



## THE BOOK

The book is a collection of articles on Ayurveda and Drug Development aspects of research in India authored by different experts in their respective fields. The book is a noble attempt to compile the research article on Ayurveda & Drug Development to identify gaps of research works in the field of Ayurveda & Drug Development in India.

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## RECENT ADVANCES IN AYURVEDA AND DRUG DEVELOPMENT

Editors: Imlikumba, Kenjum Bagra, Amal Bawri & Robindra Teron

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*Robindra Teron*



NORTH EASTERN INSTITUTE OF AYURVEDA & FOLK  
MEDICINE RESEARCH,  
PASIGHAT, ARUNACHAL PRADESH

***Imlikumba, Kenjum Bagra, Amal Bawri, Robindra Teron***

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## *Preface*

Ayurveda, originated in India more than 3,000 years ago. The term *Ayurveda* is derived from the Sanskrit words *ayur* (life) and *veda* (science or knowledge). Thus, Ayurveda translates to *knowledge of life*. Ayurveda is not only knowledge of life but a way of life. Ayurveda encourages certain lifestyle interventions i.e. Dinacharya (Daily Regimes) and Ritucharya (Seasonal Regimes) and natural therapies to regain a balance between the body, mind, spirit, and the environment. The principal objectives of Ayurveda include maintenance and promotion of health, prevention of disease and cure of sickness.

Ayurveda treatment starts with an internal purification process, followed by a special diet, herbal remedies, massage therapy, yoga, and meditation. Goals of treatment aid the person by eliminating impurities, reducing symptoms, increasing resistance to disease, reducing worry, and increasing harmony in life. Herbs and other plants, including oils and common spices, are used extensively in Ayurvedic treatment.

Research & Development in the field of Ayurveda system in different areas such as drug development including quality assurance, pre-clinical safety evaluation and clinical research are being conducted at different levels such as Ayurvedic Research Council under, Academic institutions (both Ayurveda and non Ayurvedic institutes such as Medical Colleges, Universities etc.), other Research organization such as ICMR, CSIR etc. Further, research support is also being extended through grant under EMR vide Ministry of AYUSH, DST, DBT, ICMR etc. in the area of traditional medicine.

During the last two decades number of active researchers in different branches of Ayurveda & Drug Development have been working and quite a good number of their publications have appeared in different reputed journals. The present volume is the outcome of an endeavour to highlight the works of such upcoming workers engaged in Ayurveda & Drug Development. The volume has 19 research articles focussing on different branches of Ayurveda & Drug Development. It is hope that this volume has comprehensively highlighted the Ayurveda and Drug Development research.

We gratefully acknowledge to all contributors for sharing their views for our endeavours.

Editors

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# Chapter 1

## A Review on Animal Diversity and its parts traditionally used in AYUSH system of Medicine.

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### Abstract

Nearly 15-20% of Ayurveda Materia Medica is based on animal derived substances. In Chakrasamhita the oldest available Ayurveda classic, 230 types of animals have been mentioned. There is reference of nearly 380 animal substances in the text. Susruta Samhita a text of 1500 BC mentions nearly 225 types of animals. Kashyapa Samhita mentions 257 types of animal substances in approximately 400 references. Majority of these references pertain to use of animal as food and medicines. Almost all the classical texts contain separate sections on how to understand and use animal derived substances. Many of these animal uses in Ayurvedic texts seem to be incorporated from rich folk traditions which are widespread and carried by word of mouth through generations. W.H.O. estimates that 80% of the world's population depends on plant and animal-based products for healing various ailments. Most of the people who spent their livelihood in remote areas and had no medical facility, for them animals are the cheapest way for curing various ailments. Total 49 animal species have been covered in this article. However, detailed study in terms of clinical study is yet to be carried out. Animal parts used as medicine can be a promising alternative option for treatment of various disorders. Overall, this review can serve as a baseline database for further studies.

**Keywords:** Ayurveda, Animal parts as Medicine, Zootherapy.

## **Introduction:**

Not alone in medical science but also in other traditions like Yoga one can find that animal life plays a very important part. Many of the yogic exercises have procedures similar to that of various animals and have been named accordingly as Kakasana (Crow posture), Mayurasana (peacock posture) etc. In medical traditions as well, the animal life was of great importance. From the Vedic hymns it is understood that formerly, usage of medicinal substance was based on the observation of their effects on animals like boar, mongoose, tortoise, snake etc. Nearly 15-20% of Ayurveda Materia Medica is based on animal derived substances. In Charak Samhita the oldest available Ayurveda classic, 230 types of animals have been mentioned. There is reference of nearly 380 animal substances in the text. Susrut Samhita a text of 1500 BC mentions nearly 225 types of animals. Kashyapa Samhita mentions 257 types of animal substances in approximately 400 references. Majority of these references pertain to use of animal as food and medicines. Almost all the classical texts contain separate sections on how to understand and use animal derived substances. Even though many animal derived substances are included in the pharmacopodia one finds only a few human parts or products used in therapeutics. Few among them are breast milk, urine, hair etc.

## **Methods:**

### **Ethnopharmacological data sources and collection**

Systematic literature searches relevant to the field of Ayurveda were carried out and the available information on various animals traditionally used for various disorders was collected from different bibliographical databases via electronic search (using Pubmed, SciFinder, Scopus, Scirus, Science Direct, Google Scholar and Web of Science) and a library search for articles published in peer-reviewed journals and also locally available Ayurveda books.

### **Systematization of plant names and chemical structures**

For the systematization of animal names and to check the status of animals gathered in this review, the database: The Animal list (<https://animalcorner.org>) was used. Only the accepted names and family of plants species highlighted in this database were retained to be listed in this review.

**Table 1.1. Diversity of Animal parts traditionally used in Ayurvedic system of Medicine.**

SL NO	SCIENTIFIC NAME OF ANIMAL	SANSKRIT NAME	COMMON NAME	PART USED INDICATION AND MODE OF USE	FORMULATION	REFERENCE
1	<i>Bandicota indica</i>	Ghunse	Bandicot	<ol style="list-style-type: none"> <li>1. <b>Flesh of head</b> is useful in cataract.</li> <li>2. <b>Blood:</b> cures warts and scars.</li> <li>3. <b>Heart:</b> is made into 7 pieces, one piece if taken daily for 7 days, cures epilepsy.</li> <li>4. <b>Brain:</b> is useful in cataract.</li> <li>5. <b>Excreta</b> with honey are useful in alopecia.</li> <li>6. <b>Skin:</b> fumes from skin are given in piles.</li> </ol>		<ol style="list-style-type: none"> <li>1. Mammals of the world part 1 &amp; 2 –by Ernest P. Walker.</li> <li>2. The Book on Indian Animals, Third revised edition, Page 211, 1971-by S.H. Pratar.</li> <li>3. Animal origin drugs used in Unani Medicine, Page 13,23,28- by S.B Vohra and S.Y. Khan</li> </ol>
2	<i>Pteropus giganteus</i>	Jatuka	Bat	<ol style="list-style-type: none"> <li>1. <b>Whole animal</b> is boiled in water. The decoction so obtained when mixed with sesame oil, forms a useful emulsion for application in rheumatism, sciatica, and paralysis.</li> <li>2. <b>Flesh</b> is detoxicant and anti-inflammatory. It is useful in Dropsy, Rheumatism, Paralysis and Gout. Ash is mixed with urine and given in intoxication.</li> <li>3. <b>Blood</b> is depilatory and it depresses memory growth.</li> <li>4. <b>Brain</b> is applied externally on the male organ for stimulation of sexual power.</li> <li>5. <b>Bile:</b> Local application on vagina</li> </ol>		<ol style="list-style-type: none"> <li>1. Dictionary (English and Sanskrit), Vol.III, page40- sirMonierWilliams.</li> <li>2. Sterndale's Mammalia of India, Page 27– Frank Finn.</li> <li>3. The book on Indian Animals, page 187 A – S.H. Pratar.</li> <li>4. Animal origin drugs used in Unani medicine, Page 5,11,2,27,31,34 and 36- S.B Vohra and</li> </ol>



				<p>facilitates delivery.</p> <p>6. <b>Milk:</b> of bat produces feeling of warmth. Local application to the male organ stimulates erectile power. It is incorporated in 'Surma' for promoting growth of eye lashes and curing eye disease.</p>		M.S.Y. Khan.
3	<i>Melursus ursinus</i>	Ruksha Bhalluka	Sloth Bear	<p>1. <b>Flesh:</b> It is fibrous, indigestible and of low nutritive value, but it possesses aphrodisiac properties.</p> <p>2. <b>Fat:</b> It is useful as an external application in Rheumatism, Leucoderma, Alopecia cases and as an inunction to the male organ for stimulation of erectile power. In Maha Yoni and Srasta Yoni Vyapat the fat of deer and hog and ghee boiled with sweet drugs should be plugged into vagina and bandage with flannel piece.</p> <p>3. <b>Lungs:</b> Warm ash cures shoe sores.</p> <p>4. <b>Urethra:</b> Possesses Aphrodisiac properties.</p> <p>5. <b>Bile:</b> is given with honey for the treatment of Epilepsy. Installation in eyes improves Eyesight and promotes the growth of Eye Lashes.</p> <p>6. <b>Bone and Teeth:</b> Teeth if rubbed in water and given to infants, facilitate early teething.</p>		<p>1. The Book on Indian Animals Third (Revised) Edition, Page 139, 1971-By.S. H. Prater.</p> <p>2. Mammal of the World, Part 1 &amp; by- Ernest P. Walker.</p> <p>3. Animal origin drugs used in Unani Medicine, Page 13, 21, 28, 29, 32, 40, 42- S.B. Vohora and M.S.Y. Khan.</p> <p>4. Ch.Chi.30/112, Charak Samhita (Text with English Translation), Vol .II, First Edition, 1983, by-Prof. P.V. Sharma.</p> <p>5. Charaka Samhita ke Jeevajantu, Page 19- Ramesh Bedi. Dictionary (English and Sanskrit), Vol. III,</p>

						page 41 by – Sir Monier Williams
4	<i>Lutra lutra</i>	Jalamarjjara	The Common Otter or Beaver	<ol style="list-style-type: none"> <li>1. <b>Costerium:</b> it is used in Paralysis, Epilepsy, Whooping Cough, Nervous Disorders, Weakness of the Semen and in Opium and Scorpio Poisoning.</li> <li>2. <b>Brain</b> is mixed with oil of <i>Viola odorata</i> and instilled in nostrils for relief in Hemicrania.</li> <li>3. <b>Tongue:</b> It is applied on dog bite wound and its ash for healing wounds.</li> <li>4. <b>Bones:</b> Fumigation from burnt cures hemicrania.</li> </ol>	<ol style="list-style-type: none"> <li>1. Habb-e-Jund: National Formulary of Unani Medicine part-I, I st Edition, Page 21.</li> <li>2. Habb-e-Numsik Qawi National Formulary of Unani Medicine part-I, Ist Edition, Page 25.</li> <li>3. Habb-e-Muntin Akbar: National Formulary of Unani Medicine part-I, I st Edition, Page 26.</li> </ol>	<ol style="list-style-type: none"> <li>1. Dictionary (English and Sanskrit), VOL.III, Page 32 Sir Monier Williams.</li> <li>2. Sterndale's Mammalia of India, Page 73– Frank Finn.</li> <li>3. Animal origin Drugs used in Unani Medicine, Page 15 and 24 by- S.B. Vohora and S.Y. Khan.</li> <li>4. Dravyaguna vigyana, Part-III, 2<sup>nd</sup> Edition page no 675-by prof P.V. Sharma</li> </ol>
5	<i>Antilope cervicapra</i>	Mriga	Black Buck	<ol style="list-style-type: none"> <li>1. <b>Flesh:</b> It is easily Digestible, Palatable and Tonic for the Heart, Body and Sexual function. It is useful in Jaundice, Paralysis and Nerve disorders. It cures Fever.</li> <li>2. <b>Fats:</b> Promotes Hair Growth.</li> <li>3. <b>Testicles:</b> Pessary of testicles is useful in menorrhagia.</li> <li>4. <b>Milk:</b> It is lighter than Mare's milk. It possesses Aphrodisiac properties.</li> <li>5. <b>Excreta:</b> It is good for Eye Diseases.</li> <li>6. <b>Horn:</b> Ash of Horns is Nutritive and</li> </ol>		<ol style="list-style-type: none"> <li>1. Animal origin Drugs used in Unani Medicine, Page 15 and 24 by- S.B. Vohora and S.Y. Khan.</li> <li>2. Dravyaguna Vigyana, Part-III, Page no 656-by Prof P.V. Sharma.</li> <li>3. Indian Materia Medica, Vol.2, Page 143- A.K. Nadkarni.</li> </ol>

				<p>Demulcent. It is of value in Sciatica, Gout, Lumbago, Loss of Appetite, Cough, Asthma and Disease of the Heart.</p> <p>7. <b>Skin:</b> It is Insect Repellent</p>		<p>4. Bhavaprakash Nighantu, Mansavargha, 11/55 – by K.C. Chuneekar.</p> <p>5. Materia Medica in Ayurveda based on ayurveda Saukhyan of Toderanand, Ist Publication, Page 267, 1980 – Dash and Kashyap.</p> <p>6. Charaka Samhita Ke Jeevajantu, page 19 – Ramesh Bedi</p> <p>7. Sterndale's Mammalia of India. A new and abridged edition, thoroughly revised and with an appendi on the Reptilia, Page 226 – Frank Finn.</p>
6	<i>Boselaphus tragocamelus</i>	Neela Gao	Blue bull	<p>1. <b>Flesh:</b> It is easily Digestible, Palatable, Nervine and Sexual tonic.</p> <p>2. <b>Heart:</b> is Cardio Tonic, so use in heart diseases.</p> <p>3. <b>Brain:</b> and spinal cord. It is in loss of memory and weakness of the brain.</p> <p>4. <b>Kidneys:</b> invigorate kidneys.</p> <p>5. <b>Horns:</b> Ash of horns is Styptic. It is mixed with <i>Gum tragacanth</i> and given in cases of Leucorrhoea and</p>		<p>1. Dictionary (English &amp; Sanskrit), Vol. III, page 69 – Sir Monier Williams.</p> <p>2. Animal origin drugs used in Unani Medicine, page 13,26,28,37,44 –S.B. Vohora and S.Y. Khan.</p>

				Bleeding.		<p>3. Sterndale's Mammalia of India, page 229 – Frank Finn.</p> <p>4. The Book on Indian Animals, Third (Revised) Edition, Page 7 1971– S.H. Prater</p>
7	<i>Bos bubalus</i>	Mahisha	Buffalo	<p>1. <b>Milk:</b> It is useful for the persons suffering from Sleeplessness and excessive Digestive power.</p> <p>2. <b>Ghee:</b> The Ghee prepared from buffalo milk is sweet. It cures Rakta Pitta (a disease characterized by bleeding from different parts of the body). It is heavy for digestion. It aggravates Kapha and alleviates Vayu and Pitta. It is cooling Ghee cooked with milk of buffalo, Goat, Sheep, Cow and Juice of Amlakhi, all in equal quantity should be taken to alleviate Pitta, Kapha. In discharge of vital blood Enema with milk of Cow, Sheep, Goat and Buffalo added with vitalizer (Jeevaneeya) drugs is also useful.</p> <p>3. <b>Urine:</b> It is useful in Piles, Udararoga, Colic, Kustha, Prameha, incomplete evacuation, and hardness of bowels, Oedema, Gulma and Anaemia.</p> <p>4. <b>Flesh:</b> It is use in Sleeplessness,</p>	<p>1. Prabhakara rasa (Bhaisaaryaraaina vali Jvardhikara 641: AFI, Part-I, 266.</p> <p>2. Vailappu Vatakam (Citta Vaittiyat Tirattu Page-231): SFI,Part-I, first edition page-147.</p> <p>3. Iraj Rajesvaram (Citta Vaittiya Tirattu Page-6: SFI,Part-I, first edition page-88.</p>	<p>1. Dravyaguna Vigyana, part – III, Page 656,658 – Prof. P.S.Sharma.</p> <p>2. Ch.Su 27/219 – Charaka Samhita, Text with English Translation Prof P.V.Sharma.</p> <p>3. Su.Su 45/55–Susrut Samhita, Text with English Translation P.V.Sharma.</p> <p>4. Materia Medica of Ayurveda, page 143, 157, 173 – Bhagwan Dash and Kashyap.</p> <p>5. Bhavaprakash Nighantu, Dugdha varga/ 14, Ghrita varga/ 7, Dadhi varga/ 11 – Prof K. C. Chuneekar.</p>

				<p>Emaciation, Sexual Impotency, Oligospermia, and Scanty breast milk.</p> <p>5. <b>Whole Animal:</b> If a leprosy patient sits inside the abdominal cavity of a freshly slaughtered eviscerated buffalo, he will be cured of leprosy.</p>		<p>6. Indian Meteria medica, VOL.2, page 140, 146, 181 – A.K.Nadkarni.</p> <p>7. Charaka Samhita ke Jeevajantu, page 29 – Ramesh Bedi.</p> <p>8. Ch.chi – 18/107 – Charaka Samhita, Vol. 2 – (Text with English Translator) Prof P.V.Sharma.</p> <p>9. Ch. Chi 10/ 40. Vol.2 Charaka Samhita, Text with English Translation– Prof P.V.Sharma.</p> <p>10. The Book of Indian animals, Page 247 – S.H.Prater.</p> <p>11. Sterndale's Mammalia of India animals, page 240 – Frank Finn.</p> <p>12. Mammals of the world, part 1 &amp; 2, - Ernest Walker.</p> <p>13. Animal Origin Drugs used in Unani Medicine, Page 10 – S.B.Vohora and M.S.Y.Khan</p>
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8	<i>Camelus dromodarius</i>	Ustra Karabha	Camel	<p><b>1. Milk:</b> It is useful in Oedema, Gulma (Phantom tumor), Udara Roga (Obstinate Abdominal diseases with Ascites), Piles, Worms, Kustha (Skin diseases), Poison, Dropsy, Asthma, Phthisis, General Scrofulous Conditions, Cancer, Anaemia and Jaundice. When applied as a swab on Eye-Sight. In Udara Roga-one should take Camel's Milk added with Trikatu for one month keeping on cereal diet.</p> <p><b>2. Ghee:</b> It is useful in Convulsion, Worms, and Leprosy and good in Vatika Arsa (Piles). It also alleviates Oedema, Poisons, Kustha, Gulma and Udara Roga.</p> <p><b>3. Urine:</b> It alleviates oedema, Kustha Udara, roga, Unmada, Worms, Piles, Dyspnoea and Cough.</p> <p><b>4. Dung:</b> It is used in Pinda Sweda with other drugs in Kaphaja Disorders. In Predominance of Kapha, juice of the excreta of any one of Ass, Horse, Camel, Boar, Sheep and Elephant mixed with Honey should be taken. It is used for Scrofula, Epistasis and Epilepsy.</p> <p><b>5. Flesh:</b> The description about the properties actions and uses are available only from Nighantus. Useful for Eye and Piles .It is also useful in Worm Infestation, Jaundice, Sciatica</p>	<p>1.Dravyaguna Vigyana,part – III, Page 663 – prof. P.V.Sharma</p> <p>2.Indian Materia Medica, Vol.2, page 146 – A.k. Nadkarni.</p> <p>3.Bhavaprakash Nighantu, Dugdha varga2 1K.C.Chunekar</p> <p>4.Materia Medica of Ayurveda, page 143, 160, 174 – Bhagwan Dash and Kashyap.</p> <p>5.Sterndale's Mammalia of India. A new abridged edition, through revised and with an Appendi on the Reptilia, page no 197 – Frank Finn.</p> <p>6.Charaka Samhita ke Jeevajantu, Page 18- Ramesh Bedi.</p> <p>7.Su.Su.45/48,Sushruta Samhita, Vol. 1 (with English Translation of Text and Dalhana's commentary along with critical notes)- Prof. P.V.Sharma.</p> <p>8. Su.Su.45/74,Sushruta</p>
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				<p>pain, Tuberculosis of hip joint. Urinary Tract Inflammation and Painful Micturation. Ash is used eternally in Urticaria and skin diseases. For Carination meat soup of Fox, Cat, Camel, Bull, Tortoise and Pangolin should be prepared and used with Red Shali.</p> <p><b>6. Fat:</b> The Camel hump contains huge deposits of fats. It forms a good local application for piles. Internally it is of excellent food value and Aphrodisiac.</p> <p><b>7.</b> Application of the fat of Black Serpent, Boar, Camel, Bat and fumigation is wholesome for piles.</p> <p><b>8. Lungs</b> are rubbed eternally in skin pigmentation .Warm Ash of lungs is good for treating Shoe-Sores.</p> <p><b>9. Hair:</b> Ash of hair is Styptic and Wound Healing. Pessary made of public hair with bone marrow helps maintenance of Pregnancy,</p>		<p>Samhita, Vol. 1 (with English Translation of Text and Dalhana's commentary along with critical notes) - Prov P.V.Sharma.</p> <p>9. Animal Origin Drugs used in unani Medicine, page 13, 21,28,34,35,37,40,42 and 45 – S.B.Vohora and M.S.Y.Khan.</p> <p>10.Parker &amp; Haswell Text book of Zoology, Vertebrates, 7<sup>th</sup> Edition, page 837, edited by – Marshall and Williams.</p> <p>11.Dhanwantary Nighantu, Suvarnadi Varga, 6/353.</p> <p>12.Madanpal Nighantu, Suvarnadi Varga, 6/353.</p> <p>13.Raja Nighantu, Mansa Varga, 17/29.</p>
9	<i>Fellis chaus</i>	Marjala	Cat (common jungle)			<p>1.Dictionary (English and Sanskrit), Vol.III, page 82-sir monier Williams.</p> <p>2.Sterndale'sMammalia of India, page 93 –</p>



						<p>Frank Finn.</p> <p>3. Animal origin drugs used in unani medicine, page, 11 and 42 S. B Vohora and M.S.Y.Khan.</p> <p>4. Ch.Chi 8/41 and 10/152- Charaka Samhita (text with English Translator), Vol. 2 – P.V. Sharma.</p> <p>5. Su.Su. 46/73, Sushruta Samhita, Vol. 1 – P.V.Sharma.</p> <p>6. Charaka Samhita Ke Jeevajantu, page 29 – Ramesh Bedi.</p>
10	Viverara Zibetha	Gandha Marjara	Civet Cat	<p><b>1. Secretion from scent glands:</b> The entire pouch may be cut from freshly killed animal. The more useful method of collection is to scrap the secretion from the pouch with the wooden spoon. It is used in hysteria, nervous exhaustion and oriental insense. It is also used in abdominal pain, asthma, cardiac disease and libido. It is of value in pasting, nervous exhaustion, hysteria and piles. It is good for eye sight and sensory organs. Inhalation is useful in colds and accompanied by headache. Application of civet on the male</p>	<p>1. Dhanwantara Gutika Ref : Sahastra: AFI (Vol.I) Page no - 187</p> <p>2. Cukkumti pipalyadi Gutika (Sahastra yoga Gutiprakarana.AF I (Vol.1) Page No-186.</p> <p>3. Kasturyadi Gutika (Sahastrayog Gutika- prakaran-8): AFI (Vol.1),</p>	<p>1. Sterndale's Mammalia of India, page 100 – Frank Finn.</p> <p>2. Book of Indian Animals, Page 90- S.H.Prater.</p> <p>3. Dravyaguna Vigyana, part-III, Page 676-Prof P.V.Sharma.</p> <p>4. Indian Materia Medica, Vol. 2, page 234- A.K.Nadkarni.</p> <p>5. Animal Origin drugs used in Unani Medicine, page 39-</p>

				organ before intercourse prevents pregnancy.	Page-182	S.B.Vohora and M.S.Y.Khan.
11	<i>Bos indicus</i>	Gou	Milk	<p><b>1. Milk:</b> It is most useful in Kshina (Weakness), Kshata (injury), anaemia, gastritis, emaciation, gaseous tumour, abdominal enlargement, diarrhoea, fever, burning sensation, oedema, specifically in disorders of female genital tract to maintain the quality of the semen, deficiency of urine and hardened stool. It pacifies Vata, pitta Dosha Milk is everywhere used in snuffing, pasting, bathing, emesis, non-unctuous enema, purgation and unction.</p>	<p>1. Vasanta Kusu Makara Rasa (Rasendra Sarasan -graha, Rasayana-Vajikaran adhikara ,80-83) : AFI (Part-I), Rasa Prakarana, Page-273</p> <p>2. Saubhagya Sunthi Khanda (Bhaisaj-Yarat-navali, Strirogad-hikara, 396-398): AFI, Part-I, Page 47-48</p> <p>3. Ksheera-bala Taila(Astangahrda ya, Vatarakta Chikitsa, Adhyaya, 22-44): AFI, Part-I, Page-132</p>	<p>1. Indian Materia Medica, Vol. 2, page 171-A.K.Nadkarni</p> <p>2. Science of Animals that serve mankind, page 40-Campbell &amp; Lasley</p> <p>3. Materia Medica in Ayurveda, Part-I, Page 141-Bhagwana Dash and Kashyap</p> <p>4. Bhavaprakash Nighantu, Dugdha Varga 9-10- Prof.K.C.Chunekar</p> <p>5. Dravyaguna Vigyana,Part-III,Page 663-Prof.P.V.Sharma</p> <p>6. Cow Theraphy, page 7-Shree Krishna Goushala Jeeva Raksha Kendra, Parakh bhawan, chatisgarh</p> <p>7. Animal Origin Drugs used in Unani Medicine, page 32-S.B.Vohora and M.S.Y.Khan</p>

				<p><b>2. Ghrita (Clarified Butter):</b> It is used in Unmad (Insanity), Shosha (consumption), Alaksmi (in-auspiciousness), Visa (poisoning), eye disease, indigestion, all type of fever except Nava jwara, skin diseases, piles, ulcer, burn, Vatavyadhi, giddiness, syncope, obstruction of the urine etc. It is used as a preservative and vehicle to carry the fat solvent principles of drug of both vegetable and animal origin. It is nutritive and detoxicant. Massage on head is beneficial for the brain</p> <p><b>3. Dadhi (curd):</b> It is useful in rhinitis, diarrhoea, shivering, intermittent</p>	<p>1. Amrita Ghrita (Cakradatta Amnavatchikitsa, 58): AFI (Vol.I)- Page No. 79</p> <p>2. Amrita Bhallataka LehaAstangahrday Uttarasthana, Adhyaya 39.:AFI (Vol.I)- Page No 80</p> <p>3. Panchatikta Ghrita (Bhaisajyaratnavli Kustha adhikara, 114-116) AFI, Part I, page-90.</p> <p>4. Atatotai Ney (Akattiyar Vaittiya Kaviyam-1500 stanza 344-346. SFI, Part-I, 1<sup>st</sup> Edition, Page-132.</p> <p>5. Habb-e-Bawaseer Damiya Cenkottai Ney (Citta Vaittiyat Tirattu, Page No.255): SFI, Part-I, 1<sup>st</sup> Edition, Page-130</p> <p>1. Kottam- cukkadi Taila (Sahasrayoga</p>	1. Ch. Su 27/217-218
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				<p>fever, anorexia, dysuria, emaciation, insomnia, etc. If a pregnant lady regularly takes curd prepared in silver container, she will give birth to healthy child in normal phenomena of labour. There will be no chance of abnormal labour or child in this therapy</p>	<p>Tailaprakarana, 12): AFI, Part-I Page-132.</p> <p>2. Prasarini Taila (Sarangadharasam hita, Madhyamkh anda, AFI, Part I Page-142.</p> <p>3. Adhyaya-9,119-121): AFI Part-I Page 147.</p>	<p>Charaka Samhita, Text with English Translation- Prof. P.V. Sharma.</p> <p>2. Dravyaguna Vigyana, Part-III, Page 665- Prof. P. V. Sharma.</p> <p>3. Materia Medica in Ayurveda, Part-I, Page 141- Bhagwana Dash and kashyap.</p> <p>4. Cow Therapy, Page 9 Ujjwala Gourakshana Gouvigyana Bharti, Shree Krishna Goushala Jeeva Raksha Kendra, Parakh Bhawan, Shanichari Bazar, Drug.</p> <p>5. Animal Origin Drugs used in Unani Medicine, page 32- S.B.Vohora and M.S.Y.Khan(Page No.32)</p> <p>6. Indian Materia Medica, Vol. 2, page 176-A.K.Nadkarni</p>
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				<p>4. <b>Takra, Mathita (Butter Milk)</b> It cures Sotha (Oedema), Udara Roga (obstinate abdominal diseases including ascitis), Arsa (Piles), Mutra graham (anuria), Gulma (Phantom tumour), Sneha Vyapad (hyperlipidaemia), Visha (Poison) and complications because of wrong administration of ghee. Butter milk is efficacious in Grahani disorder due to appetizing nature, astringency and lightness. Because of sweet Vipaka, it does not vitiate Pitta, is wholesome in Kapha due to astringent, hot and rough properties and in Vata due to sweet, sour and viscous nature (thus it is useful in all the three Dosas). Butter milk, if fresh, does not produce burning (o acidity). Hence, the uses of buttermilk prescribed earlier in abdominal disorders and piles are all applicable in Grahani disorder and should be applied in all ways.</p> <p>5. <b>Navaneeta (Butter):</b> Kshaya (Wasting) cough, wound, consumption (Sosha), piles, facial Paralysis, eye diseases, Rakta-Pitta, internal haemorrhage, burn, burning sensation all over the body. Syncope, Vataroga, general debility, scanty</p>	<p>1. Takravati (Bhaisajyaratnav ali Sotharoga Chikitsa Prakarana)</p> <p>2. <i>Takra Arista</i></p> <p>3. <i>Grahani Mihira Taila</i> (Bhaisajya rat-navali, Grahani, rogaadhikara 154-157): AFI, Part-I, Page-133</p> <p>4. Pirantai Vatakam (Teraiya-e-Kappiyam Page No. 20-21): SFI Part-I, First Edition- Page No 146</p>	<p>1. Dravyaguna Vigyana , Part- III, Page 666- Prof.P.V.Sharma</p> <p>2. Ch. Su 27/ 229-230- Charaka Samhita, Vol.1 (Text with English Translation)- Prof. P.V. Sharma.</p> <p>3. Bhavaprakasha Nighantu, Page 771- K.C Chuneekar.</p> <p>4. Materia Medica in Ayurveda, Part-I, Page 164-Bhagwana Dash and kashyap</p> <p>5. Ch.Chi 27/229-230- Charaka Samhita , Vol.1(Text with English Translation)- Prof. P.V. Sharma</p> <p>1. Dravyaguna Vigyana, Part-III, Page 668-Prof. P.V.Sharma.</p> <p>2. .Bhavaprakasha Nighantu, Dugdha Varga-K.C</p>
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				<p>urination, etc. The butter extracted from milk is excessively cold, brings softness, is wholesome for eyes, checks and alleviates intrinsic blood, Pitta and vision.</p> <p>6. <b>Mutra (Urine):</b> It is used in Gulma (Phantum tumor), Udararoga (obstinate-abdominal diseases including ascitis), hardening of the bowel, flatulence and for the purpose of purgation therapy and Asthapana therapy. Simply cow's urine with milk diet is too much useful in Swayathu. Enema of the decoction of Dasamoola, Triphala, Bilwa and Madanphala prepared in cow's urine and added with the paste of Kutaja, Madanphala, Musta and Patha along with rock salt, Yavakshara, honey and oil should be administered in disorders of Kapha, bulging of urinary bladder, retentions of flatus and semen, anaemia, indigestion, Visuchika and Alasaka. Paste made of power of Kakodumbara, Backuchi and Chitraka with Cow's urine is effective for leucoderma. Internally it is highly recommended for Cirrhosis of the liver in doses of one to two ounces. Enlargement of abdominal</p>		<p>Chunekar.</p> <p>3. Materia Medica in Ayurveda, Page 171- -Bhagwana Dash and kashyap</p> <p>1. Bhavaprakasha Nighantu, Page 778- K.C Chunekar.</p> <p>2. Materia Medica in Ayurveda, Page 171- -Bhagwana D 4. Dravyaguna Vigyana, Part-III, Page 671- Prof.P.V.Sharma.</p> <p>3. Indian Materia Medica Vol.2, Page 232- A.K.Nadkarni.</p>
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				<p>Viscera, painful Dyspepsia Ascitis, Anasarca, Jaundice, Leprosy, choronic prunigo and other obstinate skin diseases.</p> <p><b>According to method of preparation:</b> Pericap of Haritaki is boiled in Go mutra. Thereafter boil in Gomutra and then boiled Haritaki is soaked in each of the Kwatha successively and dried under the air tight container.</p> <p><b>7. Gomaya (Cow Dung):</b> Madhuka, Pippali moola, jaggery and juice of cow dung and horse dung mixed with ghee and honey is efficacious for cough, dyspnoea, hiccup and sliminess in channels. Ghee cooked with equal quantity of cow's dung juice, sour curd, milk and urine should be administered. It alleviates epilepsy, jaundice and fever. Application of Matulunga moola churna 1 part, Manashila-1 part with cowdung and ghee cures acne vulgaris, discoloration and black spot on the skin.</p>		
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				<p><b>8. Gorachana (Serpent stone, gall stone):</b> It is specially indicated in measles to reduce excessive heat in the body; also in whooping cough and watery stools and choleric symptoms. It is used in convulsions, hysteria, spasmodic diseases, melancholia and intestinal disorders with deficient secretion of bile, in jaundice, etc. and in abortion. It is given to infants for stopping green stools and (in a small doses) as a laxative. Some believe that these stones possess tonic and fattening properties also.</p> <ul style="list-style-type: none"> <li>• In Leucoderma one should use the paste of seeds of Bakuchi, lac, cow bile, two types of Anjana, Pippali and Lauha Bhasma.</li> <li>• Apamarga, hingu, haritala and Hingupatrika in equal quantity. Maricha in half quantity, Maricha in half quantity are powdered with bile of cow (Gorochana) and jackal and made into stick. This stick is applied to eyes in epilepsy, insanity caused by evil spirits and gods and in eye diseases.</li> <li>• In Acharana Yonivyapat, a</li> </ul>	<ol style="list-style-type: none"> <li>1. Gorochanadi vati (Vaidya yoga ratnavali Guticaprakarana 77): AFI, Part-1 Page-184-185</li> <li>2. Balarka Rasa (Sidhayoga sangraha, Bala Rogadhikara: AFI Part-II, Page 265</li> <li>3. Kasturi Mattirai (Teraiyar patal Tirattu, Page No. 38): SFI, Part-I, 1<sup>st</sup> Edition, Page-89.</li> <li>4. KorocanaMattirai (AkattiyarVaithiyairatnaccurukkam, Page No. 18, Stanza 55-57): SFI, Part-I, 1<sup>st</sup> Edition, Page 90.</li> </ol>	<ol style="list-style-type: none"> <li>1. Indian Materia Medica Vol.2, Page 161- A.K.Nadkarni.</li> <li>2. Dravyaguna Vigyana,Part-III,Page 689- Prof.P.V.Sharma</li> <li>3. Su.Uttara Tantra-19 Susrut Samhita ,Text with English Translation</li> <li>4. Ch. Chi. 7/171, Charaka Samhita, Text with English Translation.</li> <li>5. Ch.Chi 26/36- Charaka Samhita, Vol.2 (Text with English Translation)- By Prof. P.V. Sharma.</li> <li>6. The Animal origin Drugs used in Unani Medicine, Page 48- By S.B.Vohora &amp; S.Y.Khan</li> </ol>
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				<p>flaxen piece impregnated 21 times with bile of cow should be put into vagina.</p> <p>Dose 5-10 grain</p>		
12	<i>Hippopotamus amphibius</i>			<p>1. <b>Skin:</b> Ash of the skin is useful in wounds and tumours. Drinking of water from a leather pot is said to be good for heart palpitations</p>		<p>1. Dictionary (English and Sanskrit). VOL.XIII, Page 344- Sir M Monier William.</p> <p>2. Grzimek's Animal lifeEncyclopaedia-13, Mammals-4.</p> <p>3. Animal Origin Drugs used in Unani Medicine, page 45- S.B.Vohora &amp; M.S.Y.Khan</p>
13	<i>Equus caballus</i>	Vaji	Horse	<p>1. <b>Milk:</b> Diseases in the extremities due to vata dosha.</p> <p>2. <b>Horse milk ghee:</b> It is refreshing, appetizing, diuretic, urinary antiseptic, emmenagogue, anti-rheumatic and aphrodisiac. It improves eye sight and prevents pox, curd is also appetizing and beneficial for eye sight.</p> <p>3. <b>Urine:</b> Externally it is useful in ringworm and internally as a stomachic, anthelmintic and purgative agent.</p> <p>4. <b>Flesh:</b> It is nourishing promoter of strength as well as eye sight, sweet</p>		<p>1. Sterdale's Mammalia of India. A new and a bridged edition, thoroughly revised with an appendix on the Reptilia page 183- Frank Finn.</p> <p>2. The Book on Indian Animals, Third (Revised) edition, page 226, 1971-S.H.Prater.</p> <p>3. Charaka Samhita Ke Jeevajantu, page 17- Ramesh Bedi.</p>

				<p>and light. It stimulates the power of digestion.</p> <p>5. <b>Bile:</b> Around head and associated areas, to destroy the effect of poison/bile is used with other ayurvedic herbs.</p> <p>6. <b>Dung:</b> Horse's dung is heated and applied to the piles' mats.</p> <p>7. <b>Blood:</b> It is applied on boils.</p>		<p>4. Indian Materia Medica Vol. 2, page 160 A.K. Nadkarni.</p> <p>5. Ch.Chi. 3/71, Ch. Chi. 14/41 &amp; Ch. Chi 8/154- Charaka Samhita Vol. 2 (Text with English Translation)- Prof. P.V. Sharma.</p> <p>6. Su. Su. 45/47. Susruta samhita, vol. 1 (With English Translation of Text and Dalhana's commentary alongwith critical Notes)-prof. P.V.Sharma.</p> <p>7. Animal Origin Drugs used in Unani Medicine, page 1, 22, 34, 35, 40-by S.B.Vohora &amp; M.S.Y.Khan.</p> <p>8. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Toderanand, page 143, 160, 174--Dash and Kashyap.</p>
14	<i>Homo Sapiens</i>	Manushya, Manav	Human being	<p>1. <b>Milk:</b> Rakta Pitta, Akshatarpana. In case of infant, breast feeding is superior to artificial feeding.</p>	<p>1. Cukkumtippalyadi Gutika (Sahasrayoga,</p>	<p>1. Ch.Sha. 8/54 Charaka Samhita, Text with English Translation</p>

				<p>2. <b>Curd:</b> Vipaka, promoter of strength, refreshing and heavy. It is an excellent promoter of eye sight.</p> <p>3. <b>Ghee:</b> Excellent promoter of eye sight. It promotes the physique and the power of digestion. It is light for digestion and it cures Visha (poisoning). Purified cleaned, cures Gara (Poisoning). It is rejuvenating. It alleviates vitiation of blood and Pama (itching)</p>	<p>Gutikapra Karana 2): AFI, part-I, page-186</p> <p>2. Perata parpam (Pulippani Vaittiyam, stanza No. 346-347): SFI, part-1, 1<sup>st</sup> Edition, page 28.</p>	<p>2. Su.Ni,10/24 Susrut Samhita, Text with English Translation</p> <p>3. Su.Su 45/57. Susrut Samhita, Text with English Translation</p> <p>4. Bhavaprakash, Purva Khanda, Balaprakarana 4/23.</p> <p>5. Ayurvediya prasuti Tantra Evan stree roga, part-I, 2<sup>nd</sup> Edition, 1996-prof.P.V. Tiwari.</p> <p>6. Indian Materia Medica vol. 2, Reprint of Third revised and enlarge edition page 173, 1976-A.K. Nadkarni.</p> <p>7. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Toderanand, page 144, 160, 175--Dash and Kashyap.</p> <p>8. Grzimek's Animal Life Encyclopaedia, Vol. II, Mammals-II.</p> <p>9. Essential Pediatrics- O.P. Ghai</p> <p>10. Nutrition and Child Health Perspectives for the</p>
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						1980, Page 109, 147- Editors Reginald C.Tsang, Buford Lee Nichols, jr. Williams obstetrics, Eighteenth Edition- Cunningham, mac Donald.
15	<i>Hyaena</i> <i>Hyena</i>	Tarkshu	Striped Hyaena	<p>1. <b>Fat:</b> It is applied on wounds. In Rheumatism, fat of Hyena is applied on diseased organs.</p> <p>2. <b>Flesh:</b> Flesh improves complexion and prevents phlegmatic and bilious humours. It is indicated in palpitation of the heart. Both in the decoction of flesh alleviate rheumatic pains.</p> <p>3. <b>Blood:</b> Blood is claimed to cure mental disorders.</p> <p>4. <b>Bile:</b> Bile is good for eye diseases.</p> <p>5. <b>Bone:</b> Bone marrow and teeth is rubbed in olive oil for the treatment of gout. Teeth are rubbed in water and gives in case of rabid dog bite.</p> <p>6. <b>Skin:</b> Water given In bucket made of Hyena's skin to patients of hydrophobia is not resented.</p>		<p>1. Animal Origin Drugs used in Unani Medicine, page-13,23,31,42, 45- by S.B.Vohora &amp; M.S.Y.Khan</p> <p>2. Charaka Samhita Ke Jeevajantu, page 26- Ramesh Bedi.</p> <p>3. Ch.Su 27/35-Charaka Samhita, VOL. 1 (Text with English Translation) -Prof. P.V. Sharma.</p> <p>4. Ch.Chi 3/ 1920- Charaka Samhita, Vol. 1 (Text with English Translation)-Prof. P.V. Sharma.</p> <p>5. Ch. Chi 5/ 110 Charaka Samhita, Vol. 1 (Text with English Translation) - Prof. P.V. Sharma.</p> <p>6. Dictionary (English</p>

						and Sanskrit). Vol .XIII, Page 356- Sir Monier William.
16	<i>Gazella</i> <i>Gazzella</i>	kalapuchhaka	Indian gazelle  Chinkara	1. <b>Flesh</b> It is good for paralysis, colic, phlegm and biliousness.		2. Ch. Su 27/46- Charaka Samhita, Vol. 1 (Text with English Translation) - Prof. P.V. Sharma. 3. Sterdale Mammalian of India. A new and an abridged edition, thoroughly revised with an appendix on the Reptilia page 221-Frank Finn.
17	<i>Hystrix</i> <i>Indica</i>	Shalaka	Indian Porcupine	1. <b>Meat Soup:</b> act as carminative and digestive. It is used in cough, breathlessness, in retention of stool and flatus. 2. <b>Fat</b> used as local application to cure skin pigmentation. 3. <b>Bile:</b> Oral indigestion or administration in the form of a pessary made with wax facilitates expulsion of dead foetus.		1. Charaka Samhita Ke Jeevajantu, page 33- Ramesh Bedi. 2. Ch.Chi 9/ 74- (Charaka Samhita, Vol.2) Text with English Translation- By Prof. P.V. Sharma. 3. Animal Origin Drugs used in Unani Medicine, page 11 S.B.Vohora & M.S.Y.Khan. 4. Ch.Chi 10/51 and Ch.Chi. 8/150- (Charaka Samhita,

						Vol.2) Text with English Translation- By Prof. P.V. Sharma.
18	<i>Canis Aureus</i>	Shrugala	Jackle	<p>1. <b>Flesh:</b> It is prescribed in melancholia. The patients who are drying up and emaciated in Rajyakshma (tuberculosis) should be given the meat of jackal, fox, large mongoose and cats in the name of rabbit</p> <p>2. <b>Milk:</b> If instilled in eyes, cures cataract.</p> <p>3. <b>Urine:</b> Urine of jackle is very efficacious as snuff in case of Apasmara(epilepsy)</p> <p>4. <b>Excreta:</b> It is useful in skin diseases.</p> <p>5. <b>Bile:</b> It is instilled in eyes for the treatment of cataract.</p>		<p>1. The Book of India Animals, third (revised), Edition page 126, 1971-S.H.Prater.</p> <p>2. Charaka Samhita Ke Jeevajantu, page 34- Ramesh Bedi.</p> <p>3. Ch.Chi 8/ 152- (Charaka Samhita, Vol. 2) Text with English Translation- By Prof. P.V. Sharma.</p> <p>4. Ch. Chi 8/ 152- (Charaka Samhita, Vol. 2) Text with English Translation- By Prof. P.V. Sharma.</p> <p>5. Dictionary (English and Sanskrit). Vol. XIII, Page 344-Sir Monier William.</p> <p>6. Animal Origin Drugs used in Unani Medicine, page-12, 31, 34, 37- by S.B.Vohora &amp; M.S.Y.Khan.</p>

19	<i>Panthera Pardus</i>	Chitra Vyaghra	Leopard	<p>1. <b>Flesh:</b> Flesh along with fat is cooked with water and olive oil to form a useful application for rheumatism, gout and paralysis.</p> <p>2. <b>Blood:</b> is use food skin pigmentation.</p> <p>3. <b>Brain:</b> is cooked with certain herbs and the fluid exuded from. It is instilled in the male organ for stimulation of erectile power.</p>		<p>1. Dictionary (English and Sanskrit). Vol. XIII, page 448-Sir Monier William.</p> <p>2. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 96-Frank Finn.</p> <p>3. Animal Origin Drugs used in Unani Medicine, page-13, 23, 28- by S. B. Vohora &amp; M. S. Y. Khan.</p> <p>4.</p>
20	<i>Panthera Pardus</i>	Chitra Vyaghra	Leopard	<p>1. <b>Flesh:</b> Flesh along with fat is cooked with water and olive oil to form a useful application for rheumatism, gout and paralysis</p> <p>2. <b>Blood:</b> It is use for skin pigmentation.</p> <p>3. <b>Brain:</b> is cooked with certain herbs and the fluid exuded from, it is instilled in the male organ for stimulation of erectile power.</p>		<p>1. Dictionary (English and Sanskrit). VOL.XIII, page 448-Sir Monier William.</p> <p>2. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 96-Frank Finn.</p> <p>3. Animal Origin Drugs used in Unani Medicine Page-13,23,28- by</p>

						S.B.Vohora & M.S.Y.Khan.
21	<i>Felis Leo</i>	Singha ,kesari	Lion	<ol style="list-style-type: none"> <li>1. <b>Flesh:</b> Paralysis, arthritis, piles. If one sits on the flesh of lion he will not suffer from piles and arthritis.</li> <li>2. <b>Fat:</b> Skin diseases, cold, arthritis, rheumatism and stiffening of joints. It is also used as an injunction to the male organ for the generation of stimulation of sexual power. It is incorporated in ointment and for paralysis. When its fat is rubbed on hands and feet it prevents effect of cold. When it is rubbed on face and body then it prevents patches on face and all kinds of skin diseases are prevented. Its rubbing prevents attack of lice.</li> <li>3. <b>Bile:</b> It is useful in impotency, neck, nodules, jaundice, eye diseases and high fever. In case of impotency, with the start of the month, Lion's bile is mixed with egg and given. Bile when mixed with honey is applied on neck nodules, they disappear. In jaundice, bile is taken along with Pudina leaves. Bile is used as anjana. It is also useful in high fever and cerebritis</li> <li>4. <b>Brain:</b> Brain mixed with oil is applied on tumours. Its massage is also useful in tremoring.</li> <li>5. <b>Excreta:</b> Lion's excreta is dried and</li> </ol>		<ol style="list-style-type: none"> <li>1. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 75- Frank Finn.</li> <li>2. The Book on Indian Animals, Third (Revised) edition, page 66 and 67, 1980- S.H.Prater.</li> <li>3. Charaka Samhita Ke Jeevajantu, page 35- Ramesh Bedi.</li> <li>4. Cha.Chi-8/153, 10/41,3/306 Charaka Samhita ,Text with English Translation</li> <li>5. Animal Origin Drugs used in Unani Medicine, page-20,31, 44- by S.B.Vohora &amp; M.S.Y.Khan.</li> </ol>



				<p>mixed with scented oil before taking bath it is applied on skin and help cures skin diseases. If alcoholic person is given drink mixed with excreta powder of lion he will abstain from alcohol.</p> <p>6. <b>Hair:</b> Epilepsy. Fumigation of hair is recommended in semi tertian fever. Flesh alongwith hair if worn cures epilepsy. Lion's ayal.s hair and moustaches hair's Tabeez is worn for success.</p> <p>7. <b>Testis:</b> Piles, pain in uterus, dysentery, diarrhea, abdominal disorders.</p> <p>8. <b>Urine:</b> It cures asthma and tuberculosis</p> <p>9. <b>Teeth:</b> If its teeth are worn it cures toothache.</p> <p>10. <b>Milk:</b> Milk mixed with rose water added to eyes cure blindness.</p>		
22	<i>Herpestes Auropunctatus</i>	Nakula	Mongoose	<p>1. <b>Flesh:</b> Flesh of iguana, mongoose, cat, rat and porcupine-400gm. Along with Laghupanchamula should be cooked in milk and added with the paste of pippali and Madhanapala, rock salt, Sauvarchala, sugar, honey. Ghee and oil. This enema is tonic, Rasayana, healing for that wounded in chest and wasted and is beneficial for those having their chest agitated, broken by journey on chariots,</p>		<p>1. The Book on Indian Animals, Third (Revised) edition, page 102, 112-S.H.Prater.</p> <p>2. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 112-</p>

				<p>elephants and horse, Vatabalasaka etc, having reverse movement of vayu and retention of urine, faeces and semen. It is also used in epilepsy, dropsy gout, scrofula, liver and kidney diseases, sexual debility and bites of poisonous insects. The patients who are drying up and emaciated should be given well prepared meat of fox, large mongoose, cats and jackal-cubs in the name of rabbit.</p> <p>2. <b>Blood:</b> Blood is boiled with olive oil and filtered; the filtrate so obtained is used in pains and piles.</p> <p>3. <b>Leg Bone:</b> It is tied on the thigh of parturient women to facilitate delivery.</p> <p>4. <b>Faeces and Beak:</b> In case of epilepsy. The physician should fumigate with beak and faeces of mongoose.</p>		<p>Frank Finn.</p> <p>3. Animal Origin Drugs used in Unani Medicine, page-13, 23, 42- by S.B.Vohora and M.S.Y.Khan.</p> <p>4. Ch. Chi.10/51 Charaka Samhita, Text with English Translation.</p> <p>5. Charaka Samhita Ke Jeevajantu, page 6- Ramesh Bedi.</p>
23	<i>Macacus Rhesus</i>	Banar	Monkey	<p>1. <b>Flesh:</b> It is useful for anaemia, phthisis, cough, eye diseases, and piles and healing of wounds.</p> <p>2. <b>Blood:</b> It is depilatory.</p> <p>3. <b>Gall Bladder Stones:</b> It is used for detoxicant, tonic, aphrodisiac, mood devating and anti-inflammatory properties. These are indicated in cholera, inflammations and biles and stings of poisonous insects.</p>		<p>1. Indian Materia Medica vol. 2, page 191-A.K. Nadkarni.</p> <p>2. Animal Origin Drugs used in Unani Medicine, page-11, and 22- by S.B.Vohora and M.S.Y.Khan.</p> <p>3. Charaka Samhita Ke Jeevajantu, page 32-</p>

						<p>Ramesh Bedi.</p> <p>4. The Book on Indian Animals, Third (Revised) edition, page 23, 1971-S.H.Prater.</p> <p>5. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 16-Frank Finn.</p>
24	<i>Equus mulus</i>	Khesara, Atibharagah	Mule	<p>1. <b>Flesh:</b> Flesh is recommended for Rheumatic patients.</p> <p>2. <b>Fat:</b> It is good for Sciatica and gout. Fumes are abortifacient and insects repellent.</p> <p>3. <b>Heart:</b> If taken for three days after menstruation, acts as an anti-fertility agent.</p> <p>4. <b>Urine:</b> It is abortifacient.</p> <p>5. <b>Hoof:</b> Rubbed in oil forms a useful application for alopecia.</p>		<p>1. Grzimek's Animal life Encyclopaedia No 13, Mammals.</p> <p>2. Dictionary (English and Sanskrit, page 520-by Sir Monier William.</p> <p>3. Animal Origin Drugs used in Unani Medicine, page-12, 20, 26, 35, 44- by S. B. Vohora and M. S. Y. Khan.</p>
25	<i>Moschus Moschiferus</i>	Kasturi Mriga	Musk Deer	<p>1. <b>Musk:</b> It is used in hysteria, hiccup, asthma, palpitation &amp; other cardiac diseases, insanity, epilepsy and coma, loss of memory, paralysis, facial paralysis, numbness, colicky pain, Parkinson's disease, bronchitis disease,</p>	<p>1. Nagavallabha Rasa (Yogaratanakara, Kasa Chikitsa page No. 358-359): AFI (Vol.I),</p>	<p>1. Indian Materia Medica. vol. 2, page 196-A.K. Nadkarni.</p> <p>2. Dravyaguna part-III, page 667, by-prof P.V.Sharma</p>

				<p>pleurisy, typhoid, plague, meningitis, hydrophobia, lock jaw, general debility, Rakta Pitta( bleeding from any part of the body), whooping cough, gonorrhea, spermotorrhoea, melancholia, eye diseases and sexual debility.</p> <p><b>Preparation of the tincture:</b> The whole mask bag is dissolved in diluted alcohol in the proportion of 1 to 20. Dilute alcohol, in the proportion of 20 to 80, is used in making the 1x and 2x dilutions.</p>	<p>Page-265.</p> <p>2. Brihat Kasturi Bhairava Rasa (Jvaradhikara; 723: AFI Vol.I), Page-265.</p> <p>3. Vata Kulantaka Rasa Bhaisajya Ratnavali, Apasmara Adhikara 40-41: AFI (Vol.I), Page-274.</p> <p>4. Kasturyadi Gutika Sahasra yoga gutika prakarna; 8: AFI (Vol.I), Page-182.</p> <p>5. Kasturi Modaka: Bhaisaiya Ratnavali, 86/54-60.</p> <p>6. Kasturi Mattirai (Teraiya patal Triattu, page No.38): SFI, Part-I, 1<sup>st</sup> Edition, Page No.89.</p> <p>7. Kasturi Karuppu (Citta Vaitiyat Tirattu, page No.164): SFI,</p>	<p>3. Bhavaprakasha Nighantu, karpuradi Varga/178- Prof K.C Chuneekar.</p> <p>4. Animal Origin Drugs used in Unani Medicine, page 38- S.B.Vohora and M.S.Y.Khan.</p> <p>5. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 244- Frank Finn.</p> <p>6. The Book on Indian Animals, Third (Revised) edition, page 295, 1980- S.H.Prater.</p>
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					Part-I, 1 <sup>st</sup> Edition, Page No.48. 8. Habba Ambar: National Formulary of Unani Medicine, part-I, 1 <sup>st</sup> Edition, Page No. 9-10. 9. Habbe Ambar Momyaee: National Formulary of Unani Medicine, part-I, 1 <sup>st</sup> Edition, Page No. 9-10.	
26	<i>Suncus murinus</i>	Gandha Musika	Musk Rat	1. <b>Flesh:</b> It is poisonous and unfit for ingestion with rose oil it forms a useful application for scrofula and leucoderma.		1. Dictionary (English and Sanskrit). Vol. XIII, page 522- Sir Monier William. 2. Sterdale's Mammalia of India, page 44- by Frank Inn. 3. Animal Origin Drugs used in Unani Medicine-by S.B. Vohora and M.S.Y. Khan 4. Ch.Chi 9/74-Charaka Samhita , Vol. 2 (Text with English Translation)- By Prof. P.V. Sharma

27	<i>Fel Bovis</i>	Brushabha	Ox	<p>1. <b>Fat:</b> It is applied on piles and scrofula.</p> <p>2. <b>Penis and Testicles:</b> Soup of testicles and male organ of ox is taken for increasing sexual vigour. The Penis is incorporated into the Unani aphrodisiac preparation, called Laboob-e-Kabeer''. In case of retention of the placenta, Maharshi Charaka has described that cutting the right ear of the living untamed bull and pounding it on grinding stone should be kept for an hour in one of the decoctions of balwaja etc the liquid portion of this should be administered to the patient. Maharshi Charaka has described that milk boiled with flesh of one of the animals from tortoise etc and added with the juice of the testicles of bull, elephant and horses, crocodile, swan and cock, honey, ghee, sugar, rock salt and the paste of seeds of Ikshuraka and Kapikachhu should be use as enema. This provides strength even to the old.</p> <p>3. <b>Bile:</b> It is laxative, tonic and stomachic</p> <p>4. <b>Excreta:</b> It is styitic and healing for burns and wounds.Heated plaster of fresh dung causes relief of pain resulting from falls or wounds. Fumigation of excrement of boar and bull, parched grain flour and ghee is</p>	<p>1. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia Page 112- Frank Finn.</p> <p>2. Dictionary (English and Sanskrit). Vol .XIII, page 565-Sir m.Monier William</p> <p>3. Dravyaguna part II &amp;III, page 689, by-prof P.V.Sharma.</p> <p>4. Charaka Samhita Ke Jeevajantu, page 32- Ramesh Bedi.</p> <p>5. Ch.Chi 14/51 and 12/17- (Charaka Samhita (Text with English Translation), Vol. II, First Edition, 1983, by- Prof. P.V. Sharma.</p> <p>6. Indian Materia Medica. vol. 2, page 144, 146, 161-A.K. Nadkarni.</p> <p>7. The Book on Indian Animals, Third (Revised) edition, page 102, 112-S.H.</p>
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				<p>useful in piles</p> <p>5. <b>Gorochana (Oxgall):</b> It is used singly or in combination with other drugs for the treatment of infantile pneumonia, epilepsy, jaundice and fevers. Some believe that these stones possess tonic and fattening properties also.</p>		Prater.
28	<i>Manis crassicaudata</i>	BhajraKapta	Pangolins	<p>1. <b>Flesh:</b> its flesh is tonic and produces warmth in the body.</p> <p>2. <b>Scales:</b> Powder of scales is useful in epilepsy.</p>		<p>1. Sterdale's Mammalia of India. A new and an abridged edition, thoroughly revised with an appendix on the Reptilia page 261-Frank Finn.</p> <p>2. Animal Origin Drugs used in Unani Medicine, page19, 46 S.B. Vohora and M.S.Y. Khan</p>
29	<i>Acinonyx jubatus</i>	Tarakshu Chitraka	Cheetah or Panther	<p>1. <b>Fats:</b> stimulates erectile power</p> <p>2. <b>Urine:</b> It repels rats.</p> <p>3. <b>Flesh:</b> It is hot and dry in nature.</p>		<p>1. Dictionary (English and Sanskrit). Vol. XIII, page 569-Sir Monier William.</p> <p>2. Sterdale's Mammalia of India, page 82-Frank Finn.</p> <p>3. Animal Origin Drugs used in Unani Medicine- S.B. Vohora and M.S.Y. Khan.</p>

						4. Charaka Samhita Ke Jeevajantu, page 33- Ramesh Bedi.
30	<i>Oryctologus Cuniculus</i>	Sasa, sasaka	Rabbit	<p>1. <b>Blood:</b> In case of Haemorrhage, Amenorrhoea (Primary, secondary), Krimija Siroroga. It is prescribed for the treatment of asthma and bronchitis. It promotes hair growth on external application.</p> <p>2. <b>Flesh:</b> It is beneficial in fever, jaundice, diarrhea with fever, phthisis, cough and files. It is also used in imaciation</p>		<p>1. Bhavaprakash Nighantu Mansavarga Sloka No. 50-51.</p> <p>2. Materia Medica in Ayurveda, part- I,- Bhagwan Dash and Lalitesh Kashyap.</p> <p>3. A Text Book of Zoology, Dr. Sanpati, Dr. Radharaman Nanda, Shri Krishna Kinkar Ghosh- 4<sup>th</sup> edition.</p> <p>4. Indian Materia Medica, Vol.2, A.K.Nadkarni.</p> <p>5. Dravyaguna Vigyana by prof. P.V.Sharma, Part-III.</p> <p>6. Animal Origin Drugs used in Unani Medicine BY S.B.Vohora and M.S.Y.Khan</p>
31	<i>Mus Rattus</i>	Mushika	Mouse	1. <b>Flesh:</b> Flesh is used in piles, parasitic infection and Dsivisha (artificial poisoning). The fat is used in prolapsed of the rectum, uterine and vaginal prolapsed and Rakta Pradara	1. Musikadya Taila (Bhaisajya ratnavali, Ksudra rogadhikara, Sloka 37) : AFI,	<p>1. Materia Medica in Ayurveda, page 280,- Bhagwan Dash and Kashyapa</p> <p>2. Sterdale's Mammalia</p>



				<p>(excessive uterine bleeding). Flesh of freshly killed rat is applied on scrofula and snake bite wound. Internally it is demulcent, cardiac stimulant and of value in urinary obstruction and piles. It is said to be bad for memory. Flesh of albino rat increase semen. Wild rat's (Hedge hog) flesh is recommended in cough, respiratory diseases and blood diseases.</p> <p>2. <b>Excreta:</b> Its ash in conjunction with vinegar and honey in used for the treatment of alopecia, eye diseases and for promotion of the growth of eye lashes. In case of mad dog bite, the traditional healers of Bagbahera(Chhattisgarh) give patients the mixture containing Bhavri insect and rat excreta with Gud(jaggery).In case of bee bite, they advise to rub the dried powder(not fresh excreta) of excreta on the affected part. In order to prevent the unwanted hair growth, the traditional healers of Bhimkhoj recommend his patients to rub the fresh excreta with common herb Bhawchi leaves (Psorolea corylifolia) on the affected part upto one week.As birth control measure, the traditional healers advise the women to put the rat excreta mixed with honey and the fresh leaf juice of Muccuna leaves</p>	Part-II, Page -153	<p>of India, page 154- Frank Finn</p> <p>3. Animal Origin Drugs used in Unani Medicine page 12, 26, 36 by S.B. Vohora and M.S.Y. Khan</p> <p>4. Reasearch note on traditional medicinal knowledge about excreta of different animals used to treat many common diseases in Chattisgarh, India ( Pankaj Oudha)</p>
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				<p>inside the Vagina. In case of bleeding of pile, the rat excreta (dried) is recommended with the fresh juice of Blumea lacera leaves externally. The patients are advised to put this mixture inside the anus for quick and permanent relief. In order to remove the gas from stomach, the traditional healers advise the patients to apply the aqueous paste of Saunf, asafetida and rat excreta externally.</p> <p>3. <b>Liver:</b> It is recommended for the treatment of epilepsy.</p>		
32	<i>Mellivora Indica</i>	Kurara	Ratel or Honey badgar	<p>1. <b>Flesh:</b> of such animal is used which does not feed on dead bodies. It is good for gastric disorders, cough, cold, asthma and increases semen volume and quality. It is bad for rheumatic patients.</p> <p>2. <b>Skin:</b> Sitting on and wrapping with its skin prevents cold, trembling and rheumatic pains.</p>		<p>1. Sterdale's Mammalia of India, page 66- Frank Finn.</p> <p>2. Animal Origin Drugs used in Unani Medicine, page 11 and 44 by S.B. Vohora and M.S.Y. Khan.</p>
33	<i>Cervus elaphus</i>	Harina	Red Deer or Khasmir stag	<p>1. <b>Flesh:</b> It is useful for the patients of Sannipata having preponderance of Pitta, Vata in moderate degree and Kapha in the lowest one.</p>		<p>1. Charaka Samhita Ke Jeevajantu, page 36- Ramesh Bedi.</p> <p>2. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Toderananda, page 267- by Dash &amp; Kashyap.</p>

						<p>3. Grzimek's Animals life Encyclopaedia, VOL-II, Page 175 Mammals-II</p> <p>4. Su.Su.46/-56-57 Sushruta Samhita, VOL.1 with English Translation of Text and Dalhana's Commentary along with critical notes- Prof. P.V.Sharma.</p> <p>5. Su.Su. 27/60- (Charaka Samhita (Text with English Translation), VOL.II, First Edition, 1983, by- Prof. P.V. Sharma.</p>
34	<i>Rhinoceros unicorni</i>	Ekashringa Ganda Khadga	The great Indian one horned Rhinoceros	<p>1. <b>Flesh:</b> It is difficult to digest but nutritious. It is anti-emetic, astringent, cardio-tonic and good for epistaxis. The physician should give the well spiced meat of rhinoceros, elephant and horse in the name of buffalo for increasing flesh.</p> <p>2. <b>Fats:</b> Along with sesame oil, forms a useful application for boils and wounds.</p> <p>3. <b>Horns:</b> Powder of Horns is used to cure mania, insanity, loss of memory, biliousness Fumes of horns and</p>		<p>1. Dictionary (English and Sanskrit), page 690-Sir M.Monier William.</p> <p>2. Sterdale's Mammalia of India, page 186- by Frank Finn</p> <p>3. Charaka Samhita Ke Jeevajantu, page 22- by Ramesh Bedi.</p> <p>4. Indian Materia Medica, Vol.2, second reprint of third revised</p>

				<p>hooves are given to facilitate delivery and in case of piles.</p> <p>4. <b>Excreta:</b> the fruit of Dhamargava should be taken in the juice of faeces of prisata, rusya, Kuranga, elephant, camel, mule, sheep, swadamstra, ass and rhinoceros for elimination of Dosahas by vomiting.</p>		<p>and enlarged edition, page 217, 1982- A.K.Nadkarni</p> <p>5. Ch.Su. 27/ 84-85 Charaka Samhita(English Translation), Vol. I- by- Prof. P.V. Sharma</p> <p>6. Ch.Chi. 27/ 84-85 Charaka Samhita (English Translation), Vol. I- by- Prof. P.V. Sharma.</p> <p>7. Ch.Chi. 8/62, Charaka Samhita (English Translation), Vol. I- by- Prof. P.V. Sharma.</p> <p>8. Ch. Sha. 8/62, Charaka Samhita (English Translation), Vol. I- by- Prof. P.V. Sharma.</p> <p>9. Animal Origin Drugs used in Unani Medicine, page 12, 20, 43 by-S.B. Vohora and M.S.Y. Khan.</p>
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						10. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Toderananda, page 277- by Dash & Kashyap.
35	<i>Hippotragus niger</i>	Krishna Mriga	Sable antelope	<p>1. <b>Flesh:</b> is aphrodisiac.</p> <p>2. <b>Fat:</b> is prescribed in Oedema.</p> <p>3. <b>Hair:</b> Ash of hair heals wounds.</p>		<p>1. Dictionary (English and Sanskrit) Vol- XIII, page 703-Sir M.Monier William.</p> <p>2. Grzimek's Animals life Encyclopaedi-13, Mammals-4, Page 411,412.</p> <p>3. Animal Origin Drugs used in Unani Medicine page 13, 21, 45 by S.B. Vohora and M.S.Y. Khan.</p>
36	<i>Ovis vignei</i>	AvikaMesha	Sheep	<p>1. <b>Milk:</b> is useful in simple Vatika disorders and cough caused by Vata. It is good for growth of hair but causes respiratory trouble, ulcer on tongue, lips and gums. Milk of cow, sheep and goat mixed with oil or decoction of vitaliser drugs or Panchamoola should be used for sprinkling in Vatarakta. For Vomiting, the Powder of Dhamargava fruit (size of jujube fruit) should be taken after dissolving in 160ml of juice of dung of the sheep.</p> <p>2. <b>Ghee:</b> It is used in disorders of</p>		<p>1. Indian Materia Medica. vol. 2, page 185, 212-A.K. Nadkarni.</p> <p>2. Ch. Su. 27/222-223 Charaka Samhita, Text with English Translation.</p> <p>3. Su. Su. 45/54 Susrut Samhita ,Text with English Translation</p> <p>4. Su. Su. 45/101 Susrut Samhita, Text with</p>

				<p>female's genital tract, consumption and trembling.</p> <p>3. <b>Urine:</b> It is useful in cough, splenomegaly, dyspnoea, consumption and constipation. It is also beneficial in leprosy, piles, dropsy, oedema and gonorrhea.</p> <p>4. <b>Fat:</b> Fresh fat is good for cough, chest pain, asthma and urinary infections.</p> <p>5. <b>Blood:</b> It is good for healing burns.</p> <p>6. <b>Liver:</b> It is hepato tonic.</p> <p>7. <b>Heart:</b> It is useful in palpitation.</p> <p>8. <b>Brain:</b> It is brain tonic.</p> <p>9. <b>Kidneys:</b> Invigorate kidneys.</p> <p>10. <b>Bile:</b> External application of bile is useful in skin.</p> <p>11. <b>Milk:</b> its ingestion removes weakness of excessive indulgence in coitus. It is useful in stomatitis, intestinal ulcers, dysentery, flatulence, obesity, cough, rheumatism, gonorrhea and toxaeimias.</p> <p>12. <b>Curd:</b> It is good for piles. It should not be given to subjects suffering from respiratory affections.</p> <p>13. <b>Excreta:</b> It is indicated in inflammations, wounds, burns, dropsy etc. It is tonic for the brain and sexual activity. It increases Pitta and Kapha and is useful in Vata.</p> <p>14. <b>Bone:</b> Ash of bones is useful in</p>		<p>English Translation.</p> <p>5. Su. Su. 45/224 Susrut Samhita ,Text with English Translation</p> <p>6. Ch. Chi. 29/126 Charaka Samhita, Text with English Translation.</p> <p>7. Ch.Ka. 4/12 Charaka Samhita ,Text with English Translation</p> <p>8. Charaka Samhita Ke Jeevajantu, page 18- Ramesh Bedi</p> <p>9. Animal Origin Drugs used in Unani Medicine, page , 20,22,25,26,27,29,31, 33,35,36 and 42 by- S.B.Vohora and M.S.Y.Khan</p> <p>10. Sterdale's Mammalia of India, page 201- by Frank Finn.</p> <p>11. The Book of Indians Animals, page 234-S.H.Prater.</p> <p>12. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Todarananda, page</p>
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				diarrhoea, haemorrhages and alopecia.		142,160,174,274-Dash & Kashyap.
37	<i>Mephitis putorius</i>	skunk	Mephitis	<b>Secretion from the anal glands:</b> Whooping cough, with a marked laryngeal spasm and a whoop, cough, is worse at night on lying down; there is a suffocative feeling and the child can not exhale.		1. Colin's Encyclopedia of animal, reprint of first edition page 273,1971-by Dr Jan Hanzak, Dr .Zdenek Veselovsky, David Stephen.
38		Agnijara	Ambergri s	1. <b>Milk:</b> It is used in general weakness, epilepsy, spasms and nervous debility; also given in high fever with insensibility or delirium and in the collapse stage of cholera, plague and other infection disease. It is given in urinary irritations. It is also used as a base for ointments. As an emollient dressing. It is used for blistered or excoriated surfaces and ulcers. It mainly uses in brain and heart diseases hemiplegia, paraplegia, facial, paralysis, tetanus, parkinsonism and weakness of the heart, brain etc, It is also uses in weakness of the stomach and pain in cardiac orifice.	1. Brahmi vati Siddhayogsangsa Vatravogadhikara: AFI Part-II, Page 274 2. Javahara Mohara(Siddhayogsa nraha, hrdro-gathikara): AFI Part-II, Page 246 3. Mrit Sanjivani Gutika (Sahasrayoga, Gutikakaprakarna, 66) 4. Khamira-Marwar-eed: National Formulary of Unani Medicine Part-I, 1 <sup>st</sup> Edition, Page III. 5. Habb-e-Ambar:	1. Dravyaguna Vigyana, part-II & III page 699- prof. P.V.Sharma. 2. Indian Materia Medica vol. 2, page 191-A.K. Nadkarni. 3. Ayurvediya Rasashastra, page 483-prof. Siddhi Nandan Mishra 4. Modern Text Book of Zoology-R.L.Kotpal 5. Bhavaprakash Nighantu, Dugdha Varga 21, commented by-K.C. Chuneekar. 6. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on

					National Formulary of Unani Medicine Part-I, 1 <sup>st</sup> Edition, Page 9	the Reptilia page 124-Frank Finn.
39	Axis Axis	Prushata	Spotted Deer	<p>1. <b>Flesh:</b> It cures asthma and fever. It alleviates three Doshas as well as the vitiated blood. The Patients of Prameha who is not fit for evacuation should be subjected to pacificatory management for alleviation of the disease. He should take various preparations of barley mixed with the meat of ass, horse, bull, swan and spotted deer. In fever, those who are non-vegetarian may take the soup of common quail, grey partridge, ena (a type of deer), cakore, upachakra, Kuranga, prushata or rabbit unsoured or slightly soured.</p> <p>2. <b>Excreta:</b> For vomiting (Vaman Karma) in conditions of Gara (artificial poisons), Gulma (phantom tumour), Cough, Vata situated in the seat of kapha, Kapha located in throat and mouth, diseases caused by accumulation of Kapha and other stable and severe diseases, the drugs dhamargava should be taken in the juice of faeces of spotted deer, rusya, kuranga (types of deer), elephant, camel, mule, sheep, swadamstra, ass</p>		<p>1. The Book on Indian Animals, Third (Revised) edition, page 292, 1971-S.H.Prater.</p> <p>2. Charaka Samhita Ke Jeevajantu, page 27-Ramesh Bedi.</p> <p>3. Ch.Chi. 6/24; Ch.Si 12/19, Ch.Chi, 3/191, Ch. Ka 4/12-Charaka Samhita (English Translation), VOL.I-by- Prof. P.V. Sharma.</p> <p>4. Animal Origin Drugs used in Unani Medicine, page 11,43 by-S.B.Vohora and M.S.Y.Khan</p> <p>5. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Tadarana, page 1st publication, page 267, 1980-Dash &amp; Kashyap.</p>



				and rhinoceros.		6. Bhavaprakash Nighantu, Mansa Varga, 11/ 45 - commented by Prof K.C.Chunekar.
40	<i>Funambulus Pennanti</i>	Vrikshamarkatika, Chamar Puchha	Stripped squirrel	1. <b>Flesh:</b> The meat of these animals is aphrodisiac, promoter of eye sight and useful in the correction of the vitiation of blood. It cures Svasa (Asthma), Arsha (piles) and kasa (Bronchitis). Its helps in the elimination of urine and stool. Flesh is given for the treatment of Epilepsy.		1. Dictionary (English and Sanskrit), Vol.XIII, page 769- Sir Monier Williams. 2. Sterdale's Mammalia of India page 140- Frank Finn. 3. Materia Medica in Ayurveda based on Ayurveda Saukhyam of Toderanand, page 260-Dash Kashyap. 4. Animal Origin Drugs used in Unani Medicine, page 12 by- S.B.Vohora and M.S.Y.Khan.
41	<i>Cervus Elephus</i>	Sambara	Stag	1. <b>Horn:</b> The Bhasma (Ash) is given internally as a restorative tonic with honey. In diseases of the respiratory system, as cough, asthma, consumption; also weak heart, enlarged glands and in seminal debility it is too much useful. It is a specific remedy in with honey and essence of ginger.The paste is given internally in dysentery and locally		1. Dictionary (English and Sanskrit) Vol- XIII, page 769- Sir.Monier William. 2. Sterdale's Mammalia of India page 56- Frank Finn. 3. Animal Origin Drugs used in Unani Medicine, page 11,43

				<p>applied with stimulating ingredients like ammonia, brandy etc. to sprains, contusion, cracks, fissures and to the forehead in headache and to relieve itching in chronic skin diseases, also to orchitis and other enlarge glands. It is a useful remedy for the relief of rheumatic pains and for pains in the ribs. It is also useful in diarrhea, intestinal ulcers, colic, jaundice, leucorrhoea, chronic cystitis etc. Ash with Ghee(clarified butter) forms a useful emollient applications for hands and heat. It is used in cases of haemorrhages and scrofulous tumours. The ash is useful as 'Surma' for eye diseases and as tooth powder for improving gums and teeth. Fumigation cures piles.</p> <p>2. <b>Flesh:</b> It is diuretic and sexual tonic.</p> <p>3. <b>Fat:</b> It is massaged in cases of convulsions.</p> <p>4. <b>Blood:</b> It is of value in renal and cystic calculi.</p> <p>5. <b>Rennet:</b> It is a sexual stimulant. If it is taken as a pessary for three days after menstruation, pregnancy is prevented.</p> <p>6. <b>Stone growing in the gall bladder:</b> The stone is used for its detoxicant, aphrodisiac, mood elevating and anti-inflammatory properties. This is</p>	<p>by- S.B. Vohora and M.S.Y. Khan</p> <p>4. Indian Materia Medica Vol. 2, page 153-A.K. Nadkarni.</p> <p>5. Charaka Samhita Ke Jeevajantu, Page 33- Ramesh Bedi</p>
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				indicated in cholera, Inflammations and biles and sting of poisonous insects.		
42	<i>Felis tigris</i>	Vyaghra	Tiger	<ol style="list-style-type: none"> <li>1. <b>Flesh:</b> It is promoter of strength. It is always wholesome for patients suffering from the diseases of the eye and anus.</li> <li>2. <b>Fats:</b> In Malaria, Nasya of fat is given. Tiger's face fat along with rose water when rubbed on face acts as Vaseline.</li> <li>3. <b>Bone:</b> Tigers bile alongwith bone of tiger is rubbed on a abscess of hand and feet.</li> <li>4. <b>Clavicle:</b> It is used as scrap's pin. Apart from its ornamental use, its has its traditional believe that it brings good luck. For that very reason, it is also known as lucky bone.</li> <li>5. <b>Bile:</b> For eye diseases, the anjana's that are prepared, bile of tiger is used.</li> <li>6. <b>Excreta:</b> In Urustambha and Ardita its nails are rubbed and mixed with honey and given to the patient.</li> <li>7. <b>Nail:</b> In Vata Rakta, tiger's nail along with sour articles, it is rubbed and applied. In all kinds of swelling and poisonings, tiger's nail along with other medicines, is rubbed and given e.g. for eyes as Anjana, in nose as nasal drops and given in form of Lepa.</li> <li>8. <b>Brain:</b> Brain of tiger alongwith Til</li> </ol>		<ol style="list-style-type: none"> <li>1. Sterdale's Mammalia of India. A new and a abridged edition, thoroughly revised with an appendix on the Reptilia page 77- Frank Finn</li> <li>2. The Book on Indian Animals, Third (Revised) edition, page 65 -S.H.Prater.</li> <li>3. Charaka Samhita Ke Jeevajantu, page 213- Ramesh Bedi</li> <li>4. Dravyaguna Vigyana, part-II &amp; III page 1969- prof. P.V.Sharma.</li> <li>5. Indian Materia Medica Vol. 2, page 161, 532- A.K. Nadkarni.</li> <li>6. Ch. Chi 3/ 305 and Ch.Chi. 8/ 153, Charaka Samhita (English Translation), Vol.I- by-Prof. P.V. Sharma.</li> <li>7. Ch.Sha. 8/70-Charaka</li> </ol>

				<p>oil, I prepared and applied to pimples.</p> <p>9. <b>Hair:</b> Its fumigation makes Kankhajura (centipedes) run away.</p> <p>10. <b>Tail:</b> It is dried and grinded. This powder alongwith soap when applied to the body removes skin diseases.</p> <p>11. <b>Teeth:</b> It has its mythological value that its wearing protects the child from all evil spirits.</p>		Samhita (English Translation), Vol.I- by-Prof. P.V. Sharma.
43	<i>Canis lupus</i>	Vruka, koka	Wolf	<p>1. <b>Fats:</b> It is useful as an external application in alopecia and for stimulation of the erectile power of the male organ.</p> <p>2. <b>Liver:</b> It is useful in jaundice, colic of hepatic origin, liver diseases and enlargement of spleen.</p> <p>3. <b>Brain</b> is given with milk for the treatment of epilepsy Penis: Ash of penis cures piles.</p> <p>4. <b>Bile:</b> External application of bile is useful in skin diseases.</p> <p>5. <b>Excreta:</b> is given in colic and inflamed condition.</p> <p>6. <b>Bones:</b> Ash of tibial bones is useful in diarrhea, haemorrhages and alopecia.</p> <p>7. Mostly in the insanity caused by Vata and Kapha sprinkling, Collyrium, blowing, snuffing and smoking should be applied with Urine, Bile, Feaces, Skin, Hair, Nails and Hide of the Wolf</p>		<p>1. Dictionary (English and Sanskrit), Vol. XIII, page 844 –Sir M. Monier Williams.</p> <p>2. The Book of India Animals, third (Revised), page 313- by S.H.Prater.</p> <p>3. Animal Origin Drugs used in Unani Medicine, page 20, 25, 27, 29, 31, 36 and 42 by-S.B.Vohora and M.S.Y.Khan</p> <p>4. Charaka Samhita Ke Jeevajantu, page 32- Ramesh Bedi.</p> <p>5. Ch. Chi. 9/74 Charaka Samhita ,Text with English Translation</p>
44	<i>Equus zebra</i>	Aranya	Zebra	<p>1. <b>Flesh:</b> It is easily digestible, nutrient and carminative. Ingestion in winter</p>		<p>1. Dictionary (English and Sanskrit),</p>

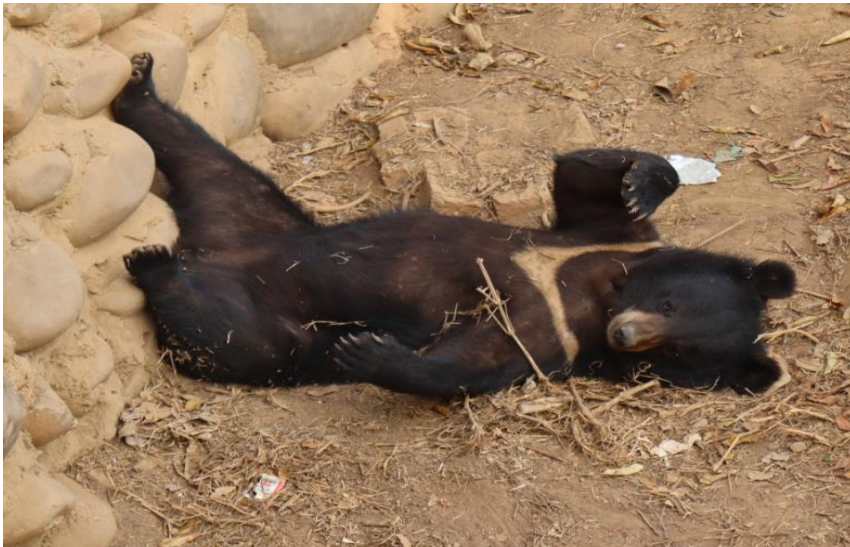
		Gardabha Vanarasabha		<p>is good. It prevents rheumatic pains and produces bilious humours.</p> <p>2. <b>Brain:</b> Ingestion is claimed to prevent bed wetting in children.</p> <p>3. <b>Lungs:</b> Lungs are dried, pulverized and made into a paste with honey and gum tragacanth. This is useful in cough, asthma, backache, sexual and urinary disorders, and baldness.</p> <p>4. <b>Penis:</b> It is aphrodisiac.</p>		<p>Vol.XIII, page 849 – Sir Monier William.</p> <p>2. Grzimek's Animals life Encyclopaedia, VOL Mammals-III, page 547.</p> <p>3. Animal Origin Drugs used in Unani Medicine, page 12, 27, 28, 29, 34, 40 by- S.B. Vohora and M.S.Y. Khan</p>
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**Figure 1.1: *Felis tigris* (Tiger)**



**Figure 1.2: *Rhinoceros unicorni* (One Horned Rhinoceros)**



**Figure 1.3: *Melursus ursinus* (Slot Bear)**



**Figure 1.4 : *Axis Axis* (Spotted Deer)**





**Figure 1.5:** *Macacus Rhesus* (Monkey)



**Figure 1.6:** *Canis lupus* (Wolf)

## Conclusions

In this review, we described the animals used to treat various disease in Ayurveda. Local people or traditional healers are using animal parts without any scientific base. There is a gap between traditional use of animals and scientific evaluation in terms of pharmacological investigation. Although maximum species reported in this review are scrutinized for classical texts, but details study leading to the discovery of novel active bio-compound is yet to be carried out. It is important to collect the valuable knowledge from traditional healers regarding medicinal use of animals to treat various ailments and should focus on the useful pharmacological evaluation of animal parts for the identification of novel compounds as well as for their protection, usefulness and effectiveness of different diseases. This review provides a baseline data for initial screening of promising animal parts used in various disorders in Ayurveda and other Indian System of Medicine.

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## Chapter 2

### ***Varaha Vasa (Pork Fat) Janu Pichu as Shoolaprashamana (Pain Reliever) & Sothahara (Swelling Reliever) In Sandhigatavata–A Case Report.***

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#### **Abstract**

*Sandhigatavata* is one of the most important and crippling non-communicable disease of the 21<sup>st</sup> century. It is an irreversible disease mostly affecting the old age and mostly females. Treatment here includes pain killers and Knee Replacement Surgery which has bad effects on the body and very expensive. Ayurveda here comes as a rescue as it avoids complication and is very cost effective. The aim of the study is to know *Varaha Vasa* (Pork Fat) *Janu Pichu* as *Shoolaprashamana* (Pain Reliever) & *Sothahara* (Swelling Reliever) In *Sandhigatavata*. A 60-year-old male patient came to OPD of NEIFM, Pasighat, with the complaints of *Sandhi shoola* i.e., severe pain and swelling over both knee joints & difficulty in walking for 3 years. The patient was taking allopathic treatment but did not get significant relief. He was being prescribed NSAIDS and was advised to get knee replacement done by orthopaedic surgeons. Examination of the patient revealed *Sandhi shotha* (moderate swelling) around both knee joints, severe Tenderness, *Vatapurnadritisparsha* (Moderate crepitus) in both knee joints. In consideration with the findings of clinical examination & investigations treatment with *ausadhi* and *Janu Pichu* with *Varaha Vasa* was given which improved the condition of the patient.

**Keywords:** *Janu Pichu* (External Ayurveda Therapy), *Janu Sandhigatavata* (Knee Osteoarthritis), *Panchakarma* (Detoxification Therapies), Osteo Arthritis

#### **Introduction:**

*Sandhigatavata* is described in *Charak Samhita* under *Vata vyadhies*.<sup>1</sup> (chapter describing diseases of *Vata dosh* vitiation). Later more or less the same description is found in various texts. Osteoarthritis (OA) is the most common joint disorder among all musculoskeletal disorders. According to W.H.O musculoskeletal and rheumatic disorders are the leading cause of disability in present world.<sup>2</sup> A high prevalence of OA among older people and women and its moderate to

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severe impact on daily life poses a significant public health problem. Limitation of conventional system of medicine in management of these disorders indicates a strong need to find out other safer and effective measures; here Ayurvedic medicine may provide a possible solution. In modern system of medicine, the pharmacological management is limited to symptomatic relief of painful conditions<sup>3</sup> and hence there is strong need of such treatment modalities, which could retard cartilaginous degeneration and disease progression.

Shiro Pichu is the procedure, in which the Sneha is retained over the scalp with help of *pothli* or a cloth for a specified period of time<sup>4</sup>. Observing the results of *Shiro Pichu* the later physicians developed a similar procedure over *Janu* and named it as *Janu Pichu*. In this way *Janu Pichu* procedure is evolved from *Shiro Pichu* procedure. Now a day's same is performed over various regions of body and named accordingly.

The *Janu* refers to knee and *Pichu* literally means cloth, it is a process of placing a piece of cotton cloth, immersed in oil, over the affected area, in this case mainly *Varaha Vasa* i.e., Pig Fat. The *Vasa* is the among the 4 kinds of *Sneha* or Lipid material explained in Ayurveda classics and major this form of *Sneha* is mainly indicated all kinds of *Vata Vyadhi* like *Sandhigataavata*. The *Vasa* can be used as both internally and externally also. In North-eastern place this *Varaha Vasa* is easily available so in the present we used *Varaha Vasa* for *Janu Pichu* procedure. Pig fat is applied in paralysis, joints pain, burns and fracture<sup>8</sup>. The *Janu Pichu* is a form fomentation to the localized area. *Janu Pichu* also considered as *Bahya Sthanik Chikitsa*. It is a specialized procedure in ayurveda, especially indicated for *Janu Sandhigataavata*. There is no direct reference and description of *Janu Pichu* in classical Ayurvedic texts. It is like a supportive Ayurvedic therapy. *Janu Pichu* can be considered as *BahirparimarjanaChikitsa*<sup>5</sup> as it is a type of *Bahya Snehana* and *Swedana* (external oil application and sudation). In different opinion, *Janu Pichu* is also considered as *Snigdha Sweda*. Different types of medicated oils are used in *Janu Pichu* according to the disease. *Tilataila* is a well-known Ayurvedic formulation that has been indicated in the treatment of different types of *Vata Vyadhi*<sup>6</sup>. Thus, *Janu Basti* with *Varaha Vasa* has been taken for the present case study.

## Aims and Objectives

1. To study the effect of *Varaha Vasa Janu Pichu* in *Sandhigataavata*.

**Case Report:** A 60-year-old male patient came to OPD of North Eastern Institute of Folk Medicine, Pasighat, with the complaints of *Sandhi shoola* i.e., severe pain and swelling over both knee joints & difficulty in walking for 3 years. The patient was taking allopathic treatment, but did not get significant relief. He was being prescribed NSAIDS, and was advised to get knee replacement Examination of the patient revealed *Sandhi shotha* (Moderate swelling) around both knee joints, Severe Tenderness, *Vatapurnadritisparsa* (Moderate crepitus) in both knee joints. The extension and flexion movements at both the knee joints were restricted and from previous X-ray of both knee joints we found that was severe osteophytic changes and reduced joints space. On the basis of the clinical features, the diagnosis of Osteoarthritis was established. In

consideration with the findings of clinical examination & investigations treatment with *ausadhi* and *Janu Pichu* with *Varaha Vasa* was given which improved the condition of the patient.

**Table 2.1 Treatment Planned:**

Sl No	Treatment	Dose	Duration
1	<i>Maha Yograj Guggulu</i>	500mg BD with <i>Maha Rasnadi Kashaya</i> after food	30 days
2	<i>Maha Rasnadi Kashaya</i>	20 ml BD with equal amounts lukewarm water after food	30 days
3	<i>Janu Pichu</i>		7 days

***Janu Pichu* Materials Required:**

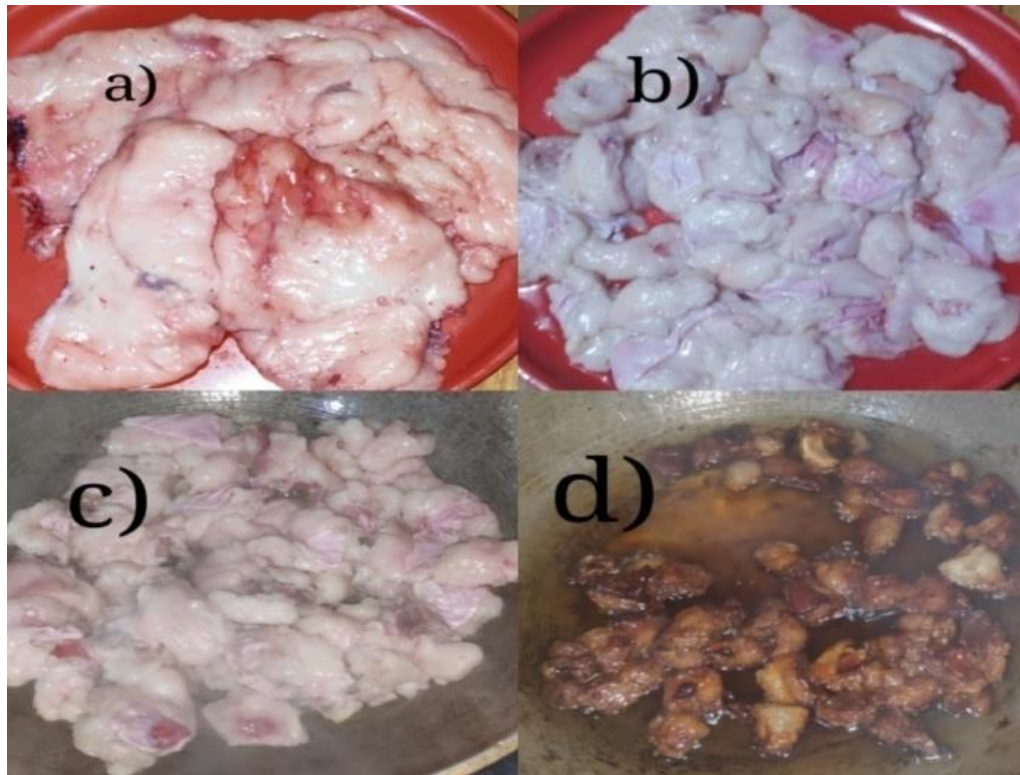
For the present study, the following materials are required for therapy session

- *Varaha Vasa* – 500ml.
- *Dashmoola kwath* – 2 litres (for *nadi swedana*).
- Small piece of gauze – 01.
- Luke Warm Water – as per requirement.

**Preparation of *Varaha Vasa*:**

*Varaha Vasa* is collected and washed then it is cut into small pieces and put it in a frying pan and heated slowly oil gets collected and the *Vasa* turns to light gold colour and shrink in size. Collect the oil in a bottle and use it for *Janu Basti*. Pasighat district in Arunachal Pradesh is a tribal state and every family have this kind of oil in their homes and being a non-vegetarian state *Varaha Vasa* is easily and cheaply available. So, the aim was to use cheaply available and helpful in disease which effects most people these days

**Fig 2.1 Preperation of Varaha Vasa a) VarahaVasa (Pork Fat) b) Varaha Vasa washed and cut into small pieces c) Frying of Varaha Vasa d) Varaha Vasa collected during frying.**



### **Procedure**

**Poorva Karma (Preoperative procedure):** This includes preparatory measures like preparation of patient, preparation of medicine and collection of materials required for the smooth conduction of the procedure. It can be conducted under following considerations.

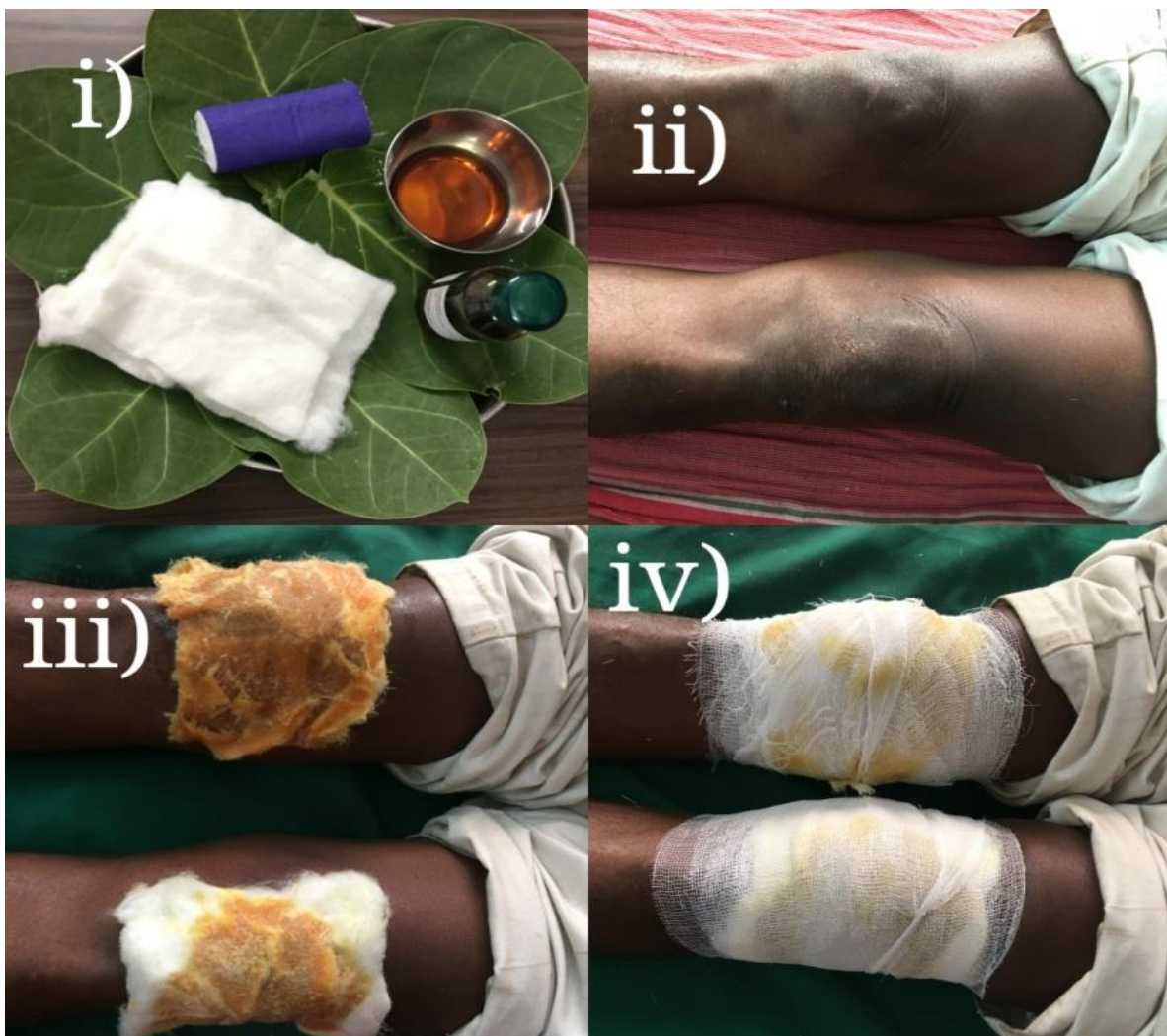
- **Atura Pariksha (Patient Examination):** The patient is examined in relation to *DashavidhaPariksha* and by applying *Pratyaksha*, *Anumana* and *Aptopadeshasiddhantas* to assess *VyadhiBala* and *Deha Bala*<sup>7</sup>. Then, the affected knee joint is examined properly and the maximum tender region is noted. It is also examined for wound.
- **Sambhara Sangraha (Collection of materials required):** It includes the collection of necessary items required for the stable conduction of the procedure. 2 cotton pads (4\*1 inch), *Aushadha Dravya* (*Varaha Vasa*), bowl, vessel, water, gas stove and table.
- **Atura Siddhata (Preparation of Patients):** Patient is asked to lie in supine position or to sit erect by extending lower limbs on the table/bed, whichever comfortable. The affected knee is exposed properly. Limbs are supported properly so that they are placed horizontally and comfortably.



**Pradhan Karma (Procedure):** The bowl containing medicine (*Varaha Vasa*) is heated indirectly by keeping over a column of hot water. Then in the gently heated Lukewarm *Varaha Vasa*, *Pichu* is dipped slowly and carefully. This is placed along the *Janu-Sandhi* analysing the tolerability of the patient. The heat of the medicine should be sufficient enough to be tolerated by the patient. At the area of maximum tenderness *Pichu* is placed and retained until the temperature of the oil reduces. Continue this procedure for 35 minutes daily, for 7 days.

**Paschat Karma (Post operative procedure):** The cotton gauze piece is removed afterwards, and the area is wiped off followed by cleaning with lukewarm water. Patient is given light oil massage over *Janu Sandhi* for 5-10 minutes. Thereafter the patient is advised to take rest for 10-15 min in comfortable position. Patient is advised to take light diet and clean with hot water after procedure.

**Fig 2.2: Procedure i) Materials Required for Janu Basti ii) Poorva Karma (Pre-Operative Procedure) iii) Pradhan Karma (Operative Procedure) iv) Paschat Karma (Post-Operative Procedure)**





**Precautions:** Care should be taken to prevent excess heating of the oil since it may cause burn and discomfort.

**Complications:** Burn and discomfort due to prolonged sitting in same posture.

**Duration:** 7 days was planned depending on the nature and intensity of the disease.

### **Results:**

After oral medications the patient experienced relief in chief complaints considerably there was reduction of Tenderness. Local *Janu Pichu* provided additional benefits to the therapy and helped patient to make joint movements freely. it helped in proper movement and helped in relieving the swelling, tenderness and also crepitus to some extent. Combination of both Oral and *Janu Pichu* proved a good combination in reducing the symptoms of *Janu Sandhigatavata*.

**Table 2.2 Results before and After Treatment.**

Parameters	Before treatment	After treatment (After 7 Days)
Crepitus	Moderate (+++)	Mild (++)
Warmth	Medium (+++)	Less (+)
Swelling	Moderate (++)	Mild (+)
Tenderness	Severe (+++++)	Mild (+)

### **Discussions:**

The external *Snehana* and *Svedana* therapies are extensively practiced in *Sandhigatavata*. The present clinical study has been conducted to evaluate the efficacy of *Varaha Vasa* in the form of *Janu Pichu* in *Janu Sandhigatavata*. On the analysis of results, individual assessment of procedures proved statistically significant results in most of the signs and symptoms of *Janu Sandhigatavata*. *Janu Pichu* with *Varaha Vasa* provided a better relief in the signs and symptoms of *Janu Sandhigatavata* mainly in warmth, tenderness, swelling, crepitus. *Varaha Vasa* being a *Sneha*, has *Vatahara* property. *Janu Pichu* with *Varaha Vasa* acted both as *Snehana* and *Svedana*, along with the combination of pharmacokinetics it brought better relief in the signs & symptoms of *Janu Sandhigatavata*.

### **Conclusion:**

In this case study we got remarkable relief with *Janu Pichu* with *Varaha Vasa* and some common internal Ayurvedic drugs. The *Varaha Vasa* generally used externally in paralysis, joint pains, fractures etc., conditions. Modern system of medicine has drugs like NSAID's, corticosteroids, DMARDs and Biologics, which have a lots of sides effects, long lasting and many others are life threatening. Most of the tribals of north-eastern region has been using this *Varaha Vasa* as a form of food and treatment. It is hard to find Ayurveda medicines as there are less pharmacy so as an alternative for Ayurvedic tails *Varaha Vasa* can be used for other external

therapies in place of *Taila* and *Grita* as it is readily available in this area. There is a strong need of such types of treatment modalities, which could retard cartilaginous degeneration and disease progression. This case study can be taken as eye opener for further clinical studies on *Varaha Vasa*.

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## Chapter 3

### Critical note on classical text *Rasatarangini*: Pharmacovigilance panorama

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#### Abstract

In the practice of Ayurveda, where herbo-mineral formulations are said to be made biocompatible through specific processes like *Shodhana* (purification process) and *Marana* (incineration process), the western medical science on the contrary has raised the safety concerns of these formulations in the recent past. A need has risen for Ayurvedic researchers to validate the utility of Ayurvedic treatment by exploring safety related aspects mentioned in classical texts. This study is aimed to review pharmacovigilance aspect of herbo-mineral formulations given in *Rasatarangini*. *Rasatarangini* is an authentic book for Ayurveda herbo-mineral formulations which is written by *Acharya* Sadanand Sharma in 20<sup>th</sup> AD. For this instance, pharmaco vigilance aspect of *Rasatarangini* was reviewed from all 24 *Taranga* (chapters) and various research articles related to safety concerns of herbo-mineral preparation. It was found that *Rasatarangini* has given specific therapeutic dose of metal/mineral *Bhasma* and *Rasa Auashadha*, guidelines on diet and behavioural practices during use of *Rasa Auashadha* and details of the signs and symptoms of toxicity caused by use of *Ashodhita* / *Agrahya* metals and minerals and their managements. Stringent procedures and specific dose along with strict *Pathya-Apathya* given in *Rasa Tarangini* indicates that, if one violates these rules while prescribing metals, mineral or herbo-mineral products, they will readily encounter ADRs. This study will be helpful to understand pharmaco vigilance panorama available in *Rasatarangini* among health care professionals and researchers.

**Keywords:** ADR, Herbo-mineral drugs, Pharmacovigilance, *Rasatarangini*

#### Introduction:

Ayurveda is an important healthcare system in India as it is practiced here since thousands of years.<sup>1</sup> Currently it comprises a wide range of therapeutic approaches such as use of herbs, metals, minerals, various panchakarma procedures (detoxifying regimes), *Pathya - Apathya* (dietary advices), and various nondrug modalities. Though, use of metals and minerals in treatment has not been enough mentioned in *Brihadtrayi* (3 authoritative books of Ayurveda i.e., *Charaka Samhita*, *Sushruta Samhita* and *Ashtanga Samgraha*), later these are introduced by a separate branch called *Rasashastra* and became inseparable component of Ayurveda. *Rasa Aushadhi* has ability to act fast with lesser dose and hence gained

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popularity in public very fast. After 8<sup>th</sup> century, *Rasa Shastra* further flourishes and many separate texts with clinical applications of metals and minerals were documented. Few of them are *Rasendramangala* (8<sup>th</sup> century), *Rasa Hridaya Tantra* (12<sup>th</sup> century), *Rasarnava* (12<sup>th</sup> century), *Rasaratna Sammucchaya* (13<sup>th</sup> century), *Rasa Tarangini* (20<sup>th</sup> century) etc. In these books there are many references of the procedures which make metals and minerals bio-available for human body. *Acharya* were well aware about its possible side effects and hence to cease that, *Acharya* have mentioned very specific procedures for single drug and compound drugs. These procedures are *Shodhana*, *Marana*, *Amrutikarana*, *Bhavana*, *Kharaliyaaushadha*, *Kupipakvaushadha* etc.

If drugs prepared with the classical methods, then chances of its adverse events are very rare. But due to commercialization, the good manufacturing practices are breached some time and improper final products come in the market, which leads to adverse drug reactions. Even international journals also raised questions on mercurial preparations for its safety. In addition to that UN Environment Programme (UNEP) released a report *Mercury - Time to Act*, where imposing a ban on Mercury for trade considering its effect on environment has been put forward.<sup>2</sup> Such controversies have tried to malign the reputation of Ayurveda at global levels. In such scenario, it becomes essential to evaluate pharmaco vigilance panorama mentioned in various *Rasashastriya* books.

Pharmacovigilance (PV) is defined as the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug-related problem<sup>3</sup>. The major objectives of pharmaco vigilance are to improve patient care and safety in relation to drug use, and thus promote rational drug use in therapeutics.

No direct reference of Pharmaco vigilance concerns of drugs of metal and mineral origin used in *Ayurveda* is available in *Rasa* classics but ample of references pertaining concept of untoward effects after administration of these drugs due to not following pharmaceutical code of conduct during preparation are available in various *Rasa* classics<sup>4</sup>. So, it is high time to critically analyse and compile pharmacovigilance aspects in *Rasa aushadhi*. The indications, dose, *Anupana* (vehicle), *Sevana Kala* (period of drug administration), interval or duration of treatment, *pathya-apathya* (Diet and Routine management), *Savirya Avadhi* (shelf life), *Samskara* (pharmaceutical-processing) and parameters for testing are major factors which found to have great impact on safety and efficacy of drugs. Consequently, these modules are explored here with pharmaco vigilance standpoint from classical text *Rasa Tarangini*.

### **Highlights on Subject Matters of Book:**

*Acharya* Sadananda Sharma has dedicated *Rasatarangini* to his teacher, *Kaviraj* Narendra Nathmitra. Foreword of the text is written by Sadananda Sharma himself, whereas prologue by Hari Dutt Shastri, the Sanskrit commentator of the text. Colophon given at the end of last chapter clearly indicates the author of this text is *Acharya* Sadananda Sharma. Hindi preface is written by Dharmananda Shastri. The book is complete in it and contains 24 chapters termed as 'Taranga' encompassing 3651 verses.

### **Methods:**

Information collected on knowledge of pharmacovigilance standpoint from classical text *Rasatarangini* through all 24 Taranga (chapters). Contemporary knowledge of *Rasa aushadha* with perspective of pharmacovigilance was screened from standard modern texts, reputed research journals, pharmacology texts. Observation was summarized and tabulated.

**Data and Discussion:**

Modules in pharmacovigilance perspective as listed below.

**Guidelines on therapeutic dose of metal/mineral *Bhasma* and *Rasa Auashadha*:** Appropriate guidelines regarding dose of metal, mineral *Bhasma* and formulations have been stated in *Rasa Tarangini* text. However, these guidelines are observed to be seldom followed by practitioners. These guidelines are introduced in table 3.1, 3.2.

**Table 3.1. Therapeutic dose of metal/mineral *Bhasma***

Sr. No.	Minerals / Metals	Scientific name	Guna (Characteristics)	Dose
1	<i>Rajata Bhasma</i>	Incinerated Silver	<i>Ati pravrudhha koshta gata vat nashaka, dhyapanado and shishunaparama</i>	¼ to 1 Ratti
2	<i>Taamra Bhasma</i>	Incinerated Copper	<i>Tikta, Kashaya, Madhura rasa, katuvipaka, ushnaveerya, snigdha, vishanashaka, pitta nisharaka, lekha, kapha pitta nashaka</i>	1/8 to ½ Ratti
3	<i>Hridayaarnava Rasa</i>	formulation	<i>Hridaya roga nashaka</i>	¼ Ratti
4	<i>Vanga Bhasma</i>	Incinerated Tin	<i>Shvas anali gata kapha nashaka, vata prakopa nashaka, manasika vikruti nasaka</i>	1 to 2 Ratti
5	<i>Svarna Vanga</i>	formulation	<i>Tikta, amla, lavana rasa, sita, ruksha, sara, rasayana, prameha hara, balya, budhhi vardhaka, Netra hitkari, kshudha janaka, urdhva jatrugata kapha vikara nasaka, sukra dhatu vridhhi.</i>	1 to 2 Ratti
6	<i>Naga Bhasma</i>	Incinerated Lead	<i>Madhura, tikta rasa, snigdha, udhna veerya, guru, lekha, sara, vahnivi vardhana, pramehakarikesharee, kapha nasaka</i>	¼ to 1 Ratti
7	<i>Yashada Bhasma</i>	Incinerated Zinc	<i>Kasaya, katua rasa, sheeta, nayana Amaya nashaka, kapha-pitta roga hara, pandu shamaka, meha nashaka, kasha swasa nashaka, nisasweda nirvahana, sleshmaka lasankochana kara, vrana stravarodhana, rajastravanishoodanam, kampavata nashaka, Ekanga /sarvangagataavata nashaka</i>	½ to 1 Ratti
8	<i>Loha Bhasma</i>	Incinerated Iron	<i>Tikata-kashaya rasa, Madhura vipaka, ruksha, sheeta veerya, lekha, netrya, balya, vrushya, jatha rarog nashaka, sleshma – pitta nashaka, varnya, medhya,</i>	¼ to 2 Ratti

			<i>visarpa kari keshari, sthauilya nasahaka, kapha gatroga nashaka</i>	
9	<i>Mandura Bhasma</i>		<i>Vrushya, sheeta, ruchikara, agni deepaka, uttama rakta vardhaka, pandu kamla nashaka, shosh aroga nashaka, pliha vridhhi nashaka</i>	¼ to 2 Ratti
10	<i>Svarnamakshika Bhasma</i>	Incinerated chalcopyrite	<i>Madhura – tikta rasa, vrushya, rasayana, swarya, chakshushya, tridoshaghna, kshaya, arsha, mehanashaka, anidra nashaka, yogvahi, visha dosha nashaka</i>	½ to 2 Ratti
11	<i>Pitala Bhasma</i>	Incinerated Brass	-	½ to 1 Ratti
12	<i>Shilajita</i>	Purified Asphaltum	<i>Tikta rasa, katu vipaka, mutrala, yogvahi, rasayana</i>	2 to 8 Ratti
13	<i>Gairika</i>	Red ochre	<i>Snigdha, madhura Kashaya rasa, sheetaveerya, tapa nashaka, hikkavamannivaran, raktapittaprashamak, asrigdaranashaka, visapah, balya, netrya, udardakandunashaka, vranaropana, jvaraghna, vahnidahani varaaka</i>	2 to 4 Ratti
14	<i>Kaseesa Bhasma</i>	Incinerated ferrous sulphate	<i>Kashaya, grahi, ushnavipaka, shvitraghna, netrya, vishaghna, vatasleshm Amaya nashaka, mutra kruchha nashaka, rakta sanjanana, rajahpravartaka, jvarghna, pleehanashaka</i>	½ to 2 Ratti
15	<i>Kantapashana Bhasma</i>	Incinerated Bell metal	<i>Sheetaveerya, bruhana, balya, vrushya, tvachya, murchha moha nashak, jvaraghna, balya, vrushya, vardhakaya nashaka, rakta sanjanan, klebya nasghaka, kasha swasapramehanashaka</i>	2 Ratti
16	<i>Kharpara Bhasma</i>	Incinerated zinc carbonate	<i>Sheeta, kapha pitta nashaka, chakshuhsya, raktapradranashaka, jirnajvarahara, atisaranirvahana, yogvahi, balaviryavrudhhikruta, tridoshaghna, vishanashaka</i>	½ to 2 Ratti
17	Purified <i>Tuttha</i>	Purified copper sulphate	<i>Tikta rasa, tvachya, grahi, vantikara, kafaghna, chakshushya, vrana dosha nishoodanam, klistavartma nashaka</i>	1/8 to ¼ Ratti
18	<i>Shodhita Haratala</i>	Purified orpiment	<i>Snigdha, bhutajvaranashaka, tvachya, kushtadishamana, rasayana</i>	1/4 to ½ Ratti
19	<i>Shodhita Manahshila</i>	Purified realgar	<i>Katutikta rasa, snigdhaushna, lekhami, guru, kasasvasa hara, bhutap</i>	1/32 to 1/16 Ratti

			<i>dravnashini, agnimandhya, kshaya, anaha, kandu vinashini, rasayani, jvarahara, varnya, vishapaha</i>	
20	<i>ShodhitaSomala</i>	Purified Arsenic trioxide <sup>1</sup>	<i>Snigdha, kapha vata rogahara, svasanashaka, kushthanasaka, firang keshari, jirna pandu nishudana, vishama jvaranshana, kshara karma kar param.</i>	1/120 to 1/30 Ratti
21	<i>Swarna Bhasma</i>	Incinerated gold	<i>Snigdha, madhura, vrushya, ayushyaagraya, varnya, balya, visham jvara hara, antrashoshakshayaghna, ruchya, punya, deepana, atikeshya</i>	1/8 to 1/4 Ratti
22	<i>Godanti Bhasma</i>	Incinerated gypsum	<i>Sheeta, pitta jvaranasana, jirnajvarahara, balya, deepana, svasakashanashaka</i>	1 to 3 Ratti

Ratti = 125mg

As per table 3.1. *Shilajatu* having maximum therapeutic dose of 2 to 8 Ratti. *Shodhita Manahshila*(purified realgar) having minimum dose of 1/32 to 1/16 Ratti. In 11<sup>th</sup> Taranga, it is explicated that 1 Ratti of *Somala* (Arsenic oxide) causes death. Consequently, all Ayurveda practitioners must be intelligible about *Desha, Kala, Avashtha, Rogibala, Dosa* etc. before dose fixation.<sup>5</sup>

Therapeutic efficacy of *Tamra Bhasma* has been substantiated in *Shvasa, Amlapitta, Kasa, Yakrit- Pliha Vriddhi*, and *GrahaniRoga*.<sup>6</sup> The therapeutic dose in their studies was ranging in between 65 and 250 mg.<sup>7</sup>

Clinical trial was carried out on *Ardraka* (ginger) *shodhita Manahshila* (Realgar) in patients of *Vatika Kasa*. In which, adult dose and child dose was taken 25 mg and 10 mg respectively with *Anupana* of honey for 4 weeks.<sup>8</sup>

Pharmaco - clinical study of *Lauha Bhasma*, shows no any serious toxicity. Only mild impairment in the hepatic functions and hepatic cytoarchitecture was observed. And hence, *Lauha Bhasma* should be considered as safe drug while used judiciously.<sup>9</sup>

*Naga Bhasma* has got no acute toxic effects on G.I.T, Liver, testis, kidney and seminal vesicle in the dose of up to 416 mg/ 100 g body weight. 60 days study also do not shows, any toxic effects on G.I.T. Liver, testes, seminal vesicle, kidney in therapeutic dose and intermediate dose. But in higher doses significant toxicity has been attributable to *Naga Bhasma*. However, further giving *Haritaki Churna* with *Swarna Bhasma* to the highest dose animals seems lesser amount of toxicity. So, the concept of *Bhasmavikarashantiupaya* described by different authors in different *Rasa Shastra* literature proves its significance.<sup>10</sup>

*Yashada Bhasma* has no serious deleterious effect on body functions as a whole, the epithelial proliferation may be indicative of androgenic activity and may not be considered as pathological changes and the changes in kidney function are of moderate intensity, they are likely to be reversible. It has moderate cytoprotective activity by promoting the formation of anti-stress proteins, by promoting the turnover of epithelial tissues in different organs, by inhibiting lipid peroxidation and DNA fragmentation in target tissues.<sup>11</sup>

In a study, oral administration of *Swarna Bhasma* up to dose of 13.5 mg per kg body weight for 14 consecutive days was found to be innoxious in Wistar rats.<sup>12</sup> *Swarnavanga* contains tin and sulphur as major components along with traces of mercury, iron and aluminium. Its short duration toxicity study (14 days) was found to have no toxic effects in tissues of the animal at doses of 12.5 mg and 25 mg / 100 gm b.wt. / day. Fine fatty vacuolization in liver and focal superficial mucosal degeneration and necrosis of small intestine confined to one animal each at dose of 50 mg / 100gm b.wt. and 100 mg/ 100 gm. b.wt. / day were observed.<sup>13</sup>

The toxicity of heavy metals is attributed to their ability to form complexes with important biological radicals like the sulfhydryl, the hydroxyl, the carboxyl, the amino and the imidazole. Inhibition of various enzymes leads to the toxic effects. Attempts were, therefore, made to develop organic compounds which would have a high affinity for the metallic ions. Such drug would combine with the metallic ions to produce relatively non-toxic substances.<sup>14</sup> Group of some fruits and vegetables collectively known as *Kakarashtaka Gana* should be prohibited during administration of mercurial formulations because they decrease the therapeutic effect of the drug or create ill effects.

**Table 3.2. Therapeutic doses of formulation**

Sr. No.	Formulation name	Contents	Indications	Therapeuticdose
1	<i>Mugdha rasa</i>	<i>Parada 1p</i> <i>Khatika 2p</i>	<i>Udara roga, chhardi, firanga, shishuroga</i>	<i>Tarunavaya: 0.5 to 1.5Ratti</i> <i>1year child: 1/8 to 1/4Ratti</i>
2	<i>Rasa pushpa</i>	<i>Parada 1p</i> <i>Saindhava 1p</i> <i>Kasisa 1p</i>	<i>Pitahara, Mootrala, Vranadosha Hara, Virechanakara, Bhootavishapaha, Krimi, Visoochika, Hikka, Firanga, Jalodara</i>	<i>Virechanarthe: 2.5 Ratti (purnamatra)</i> <i>In child for virechana: 1/2 ratti</i> <i>In hikka: 1/8 Ratti</i> <i>In phiranga: 1/4 Ratti</i>
3	<i>Rasa karpura</i>	<i>Parada churna</i> <i>(Mercuric sulphate) 1p</i> <i>Saindhav 1p</i>	<i>TvakaRakta Dosha</i> <i>Nasha, Krumihara, Atisara, Pravahika, Sphota, Kandua, Mandala Kushtha, Firanga, Vrana</i>	<i>1/64 to 1/32 Ratti</i>
4	<i>Rasa sindoora</i>	<i>Parada 1p</i> <i>Gandhaka 1P</i> <i>Vatankurasvarasa</i> <i>QS (for Bhavana)</i>	<i>Prameha, shoola, Bhagandara, Mahajvara, Sarvaroga, Shosha, Gulma, Pleeha, Yakshma, Kushtha, Vrana, Pandu etc.</i>	<i>1 year child: 1/16 ratti</i> <i>2year: 1/7 ratti</i> <i>6 years: 1/3 ratti</i> <i>12 years: 1/2 ratti</i> <i>Above12 years: 1 ratti</i>
5	<i>Rasa Manikya</i>	<i>Shudhdha</i> <i>Haratal</i>	<i>Vata rakta, Kushtha, Firanga, nadivrana,</i>	<i>2 ratti</i>



			<i>bhagandara.</i>	
<b>6</b>	<i>Swarna lavana</i> (Gold chloride)	<i>Shudhdha svarna choorna</i> 3p Nitric acid QS	<i>Madhumeha, firanga, shvasa, apasmara, klaibya, unmad</i>	1/50 to 1/20 ratti

*Ratti* = 125 mg; p=part; QS=quantity sufficient

As table 3.2. shows *Rasatarangini* have mentioned very specific dose system for all compound formulation which indicates the strict and clear message that less dose will affect efficacy and over dosing will affect its safety. *SwarnaLavana* having dose of 1/50 to 1/20*Ratti*. There is a reference regarding *SwarnaLavana* (gold chloride) used as injection. It is having properties like *Vrushya*, *Tridoshashamaka*, useful in *Pushpaavarodha*, *Phirangaroga*, *Apasmara* etc.<sup>15</sup> *Rasakarpura* is enlisted as poisonous substance under the Ayurvedic and Unani system of medicine in Schedule E1 of Drug and Cosmetic Act 1940 and Rule 1945.<sup>16</sup> It is also important to notice that over dose of *Rasa Karpura* is said to cause *Parada VishaJanyaLakshana*. *Rasa karpura* is a combination of mercuric chloride and mercurous chloride if prepared by traditional method and 98% mercuric chloride if prepared by *Rasa Tarangini* method.<sup>17,18</sup> Toxicity study of *Rasakarpura* was carried out on 5 times dose of TED i.e. 1.750 mg/kg (TED X 05). Histo-pathologically results showed that TED X 05 of *Rasakarpura* is relatively less toxic in comparison to mercuric chloride on various organs in rats. Study concluded that at fivefold therapeutic dose level both *Rasakarpura* and mercuric chloride have toxic potential on multiple organs, so it is better to avoid internal administration of *Rasakarpura*.<sup>19</sup> The use of *Parada* (Mercury) in earlier period was confined only for the purpose of rejuvenation with holistic practices and a disciplined life style; but from medieval period it became very common to use these formulations for the therapeutic purposes. Due to improper pharmaceutical processing, lack of prohibited diet and behavioural follow-up and unawareness in life style follow-up leads to ADR.

The *Vaidya* from medieval period noticed and reported that ADR from these formulations and they cured them. These developments are mentioned as management in respective treatises, for example as in *AyurvedaPrakash*, “*Anupanamanjari*”, *Brihadrasarajsundar*, *Rasachandanshu*, *Rasatarangini*.<sup>20</sup> *Rasatarangini* can be considered as one of the authentic books, written on *Rasashastra* having a practical approach. It has provided a scientific approach to the procedures of *Rasashastra*. Primordial science of *Rasashastra* with a comprehensive intrinsic chemistry approach as envisaged in *Rasatarangini* can benefit the science and society.

**Guidelines on diet and behavioural practises:** It is playing an important role in enhancing or countering pharmaceutical action and toxicity of *Rasaaushadhis*. Some dietary ingredients which need to be avoided are presented in table no 3.3.

**Table 3.3 Elucidation of *Pathya Apathya***

Sr. No.	Formulation	<i>Pathya</i>	<i>Apathya</i>
<b>1</b>	<i>Rasa Karpura Gutika</i> ( <i>Rasa Tarangini</i> 6/84-86)	<i>Navneet</i> (butter)	-
<b>2</b>	<i>Rasa Parpati</i> ( <i>Rasa Tarangini</i> 6/154-161)	<i>Kakahva</i> ( <i>Solanum nigrum</i> Linn.), <i>Patola</i> ( <i>Trichosanthes</i>	<b>Aahara:</b> <i>Amla dravya</i> (sour substance), <i>Ushnadravya</i>

		<i>dioica</i> Roxb.), <i>Pugaphala</i> ( <i>Areca catechu</i> ), <i>Ardra</i> ( <i>Zingiber officinale</i> Roscoe.), <i>Vastuka</i> ( <i>chenopodium album</i> Linn.), <i>Kadali Prasuna</i> (Inflorescence of <i>musasapientum</i> Linn.), <i>Krishna Vartaka</i> ( <i>Solanum melongena</i> Linn.), cow milk with sugar	(hot substance), <i>Tikta dravya</i> (herbs that are bitter in taste), <i>Guda</i> (jaggery). <b>Vihara:</b> <i>Shishirasalilsnana</i> (bath with cold water), <i>Shishiravatadi sevana</i> (exposure to cold wind), <i>kopa</i> (anger), <i>chinta</i> (excessive thinking) etc.
3	<i>Parada rasayanasevana</i> ( <i>Rasa Tarangini</i> 7/89-100)	<b>Aahara:</b> <i>Shringvera</i> ( <i>Zingiber officinale</i> Roscoe.), <i>Dhanyaka</i> ( <i>coriandrum sativum</i> Linn.), <i>Jeeraka</i> ( <i>Cuminum cyminum</i> Linn.), <i>Vartaka</i> ( <i>Solanum melongena</i> Linn.), <i>Patola</i> ( <i>Trichosanthes dioica</i> Roxb.), <i>Tandula</i> ( <i>Oryza sativa</i> Linn.), <i>Vastuka</i> ( <i>Chenopodium album</i> Linn.), <i>punarnava</i> ( <i>Boerhaviadiffusa</i> Linn.), <i>Go payah</i> (cow milk), curd, <i>Ghee</i> , <i>Godhuma</i> ( <i>Triticum sativum</i> Lim.), <i>Mudga</i> ( <i>Phaseolus radiates</i> Linn.)	<b>Aahara:</b> <i>Madya</i> (alcohol), <i>Kakaradigana</i> like <i>Kushmanda</i> ( <i>Benincasahispida</i> (Thunb.) Cogn.), <i>Kulatha</i> ( <i>Dolicos biflorus</i> Linn.), <i>Karkotaka</i> ( <i>Momordica dioica</i> Roxb.ex Willd.), <i>Kapitha</i> ( <i>Limoniaacidissima</i> Groff.) <b>Vihara:</b> <i>Salila Krida</i> (playing with water), <i>Atinidra</i> (excessive sleep), <i>Kopa</i> (Anger), <i>Dukha</i> (grief), <i>Atimodam</i> (excessive happiness) etc.
4	<i>Gandhaka</i> (Sulphur) ( <i>Rasa Tarangini</i> 8/66-93 and 109)	<b>Aahara:</b> <i>Shashtikodana</i> ( <i>Oryza sativa</i> Linn.) + <i>Dugdhasarkara</i> (milk with sugar), <i>sheetaviryadravyas</i> (substances that are cool in nature)	<b>Aahara:</b> substances that are <i>Kshara</i> (alkaline), <i>Amla</i> (Sour), <i>Lavana</i> (salty) etc.
5	<i>Abharaka</i> (mica) ( <i>Rasa Tarangini</i> 10/74-116)	-	<b>Aahara:</b> <i>Karira</i> ( <i>Capparis aphylla</i> Roth.), <i>Karvellaka</i> ( <i>Momordica charantia</i> Linn.), <i>Amla kola</i> (Sour fruits of <i>Ziziphus jujube</i> Lam.), <i>Taila</i> (oils), <i>Kshara</i> (Alkaline substances), <i>Vartaka</i> ( <i>Solanum melongena</i> Linn.)
5	<i>TutthamrutaVati</i> ( <i>Rasatarangini</i> 21/113-118)	<i>Shali</i> , <i>Godhooma</i> ( <i>Triticum sativum</i> Linn), <i>Mrudaga</i> ( <i>phaseolus radiates</i> Linn.), <i>Aajya</i> (ghee)	-

Although there is a widespread public perception that all dietary supplements are safe during pharmacotherapy, *Rasa Tarangini* (Table 3.3) has demonstrated that some dietary products also carry the dangers of drug interaction. Drug interactions can be defined as the modification of the safety and efficacy profile of a medication following the co-administration of drugs, ingredients or additives present in the diet.<sup>21</sup> When food is associated with such interactions, the situation is known as food-drug interactions.<sup>22</sup>

#### **Guidelines on the signs and symptoms of toxicity and their management:**

Presently at somewhere heavy metals have been reported for their toxicity which raised concern about *Rasa Aushdha*. It is imperative to mention that seers of *Rasa shashtra* were well aware of adverse reactions, toxicity of these drugs. Accordingly, the possible signs and symptoms of their toxicity and measures to combat them also found in classics as elucidated in table 3.4 and 3.5.

**Table 3.4 Description of Adverse effect by Ashodhita / Agrahya metals / minerals**

Sr. No.	Material	Adverse effects
1	<i>Ashodhita gandhaka</i>	<i>Chittavibhrama, raktavikrutijanitroga and prashannata, surupata, prabha, balanasha</i>
2	<i>Ashuddha hingula</i>	<i>Moha, prameha, chittavibhrama, andhya, klama</i>
3	<i>Pinkabhra</i>	<i>Mala rodhana, mrutyu, kushthaetcmaharoga</i>
4	<i>Nagabhra</i>	<i>Mahaghor bhagandara, madalakushtha, mahakushtha</i>
5	<i>Madukabhra</i>	<i>Sashtrasadhya ashmari</i>
6	<i>Ashodhita abhraka</i>	<i>Hrid parshva peeda, shotha, kshaya, pandu, kushtha</i>
7	<i>Ashodhitaharatla</i>	<i>Daha, kshobh, sarirakampa, toda, pida, kushtha, sarirakamatanashta, vatakapraprakopakaroga</i>
8	<i>Ashodhita Manahshila</i>	<i>Balanasha, tvaka sundarata nasa, malavishtambhakarini, mutra avrodhakari, mrutra kruchhha.</i>
9	<i>Ashodhita swarna</i>	<i>Budhhi bala nashaka, vividha rogajanaka</i>
10	<i>Ashodhita Swarna makshika</i>	<i>Akshiroga, mandagni, kushtha, haleemak, koshta gata vata prakopa</i>
11	<i>Ashodhitarajatasmakshika</i>	<i>same as described in swarnamakshika</i>
12	<i>AshodhitaRajata</i>	<i>Taap vrudhdi, Veerya naasha, Shareera pushtihaani, vidabandh, Angasaad</i>
13	<i>AshodhitaTamra</i>	<i>Kaayakaanti Naasha, Vaanti, Bhranti, Taapa Vrudhdi, Dhaatu Pushti Haani, Atisara, Moorchha need of Amrutikarana: Vaanti, Bhranti, Chita Santaap, Mukha Shosha, Dhaatu Kshobha, Aruchi, Daha, Moha</i>
14	<i>Ashodhita Vanga</i>	<i>Kaya Kanti Nasha, Kushtha, Kilasa, Gulma, Prameha, Kshaya, Pandu, Shotha, Shleshma Jvara, Bhagandara, Shukrashmari, Rakta Vikara</i>

**Table 3.5. Description of *Vikara* (adverse effects) *Shanti upaya* (treatment protocol)**

Sr. No.	Materials causing <i>Vikara</i>	<i>Shanti upaya</i> (treatment protocol)
1	<i>Naga Bhasma</i>	<i>Shudhdha Gandhaka</i>
2	<i>Parada Bhasma Sevana Janya Vikara</i>	<ol style="list-style-type: none"> <li>1. <i>Tapa vrudhhi: Shitalajalasinchana, Chandana lepa, kavya gathaprasang</i></li> <li>2. <i>Manasika Sakti Durbala: Asava Arishta Pana</i></li> <li>3. <i>Atyadhika Trusha: Narikela Jalapana, Shitala Pathya</i></li> <li>4. <i>Daha:</i>  <i>I) Kashaya of Guduchi, Ushira, Dhanyak, Yashtimadhu, Parpata, Chandana, Tugakshiri and Sita Churna</i>  <i>II) Praval Bhasma and Guduchi Satva (in same proportion) with Kushmanda Swarasa</i> </li> </ol>
3	<i>Parada janya Vikara</i>	1. <i>Ghritha, dugdha, shodhita gandhaka with nagarvallipana</i>
4	<i>Ashuddhanaga Sevanajanyavikatra</i>	<i>Gandhaka drava</i>
5	<i>Haratala dosha janitavikara</i>	1. <i>Jeeraka, Madhu, Sarkara with Kushmanda Swarasa (3 times /day)</i>
6	<i>Manahshila dosha janitavikara</i>	1. <i>Ksheera with Madhu Pana (till 3 days)</i>

*Rasa Tarangini* have faithfully noticed and reported ADRs occurred due to therapeutic use of *Ashodhita / Aagrahya* metals and minerals (Table 3.4) and at the same time also described *Vikara* (adverse effects) *Shanti Upaya* (treatment protocol) (Table 3.5). This also teaches us that remain vigilant to the given drugs is also a duty of the physician.

#### Conclusion:

On the basis of above exercise, it can be said that metal and mineral drugs are safe after proper pharmaceutical procedures, at recommended doses along with suitable adjuvant (*Anupana* and *Sahapana*) and judicious use. These classical confirmations of therapeutic uses of *Rasa Aushadhi* are strongly evidence for their efficacy and safety as they are clinically tested since ages. But stringent procedures and specific dose along with strict *Pathya-Apathya* given in *Rasa Tarangini* indicates that, if one violates these rules while prescribing metals, mineral or herbo-mineral products, they will readily encounter ADRs. Authors anticipates this study will help to understand classical text *Rasa Tarangini* in account of Pharmacovigilance concern in analysing ADRs among health care professionals and researchers.

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## Chapter 4

### ***Peganine* a potent compound of *Adhatoda vasica* against Target Protein TNF- $\alpha$ of Asthma – An in Silico**

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#### **Abstract**

Herb *Adhatoda vasica* is used in the treatment of respiratory disorders mentioned in Ayurveda since time immemorial. Asthma is the 14th most important disorder in the World. The *in-silico* method adopted in the present study has been done for discovery of potent drug candidate among compounds of *Adhatoda vasica* against the Target Protein TNF- $\alpha$  of Asthma. TNF- $\alpha$  of Asthma is identified by a study on Asthma Pathway derived from KEGG Pathway Database and cross validated using PDTD (Potential Drug Target Database). The 3D Structure retrieved from RCSB-PDB Server. 12 phytochemicals of *Adhatoda vasica* have been retrieved from Knapsack Family Data Base and toxicity assessment done using OSIRIS Property Explorer. 8 phytochemicals viz. Vasicolinone, Vasicoline, Vasicol, Vasicinolone, Vasicinone, Vasicinol, Peganine, Deoxyvasicinon passed the virtual screening phase. Molecular docking studies of all the screened 8 ligands of *Adhatoda vasica* with target protein of Asthma TNF- $\alpha$  showed *Peganine* to bind with CYS101 residue (A: CYS101:HN1) having the best minimum binding affinity  $\Delta G = -7.1$  kcal/mol. The present study helped to identify that *Peganine* can be used as a potent drug candidate for Target Protein TNF- $\alpha$  of Asthma.

**Keywords:** *Adhatoda vasica*, Asthma, *in-silico*, TNF- $\alpha$ , *Peganine*

#### **Introduction:**

*Adhatoda vasica* of the Acanthaceae family is a potent plant drug used in treatment of respiratory disorders mentioned in various Ayurved Samhitas but its functions at molecular level in Asthma is yet unknown. In this study, an *in-silico* molecular approach was followed to discover the potent drug candidates from the compounds of *Adhatoda vasica* against the target protein TNF- $\alpha$  involves in Asthma. TNF- $\alpha$  is a proinflammatory cytokine that has been implicated in many

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aspects of the airway pathology in asthma. TNF- $\alpha$  is also produced by several other proinflammatory cells, including monocytes, dendritic cells, B cells, CD4+ cells, neutrophils, mast cells and eosinophils, and the structural cells (i.e., fibroblasts, epithelial cells, and smooth muscle cells)<sup>1</sup>. The mechanisms driving TNF- $\alpha$ -induced Airway hyperresponsiveness (AHR) could be caused by a direct effect of TNF- $\alpha$  on airway smooth muscle (ASM), as outlined in detail below, or indirectly by the release of the cysteinyl leukotrienes C4 and D4<sup>2</sup>. TNF- $\alpha$  is a chemoattractant for neutrophils and eosinophils<sup>3</sup>, increases the cytotoxic effect of eosinophils on endothelial cells<sup>4</sup>, involved in the activation of T cells increase cytokine release<sup>5</sup> and increases epithelial expression of adhesion molecules, such as intercellular adhesion molecule 1 and vascular cell adhesion molecule1<sup>6</sup>. The upregulation of adhesion molecules might also promote migration of inflammatory cells to the lung and therefore indirectly affect the development of Airway hyperresponsiveness (AHR)<sup>7</sup>, including recruitment of neutrophils<sup>8</sup>, Myocyte proliferation<sup>9</sup> and stimulation of fibroblast growth and maturation into myofibroblasts by promoting TGF- $\beta$  expression<sup>10</sup>. Therefore, in severe refractory asthma, in addition to promoting airway inflammation and Airway hyperresponsiveness the TNF- $\alpha$  play a central role in airway remodeling.

## Materials and Methods

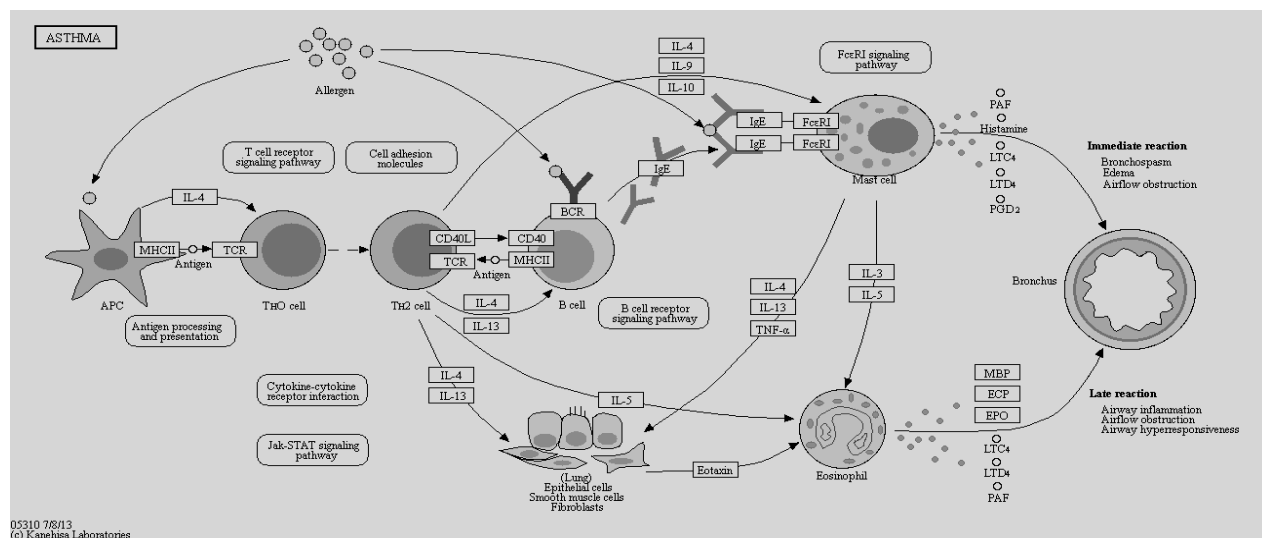
Materials used were Data base and Software. Data base includes KEGG<sup>11</sup>, KnapSack Family Database<sup>12</sup>, Research Collaboratory of Structural Bioinformatics (RCSB)<sup>13</sup> and Software includes MarvinSketch<sup>14</sup>, OSIRIS Property Explorer<sup>15</sup>, Auto Dock Vina (AutoDock4 and Auto Dock Tools)<sup>16</sup>. To identify the Target Protein TNF- $\alpha$  involved in Asthma a study on Asthma Pathway derived from KEGG Pathway Database has been done (Figure 4.1) and cross validated using PDTD (Potential Drug Target Database). The 3D Structure files of identified target protein were retrieved from RCSB-PDB Server by using the PDBID (derived from PDTD database) in the form of *.pdb File (text)* format (Figure 4.2).

Compounds of *Adhatoda vasica* - Anisotine, Deoxyvasicinone, Peganine, Vasicinol, Vasicinone, Adhatodine, Vasicinolone, Vasicoline, Vasicol, Vasicolinone, 4,2'-dihydroxychalcone 4-glucoside and Peganidine have been retrieved from Knapsack Family Data Base in the form of *.mol* format, they are converted into *.smiles* and *.pdb* format using Marvin Sketch and toxicity assessment using OSIRIS Property Explorer. Molecular descriptors like clogP, solubility, Molecular Weight, total polar surface area (TPSA), drug likeness, Drug score and side effects such as mutagenicity, tumorocity, irritant and reproductive effective are determined. 8 out of 12 compounds are selected for molecular docking depending and on the basis of drug-relevant properties and on the basis of the Lipinski's rule of 5.

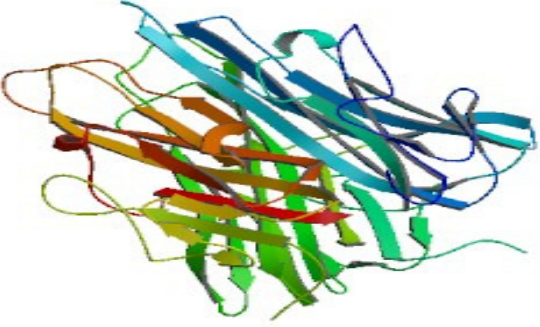
Finally, proteins were optimized for proteins ligands interaction studies by deleting all water molecules and then save the file in the form of *.pdb* file format. Then the *.pdb* files browsed in Autodock to add Hydrogen Atoms as most PDB structures do not have and charge is added to the PDB files and saved in *.pdbqt* format. The grid parameter is set. Ligands obtained

from Knapsack Family Data Base in the form of .mol format converted into .pdb format using Marvin Sketch, optimized by using AutoDock Vina and saved in .pdbqt format. Finally molecular docking is carried out between Identified Target Protein TNF- $\alpha$  and the Screened ligands using Autodock Vina. The based protein ligand complex is analyzed based on minimum binding affinity.

## Results of *In Silico* Studies



**Figure 4.1:** Pathway of Asthma

	<p><b>Name:</b> TNF-<math>\alpha</math> (PDBID: 1A8M)</p> <p><b>Classification:</b> Lymphokine Structure</p> <p><b>Weight:</b> 51986.10</p> <p><b>Length:</b> 157</p> <p><b>Method:</b> X-RAY DIFFRACTION</p> <p><b>Resolution [Å]:</b> 2.30</p> <p><b>Molecular Function:</b> Tumor necrosis factor receptor binding</p>
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**Figure 4.2:** Target Protein of Asthma TNF- $\alpha$

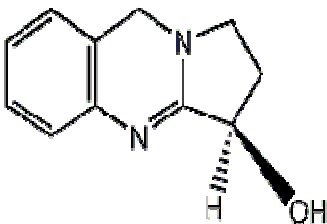


**Table 4.1. Toxicity assessment of Phytochemicals of *Adhatoda Vasica***

Sl. No.	C_ID	Metabolites	Molecular formula	Molecular weight
1	C00002150	Deoxyvasicinone <sup>17</sup>	C11H10N2O	186.07931296
2	C00002191	Peganine <sup>17</sup>	C11H12N2O	188.09496302
3	C00002201	Vasicinol <sup>17</sup>	C11H12N2O2	204.08987764
4	C00002202	Vasicinone <sup>17</sup>	C11H10N2O2	202.07422758
5	C000026253	Vasicinolone <sup>18</sup>	C11H10N2O3	218.0691422
6	C000026254	Vasicol <sup>19</sup>	C11H14N2O2	206.10552771
7	C000026255	Vasicoline <sup>18</sup>	C19H21N3	291.17354769
8	C000026256	Vasicolinone <sup>20</sup>	C19H19N3O	305.15281225

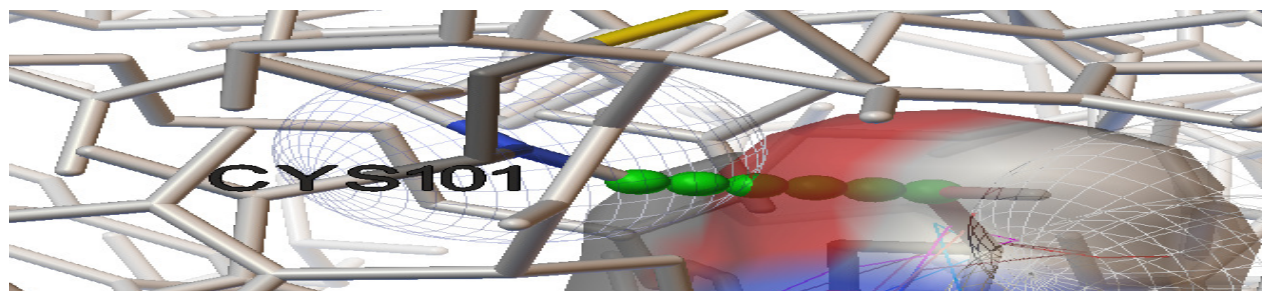
**Note:** 8 out of 12 compounds are considered in the virtual screening phase. *Adhatodine*, *Anisotine* are screened out for its tumerogenic effect; *Paganidine* for its irritant effect and 4, 2'-*Dihydroxychalcone 4-glucoside* for its partial drug likeness and drug score.

**Table 4.2: Retrival of Peganine Phytochemical of *Adhatoda Vasica* using Knapsack Family Data Base**

Compound Name: Peganine	Compound Identification Number (CID)	Molecular Formula	Molecular Weight
	<u>C00002191</u>	C11H12N2O	188.09496302

**Table 4.3: Binding affinity in the docked complex of target protein and ligands**

Sl No.	Ligands	Target Protein	Binding Affinity (kcal/mol)
1	Deoxyvasicinone	TNF- $\alpha$	NILL
2	Peganine	TNF- $\alpha$	-7.1
3	Vasicinol	TNF- $\alpha$	-5.6
4	Vasicinone	TNF- $\alpha$	-5.5
5	Vasicinolone	TNF- $\alpha$	-6.4
6	Vasicol	TNF- $\alpha$	-6.5
7	Vasicoline	TNF- $\alpha$	NILL
8	Vasicolinone	TNF- $\alpha$	-6.4

**Figure 4.3: Visualization of Potent Ligand interaction in the docked complex: Interaction between CYS101 residue of TNF- $\alpha$  with Peganine (A: CYS101:HN1)**

### Discussion

Summarizing the entire study of the results of molecular docking study-Out of 12 phytochemicals of *Adhotada vasica* (Table 4.1 & Table 4.2), 8 phytochemicals viz. Vasicolinone, Vasicoline, Vasicol, Vasicinolone, Vasicinone, Vasicinol, Peganine and Deoxyvasicinone passed the virtual screening phase and have shown good binding affinity with target protein TNF- $\alpha$  (Table 4.3). Molecular docking studies of 8 ligands with target TNF- $\alpha$  showed the *PEGANINE* binds with *CYS101* residue (A: *CYS101:HN1*) having minimum binding affinity with TNF- $\alpha$ ,  $\Delta G = -7.1$  kcal/mol (Figure 4.3). The In-silico methods adopted in the present study facilitated in identifying the potential of *peganine* as a drug candidate for target protein TNF- $\alpha$  of Asthma.

Considering the critical role of TNF- $\alpha$  in the pathogenesis of asthma and the need for alternative treatments for those asthmatic patients with severe disease who are particularly resistant to conventional therapy, molecules targeted at blocking the effects of TNF- $\alpha$  are likely to constitute a considerable advance in the management of these difficult patients. The compound identified as potent drug for Asthma as a result of in-silico molecular studies can be used as templates for synthesizing drugs. Such type of study will reduce the error of synthesizing chemical compounds (Ligands) compatible to their protein molecules. New pharmacophore can be designed based on those identified chemical compounds of plant which may have less side effect and toxicity than the original chemical compounds of *Adhatoda Vasica*.

## Conclusion

The Molecular Interaction Studies In-silico Approach will help in the further study in ‘vitro’ and ‘vivo’ reduces the time; cost in laboratory and subsequently before it enters the clinical trials. So, this technique is significant in the research and will help in the development of drug molecules at early stage, safety evaluation and old drugs with new use.

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## Chapter 5

### Anti-Diabetic Activity of Aqueous Ethanolic Extract of *Tamarindus Indica* Fruit Pulp.

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#### Abstract:

According to Ayurveda *Tamarindus indica* (*amlaka*) have high medicinal properties and different parts of the plant are used for various medicinal formulations. The present study focusses on hypoglycemic effect of aqueous ethanolic extract of the *Tamarindus indica* fruit pulp in streptozotocin (55mg/kg body weight) induced diabetic rats. Anti-diabetic effect was evaluated by administering oral doses of *Tamarindus indica* aqueous ethanolic extract (TIAEE) for 15 days on the experimental animals. TIAEE treated experimental animal shown significant ( $p < 0.01$ ) reduction in Fasting Blood Glucose and the elevated liver enzyme levels, after 15days of administration when compared to the STZ treated animal. Histo-pathological analysis shows remarkable regeneration in hepatic and pancreatic cell structure in TIAEE treated animal. Aqueous ethanolic extract of Tamarind at higher dose (400mg/kg body weight) was more effective than lower dose (200mg/body weight). Therefore, result of the present study indicates that Tamarind fruit pulp is a significant anti- diabetic compound.

**Key words:** *Tamarindus indica*, streptozotocin, anti-diabetic, hepato-protection, Diabetes mellitus, hypoglycemic effect.

#### Introduction

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia and disturbances in carbohydrates, fats, protein, and lipid metabolism (Ansarullah *et al.*, 2011). It is characterized by raised in Blood Glucose levels due to deficiency in insulin secretion and usually combine with insulin resistance. According to the International Diabetes Federation (Atlas seventh Edition 2015), about 415 million people had diabetes worldwide with Diabetes Mellitus making up about 90% of the cases. Based on current trends, about 642 million individuals all over the world will have Diabetes by the year 2040. Although the prevalence of Type-1 and Type-2 diabetes is increasing in alarming rate worldwide, but the prevalence of Type-2 Diabetes Mellitus is more dreaded because of its complication in almost every part or rather every cell of the body. Oral hypoglycemic agents and insulin therapy which are at present the cornerstone in the management of Diabetes Mellitus are not with their fair share of adverse

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effects and despite the tremendous progress made in the understanding of the patho-physiology pathways of Diabetes Mellitus, a low cost, minimal side effect producing cure remains elusive. *Tamarindus indica* is a medium to large size evergreen tropical tree belong to monotypic genus and family of the Fabaceae. Flower, Seeds, Fruit, Ksara (Alkali preparation) of Tamarind is used in Ayurvedic formulations for its medicinal properties for diseases like *Udararoga*, *Agnimandya*, *Arocaka*, *Paktisula*, *Trsna*, *Klama*, *Srama*, *Bhranti*, *Karnasula*, *Nadivrrana*, *Vatavyadhis*, *Agnimandya*, *Kamala*, *Sotha* etc. The fruit is reported of being rich in phenolic compounds and cardiac glycosides (Rasuet *al.*, 1989). Therefore, in this present study an attempt has been made to determine the therapeutic effect of Tamarind fruit pulp with special reference to anti-diabetic property.

## **Material and Methods**

*Tamarindus indica* fruits were collected from Kamrup district and authenticated in the Botany department, Guwahati University, Assam, India. Air dried 95% ethanol extract of the fruit was used for the study at two doses: 200 mg/kg body weight and 400 mg/ kg body weight.

### **Acute Toxicity Test:**

The acute toxicity study was performed in Swiss albino mice of either sex (6 animals) weighing 25-30 gm to select optimum doses to evaluate the Anti-diabetic and Hepatoprotective properties of *Tamarindus indica* fruit pulp extract.

### **Evaluation Of Anti-diabetic Property of Tamarind:**

Adult male Wistar rats weighing 150-180 gm were procured from animal house of Institute of Advanced Study in science and Technology (IASST), Guwahati, Assam, India, and the study was performed in accordance with CPCSEA guidelines. Diabetes was induced to overnight fasted rats by single Intraperitoneal (IP) injection of 55 mg/kg Streptozotocin (STZ) in citrate buffer (pH 4.35). Control rats were given with citrate buffer without STZ.

### **Animals Grouping and Drug Treatment:**

Animals were randomly divided into 5 groups containing 6 rats each. The drug treatments were given as following:

- Group 1 = Control animals treated with citrate buffer without STZ.
- Group 2 = Diabetic animals treated with 0.3 % carboxy methyl cellulose (CMC).
- Group 3 = Diabetic + Glibenclamide (10mg/kg bodyweight)
- Group 4 = Diabetic + *Tamarindus indica* aqueous ethanolic extract (200mg/kg bodyweight).
- Group 5 = Diabetic + *Tamarindus indica* aqueous ethanolic extract (400mg/kg bodyweight).

After induction of diabetes with streptozotocin, the diabetic rats were treated with plant extract and standard drug orally once daily for 15 days. Fasting Blood Glucose was measured by glucometer at morning 8 am on 0<sup>th</sup> day, 5<sup>th</sup> day, 10<sup>th</sup> day and 15<sup>th</sup> day of the study. Animals were sacrificed on 15<sup>th</sup> day by injecting high dose of ketamine anesthesia, blood was collected from retro – orbital puncture and serum was separated by using centrifugation at 400 rpm for 10minutes.

Liver and pancreas tissues were embedded in paraffin. 5µm thick sections were prepared and stained with hematoxylin and eosin dye for the microscopic observation (45X).

Statistically analyzed was calculated by one way ANOVA followed by Dunnett multiple comparison test with equal sample size.

### Observation And Results:

The animals treated with *Tamarindus indica* aqueous ethanolic extract at dose of 200 mg/kg and 400 mg/kg and Glibenclamide (10 mg/kg) showed significant ( $p < 0.05$ ) decline in FBG ALT, AST, ALP; ALP, LDH, Serum Creatinine, total Bilirubin and total protein when compared to diabetic control animals The plant extract at higher dose was more effective when compared to lower dose, as shown in following tables. The order of anti-hypoglycaemic activity of the test substances is Glibenclamide> TIAEE 400 mg/kg > TIAEE 200 mg/kg.

**Table 5.1: Effect of TIAEE on fasting blood glucose (FBG) levels**

S no.	Group	Fasting Blood Glucose (FBG) Mg/dl							
		0 <sup>th</sup> day		5 <sup>th</sup> day		10 <sup>th</sup> day		15 <sup>th</sup> day	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1.	Control	98.4	± 4.9	102.6	± 5.2	99.8	± 4.4	100.5	± 3.9
2.	Diabetic Animals	101.6	±5.8 <sup>x</sup>	289	± 7.4 <sup>x</sup>	314.7	± 8.2 <sup>x</sup>	322.4	± 7.9 <sup>x</sup>
3.	Diabetic + Glibenclamide (10mg/kg)	99.8	± 4.6 <sup>^</sup>	136.9	± 6.6 <sup>^</sup>	127.2	± 6.1 <sup>^</sup>	124.7	± 5.7 <sup>^</sup>
4.	Diabetic + TIAEE (200mg/kg)	98.4	± 5.2	203	± 8.4 <sup>^</sup>	192.7	± 7.6 <sup>^</sup>	184.1	± 7.3 <sup>^</sup>
5.	Diabetic + TIAEE (400mg/kg)	101.3	± 4.4	188.3	± 8.6 <sup>^</sup>	175.8	± 6.9 <sup>^</sup>	158.4	± 7.8 <sup>^</sup>

**Table 5.2: Effect of TIAEE on rat serum liver enzyme levels**

S no.	Group	AST (IU/I)		ALT (IU/I)		ALP (IU/I)		LDH (IU/I)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1.	Control	38.17	± 3.14	34.17	± 3.26	85.44	± 5.29	384.28	± 9.85
2.	Diabetic Animals	102.56	±6.48 <sup>x</sup>	92.19	±7.19 <sup>x</sup>	182.46	±10.47 <sup>x</sup>	808.92	±21.62 <sup>x</sup>
3.	Diabetic+ Glibenclamide(10mg/kg)	49.36	± 4.17 <sup>^</sup>	40.73	± 3.48 <sup>^</sup>	102.82	± 5.84 <sup>^</sup>	522.95	± 16.75 <sup>^</sup>
4.	Diabetic + TIHAE (200mg/kg)	71.63	± 4.86 <sup>^</sup>	63.37	± 5.24 <sup>^</sup>	155.92	± 7.29 <sup>^</sup>	724.86	± 15.44 <sup>^</sup>



5.	Diabetic + TIHAE (400mg/kg)	58.77	± 3.61 <sup>^</sup>	49.83	± 4.49 <sup>^</sup>	128.59	± 6.44 <sup>^</sup>	658.97	± 16.81 <sup>^</sup>
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ALT; Alanine aminotransferase, AST; Aspartate aminotransferase, ALP; Alkaline Phosphatase, LDH; Lactate Dehydrogenase.

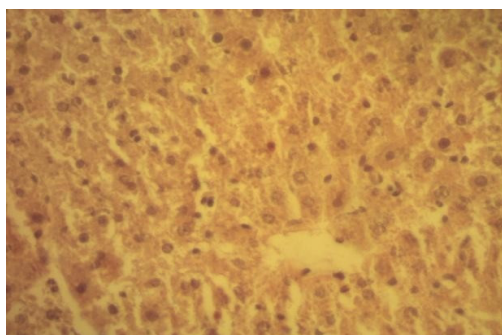
**Table 5.3: Effect of TIAEE on Serum Biomarkers**

S no.	Group	Creatinine (mg/dl)		Total Bilirubin (mg/dl)		Total protein (mg/dl)	
		Mean	SD	Mean	SD	Mean	SD
1.	Control	0.68	± 0.08	0.49	± 0.07	8.28	± 0.76
2.	Diabetic Animals	1.68	± 0.12 <sup>*</sup>	1.87	± 0.26 <sup>*</sup>	5.75	± 0.31 <sup>*</sup>
3.	Diabetic+ Glibenclamide (10mg/kg)	0.75	± 0.09 <sup>^</sup>	0.88	± 0.09 <sup>^</sup>	7.46	± 0.47 <sup>^</sup>
4.	Diabetic + TIAEE (200mg/kg)	1.08	± 0.07 <sup>^</sup>	1.26	± 0.11 <sup>^</sup>	6.37	± 0.38 <sup>^</sup>
5.	Diabetic + TIAEE (400mg/kg)	0.91	± 0.06 <sup>^</sup>	0.97	± 0.08 <sup>^</sup>	6.93	± 0.41 <sup>^</sup>

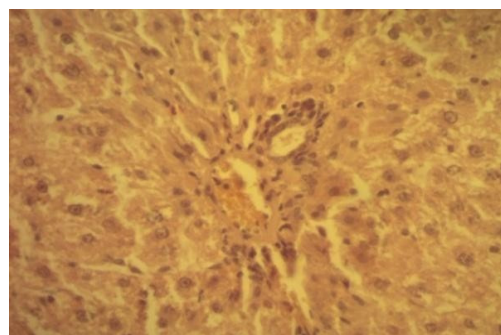
All the results were represented in Mean ± Standard Deviation (n=6). One way ANOVA followed by Tukey's post hoc test was performed to compare the groups. \*P≤0.05 in comparison of diabetic control (Group – 2) with normal control group (Group -1),<sup>^</sup>P ≤ 0.05 in comparison of drug treated groups (Group - 3, Group – 4 and Group – 5) with diabetic control (Group -2), TIAEE; *Tamarindus indica* aqueous ethanolic extract.

## Histopathological Examination

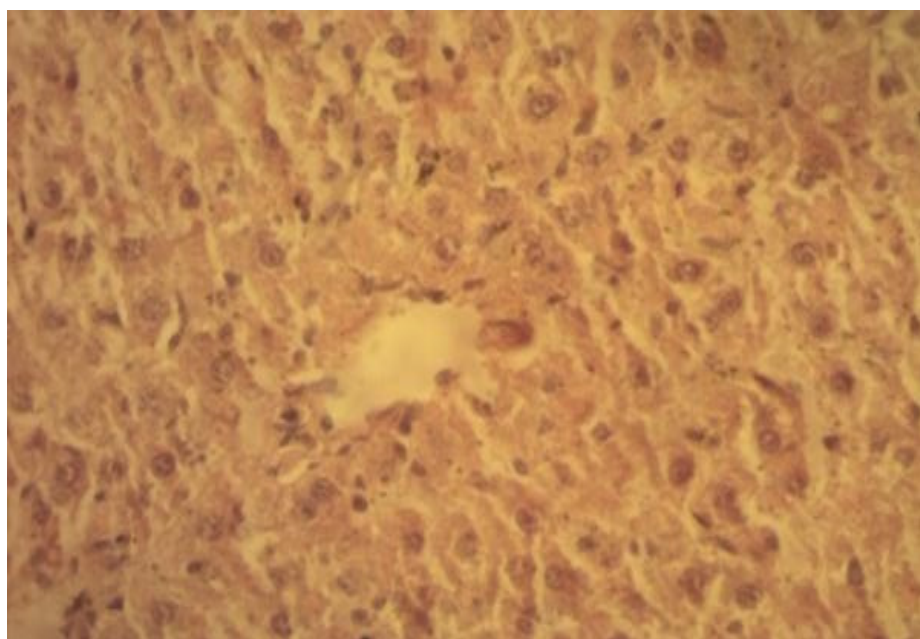
### (a) Liver



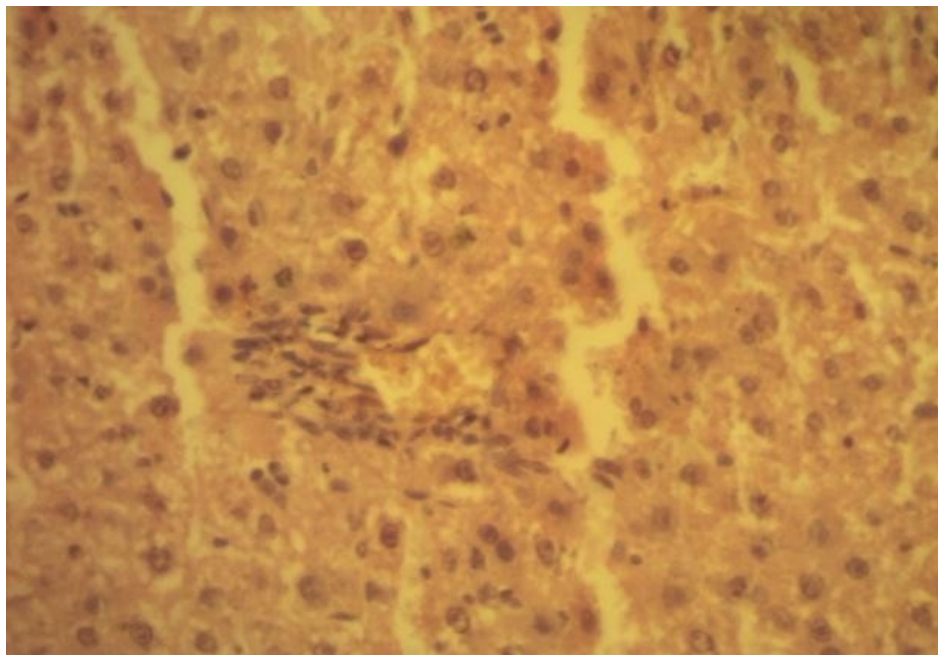
**Figure 5.1:** Histological slide of Control group shows no changes in hepatic-cellular structure.



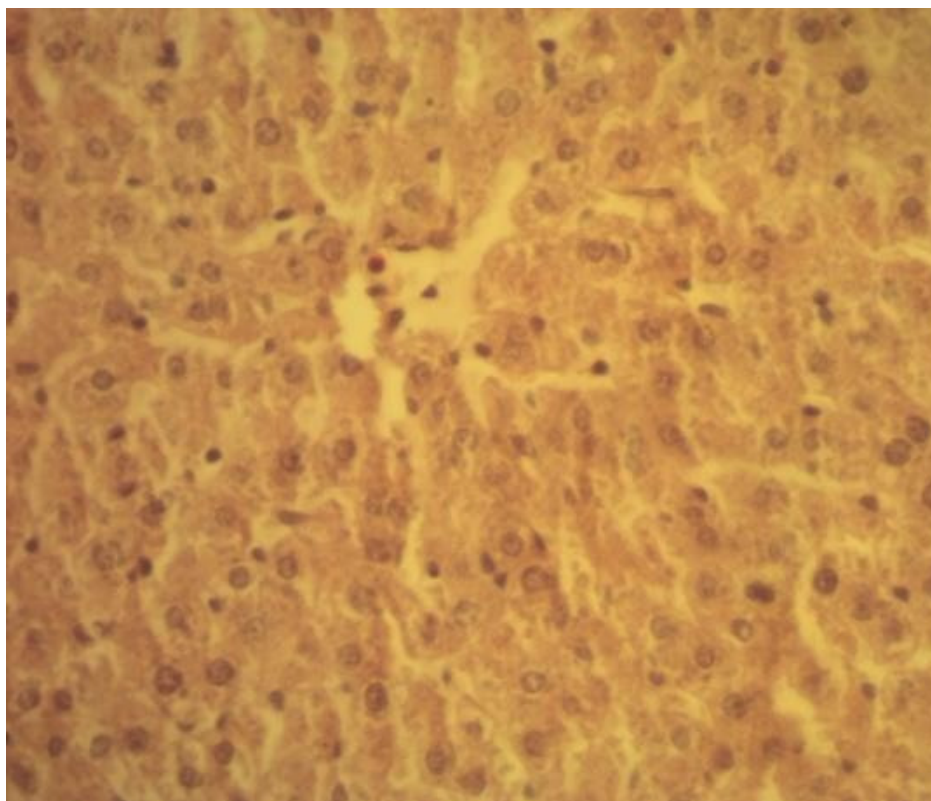
**Figure 5.2:** Histological slide of Diabetic animals shows gross degeneration and necrosis in hepatic- cellular structure



**Figure 5.3:** Histological slide of Diabetic animals treated with standard drug (Glibenclamide) shows visible hepatic- central veins.

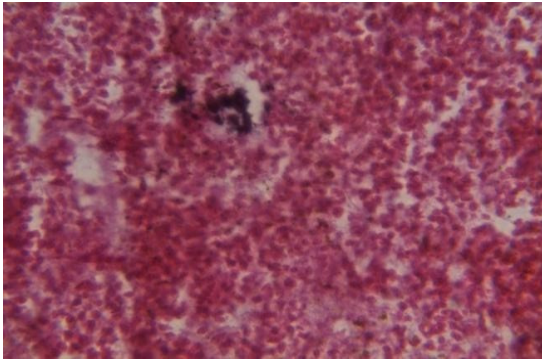


**Figure 5.4:** Histological slide of Diabetic animals treated with 200 mg/kg body weight of TIAEE shows partial reverse in damage of hepatic cell

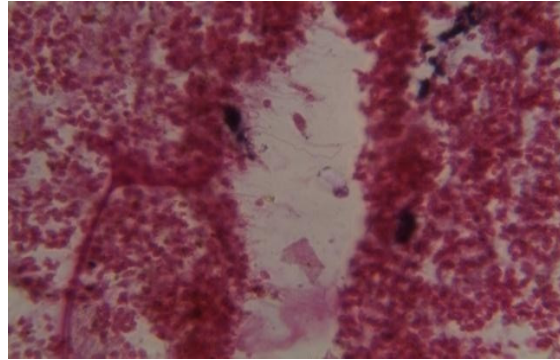


**Figure 5.5:** Histological slide of Diabetic animals treated with 400 mg/kg body weight of TIAEE shows visibly improvement hepatic-cellular Structure.

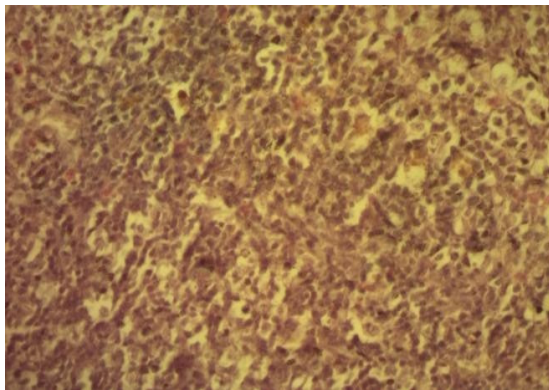
**(b) Pancreas**



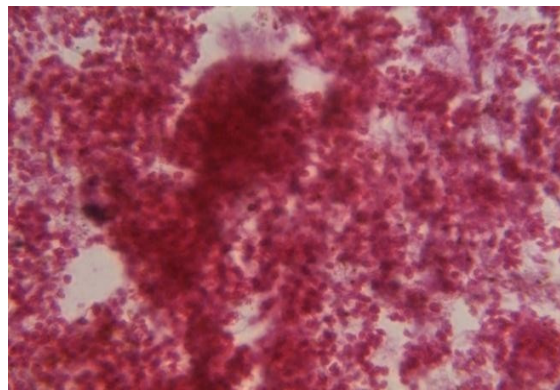
**Figure 5.6:** Histological slide of control animals shows normal cytoarchitecture of pancreatic islet.



**Figure 5.7:** Histological slide of Diabetic animals shows a decrease in the diameter of pancreatic islets and number of islets cell and degeneration in pancreatic acini.

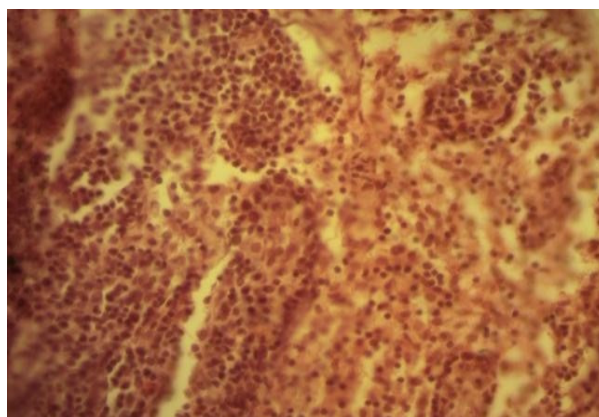


**Figure 5.8:** Histological slide of Diabetic animals treated with Glibenclamide (55 mg/body weight) shows a noticeable improvement in diameter and cell count of pancreatic islets.



**Figure 5.9:** Histological slide of Diabetic animals treated with 200 mg/ kg body weight of TIAEE shows less improvement in diameter and cell count of pancreatic islets





**Figure 5.10:** Histological slide of Diabetic animals treated with 400 mg/kg body weight of TIAEE shows partial recovery in diameter and cell count of pancreatic islets.

### Discussion And Conclusion

The experimental result showed Aqueous ethanolic extract of the Tamarind fruit pulp significantly ( $p < 0.01$ ) reduced the Fasting Blood glucose level, hepatic marker and serum Biomarker. In histo- pathological analysis the plant extract remarkably reverses the damaged induced by streptozotocin in rat liver and pancreas cellular structure. In this present study it is observed that plant extract at higher dose 400 mg/ kg body weight was more effective when compare to control group. Therefore, Tamarind fruit extract can be a good alternative for the treatment of type 2 Diabetes. However, this study had some limitations too. Firstly, more evidences would have been generated by the effect of the extract on mortality, body weight changes, glucose loading and its tolerance. Secondly, the analysis of the effect of *Tamarindus indica* fruit extract on insulin levels and viable  $\beta$  cell counts would have given strong proof of its anti-diabetic activity.

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## Chapter 6

### To evaluate the efficacy of a Poly Herbo-Mineral Compound and Yashtimadhu Churna in the management of Grade I & Grade II Fatty Liver (Hepatic Steatosis)

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#### Abstract

Hepatic Steatosis is a common predicament in society due to change of lifestyle and food practices. Depending upon the cause and amount of accumulation, fatty change may be mild and reversible, or severe producing irreversible cell injury and cell death. Disturbances of lipid metabolism in liver due to various etiological factors lead to Fatty Liver. Ayurveda has immense potential in the management of Non-Communicable Diseases, and Fatty liver is one among them. In Ayurveda, direct correlation of Fatty liver is not found but it can be considered under *Yakrit roga* and *Medoroga*, as a *Santarpanjanya Vyadhi*. Hepatic steatosis patients are treated with *Triphaladi yoga* and *Yashtimadu churna* for a period of 3 months, in the Department of Kayachikitsa, Govt. Ayurvedic College and Hospital, Guwahati. The aim of this trial is to formulate a practical Ayurvedic protocol for the management of Grade I and Grade II Fatty liver. However, further research studies are needed to fulfil the aims and objectives.

**Keywords:** *Yakrit roga*, Hepatic steatosis, *Santarpanjanya Vyadhi*, poly-herbo mineral compound, clinical trial.

#### Introduction:

Ayurveda is a holistic system of medicine. It has a great role in lifestyle disorders. So the changing lifestyle with food habits affects health along with liver too. Fatty liver is a very common disorder and refers to a condition where there is an accumulation of excess fat in the hepatocytes in the form of triglycerides. There are effective herbs available in Ayurveda for chronic diseases like fatty liver. It not only occurs in obese people but 7% of lean population is affected too. Hepatocytes perform numerous and vital roles in maintaining homeostasis and health. These functions include synthesis of serum proteins, metabolism of protein, fats and carbohydrates, storage of Vitamin A, D, B<sub>12</sub> and glycogen, coagulation factors, bile and bile acids etc. Fatty liver is a reversible condition wherein large amount of fat accumulate in liver cells via the process of steatosis. When fat content exceeds 5% of total weight of liver or more

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than 30% of liver cells in a liver lobule are with fat deposit, this condition is called as Fatty Liver. Aetiology of Fatty Liver mainly falls under two categories. First category comprises the conditions with excess fat which imparts increased workload to liver for metabolizing fat. Second category involves conditions of liver cell damage in which fat cannot be metabolized due to liver cell injury.

### **Etiology of Fatty Liver<sup>1</sup>**

<b>Conditions with excess fat</b>	<b>Liver cell damage</b>
Obesity	Alcoholic Liver Disease (most common)
Diabetes mellitus	Starvation
Congenital hyper-lipidaemia	Protein calorie malnutrition
	Chronic illness (e.g. TB)
	Acute fatty liver in late pregnancy
	Hypoxia (Anemia, cardiac failure)
	Hepatotoxins (Carbon tetrachloride, chloroform, ether, aflatoxin)
	Drug induced liver cell injury (methotrexate, CCl <sub>4</sub> ., steroids, halothane anaesthetic, tetracycline etc)
	Reye's Syndrome

Fatty Liver can be both – 1.Alcoholic Fatty Liver and 2. Non Alcoholic Fatty Liver.

According to Modern medicine, the fatty liver pathology has been classified into <sup>2</sup>

### **Non-Alcoholic Fatty Liver (NAFL)**

Presence of hepatic steatosis (fat accumulation) with no evidence of hepato-cellular injury in the form of ballooning of the hepatocytes or no evidence of fibrosis. The risk of progression to cirrhosis and liver failure is minimal.

### **Non-Alcoholic Fatty Liver Disease (NAFLD)**

Encompasses the entire spectrum of fatty liver disease in individuals without significant alcohol consumption ranging from fatty liver to steato-hepatitis to fibrosis and cirrhosis.

### **Alcoholic Liver Disease**

- Chronic and excessive use of alcohol ingestion is one of the major causes of liver disease. Alcoholic liver disease mainly comprises of – (i) fatty liver, (ii) alcoholic hepatitis and (iii) cirrhosis.
- Fatty liver is present in more than 90% of daily as well as binge drinkers.



Fatty liver is now a growing problem worldwide. Although fatty liver is not fatal, but it cripples the affected patients and alcoholic fatty liver if not treated then it can progress to steatohepatitis to cirrhosis of the liver which is irreversible. In India 16%-32% of urban and 9% of rural population are affected according to THE INDIAN NATIONAL ASSOCIATION FOR STUDY OF THE LIVER (INASL) which was renamed from THE LIVER STUDY GROUP OF INDIA in 1992 having the parent association as INDIAN SOCIETY OF GASTROENTEROLOGY formed in the year 1960. The prevalence increased significantly 80-90% in obese adult, 60% in patients with hyper-lipidemia and 30-50% in diabetic patients. In India it is emerging as an important cause of liver disease.

*Ayurveda* has immense potential in the management of Non- Communicable Disease and NAFLD is one of them.

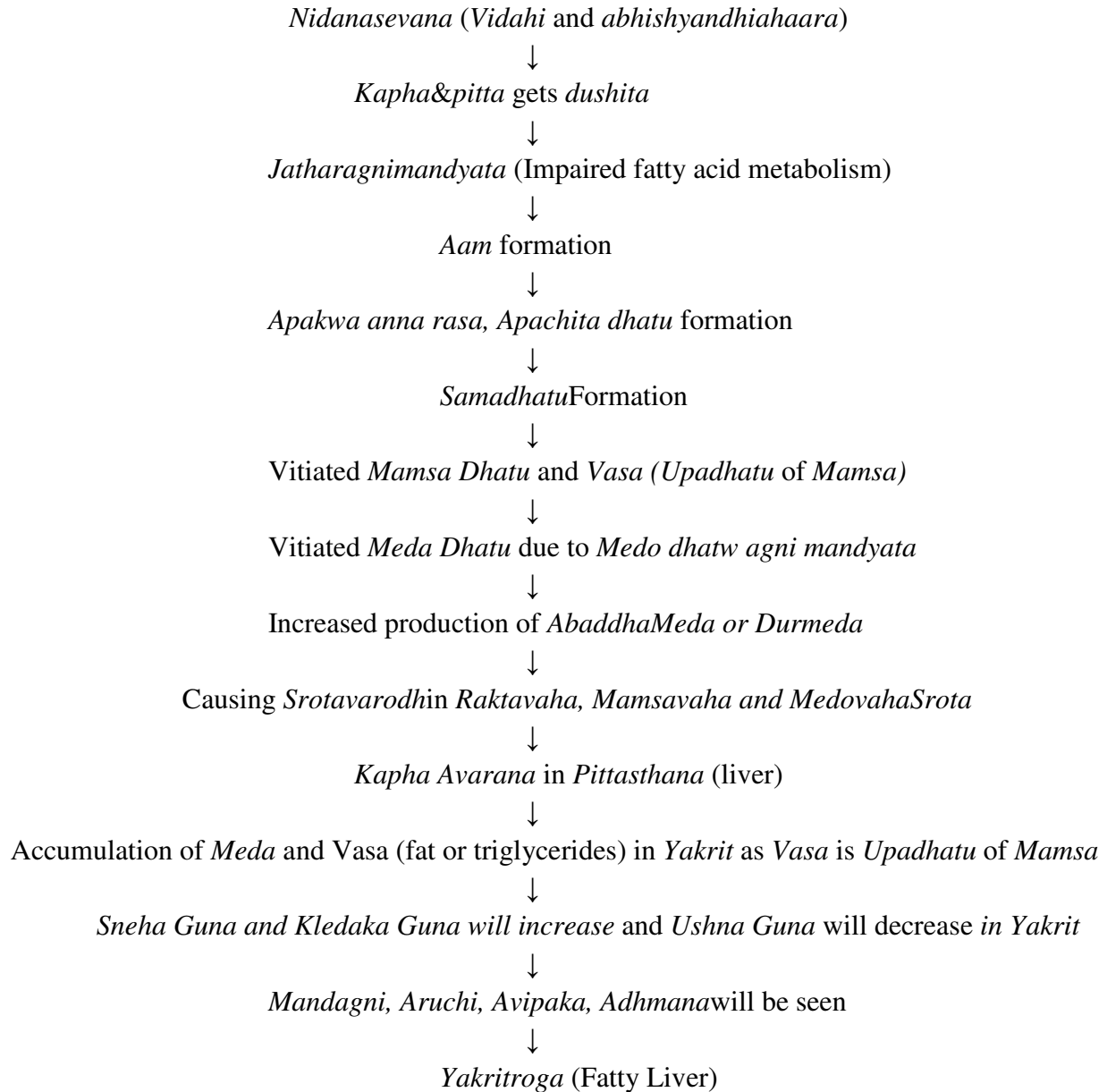
There is no description of *Yakrit vikara* as a separate chapter in Ayurvedic classics, only *Bhavaprakasha* mentioned it as a separate chapter. Description of *Yakritdalyodara* is found while describing *Pleehodara* in the *Brihatrayees*. All *Roga's* are known to occur due to *mandagni* and specially *Udararoga's*<sup>3</sup>.

In *Ayurveda*, Fatty liver may be understood considering *Yakritodara* and *Medoroga*.

*Meda* is the fourth *Dhatu* as per *Ayurveda* doctrine and resembles with adipose tissue, which in its natural state, maintains *Snigdha* and provides *Bala* to body. But when the quantity of *Meda* increases from normal, it causes various structural and functional abnormalities in the body. According to *Acharya Charaka*, *Avyayama*, *Divaswapna*, excessive intake of *Medasvi Dravya* and *Varuni Madya* are the causative factors of *Medovahasrotodushti*<sup>4</sup>. Excessive intake of these *ahara vihara* leads to *Jatharagnimandyata* and decrease the *Medodhatwagni*. If the *Meda Dhatwagni* is deregulated then there is disharmony of distribution of *Baddha Meda* (stored in particular site) and *Abaddha Meda*<sup>[5]</sup>(circulating fat) . This *Baddha Meda* can be termed as visceral fat and *Abaddha Meda* can be understood as circulating lipids which leads to *Medovridhi* and that excessive *Meda* deposits in various parts of body including *Yakrit* which impairs the proper function. The excessive fat deposit in liver causes fatty liver, which in lack of treatment can cause serious conditions. From this phenomenon it can be said that *Meda* not only creates *Sthaulya* it can create *Yakritmeda* too.

*Madya* is another common *nidana* nowadays for the development of steatosis. It is a common *raktadushakadravya* and also causes *Medovahasrotodushti*<sup>4</sup>. *Madya* has the following qualities: *Laghu*, *Ushna*, *Tikshna*, *Sukshma*, *Vishada*, *Amla*, *Ashu*, *Vikasi* and *Ruksha*<sup>6</sup>. All *Madya* are generally , *Pittakara* and *Vatahara* in nature. *Madya* is considered as *sannikrishtanidana* leading to *Yakritodara*. The *guna* of *Madya* causes *srototanutva* in *Yakrit* and brings *sithilata* in *dhatu* leading to *medodushti* and then sanchaya of *udaka* in *udaraPradesh* in between *twaka* and *mamsa*.

The probable *Samprapti* may be:



### **Samprapti Ghataka:**

- *Dosha - Kapha-pitta pradhana tridosaja*

*Vata- Prana, Vyana, Apana, Samana*

*Pitta – Pachaka*

*Kapha – Kledaka, Avalambaka*

- *Dushya – Rasa, Rakta, Mamsa*
- *Agni dushti – Jatharagni, Dhatw agni mandyata.*
- *Srota – Annavaha, Rasavaha, Raktavaha, Purishavaha*
- *Udbhavsthana – Amasaya*
- *Adhisthana – Udara*
- *Vyaktasthana – Yakrita, Pleeha, Udara*
- *Rogamarga - Abhyantara*

The management should be the breakdown of pathological factors like *kapha medodushti*, *srotoavarodha* and *agnivaigunya*. A practical treatment protocol including *Virechana* (Purgation), *Shamana* (Pacification) and lifestyle modification with due importance to particular bodily constitution (*prakriti*) can help in the proper management of the disease. Based on the *samprapti* and the *dosha* involved the drugs which are having *Tikta*, *Kasaya Rasa*, *Lekhana*, *Deepana* and *Pachana* properties, which increase the power of *Agni* and reduce *Kapha*, *Meda* and *Ama* are the choice of drugs for the management of Fatty liver.

Considering all the above qualities *Triphaladi Yoga*<sup>7</sup> mentioned in *Charak Samhita*, *Panduroga chikitsa* along with *Yashti madhuchurna*<sup>8</sup> included in *Haritakyadivarga* by *Bhava Prakash* is chosen for the study. Here in this study an attempt is made to find out the efficacy of *Triphaladi yoga* and *Yashtimadhu churna* in the management of Grade I & Grade II fatty liver.

### **Aims:**

To evaluate the clinical efficacy of a poly herbo-mineral compound and *Yashtimadhu Churna* in Grade I & Grade II fatty liver.

### **Objectives:**

1. To assess the beneficial effects of the poly herbo-mineral compound and *Yashtimadhu Churna* in Grade I & Grade II fatty liver.
2. To find out the adverse effect of the poly herbo-mineral compound and *Yashtimadhu Churna* in Grade I & Grade II fatty liver (if any).

### **Materials and Methods**

1. Sample size: 32
2. Source of data: Total 40 patients in both OPD and IPD basis, having age in between 18-70 years, irrespective of sex, occupation, religion, in the Department of Kayachikitsa, Govt. Ayurvedic College and Hospital, Guwahati were selected for the clinical trial. But owing to the COVID-19 pandemic 32 patients were able to complete the treatment.

**Method of collection of Data:**

Patient fulfilling the inclusion criteria are selected for study. Before starting the treatment, detailed clinical history are taken in the clinical research proforma based on Ayurvedic and modern parameters and the written consent were taken from patients. The study has conducted as open labelled interventional clinical trial after received written consent from The Institutional Ethical Committee.

**Inclusion criteria:**

- Patients between 18 to 70 years of age irrespective of the sex.
- Subjects having complain of indigestion, pain abdomen, anorexia, fatigue, nausea and fulfilling the criteria of diagnosis.
- Obese subjects.

**Exclusion criteria:**

- Subjects below 18 years more than 70 years.
- Pregnancy and lactation
- Severe cardiac problem
- Psychiatric disorders.
- Stomach ulcer
- Cancer patients
- Surgical intervention if any.

**Diagnostic criteria:****Subjective criteria:****History taking:**

- Family history of liver pathology, obesity.
- Diet history (if fatty diet, alcohol)
- Past History of any viral infections.
- Personal history
- Fatigability
- Pain in the right upper quadrant

**Physical examination:**

- To see if there is any swelling in the right upper abdomen.
- Palpating right upper quadrant.
- Tenderness in the right upper quadrant

**Objective criteria:**

- USG Whole abdomen
- Haematological –
  - Blood for routine examination
  - Liver Function Test
  - Lipid Profile

**Assessment of result:-**

The assessment was done on a detailed proforma on the basis of both subjective and objective criteria

**Subjective parameters:**

1. Indigestion.
2. Anorexia.
3. Abdominal bloating.
4. Nausea.
5. Fatigue.
6. Pain abdomen.

**Objective parameters:**

1. USG whole abdomen.
2. Lipid Profile.
3. Liver Function Test.

**Intervention and Posology:**

*Triphalyadi Yoga*: 8 ratti (1 gm) daily which was given on two divided doses i.e., 500 mg twice a day after food for 3 months

*Yashtimadhu churna* : 2gm twice daily after food for 3 months with warm water or honey.

Duration of the study: 3 months duration.

Follow up interval: 30 days or if necessary.

**Data Analysis:**

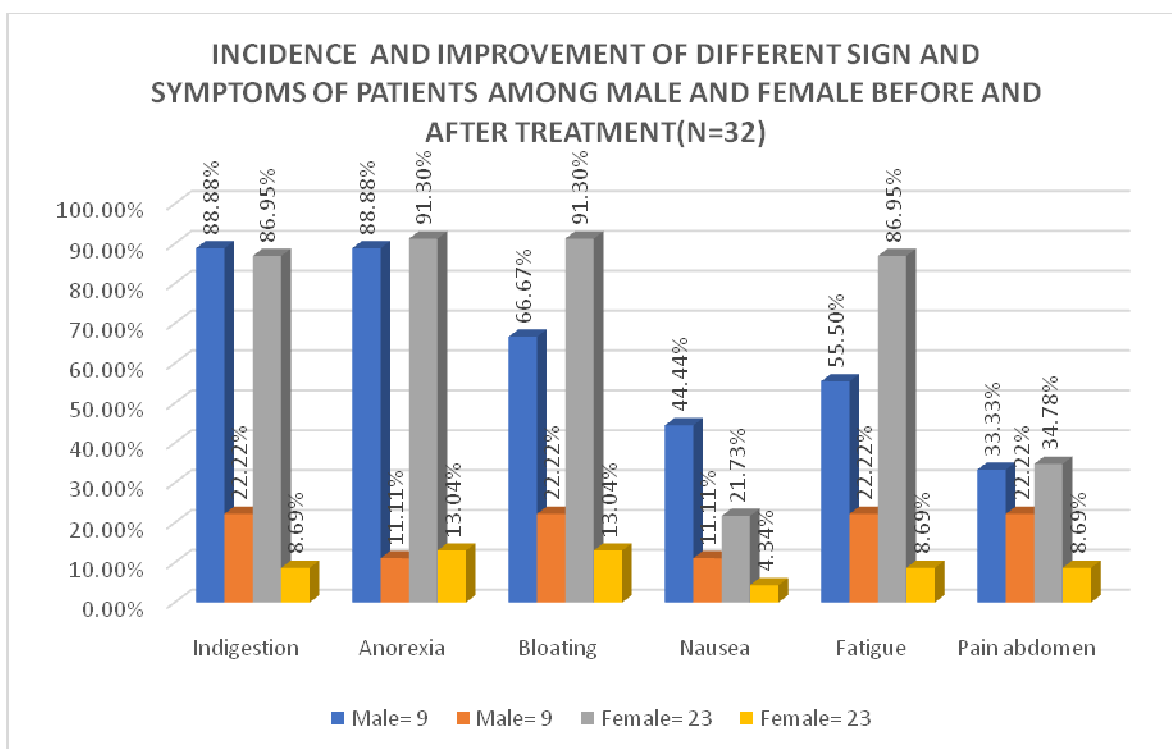
All the data collecting from case history record are placed, analyzed using appropriate statistical tools such as Arithmetic mean, percentage, standard deviation, Paired t– test and p (probability) value is calculated.

**Observation and Result**

Total 32 patients were enrolled for the present study. The result of Therapeutic profiles is

**Table 6.1: Showing the incidence and improvement of different sign and symptoms of patients among male and female before and after treatment (n=32)**

Sl.no	Subjective Sign and Symptoms		Male= 9				Female= 23					Total= 32		Total improvement in %	
		BT	%	AT	%	% of Improvement	BT	%	AT	%	% of Improvement	T <sub>BT</sub>	%	T	%
1	Indigestion	8	88.88%	2	22.22%	66.67%(6)	20	86.95%	2	8.69%	78.26%(18)	28	87.5%	24	85.71%
2	Anorexia	8	88.88%	1	11.11%	77.78%(7)	21	91.3%	3	13.04%	69.56%(16)	29	90.62%	23	79.31%
3	Bloating	6	66.67%	2	22.22%	44.44%(4)	21	91.3%	3	13.04%	78.26%(18)	27	84.37%	22	81.48%
4	Nausea	4	44.44%	1	11.11%	33.33%(3)	5	21.73%	1	4.34%	17.39%(4)	9	28.12%	7	77.78%
5	Fatigue	5	55.5%	2	22.22%	33.33%(3)	20	86.95%	2	8.69%	78.26%(18)	25	78.12%	21	84%
6	Pain abdomen	3	33.33%	2	22.22%	11.11%(1)	8	34.78%	2	8.69%	26.08%(6)	11	34.37%	7	63.64%

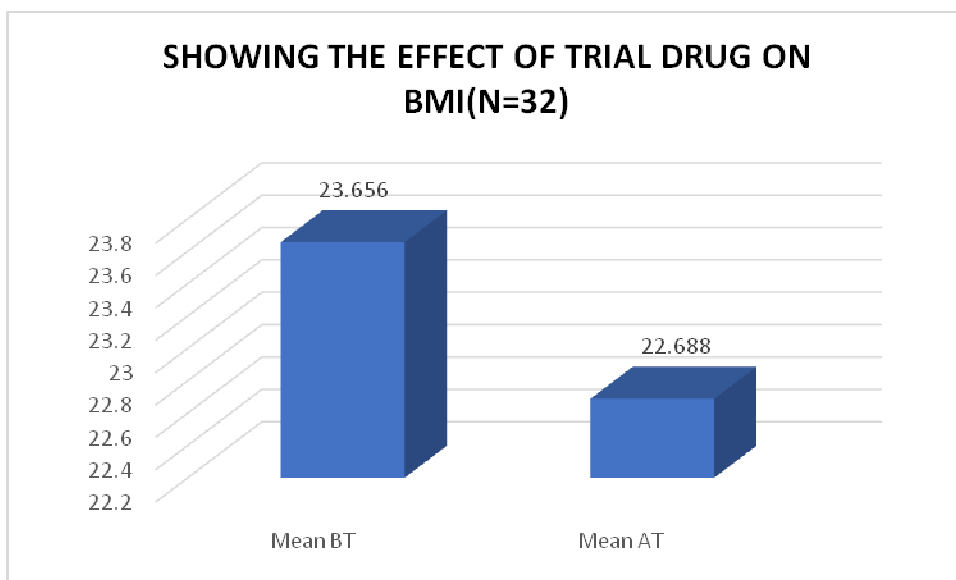


**Figure 6.1: Incidence and improvement of different sign and symptoms of patients among male and female before and after treatment (N=32)**

**Table 6.2: Table showing the effect of trial drug on BMI (N=32)**

Mean BT	Mean AT	Difference of mean	SD <sub>BT</sub>	SD <sub>AT</sub>	SEM <sub>BT</sub>	SEM <sub>AT</sub>	SE of Difference	t <sub>31</sub>	P	Remarks
23.656	22.688	0.969	5.096	4.284	0.901	0.757	0.171	5.6534	.0001	S

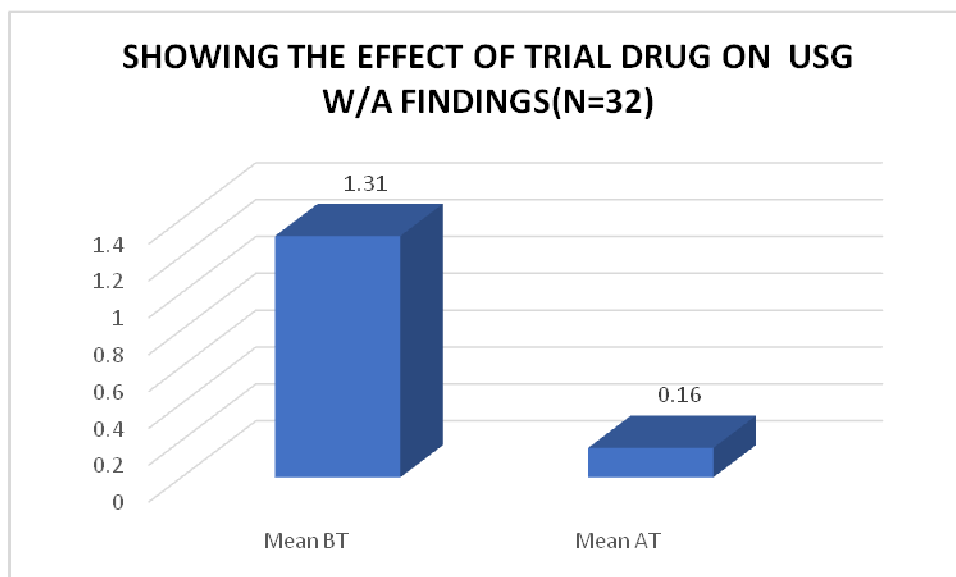




**Figure 6.2: Figure showing the effect of trail drug on BMI (N=32)**

**Table 6.3: Table showing the effect of trial drug on USG W/A FINDINGS (N=32)**

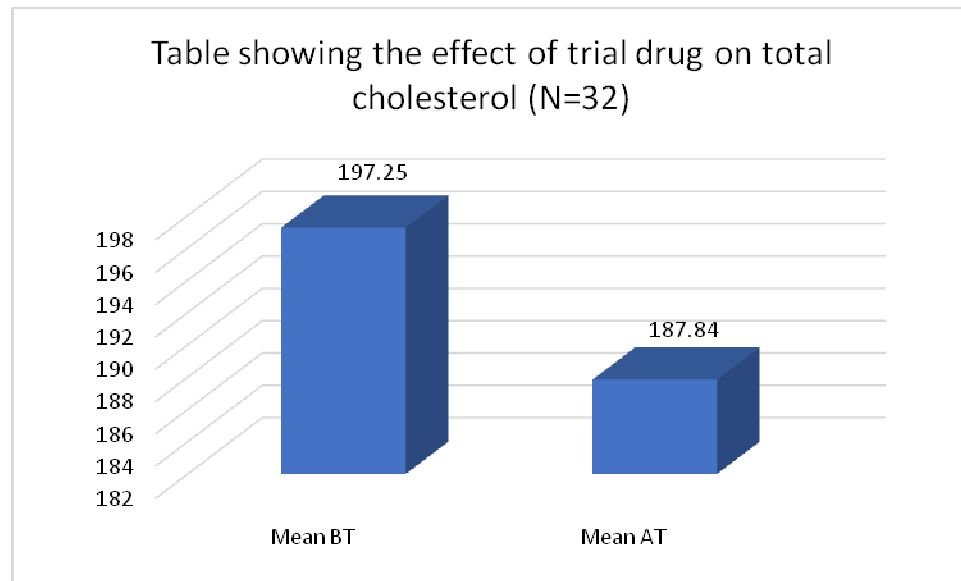
Mean BT	Mean AT	Difference of mean	SD <sub>BT</sub>	SD <sub>AT</sub>	SEM <sub>BT</sub>	SEM <sub>AT</sub>	SE of Difference	t <sub>31</sub>	P	Remarks
1.31	0.16	1.16	0.47	0.37	0.08	0.07	0.065	17.7303	.0001	S



**Figure 6.3: Figure showing the effect of trail drug on USG W/A findings (N=32).**

**Table 6.4: Table showing the effect of trial drug on total cholesterol (N=32)**

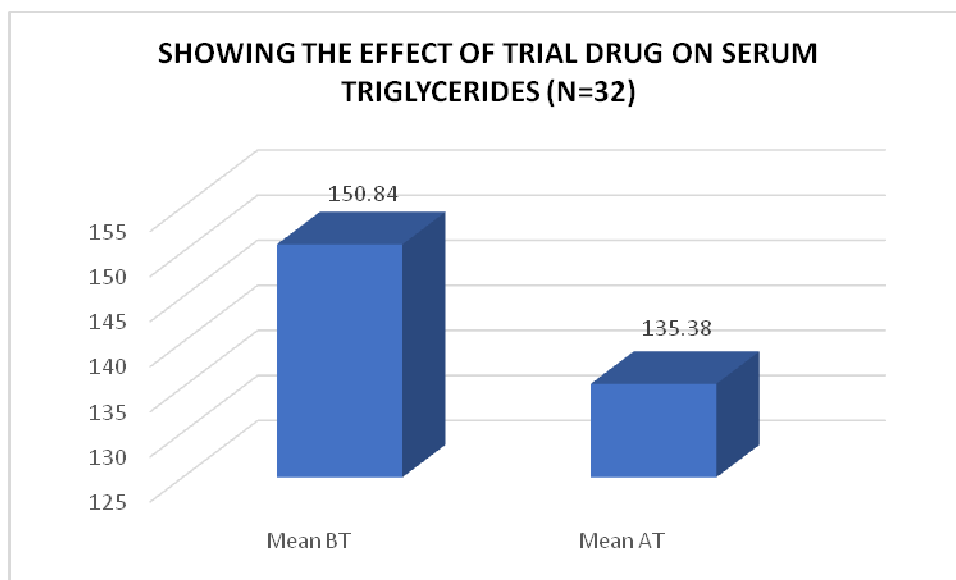
Mean BT	Mean AT	Difference of mean	SD <sub>BT</sub>	SD <sub>AT</sub>	SEM <sub>BT</sub>	SEM <sub>AT</sub>	SE of Difference	t <sub>31</sub>	P	Remarks
197.25	187.84	9.41	9.59	7.27	1.69	1.28	1.264	7.4398	.0001	S



**Figure 6.4: Figure showing the effect of trial drug on total cholesterol (N=32)**

**Table 6.5: Table showing the effect of trial drug on Serum Triglycerides (N=32)**

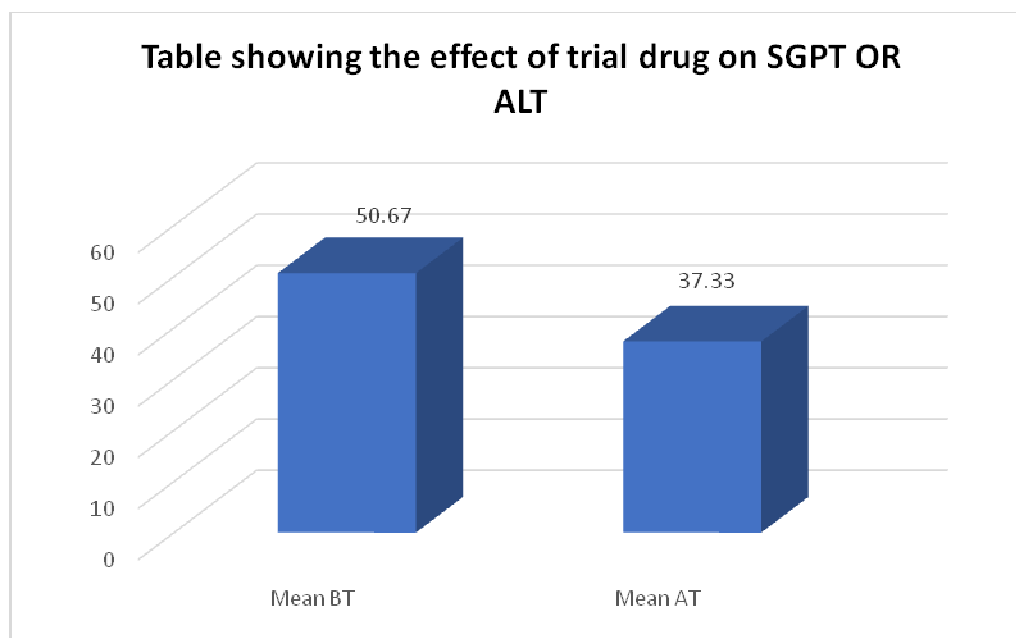
Mean BT	Mean AT	Difference of mean	SD <sub>BT</sub>	SD <sub>AT</sub>	SEM <sub>BT</sub>	SEM <sub>AT</sub>	SE of Difference	t <sub>31</sub>	P	Remarks
150.84	135.38	15.47	22.78	9.78	4.03	1.73	3.295	4.6951	.0001	S



**Figure 6.5: Figure showing the effect of trial drug on Serum Triglycerides (N=32)**

**Table 6.6: Table showing the effect of trial drug on SGPT OR ALT**

Mean BT	Mean AT	Difference of mean	SD <sub>BT</sub>	SD <sub>AT</sub>	SEM <sub>BT</sub>	SEM <sub>AT</sub>	SE of Difference	t <sub>39</sub>	P	Remarks
50.67	37.33	13.33	5.05	2.50	2.06	1.02	2.300	5.7977	.0002	S



**Figure 6.6: Figure showing the effect of trial drug on SGPT OR ALT.**

## Discussion

Fatty liver is a reversible condition wherein large amount of fat accumulate in liver cells via the process of steatosis. When fat content exceeds 5% of total weight of liver or more than 30% of liver cells in a liver lobule are with fat deposit, this condition is called as Fatty Liver (Hepatic steatosis). In Ayurveda we cannot co-relate Hepatic steatosis with any single disease but it can be co-related with *Yakritodara*, *Sthaulya* or *Medoroga* and may be termed as *Yakritmeda*.

*Triphalyadi Yoga* contains *Triphala*, *Haridra*, *Daruharidra*, *Kutki* and *Lauha Bhasma* and along with it *Yahtimadhu Churna* is also used.

- *Triphala*<sup>9</sup> has *Deepaniya* action, *Sleshma-Pittaghna* which reduces the aggravated *Kapha* and *Meda*, *Rasayni* (Rejuvenation), *Ruchikara* properties which improves anorexia.
- *Haridra*<sup>11</sup> due to its *Tikta- Katu rasa*, *Ushna Virya*, *Katu Vipaka* and *Laghu, Ruksha Guna* makes it to be *Deepaniya*, *Pachaniya* and *Lekhaniya* helps in removing the excess fat and clearing out channels and improving the function of Liver.
- *Daruharidra*<sup>12</sup> has *Tikta-kasaya rasa*, *Laghu-Ruksha Guna*, *Katu Vipaka* and *Ushna Virya* and is *Lekhaniya*.
- *Kutki*<sup>10</sup> has *Tikta Rasa*, *Ruksha-Laghu Guna*, *Katu Vipaka* and *Shita Virya*, *Deepaniya*, *Ruchikara* and *Bhedaniya*.

- *LauhaBhasma*<sup>13</sup> is *Ruksha, Tikta, Kasaya, Madhura, Tridoshanashaka, Deepaniya, Lekhaniya, Yogavahi, Rasayani* (Rejuvenation), *Medonirvahanam*.
- *Yashtimadhu*<sup>8</sup> has *Deepaniya, Pachaniya* property helps in *Ama pachan, Rochana* which stimulates appetite, *Rasayani* (Rejuvenation), *Yakrituttejaka*.

If we see the Ayurvedic properties along with the therapeutic evaluation or the results of various clinical and experimental research already done on the individual plants, it shows that all of them have *Lekhaniya* and *Medohara* actions which plays a role on fat deposition in the liver directly or indirectly without any adverse side effect.

The result of therapeutic trial showed that- the effect of oral poly-herbo mineral compound is effective. In all criteria p values are less than 0.0001 and shows highly significant.

## Conclusion

Fatty liver is more common nowadays due to change in lifestyle, affecting millions of people around world. No established pharmacological treatment is available for Fatty liver in conventional medical science. Several empirical treatment strategies such as dietary restriction, physical exercise and weight reduction form the first line of treatment. Oral Ayurvedic Poly-herbo mineral formulation is much more convenient to reduce the symptoms and help to protect the liver. However, beyond the present clinical trial, further mass study is required to establish the research drug.

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## Chapter 7

### Spice fortified *Sandogh guri* for prevention & treatment of hyper-lipidemia

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#### Abstract:

Folklores are as old as human civilization and evidence of ancient practices. Folklores signify the use of different herbs including spices to treat different disorders. They are effective and at the same time have no or minimum side effects. So, their study as a value-added product in diet or dietary supplement is significant. In this study, the traditional Assamese breakfast item *Sandogh guri* (roasted parboiled rice powder) is fortified with green gram *dal*, arjuna, cinnamon, and fenugreek to put in hypolipidemic properties into it. The proximate composition and values of a few micronutrients in the mix are recovered through standard biochemical methods and standard calculations. The cereal pulse combination improves the overall protein quality of the product and phytochemicals, antioxidants and fatty acids present in the mix has hypolipidemic effect. The study results verify that this developed mix is a much better breakfast alternative for a hyperlipidemic person compared to *Sandogh guri*. A human case study confirms that the mix holds many hypolipidemic properties without any known side effects. It is nutritionally balanced and provides a wide range of essential nutrients that can be used to prevent and treat hyperlipidemia.

**Keywords:** Hyperlipidemia, *Cinnamon*, *Arjuna*, *Fenugreek*, Non-Communicable Disease.

#### Introduction

As a result of alteration in the agricultural field, Industrialization and urbanization; India has experienced a notable transformation in nutrition scenario and disease pattern during the last few decades. Since independence, the government had launched different community-based programs specifically on communicable and nutritional deficiencies diseases and limiting services on non-communicable diseases (NCD) only up to the facility level. But as per the ICMR report on India: Health of the Nation's States (2017), the country is experiencing a rising burden of NCDs over different water, air and vector-borne communicable diseases like Malaria, STH, TB, HIV, etc since 1990. NCD alone was accountable for 61.8% of death in India in 2016. The same report proposed that dietary risks, high systolic blood pressure, high fasting plasma glucose, high total cholesterol, high body-mass index, and impaired kidney function were the

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major causes of disability-adjusted life-years (DALYs) in high epidemiological transition level (ETL) state of India. Diet is a modifiable risk factor of NCD. The occurrence of NCD may be prevented by changing the dietary components and patterned. The traditional lifestyle and dietary practices and use of folk or traditional treatment practices like Ayurveda are known to have a great role in the prevention and treatment of NCDs (Banamali Das, 2019).

Long-established folk medicine is as old as human civilization. The use of such medicine extended with the development of thoughtful information on pain, wound healing and identification of various diseases. Initially, human communities/ tribal groups customized and personalized specific folk treatment processes through trial and error and finally with time, they became skilled in it. Later on, ancient natives realized that many of the plant-based folk medicines which are used for treatment have protective properties against diseases and also taste good. So, they started including them in the daily diet as species and herbs. Ayurveda is an olden folk curative practice of India and believe that spices not only enhance the organoleptic properties such as colour, texture, flavor and taste of the food item but improves appetite, helps in digestion and other metabolic processes due to the presence of different nutrients like vitamins, minerals and non-nutrient components namely antioxidant, photochemical etc. Ayurveda is a popular treatment method because of its effectiveness against most chronic diseases which are not treatable by modern medicines (Bombardieri, 2000).

Traditionally, Indian people use a wide variety of spices in recipes based on their availability and most of them are listed in the books of ayurveda with healing properties. *Cinnamomum cassia* or cinnamon and *Trigonella foenum-graecum* or fenugreek are two common spices of the Indian kitchen spice racks. Cinnamon is produced from the inner bark of shoots of a cinnamon tree found in South East Asia. It is rich in polyphenols, proanthocyanidins, and antioxidants and a good source of minerals like manganese, fiber, iron and calcium. Cinnamon contains strong antioxidants than many so-called antioxidant-rich foods. The number of antioxidants present in 1 teaspoon of cinnamon is equivalent to a full cup of pomegranate juice or a half-cup of blueberries. According to Khan *et al.* (2003) people with type 2 diabetes can reduce serum glucose, triglyceride, LDL cholesterol, and total cholesterol by taking cinnamon (1 to 6 g per day) regularly and further more addition of cinnamon in daily diet helps in reducing the risk factors associated with diabetes and cardiovascular diseases. The metabolites found in cinnamon are shown to have hypoglycemic and hypolipidemic effects (Marles *et al.* 1995). Fenugreek is universally found in Mediterranean regions of Southern Europe but is highly used by Indians. Seeds are used as spices and leaves are used lean leafy vegetables in Indian culinary. The seeds are an effective nutrient supplement and have also been used by herbalists for many centuries for their health benefits. Scientifically, 25 and 50 gm fenugreek powder if taken twice per day before food shown to have a hypo-lipidemic effect on hyper-cholesterolaemic patients. (Prasanna, 2000) and 25 gm fenugreek seed powder twice daily pledge significant ( $P < 0.001$ ) reduction in serum total cholesterol, triacylglyceride and LDL-cholesterol, but no effect on serum HDL-cholesterol (Moosa *et al.* 2006).



Appreciating the power of maintaining blood lipid profile in the body, it is realized that the addition of these spices to the daily diet would be beneficial for the promotion of healthy behavior to assure protection against hyper-lipidemia and other NCDs. The addition of *Terminalia arjuna* or arjuna is thought to be beneficial to get better the hypo-lipidemic effect in this case. The plant of arjuna is commonly found in Indian planes and the bark is widely used in the preparation of ayurvedic medicines. Gupta *et al.* (2001) found that the bark powder of this plant has a significant antioxidant property that is comparable to vitamin E along with a noteworthy hypo-cholesterolemic effect. According to Dwivedi *et al.* (2005) powdered the bark of arjuna can be used as anti-anginal, decongestive and hypo-lipidemic effects.

Traditional Indian recipes are rich in different spices but their cooking methods are laborious and oily. But some of the cereal-based processed preserved food items are low in fat and the addition of spices to traditional processed foods can improve their nutritive as well as medicinal value. According to Maki *et al.* (2010), a whole grain-rich ready to eat cereal containing various food items can reduce LDL cholesterol levels if consumed without additional fat. *Sandoh guri* a common traditional roasted parboiled rice product (rice powder) of Assam is an example of such a cereal item that is popularly used as a breakfast cereal with milk by most of the Assamese people. *Sandoh guri* is an instant food item, which is readily available and easily digestible and affordable. In general, rice contains 72-75% carbohydrates, 7% protein and some amount of minerals (Srilakshmi 2003), but is deficient in lysine and contains less amount of protein. So, to improve lysine content and hypo-lipidemic character it is fortified with a pulse (which is rich in protein including amino acid lysine) and spices namely cinnamon, arjuna and fenugreek.

## Objective

The study has been undertaken to develop a rice-based hypo-lipidemic instant health mix with green gram *dal*, arjuna, cinnamon and fenugreek (*methi*) with the following objectives.

- (i) To develop rice-based instant health mix with hypolipidemic effect.
- (ii) To analyze the nutritive value of the health mix.
- (iii) To evaluate the food quality through sensory evaluation.
- (iv) To study the shelf life of the health mix.
- (v) To analyze the fatty acid composition of the health mix.
- (vi) To evaluate the efficacy of the health mix as a hypolipidemic.

## Methodology

### Preparation of the Health Mix

#### **Assortment of ingredients:**

Following products are used for the development of the health mix.

#### Base Ingredients:

Rice (*Oryza sativa*) and mung or green gram (*Vigna radiata*) dal are taken as the base products for the formulation of the health mix. Rice is a staple food of India and it is a traditional food habit of India to eat rice in combination with any pulse. Cereal- pulse combination has better nutritive value than cereal or pulse alone. Cereals are deficient in lysine and pulses are deficient in methionine but in combination both supplements each other. Cereal- pulse combination is a relatively cheap, but rich source of energy, protein, carbohydrates, invisible fat, dietary fiber, vitamins and minerals. Both cereals and pulses are nutritionally important since they usually provide the bulk of the diet. Owing to low moisture content, cereals and pulses are relatively stable during storage and processing is also easy. To enhance the nutritive value parboiled rice is used.

#### Hypo-lipidemic Ingredients:

Any eatable food product, which has the ability to reduce bad lipid (VLDL, LDL, cholesterol and triglycerides) levels and to increase good lipid (HDL) level in the body is known as hypo-lipidemic food, *e.g.*, fruits and vegetables, spices, herbs etc. As mentioned earlier different herbs and spices have been used as traditional medicines for healing different diseases and recent studies reveal that fenugreek, arjuna and cinnamon have good hypo-lipidemic properties. These products also help in improving the keeping quality of any food product.

#### **Processing of Ingredients**

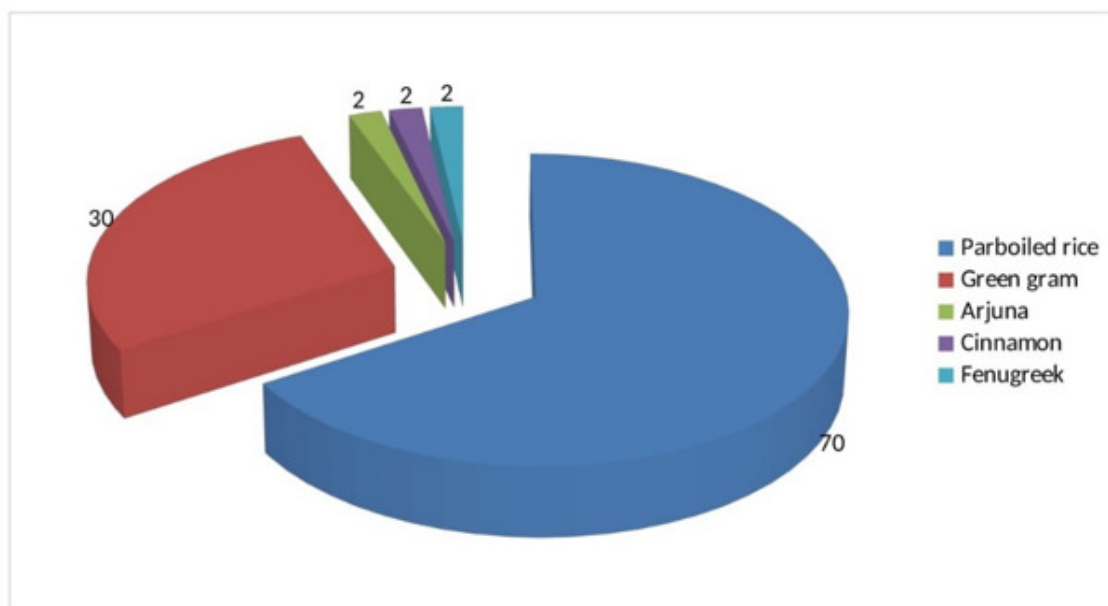
Food processing means the application of methods and techniques to transform raw ingredients or any raw food item into food for consumption. Food preservation is the process of treating and handling food to slow down spoilage food and improve its keeping quality. To develop the health mix below mentioned food processing and preservation techniques are applied.

1. **Cleaning:** To remove all foreign matters like stone, hey, etc.
2. **Washing:** To clean ingredients all dust, sand, etc.
3. **Sun drying:** To reduce extra moisture and make ingredients dry.
4. **Roasting:** To maintain the moisture level below 12 percent to avoid microbial contamination. It is also done to develop palatable flavors.
5. **Grinding:** To make all ingredients into powder form.

6. **Mixing:** All ingredients are mixed in correct proportions.

### Composition of the Health Mix

Powdered parboiled rice, green gram *dal*, arjuna, cinnamon and fenugreek are mixed together in proportion of 70:30:2:2:2. Percentage distribution of powdered parboiled rice, green gram *dal*, arjuna, cinnamon and fenugreek in the developed hypolipidemic health mix is shown in Figure 7.1



**Figure 7.1: Percentage distribution of powdered parboiled rice, green gram dal, arjuna, cinnamon and fenugreek in the developed hypo-lipidemic health mix.**

### Nutritive Value Analysis

Estimation of total Carbohydrates done by Anthrone method, fat by Soxhlet method and protein by Lowry's Method. For estimation of Dietary Fibre, Lipid Fraction, Vitamin (A, E & C), Minerals (Selenium, Copper, Zinc, Manganese & Iron) Data on standard values of dietary fibre, lipid fractions, vitamins (A, E and C) and minerals (selenium, copper, zinc, iron and manganese) content per 100 grams of each ingredient of the health mix are referred and a compiled table is prepared for calculation of these nutrients in 100 g of the health mix. Phytochemical and free fatty acid analysis was done according to AOCA method.

### Organoleptic Evaluation

Different sensory perceptions used for the organolaptic/ sesory evaluation are mentioned below.

Perception	Example
Vision	Shape, colour, appearance.
Olfaction	Odour (sweet, pungent, floral).
Gustation	Sweet/salt, sharp/bitter, flavours (savour, perfume in mouth).

Hearing	Crunchy.
Sense of touch	Texture (smooth, rough), temperature, firmness.
Trigeminal perception	Fresh/hot sensations, astringency.

### Shelf-Life Analysis

To study the storage quality of the health mix, the product is kept for six months in sealed airtight packaging and after six months following tests are done. To verify the shelf life, moisture content, acid value and peroxide value of the product were regularly checked every month.

### Case Study on Hyperlipidemic Patient

An adult patient having classical hyperlipidemia without any other health problem was selected from Government Ayurvedic College and Hospital, Guwahati. The information regarding his socio-economic and diet pattern was obtained by direct interview method with the help of an interview schedule. The anthropometric measurements namely height, weight, body mass index (BMI), waist-hip ratio (WHR) of patients is measured using standard procedures. Dietary information was gathered through a food frequency questionnaire and diet history method. A food frequency questionnaire including common Assamese food items with frequency was used and added to obtain a clearer picture of the subject's common dietary habit, one's diet history is enquired through an interview. A sample of blood is sent to the standard pathological laboratory for estimation of lipid parameters.

The patient was prescribed to have a total of 90 grams of the health mix twice daily as an alternative to his regular breakfast item and evening refreshment along with a little lifestyle modification of 30 minutes of brisk walking per day.

### RESULTS Nutritive Value Analysis of the Health Mix

People need a wide range of nutrients to be healthy and active. Different nutrients have different health benefits and are needed in different magnitudes. The result of the nutritive value analysis of the item is placed Table 7.1.

**Table 7.1: Nutrient composition of the health mix (Nutrients per 100 gram)**

Nutrients present		Weight or % or presence
Carbohydrates		74.75 g
Proteins		12.92 g
Fat	Total fat	1.07 g
	Saturated fatty acids	254 mg
	Mono unsaturated fatty acids	671 mg
	Poly unsaturated fatty acids	526 mg
Dietary fibre		7.13 g

Vitamins with antioxidant properties	Vitamin A	29.8 IU
	Vitamin C	0.16 mg
	Vitamin E	0.57 mg
Minerals with antioxidant properties	Selenium	11.2 mcg
	Copper	193.4 mcg
	Zinc	529.2 mcg
	Iron	2531 mcg
	Manganese	810.7 mcg
Phytochemical	Tannins	Absent
	Saponin	Present
	Flavonoids	Absent
	Alkaloids	Present
	Terpinoids	Present
	Cardiac Glycosides	Present
	Phenols	Present
Fatty acids	<b>Saturated</b>	<b>0.30%</b>
	Palmitic acid	0.23%
	Stearic acid	0.07%
	<b>Monounsaturated</b>	<b>0.41%</b>
	Oleic acid	0.24%
	Eicosenoic acid	0.17%
	<b>Polyunsaturated</b>	<b>0.44%</b>
	Lenoleic acid	0.44%
	Values of all other fatty acids and trans fatty acid	<0.01%
Moisture percentage		8.93%

### Organoleptic properties of the health mix

Sensory perception results from the integration of information from multiple sensory organs. Colour is the first noticeable organoleptic character of a food product. Colour build ups the first judgment on the food about its acceptability. Taste is the sensation produced when a food product reacts in the mouth chemically with taste receptor cells located on taste buds. Taste along with smell (olfaction) and trigeminal nerve stimulation (registering texture, pain and temperature), determines flavour of the food. Humans have taste receptors on taste buds and other areas including the upper surface of the tongue and the epiglottis. People like or dislike food because of its taste, but the texture of the food also plays an important role in its overall acceptability. The texture of food refers to those qualities of food that can be felt with the fingers, tongue, palate, or teeth. Foods have different textures, such as crispy, crunchy, hard, tender, chewy and creamy, etc. From a sensory perspective, the texture of a food is evaluated when it is chewed. The term mouth feel is a general term used to explain the textural properties of food as perceived in the mouth. All these qualities of a food product determine its overall acceptability. Outcomes of the organoleptic test of the developed mix are shown in Table 7.2.

**Table 7.2: Organoleptic properties of the health mix**

Character	Result
Colour	Off white to light brown
Texture	Free flow, smooth powder
Aroma	Cinnamon and roasted aroma
Taste	Slightly bitter
Overall acceptability	Good

### **Shelf-Life Analysis**

Shelf life is the period of time up to which an edible product can be kept for consumption. It is the expected length of time during which the product is free from deterioration and retains its all-quality characteristics. Shelf-life evaluation of a developed food product is very essential as food may become unsafe during storage because of the formation of toxic substances, growth of pathogenic microorganisms, or oxidation of fats and oils. Results of shelf-life test after 6 months of storage are shown in table 7.3.

**Table 7.3: Moisture percentage, acid value, peroxide value & free fatty percentage of the health mix after 6 months of storage**

Moisture	9.70%
Acid value	2.2 mg KOH/g
Peroxide value	2.4 meq/kg
Free fatty acid analysis	1.11%

### **Case Study**

38 years old non-alcoholic and non-smoker centrally obese (WHR = 1.108) individual with a normal BMI of 23.88 is identified for the case study. The patient has been suffering from hyperlipidemia without any other medical complications. The impact of intake of the health mix on anthropometry is displayed in Table 7.4.

**Table 7.4: Anthropometric Details**

Anthropometry	Before	After
Weight (kg)	69	64
BMI	23.88	22.15
WHR	1.108	1.054
Height (cm)	170	

By replacing the normally taken breakfast by the subject with 90g/day health mix, a change had been done in his daily nutrient intake and changes in daily intake are shown in Table 7.4. This change had a great impact on the lipid profile of the subject which is mentioned in table

**Table 7.5: Comparison of the patient's previous and subsequent nutrient.**

Nutrients	Previous	Subsequent
Total Energy (Kcal)	2204 - 2341	2175 - 2241
Carbohydrates (g)	386.7 - 408.7	385.7 - 393.2
Protein (g)	65.7 - 70.9	70.5 - 82
Total Fats (g)	40.3 - 47.3	43 - 44.1
Visible Fat (g)	31.4 - 40.1	17.4 - 19.4

**Table 7.6: Change in lipid profile.**

Parameters	First	Second (on 30 <sup>th</sup> )	Third (on 60 <sup>th</sup> )
Tryglyceride (md/dl)	182	83	87
Cholestero (md/dl)	278	193	190
VLDL (md/dl)	36.4	16.6	17.4
LDL (md/dl)	191.6	136.4	115.6
HDL (md/dl)	50	40	57
Cholestero:HDL	5.56	4.82	3.33
LDL:HDL	3.83	3.41	2.03

### Discussions:

Hyperlipidemia is one of the major non-communicable disorders of recent time. Increased level of blood lipids except for high-density lipoproteins, such as cholesterol, triglycerides and low-density lipoproteins is called hyperlipidemia. It is often associated with obesity, diabetes, atherosclerosis and other cardiovascular diseases. Several factors are likely to have contributed to accelerate hyperlipidemia and some of them are wrong dietary habits, faulty lifestyle, lack of physical activity and various stresses. The factors stated above are outcomes of the busy work schedule of the present time. Management of hyperlipidemia through a good selection of food and a high-quality lifestyle is essential to prevent other life-threatening disorders. So, the main

idea behind the development of this health mix is to formulate a ready-to-use nutritious herbal health mix for hyperlipidemic patients without any side effects.

A hypolipidemic health mix is developed with easily available household food items through easy methods of food processing and preservation and this study has been undertaken to develop a healthy ready-to-eat food product with hypolipidemic effect. Different processed rice products, such as puffed rice (*Muri*), flaked rice (*Chira*), *Pithaguri* (Rice powder), *Sandoh guri* (Roasted parboiled rice powder) etc. are popular breakfast cereals of Assam, India. *Sandoh guri* is the roasted parboiled rice powder that is usually eaten with milk or curd and sugar. Like other cereals, it is a good source of carbohydrates but deficient in different minor nutrients, such as lysine, vitamin C etc. Different studies (Das *et al.* 2005, Gahlawat and Sehgal 1994) indicate that different food combinations lead to good nutritional status. These combinations may include foods from different groups like cereals and pulses, fruits and vegetables, milk and milk products, nuts and oilseeds, meat, fish and poultry etc. To catch the benefit of nature, in the present study, *Sandoh guri* is mixed with green gram *dal* powder. Green gram *dal* is a pulse and it is wealthy in plant protein and amino acid including lysine. So, the combination of *Sandoh guri* with green gram *dal* powder provides superior nutrition rather than a single item. This cereal-pulse mix is fortified with cinnamon, fenugreek and arjuna powder to affix hypolipidemic properties into it.

As mentioned in Figure 7.1 all mixed together in the ratio of 70:30:2:2:2, respectively. Scientifically fenugreek, cinnamon and arjuna are known to have a hypolipidemic effect. So, these are the potent ingredients in the health mix. The proximate composition (Table 7.1) of the mix and values of a few micronutrients in the health mix are found through standard biochemical methods and calculated using the standard nutritive value of ingredients present. Per 100 grams of the health mix contain 74.75 g carbohydrates, 12.92 g protein, 1.07 g fat (0.45 g saturated, 0.4 g monounsaturated and 0.51 g polyunsaturated fatty acids) and 7.13 g dietary fibre. Main nutrients with antioxidant properties in the health mix are vitamin A (29.8 IU), vitamin E (0.57 mg), vitamin C (0.16 mg), selenium (11.2 mcg), copper (193.4 mcg), zinc (529.2 mcg), iron (2531 mcg) and manganese (810.7 mcg). Due to fortification, the nutritive value of the health mix is improved as a whole except for vitamin E, selenium and zinc. The ratio of carbohydrate to protein is increased remarkably due to the addition of green gram *dal*. An increase in the proportion of protein to carbohydrate in the diet has a positive effect on body composition, blood lipids and glucose homeostasis, and also minimizes other cardiovascular risks (Borkotoky & Sarma 2016). The mix does not need extra fat for preparation, hence if a hyperlipidemic person includes it in his/her daily menu; he/she can reduce his/her total visible fat intake per day. The high fiber content in the health mix along with very low-fat content will help in balancing the lipid profile in hyper-lipidemia.

Some dietary factors, such as phyto-chemicals and antioxidants play important role in maintaining blood lipid profile. The phyto-chemicals present in the health mix are alkaloids, saponin, terpenoids, cardiac glycosides and phenols, but limited in flavonoids and tannins. The



antioxidants present in the health mix are vitamins A, C and E and micro minerals, such as selenium, copper, zinc, iron and manganese. Optimal levels of Mn, Cu, Zn, Fe and Se help to maintain the efficient levels of endogenous antioxidants in the tissues and optimal nutrient composition allows the food antioxidants to be efficiently absorbed and metabolized. The nutritive value analysis of the health mix verifies that this developed health mix is a much better breakfast alternative for a hyper-lipidemic person compared to any other commonly used breakfast food items (Borkotoky & Sarma 2022). The fatty acids present in the health mix are palmitic acid, stearic acid, oleic acid, eicosenoic acid and linoleic acid. Out of these linoleic acid and oleic acid are major fatty acids that have a positive effect on blood lipid profile.

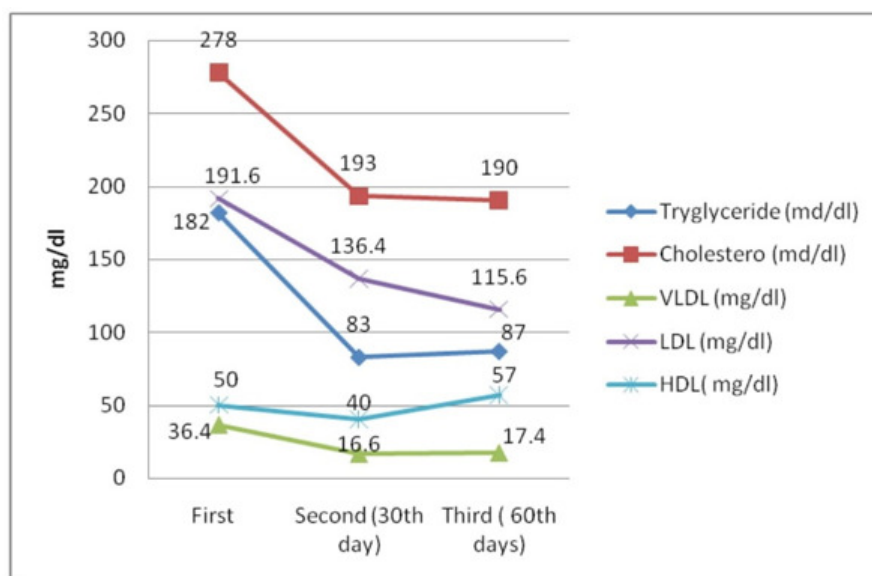
The health mix is rich in protein, dietary fiber, vitamins and minerals loaded with antioxidants and contains high amounts of unsaturated fatty acid and a reduced amount of saturated fatty acids as compared to Sandoh guri. So, it is a better breakfast substitute for patients with hyper-lipidemia than conventional Sandoh guri. Alkaloid, saponin and phenol are the main phyto-chemicals having lipid-lowering or antioxidant effects on blood plasma that are present in the mix. Similarly, it also contains vitamins and minerals with antioxidant effects. Linoleic acid is the most beneficial fatty acid followed by oleic acid which has hypolipidemic properties in the health mix. The palmitic acid is expected to show an advantageous effect in presence of linoleic acid and oleic acid in this case.

The health mix is a little creamy white in colour powder with malt and cinnamon flavour cinnamon smell makes it more appealing. The product does not have any specific taste apart from *Sandoh*. It can be mixed with sugar and milk for eating purposes (Table 2).

As mentioned in Table3, the overall keeping quality of the product is checked after 6 months storage period and the nutritive value is found analogous with a fresh health mix. The moisture percentage of 9.7% after 6 months of storage life gives the impression of the non-possibility of any microbial growth. Other parameters, such as acid value (2.2 mg KOH/g), peroxide value (2.4 meq/kg) and free fatty acid percentage (1.1%) are with the same limit as per different scientific evidence. No change in colour, texture, flavor and test of the product has been observed during storage. No rancid odour has developed during storage of the health mix at normal temperature (room temperature) in sealed and airtight condition (Borkotoky & Sarma 2017).

A case study has been completed to know the effect of the health mix on human blood lipid profile and at the end of the study; it is found that the health mix helps to reduce various risk factors of cardiovascular diseases, such as hyper-lipidemia, body weight, body mass index (BMI) and waist-hip ratio (WHR) (Borkotoky & Sarma 2017). During the study, the patient was consuming 90 g of health per day. Initially, the patient consumes a 2204 to 2341 kcal diet composed of 368.7 to 408 g carbohydrate, 65.7 to 70.9 g protein and 40.3 to 47.3 g total fat. The visible fat intake quantity is 31.4 to 40.1 g. According to the recommended dietary allowances (RDA) of the Indian male, the patient's visible fat intake was above the normal limit. So, during

the experimental period, reduction had been done only in case of total visible fat intake and the patient's protein intake was increased to get its benefit on hyper-lipidemia. The daily diet is modified by alternating the breakfast and evening meals with a total 90 g of the health mix per day. The overall nutrient intake of the patient was changed due to consumption of the health mix as an alternative of his regular breakfast item and evening refreshment. The comparison of the previous and subsequent (when the patient had health mix in breakfast and evening time) nutrient intake by the patient is shown in Table 4. After diet modification, the total daily energy intake by the patient is 2175 to 2241 kcal, daily carbohydrate intake is 385.7 to 393.2 g and total fat intake is 43- 44.1 g. Though there is no enormous change in total fat consumption, the total visible fat consumption changes massively. Total visible fat consumption reduces to 17.4 to 19.4 g, which is within the RDA for visible fat. This change in dietary habits had a great impact on the lipid profile of the individual as shown in Table 5 and Fig: 2. The health mix was found to have a positive influence on the lipid profile for which levels of TAG, cholesterol, LDL and VLDL are reduced, whereas the level of HLD is increased marginally (Borkotoky & Sarma, 2022). So, intake of the health mix may reduce the risk of atherosclerosis-index, body weight, BMI and WHR along with optimistic alteration on lipid profile.



**Figure 7.2: Effect of consumption of the mix on lipid profile.**

## CONCLUSION:

This experimental study on the health benefits of some specific herbs as value addition local and common food items that is *Sandog* seems to prevent risk factors of different degenerative disorders with lifestyle modification. The addition of this health mix to daily diet has a positive effect on health. So, studies on fortification of food items with assorted herbs for prevention of different health conditions are essential in the future along with proper efficacy test. The same health mix may be tested on diabetic, cardiovascular disease patients as the basic dietary principle for these diseases and hyper-lipidemia is the same.

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## Chapter 8

### Practice of Leech Therapy in Ayurveda – A Short Review

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#### Abstract

Bloodletting has been practiced since Stone Age. History of bloodletting is around 3000 years old with the Indians. Leech application is one among the prime method of bloodletting. Treatment by leeches is commonly known as *Hirudo therapy* or Leeching. Present day Medicinal Leeches are used as biotherapy. In Ayurveda, application of medicinal leech is the most affordable treatment procedure for pain management and different skin ailments. During the past 75 years in India Leech therapy has taken a great leap under the Indian system of Medicine. *Ayurveda* and *Siddha* are the Indian System of medicines where Leech Therapy is widely practised. In Ayurvedic texts leech therapy is known as '*Jaloukavacharana*' and '*Attaival*' in Siddha Medicine. In this 21st century many clinical studies were conducted in India and many parts of Europe, America, and Egypt showed the holistic effect of leeches for different ailments. Generally medicinal / non-poisonous leeches are used for treatment purpose and are considered to be easy and cost-effective method of bloodletting. In India, Leech therapy is recognized as a classical therapy. It is very well practised in the diseases of eye, phlebitis and in the management of ulcers, post operative surgeries.

**Keywords:** *Ayurveda*, Bloodletting, *Jaloukavacharana*, Leech therapy

#### Introduction

Leech therapy is a composite and distinctive system of treatment in Ayurvedic medicine. Leeches are considered to be natural and drugless. So, leech therapy is contemplated as non-invasive bio therapy with no side effects. In Ayurveda, Leech therapy is known as *Jaloukavacharna*. Many references are found in Ayurvedic classics. *Sushruta Samhita* one of the authentic Ayurvedic text devoted a complete chapter on Leech therapy. Besides the text books on Ayurveda, the British Association of Hirudotherapy mentions that Leech therapy is applicable for over 440 chronic health disorders.<sup>1</sup> *Sushruta* explained fifteen types of *anushastras* i.e., para-surgical procedures performed with non-surgical items or instruments used in absence of surgical instruments. Application of *Jalauka* (Leech) is one among them.<sup>2</sup>

This review article provides a concise knowledge on the procedure of Leech Therapy as well as throws light on mode of action.

## Aim and Objective of the Study

1. To do a literary review on Leech Therapy and its application.
2. To Study the procedure of Leech Therapy as explained in Ayurvedic classics with recent updates.

## Materials and Method

The Present study is literary review regarding Leech Therapy as described in Ayurvedic classics. For this study various research article published were also searched. The material for the present study were searched with the term – *Jaloukavacharana* / Leech Therapy in Ayurveda) The data has been concise and summarized. As per the information collected from the data observations were noted and conclusion has been drawn.

## Observation and Results

Leeching is a blood purification remedy which is helpful in letting the toxic blood out of the body. Also leech therapy is known as Hirudotherapy or Hirudin therapy. There are two types of Leeches - *savisha* (poisonous) and *nirvisha* (Non-poisonous) having each of 6 types. Non-poisonous are used for therapeutic purpose.<sup>3</sup> In India, usually the species *Hirudo verbena* or *Hirudo Manillensis* is used for treatment than *Hirudo medicinalis*.

## Indications of Leech Therapy

In Ayurveda '*Jaloukavacharana*' is indicated in delicate persons like weak patients, female patients, too aged or too young patients suffering from *Rakta-Pradoshaja vikaras* [diseases originated in *Rakta Dhatu* (~blood)]. The *Rakta pradoshaja vikaras* are *Mukhapaka* (erosion in oral cavity), *Akshiraga* (redness in eyes), *Puti Nasa* (Smelly secretion from nose or foul smell sensation), *Asyagandhata* (smelling mouth or smelly secretion from mouth), *Gulma* (inflammatory condition of abdomen), *Upakusha* (Bleeding gums), *Visarpa* (inflammatory skin disorders), *Raktapitta* (hemorrhagic disorders), *Prameelaka* (fatigue), *Vidradhi* (abscess), *Raktameha* (blood discharge with urine), *Pradara* (vaginal discharge), *Vatashonita* (gout), *Vaivarnya* (discoloration of skin), *Agnisada* (loss of appetite), *Pipasa* (excessive thirst), *Gurugatrata* (heaviness in body), *Santapa* (febrile condition), *Atidurbala* (excessive weakness), *Tikta-amla Udgara* (belching with acidic taste), *Klama* (unexplained fatigue), *Krodha Prachurya* (excessive explained anger), *Buddhi Sammoha* (confusion), *Lavana Asyata* (unreasonable excessive salty taste perception), *Sweda Sharira Dourgandhya* (excessive sweating with or without foul odor), *Mada* (unreasonable compulsive behavior disorders), *Kampa* (tremors like pathological condition), *Swara Kshaya* (vocal intensity decreased), *Tandra* (unexplained mental fatigue), *Nidra Atiyoga* (excessive sleepiness), *Tamas Atidarshana* (unexplained frequent blackouts), *Kandu* (itching), *Twak Vikara* like *Aru*, *Kotha*, *Pidika*, *Kustha*, *Charmadala* etc (skin disorders)<sup>4</sup>. Specific indications are *Gulma* (~various gastrointestinal diseases) *Arsha*, *Vidradhi*, *Kustha* (various skin diseases) *Vatarakta*, *Galamaya* (diseases of throat region), *Netra ruk* (eye pain, various diseases of eye) *Visha* (poisoning and other similar condition) etc.<sup>5</sup>

**Contraindications** - No direct description on contraindications of Leech therapy is found in any of the Ayurvedic classics. But there is mention of contraindications on *Raktamokshana*, which can be considered as contraindications for the same.

**Table 8.1: Showing contraindications for Raktamoksana<sup>6,7,8</sup>**

Sl. no.	Contraindications
1.	Sarvanga Sotha (individual with generalized edema)
2.	Ksheenacha Amla Bhojana Nimitta (individuals emaciated due to intake of sour food articles)
3.	Pandu Rogi (Anemic Patient)
4.	Arsha Rogi (individual suffering hemorrhoids)
5.	Udara Rogi (individual with inflammatory disorders of abdomen organs)
6.	Shosha Rogi (individual suffering from disorders causing cachexia)
7.	Garbhini (pregnant ladies)
8.	Svayathu (individual suffering from inflammatory disorders)
9.	Duradina (days with rainfall)
10.	Sheetavata (breezy day or place)
11.	Aswina (without administration of proper swedana)
12.	Bhukta Matre (after intake of complete meals or immediately after meals)
13.	Mada (delirium)
14.	Murcha (unconscious patient)
15.	Shrama Artanama (physically exhausted patient)
16.	Vata e Vina- Mutra Sangi (patient with holding the urges of flatus, feces & urine)
17.	Nidraabhibhota (in sleeping state) and Bheeta (in fearful individual)

**Method of application of Leech****Pre-operative Procedure -**

In order to suck the maximum amount of blood quickly without any complication, leeches should be stimulated to be energized. So, purification of leeches is carried out by putting them into a vessel of turmeric water and allowed to remain there for 5-10 minutes, then transferred into normal water. After this leech are ready to be applied.

**Main operative Procedure –**

The main procedures are as follows:

1. Prior to the application of leeches, patient's affected part is cleaned and sterilised with luke warm water.
2. Adequate numbers of leeches are applied to the affected area.
3. Once the leeches are applied, it remains safely in that place until fully distended for 15-25 minutes.
4. Leeches therapy should again be carried out on the patient on every 4<sup>th</sup> day or as when required.
5. The wound is applied with turmeric powder.

### Post Procedure -

1. Generally, leeches fall down after sucking the blood and blood should be allowed to flow from the wound for a few minutes.
2. When leeches fall apart, vomiting is induced to the leech so that sucked blood is removed i.e., with the application of turmeric powder on its mouth, then by slowly and gently squeezing from tail to mouth.
3. After the use of leeches, they are kept in fresh water jar. Again, application of leeches can be done after an interval of one week.
4. Leeches should move freely in water else they suffer from *Indramada* disease and may die, because of *durvanta* (Improper vomit).

**Table 8.2: Showing premiere Ayurvedic institutes in India offering Leech therapy<sup>9,10,11</sup>**

Sl. no.	Name of Ayurvedic Hospital / Institute
1.	National Institute of Ayurveda, Jaipur
2.	Institute of Training and Research in Ayurveda, Jamnagar
3.	Sir Sunderlal Hospital, IMS, BHU, Varanasi
4.	Govt. Ayurveda College, Thiruvananthapuram
5.	Rajiv Gandhi Govt. PG Ayurvedic College, Paprola
6.	Arya Vaidya Sala, Kottakkal
7.	CBPACS, New Delhi
8.	Central Ayurveda Research Institute, Bhubaneswar

### Discussion

The common leech species found in India are *Hirudinaria granulose*, *Hirudinariaviridis*, *H. verbanaa*, and *H. manillensis*. Mostly *Hirudo verbana* and *Hirudo medicinalis* are used for therapeutic purposes. On an average, weight of leech is 2.5-3 gm but after sucking blood it can weigh up to 11gm.<sup>13</sup> It is estimated that one leech can draw up to 50 ml of blood during and post leeching session. Compare to other methods of bloodletting, leech therapy is a cost-effective treatment. A decade back at Varanasi, a leech costs anything between Rs 25 to Rs 40, but now in BHU's Sir Sunderlal Hospital, a single sitting of Leech therapy costs Rs 100 only.<sup>11,12</sup> In present era among the *anushastra karma*, *Jaloukavacharana* (Leech therapy) is gaining popularity because of its effectiveness in *pitta dushita rakta* and *Pittaja granthi*.

Leeches are found to act as vasodilatation on the microvasculature over the site of application. The properties like anti-inflammatory, antibiotic, vasodilatation increase blood flow and are too helpful in wound healing. Increased blood flow in terms increase oxygen supply and eventually remove toxic



materials from affected part. The saliva of medicinal leech contains more than hundred bioactive substances which includes coagulation inhibitors, platelet aggregation inhibitors, vasodilators, as well as anaesthetizing, antimicrobial and anti-inflammatory agents. One of the most important ingredients is hirudin. Hirudin is a naturally occurring peptide in the salivary glands of blood-sucking leeches (such as *Hirudo medicinalis*) that has a blood anticoagulant property and is the most potent natural inhibitor of thrombin known to date. It is gaining popularity as an anticoagulant. Moreover, leech saliva is an effective platelet aggregation inhibitor due to the presence of active ingredients such as calin, apyrase (adenosine diphosphatase), platelet activating factor (PAF) - antagonist, collagenase and prostaglandin. Leech can help reduce venous congestion and prevent tissue necrosis. So, it can be used in the postoperative care of skin grafts and reimplanted fingers, ears, and toes. Because of concern regarding secondary infections a “mechanical leech” has been developed at the University of Wisconsin.<sup>14</sup> Further, the approval of Leeches as a medical device in 2004 by the US Food and Drug Administration (FDA) supports the expanding understanding around practical roles of medicinal leeches.<sup>15</sup> Leeches are primary requisite in Leech therapy. So, leech breeding is mandatory at present. Much awareness is required in establishing leech farming centres.

**Table 8.3: Showing different Leech Breeding Farms in India<sup>11,16</sup>**

Sl no.	Name of Leech Breeding Centres
1.	<i>Jalouka Palan Kendra</i> at Sir Sunderlal Hospital, IMS, BHU, Varanasi
2.	Choudhury Brahm Prakash Ayurved Charak Sansthan, New Delhi
3.	Leech Breeding and Research Centre at Rajiv Gandhi Govt. PG Ayurvedic College, Paprola, Himachal Pradesh
4.	Dr. Shah's Panchakarma Ayurveda, Indore, MP
5.	Leech Farm India, Thiruvananthapuram

Leech therapy has many benefits but to counter the unavailability of medicinal leech and to minimize the chances of secondary infections, chemical and mechanical alternatives may prove a beneficial tool in the future. Recent research had been carried out for developing a continual suction electromechanical device which performs the feeding function like medicinal leech.

## Conclusion

In the coming days we can anticipate that with further practices in Ancient Ayurvedic knowledge our diagnoses will become more refined and our treatments less invasive. We can make that, more research on traditional therapies will proceed unhampered by today's commercial market and unbridled by political ideas, if we truly believe that we can move closer to the truth of scientific practice of age-old leech therapy as described in Ayurvedic texts. So, it can be concluded that leech therapy is an effective, safest and unique method of bloodletting.

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## Chapter 9

### Application of *Vishaghna Lepas* w.s.r.t *Susruta Samhita Kalpasthan*

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#### Abstract:

*Agad Tantra* is an important branch of *Ayurveda* that deals with *Visha Chikitsa* which requires instant action to be taken in order to control the rapid spread of poisons. For this purpose, 24 *Upakramas* have been mentioned, and, one of the major modes of treatment is *Lepa Chikitsa*. It has been used extensively to bring in control very fatal stages of poisoning determining its role in acute or emergency conditions which are often ignored. This article aims to bring to light the various ways in which these *Lepas* can be used in order to widen the horizons of its use as well as to establish the use of Ayurvedic treatment modalities in case of emergencies.

**Keywords-** *Visha, Vishaghna, Vishaghna lepa, Antitoxic, Topical Treatment, Poison, Agada, Local Treatment*

#### Introduction:

*Lepa* (paste application) is one of the 24 treatment modalities of treating poison. In the treatment of poisoning, skin is considered as one of the major routes of drug administration. This therapy is known as *Bahya Parimarjan Chikitsa* and this is highly effective in treating local symptoms. Many formulations for local application in *Lepa* form have been described in classical texts of *Ayurved*. *Acharya Sushrut* states that *Lepa* is the most superior of all therapies of external application due to its property of “*Ashupeedaharatvat*” (instant alleviation of pain). He has explained three types of *Lepas*:<sup>1</sup>

1. *Pralepa* (thin paste)- they are cold and thin may be absorbent or non-absorbent.
2. *Pradeha* (thick paste) - they may be warm or cold, thick or thin and is non-absorbent. It pacifies *Vata* and *Kapha*, cleanses and heals wounds, alleviates inflammatory swellings and hence used in open and closed wounds. It should be applied in the day time in diseases caused by *Rakta, Pitta*, injury and poison.

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3. *Alepa* (paste of moderate consistency)- it is in between *Pralepa* and *Pradeha* and it alleviates the disorders of *Rakta* and *Pitta*.

*Lepa* suppresses the vitiated *Doshas* by using *Dravyas* according to *Dosha Pradhanya*.<sup>2</sup> *Lepa* also subsides burning which is due to *pitta*, itching mainly due to *Kapha Dosha* and pain due to *Vata Dosha* by using respective *Dravya* in external application. *Lepa* application is also effective on *Dushyas* like *Twak*, *Mamsa* and *Rakta* which get infected by *Doshas*.<sup>3</sup>

In *Susruta Samhita* it was also explained that the thickness of *Lepa* application should be equal to the thickness of a buffalo's wet skin i.e. thickness less than buffalo's wet skin is considered as thin *Lepa* and greater will be considered as thick *Lepa*.<sup>4</sup> *Sushrutacharya* states that pouring water over a burning house extinguishes fire very soon, in the same way aggravated *Doshas* will be subsided by application of *Lepa*.<sup>5</sup> In treatment of *Vatic* inflammation, the *Lepa* should be slimy, sour, salty and warm. In *Paittik* type of condition *Lepa* should be cold and mixed with milk. For *Kaphaj* conditions, the *Lepa* should be warm and should be used with an excess of alkalis and urine. In inflammation due to external poison the *Upakramas* to counteract the poison should be specially the *Pitta* alleviating procedures.<sup>6</sup>

<sup>7</sup>According to *Acharya Susruta* when *Lepa* is used for *Doshavikaras* the quantity of *Sneha* depends on *Dosha* as below:

- *Vataj Shoth*- 1/4<sup>th</sup> part of *Lepa*
- *Pittaj Shoth*- 1/6<sup>th</sup> part of *Lepa*
- *Kaphaj Shoth*- 1/8<sup>th</sup> part of *Lepa*

*Vishaghna Lepas* are the *Lepas* that are used in the treatment of poisons. In *Visha Chikitsa* *Lepas* are considered as a basic & important treatment modality. They destroy the harmful effect of the poison locally, prevent the further spread of poison and/or neutralize the poison (Sanjay et al. 2017)<sup>8</sup>. In the case of poisoning due to bites, the local area of bite shows various changes such as inflammation, blisters, vesication etc. These symptoms can be treated by *Vishaghna Lepas*. The *Lepa* will absorb or neutralise remaining amount of poison at the bite site. It is used in the treatment of *Sthavarvisha*, *Jangamvisha* and *Krutrimvisha*.

*Lepa Chikitsa* is included in *Vishachikitsa Upakrami*.e 24 *Upakramas* to treat toxic effect such as pain, burning symptoms, inflammation and other fatal conditions caused due to poison.<sup>9</sup> Some references from *Susruta Samhita* that include *Lepa* as one of the general lines of treatment are as follows-

1. *Indravajraagni dagdha*<sup>10</sup>- cooling treatment should be the method of treatment for those afflicted with hot winds and sunstroke. Hot and oily application should be applied preferably for those afflicted with frost bite.
2. *Bhagna Chikitsa*<sup>11</sup>- cold irrigation or *Pradeha* (paste) mixed with *Dosha* pacifying drugs should be used taking into account the *Dosha* and the season.

3. *Twakmamsasiragata Vata*<sup>12</sup>- oily massage, poultice, and *Lepa* application etc should be done for *Vata* getting vitiated in *Twak*, *Sira*, *Rakta* and *Mamsa*.

Nineteen *Vishaghna Lepas* were found in *Sushrut Samhita's Kalpasthan*. They are used under varied conditions of poisoning. The use of these *Lepas* in pathologies apart from poisoning conditions has been explored by using *Tantrayukti* for promoting the use of *Lepas* in various conditions for instant relief in distressing symptoms experienced by the patient.

#### **Objective of this study:**

- To study the *Lepa Chikitsa* in detail w.s.r.t *Vishaghna Lepas*
- To study the local poisoning symptoms in which these *Vishaghna Lepas* are indicated
- To clinically apply this knowledge in other conditions using *Tantrayukti*
- To promote the utilisation of the *Vishaghna Lepas* or *Dravyas* of *Vishaghna Lepas* to treat other local symptoms that mimic the classically established local symptoms caused due to poisoning.

#### **Materials:**

- *Charak Samhita* with *Chakrapani Teeka*
- *Sushrut Samhita* with *Dalhan Teeka*
- *Sushrut Samhita* by *P V Sharma*
- Other allied books of Biomedical Science

#### **Methodology:**

- The references of *Lepas* and *Vishaghna Lepas* were compiled from *Kalpasthan* of *Sushrut Samhita*.
- The indication of *Lepas* and its mode of action was analysed from the *Brihatrayee*
- The local symptoms caused due to poison was compiled from the *Brihatrayee*
- Clinical application of the *Vishaghna Lepas* has been projected with the help of *Tantrayuktis*

## Observations and Results:

**Table 9.1: Vishaghna Lepas found in the Kalpasthan of Sushrut Samhita**

Sr. No.	Kalpa	Ingredients	Indication
1.	<i>Shirishadi Agad Lepa</i> <sup>13</sup>	<i>Shirish, Haridra, Chandana</i>	Cardiac pain, abnormal movement of eyes and headache due to inhalation of vapours of poisoned food
2.	<i>Shyamadi Agad Lepa</i> <sup>14</sup>	<i>Shyama, Indragopa, Soma (Guduchi), Utpala</i>	Burning sensation in hands and falling of nails due to contact with poisoned food
3.	<i>Chandana di Lepa</i> <sup>15</sup>	<i>Chandana, Tagara, Kushtha, Ushira, Venupatrika, Somavalli, Amrita, Shveta, Kamala, Kaleeyaka and Tvak</i>	Eruptions of boils, pain, discharge, suppuration of skin, sweating, fever and tearing of muscles due to massage with poisoned materials
4.	<i>Chandana -ghrutadi Lepa</i> <sup>16</sup>	<i>Chandan, Ghruta, Payasya, Madhuka, Phanji, Bandhujeeva, Punarnava</i>	Blackish discoloration of face, eruptions of boils, pain, discharge, suppuration of skin, sweating, fever and tearing of muscles along with thorny eruptions due to application of poisoned cosmetic on the face.
5.	<i>Mahasug andhi Agad Lepa</i> <sup>17</sup> ,	<i>Chandana, Agar, Kushtha, Tagara, Tilaparni, Prapaundarika, Nalada, Sarala, Devadaru, Bhadrashriya, Yavaphala, Bhargi, Nili, Saugandhika,</i>	This is considered as the chief of all <i>Vishaghna</i> formulations and must be carried by the king at all times. By using this formulation as an after bath, the king becomes charming and popular and acquires brilliance in spite of being amidst enemies.
6.	<i>Mahasug andhi Agad</i> <sup>18</sup>	<i>Kaleyaka, Padmaka, Madhuka, Shunthi, Jata, Punnaga, Ela, Elavalu, Gairika, Dhyamaka, Bala, Balaka, Sarjarasa, etc.</i>  It contains a total of 85 drugs	
7.	<i>Vamsaadi Agad Lepa</i> <sup>19</sup>	<i>Vamsha, Amalaka, Kapittha, Trikatu, Haimavati, Kushtha, Karanja Seeds, Tagara and Shirisha flowers mixed with</i>	It destroys poisons of spider, rats, snakes and insects

		cow bile	
8.	<i>Shirishadi Lepa</i> <sup>20</sup>	<i>Shirisha, Haridra, Kushtha, Kumkuma and Guduchi</i>	Applied after cauterization and scarification at the site of bite by rats
9.	<i>Kusthadi Agad Lepa</i> <sup>21</sup>	<i>Kushtha, Tagara, Vacha, Patha, Bilva Root, Suvarchika, Soot, Haridra and Daruharidra</i>	Used in poisoning by <i>Trikantaka</i>
10.	<i>Rajanyadi Agad Lepa</i> <sup>22</sup>	<i>Haridra, Soot, Tagara, Kushtha and Palash seeds</i>	Used in poisoning by <i>Galagolika</i>
11.	<i>Kumkumadi Agad Lepa</i> <sup>23</sup>	<i>Kumkuma, Tagara, Shigru, Padmaka, Haridra and Daruharidra</i>	Used in poisoning by <i>Shatapadi</i> (centipede)
12.	<i>Shirishagaradi Agad Lepa</i> <sup>24</sup>	<i>Shirish, Tagara, Kushtha, Shalaparni, Mudgaparni, Haridra, and Daruharidra</i>	Used in poisoning by <i>Ahinduka</i>
13.	<i>Krushnamruttika Lepa</i> <sup>25</sup>	Black earth of anthill pounded with cow's urine	Useful in stings due to ants
14.	<i>Meshasru ngyadi Agad</i> <sup>26</sup>	<i>Meshashruni, Vacha, Patha, Nicula, Rohini and Balaka</i>	Useful in poisonous bites of all types of frogs
15.	<i>Arkamuladi Agad Lepa</i> <sup>27</sup>	<i>Arkaroot, Haridra, Nakuli and Prishnaparni</i>	Discharge of black blood, cracked site, deafness, blurred vision and burning sensation in eyes due to <i>Trimandala</i> spider bite
16.	<i>Chandanasnadi Agad Lepa</i> <sup>28</sup>	<i>Chandana, Rasna, Ela, Harenu, Nala, Vanjula, Kushtha, Lamajjaka, Tagara and Nalada</i>	White itching boil with spreading inflammation, moistening and pain along with burning sensation, fainting and fever due to <i>Shveta</i> spider bite
17.	<i>Surasadi Lepa</i> <sup>29</sup>	<i>Surasa Leaves</i> pounded with <i>Matulunga</i> juice and cow's urine	Used in one stung with virulent or moderate poisonous animals. The site of bite should be fomented, scarified and then rubbed with various powder



			followed by <i>Lepa</i> application
18.	<i>Vakradi Agad</i> <sup>30</sup>	<i>Tagara, Kushta</i> and <i>Apamarga</i>	Poisoning by <i>Shukavrunta</i>
19.	<i>Bhrungadi Agad</i> <sup>31</sup>	Black earth of anthill pounded with juice of <i>Bhringaraja</i>	Poisoning by <i>Shukavrunta</i>

### Mode of Action:

The *Lepa* drugs get absorbed by the *Romakooapas* present on the surface of the skin. It is absorbed by pitta (*Bhrajak Pitta*) and these potent fractions are carried throughout the body by the *Svedavaha Srotas* via *Vata Dosha* since it is lodged in the *Sparshanendriya*. Application of *Lepa* in a direction opposite to hair growth and *Udwartan* is advised before application of *Lepas* to open the *Romakupas* and *Srotasas* for better circulation of the potent fractions of the drugs.

### Discussion:

The enlisted *Lepas* should not only be limited to the texts but should also be used extensively in conditions which are regularly faced by the physicians.

*Acharya Charak* states that the formulations and the rules to use them are just for the dull minds. But the intelligent *Vaidyas* must use their own intelligence and make as many formulations, ways of application, etc. according to *Desha, Kaala, Awastha*, etc. The given text is just a list of guidelines that should be considered as a baseline for carrying out treatment in multiple ways. Some of the guidelines given in the form of *Vishaghna Lepas* is enumerated below:

1. *Shirishadi Agad Lepa*- This can be used extensively in all conditions that are caused due inhalation of gases resulting in cardiac pain. Inhalation of Carbon monoxide and methyl isocyanate are few such examples.
2. *Shyamadi Agad Lepa*- Classically it is used in conditions causing burning in hands and falling of nails due to contact with poisons. Burning sensation in palms are also seen in sunburns, insect stings, interaction with certain plant species such as poison oak, wood nettle, leadwort, etc., reaction to household products such as bleach, detergent, etc. Falling of nails is associated with injury, infection or due to substances such as nail hardeners or adhesives. This can also be used in chronic conditions such as psoriasis or eczema.
3. *Chandanadi Lepa*- this is to be used in various conditions causing carbuncles, furuncles and abscess due to numerous reasons such as bacterial infections, injuries or diabetes

4. *Chandana-Ghrutadi Lepa*: This can be used in various conditions such as acne, eczema, wound healing, sun exposure and various bacterial infections. It should also be used even in the winter months as *Mukha Lepa* to protect from the cold drying season which aggravates conditions such as psoriasis and eczema. It can be used in women who wear cosmetics regularly to protect the skin from the harmful effects of the chemical loaded cosmetic products. Therefore, it is not only beneficial for curative purpose but also carries out preventive purpose.
5. *Mahasugandhi Agad*- This is one of the most unique and distinctive formulation mentioned in *Sushrut Samhita*. This must be used to keep oneself from harmful effects of all the pollution and adulterated food elements that are unavoidable these days.

The other *Lepas* mentioned are used in various animal bites to combat the symptoms seen in the local areas. The properties of poisons are *Ushna-Teekshna-Vyavayi-Vikasi*, etc. These are exactly opposite to that of *Oja*. Therefore, the predominant action of these *Lepas* is to arrest the spread of the *Visha Gunas* and enhance the *Gunas* of *Oja*.

In acute conditions, the *Lepas* should be used immediately followed by *Shaman* or *Shodhan Chikitsa* whereas in chronic conditions *Lepa Chikitsa* should be preceded by *Shodhan* and *Shaman Chikitsa*.

### **Conclusion:**

Skin toxicity will always be a curse if experienced by any individual which is common nowadays in modern era of pollution and cosmetics that is why its immediate treatment is of great importance.

The probable mode of action of *Lepas* can be related by the explanation of *Acharya* in *Dhamanivyakaran Adhayay* of *Sharir Sthan* where he explains that *Dhamanis* are *Urdhwa Gata*, *Adhogata* and *Tiryakgata*, he also explains four *Tiryak Gami Siras*, out of these four each divide gradually into hundred and thousand times and thus becomes innumerable. By the above concept it can be inferred that body is covered by networks of *Sira-Dhamanis* and pervaded their openings are attached to hair follicles which are connected to the *Svedavaha Srotas*. Through them only the potent fraction of *Abhyanga*, *Snaan*, *Lepa* etc. enters the body after being broken down into assimilable forms in the skin by *Bhrajak Pitta*. In *Sushruta Samhita* it was also explained that the application of *Lepa* in direction of hair follicles facilitates quicker absorption of drug through *Roma Kupas* (hair roots), *Sweda Vahini* (sweat glands), and *Sira Mukha* (blood capillaries).<sup>32</sup> It was also explained by *Dalhan* that *Pitta* seated in skin is *Bhrajak Pitta* which maintains the temperature and colour of skin. *Bhrajak Pitta* absorbs the medicine applied in form of *Abhyanga*, *Parishek*, *Avagaha*, *Alepa*.<sup>33</sup>

According to modern pharmacology in the process of absorption through the skin, a chemical must pass through the epidermis, glands, or hair follicles. Sweat glands and hair follicles make up about 0.1 to 1.0 percent of the total skin surface. Though small amounts of

chemicals may enter the body rapidly through the glands or hair follicles, they are primarily absorbed through the epidermis. Chemicals must pass through the cell layers of epidermis before entering the dermis where they can enter the blood stream or lymph and circulate to other areas of the body. The stratum corneum is the outermost layer of the epidermis and the rate-limiting barrier in absorption of an agent. After penetrating through the stratum corneum and into viable epidermis and dermis the molecules of the formulation produce its characteristic pharmacological response through receptors even before the blood and lymph circulations remove it. Thus, helps to remove or neutralize the toxins in initial stage only.<sup>34</sup>

All these references found in *Susruta Samhita* shows that *Lepa Chikitsa* is one of important part of *Ayurveda* treatment. It has strong conceptual base to get specific and desired results. So, *Lepa Chikitsa* must be considered while adopting *Samanya Chikitsa* in treatment of diseases or *Visha Chikitsa*. Most of the *Vishaghna Lepas* are *Tridosahar* mainly *Pittahara* and *Sheeta* in nature. The indications of *Vishaghna Lepas* mentioned by *Susrut* acharya are indicative of the concept that *Vishaghna Lepas* are not only restricted to poisonous bite but can be also used in *Twakvikaras* and as a supportive way of treatment to cure most of other diseases.

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## Chapter 10

### *Keshya Lepa – A boon to absolute hair care*

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#### **Abstract:**

Hair plays a significant role in our beauty and personality. As hair is a beauty standard for women as well as men, both strive towards obtaining hair that is healthy, beautiful, shiny and these assets are to be maintained and protected with utmost care. Disorders like hair fall, greying of hair and dandruff are the commonest hair problems seen among young adults today. In *Ayurveda*, hair is known as *Kesha* and the drugs which are suitable for healthy hair are known as *Keshya* drugs. This clinical trial is an effort to compile and test the efficacy of *Keshya* drugs which are described in the *Ayurveda* classics which can be used both diseased as well as healthy persons so as to prevent occurrence of hair disorders.

**Keywords:** *Keshya Lepa*, Hair care, Hair fall, *Khalitya*, *Palitya*, *Darunak*

#### **Introduction-**

*Lepa* falls under the category of *Bahya Parimarjana Chikitsa* along with others such as *Abhyanga*, *Udvartana*. *Lepa Chikitsa* is necessary mostly for the *Twak Roga*. They are also used in conditions of *Vatavyadhi*, *Vrana*, *Visarpa* and *Visha*. The word “*Kesha*” originally has been derived from the word “*Shee*” with “*Ach + Aluk Samasah*” which has been explained as “*Ke Mastake SheteIti*” by *Halayudha Kosh*<sup>1</sup>. The word “*Keshya*” is suggestive of ‘*Keshaaya Hitam Yat Tat*’. It means that which is good for hair.

A normal human being has approximately 1 million hair follicles on his body out of which 1 lack hair are present on the scalp. A hair normally grows at the rate of approximately 1 cm per month, but each hair grows in cycles, each cycle being constituted by –

- The growth phase (Anagen)
- The transition phase (Catagen)
- The resting phase (Telogen)

The Catagen Phase in a hair cycle usually lasts 3 weeks, while the Telogen phase lasts 3 months. The duration of the Anagen Phase in different hair follicles, however, vary depending upon the site of the body. In the scalp hair, the duration of Anagen phase can be as long as 10 years. After completing the Anagen phase, each hair follicle enters the Catagen phase which is followed by Telogen phase. The old hair, however, falls off only after the completion of the Telogen phase and when the new hair has already started growing in its place.<sup>2</sup>

*Ayurved* considers “*Kesh*” as the *Mala* of *Asthi Dhatu* and states variation in its quality, colour, thickness, etc. on the basis of *Prakriti*. Amongst the seven *Dhatus*, every *Dhatu* goes through alteration by *Dhatvagnipaka* and produces *Sara* (essential compound) and *Kitta* (by-product). In this consecutive process, *Asthi Dhatu* produces two compounds viz. *Sara Bhaga* and *Kitta Bhaga*.<sup>3</sup> The function of *Rasa Dhatu* is *Tushti* (nourishment) and *Preenana*. As a result, *Twakor Kesha bhoomi* (scalp) receives nourishment from it. Hence, quality of hair is also dependent on *Rasa Dhatu*. *Asthi Dhatu* and *Vata Dosha* are inversely related with each other. Thus, vitiation of *Vata Dosha* leads to counter effect on development of *Dhatus* primarily on *Asthi* resulting in *Kesha Rogas* viz. *Khalitya* (hair fall), *Palitya* (Greying of hair), *Darunaka* (Dandruff), *Indralupta* (Alopecia areata), etc.<sup>4</sup>

Both contemporary and ancient sciences quote several diseases of hair, Alopecia (*Khalitya*), Greying (*Palitya*), Alopecia areata (*Indralupta*) etc., *Ayurved* quotes *Darunaka*, one of the common hair problems as a *Kshudraroga* precipitated as a result of the vitiation of *Kapha* and *Vata* leading to dry scalp surface that causes *Kandu* (itching), *Raukshya kritsphutan* (flaking) and *Keshchyuti* (hair fall)<sup>5</sup>. The aetiological factors or *Hetu* of various hair problems is attributed to improper hygiene, environment induced skin changes viz. excessive dryness, air/ water pollution, over exposure to exogenous toxins viz. shampoos, hair dyes, hair colors, etc. and also diet and hormonal imbalance. There are several *Keshya* drugs which are described in *Ayurveda classics* which can be used by the one suffering from hair related problem as well as a healthy person in order to prevent the occurrence of any hair disorder. The *Keshya Lepa* for the clinical trial was prepared for the nourishment of hair, improvement of hair texture and to cure conditions such as *Khalitya* and *Palitya*.

### **Aim-**

To study the effect of *Keshya Lepa* on hair.

### **Objectives-**

- Selection of Suitable *Keshya* drugs from Ayurvedic Literature.
- To observe the effect of *Keshya Lepa* through clinical trials
- To analyze the probable mode of action on the basis of Ayurvedic principles

## Material-

1. *Churna* (fine powder) of following *Dravyas* mixed in equal proportion-

- a) *Musta*
- b) *Jatamansi*
- c) *Brahmi*
- d) *Triphala* (Combination of *Haritaki*, *Bibhitak* and *Amalaki*)
- e) *Japa*
- f) *Yashtimadhu*
- g) *Bhringaraj*
- h) *Methika*
- i) *Ratanjyot*
- j) *Neeli*
- k) *Aamrabeeja*

2. *Charaka Samhita* with *Chakrapani Teeka*

3. Allied Biomedical Sciences

## Method:

### Clinical Study

This study was conducted to assess the clinical efficacy of *Keshya Lepa*. 10 patients were Selected randomly as per the inclusion and exclusion criteria. Only one group was selected for the study and pre-and post-assessment has been done. All 10 patients participated successfully till the end of study.

### Duration of Study- 90 Days

- *Keshya Lepa* was administered to 10 healthy subjects.
- Patients were asked to apply *Keshya Churna* mixed with any liquid media (*Drava Dravya*).
- If the scalp is too dry, then *Snigdha Dravya* like Curd or Coconut milk is to be used, whereas in oily scalp, it is mixed with lukewarm water before applying.
- *Lepa* is instructed to be applied in the direction opposite to hair growth



- *Lepa* should be applied twice a week during morning hours for 30mins. Then hairs were washed with regular water without any soap or shampoo.
- During the study period, patients were advised to not use soap or shampoo over the scalp.

### **Inclusion Criteria**

- Healthy individuals with no physical and/or mental illness.
- Individuals between the age of 16 years to 40 years were taken.

### **Exclusion Criteria**

- Patients suffering from conditions like Alopecia, Psoriasis of the scalp, Allergic manifestation
- Conditions in which head wash is restricted.

### **Assessment Criteria**

Assessment was done based on the signs and symptoms and scoring was done using the gradation index. Assessment was done before treatment, after treatment (90 day) and during monthly follow up. Findings were recorded and result was analyzed.

### **Gradation Index**

- ***Kandu*** (Itching)
  - 0 – No itching
  - 1 – Mild; Tolerable (1 to 2 times a day)
  - 2 – Moderate; Intolerable (3 to 4 times in a day)
  - 3 – Severe; Intolerable (5 to 8 times a day)
- ***Twaksputana*** (Scaling/Cracking of skin)
  - 0 – No scaling
  - 1 – Mild scaling
  - 2 – Moderate
  - 3 – Severe
- ***Rukshata*** (Dryness)
  - 0 – No dryness
  - 1 – Mild (Dryness with rough skin)

2 – Moderate (Dryness with scaling))

3 – Severe (Dryness with cracking skin)

- **Keshachyuti** (Falling of hair)

0 – 1 to 5 hair fall

1 – Mild (less than 20)

2 – Moderate (more than 20 on combing)

3 – Severe (more than 20 on simple hand strength)

### Results-

After using the *Lepa* for 3 months, their feedback was taken. 7 out of 10 patients gave the feedback of shinier and denser hair than before. 5 amongst those 7-people suffered lesser hair fall. Itching was reduced in 5 patients. Rest 3 did not notice any significant change in their hair but did not find the need to apply any shampoo and conditioner. 2 individuals habitual of applying artificial hair colour did not need to apply it frequently during this study.

### Discussion-

*Keshya Lepa* is in the form of *Churna*. *Churna* is an extremely dry form of *Bhaishajya Kalpana*. Therefore, it is not possible to retain them on scalp or anywhere on skin. A medium is necessary for its application as well as absorption on skin, which should be in *Drava* form acts as a vehicle to transport the fine particles of *Churna* into the skin. Selection of *Drava Dravya* depends on the condition in which *Keshya Lepa* is to be administered. *Lepa* should be applied in direction opposite to the hair growth in order to stimulate and open the obstructed *Roma koopas* and *Strotas* for better penetration and circulation of *Drugs*. *Lepa* applied on scalp gets penetrated in *Romakoopas* present on the surface of the skin. It will be absorbed by *Bhrajak Pitta*.

**Table 10.1: Ingredients of Keshya Lepa along with their attributes**

<b>Dravya</b>	<b>Guna Dharma</b>	<b>Dosh aKarma</b>	<b>Indication</b>
<i>Musta</i> ( <i>Cyperus rotundus</i> )	<i>Laghu, Ruksha, Sheeta; Tikta, Katu, Kashaya</i>	<i>Kapha Pitta Disha Prashaman</i>	<i>Grahi</i>
<i>Jatamansi</i> ( <i>Nardostachys jatamansi</i> )	<i>Sheeta, Tikta, Kashaya</i>	<i>Kapha Pitta Dosha Prashaman</i>	<i>Rasayan</i>
<i>Brahmi</i> ( <i>Bacopa monnieri</i> )	<i>Sheeta, Picchila</i>	<i>Vata Kapha Prashamana</i>	<i>Vayasthapana</i>

<i>Triphala</i> (Combination of <i>Haritaki- Terminalia chebula Bibhitaki- Terminalia bellerica</i> and <i>Amalaki- Emblica officinalis</i> )	<i>Haritaki- Kashaya</i> dominant <i>Pancharasa</i> except <i>Lavana</i> ; <i>Virya- Ushna</i> ; <i>Guna- Laghu</i> , <i>Ruksha</i> .  <i>Bibhitaka- Kashaya, Virya- Ushna; Guna- Laghu, Ruksha</i> .  <i>Amalaki- Pancharasa</i> except <i>Lavana</i> ; <i>Virya- Sheeta</i> ; <i>Guna- Guru</i> , <i>Ruksha</i>	<i>Kapha Pitta</i> <i>Shamaka</i> .	<i>Rasayana Yoga. Bibhitaka - Keshya</i> and <i>Keshavrudhikara</i> .  <i>Amalaki- Keshya</i> .
<i>Japa</i> ( <i>Hibiscus rosa- sinensis</i> )	<i>Laghu, Ruksha, Sheeta; Kashaya, Tikta, Katu</i>	<i>Kapha Pitta</i> <i>Prashamana</i>	<i>Keshya (Bh.P.)</i>  <i>Keshavivardhana (Ra.Ni.) Grahi.</i> <i>Pushpa Lepa</i> used in <i>Khalitya</i> and <i>Palitya</i>
<i>Yashtimadhu</i> ( <i>Glycyrrhiza glabra</i> )	<i>Guru, Snigdha; Sheeta; Madhura</i>	<i>Vata Pitta</i> <i>Prashaman</i>	<i>Keshya</i>
<i>Bhringaraja</i> ( <i>Eclipta alba</i> )	<i>Laghu, Ruksha, Ushna, Katu, Tikta, Vranaropana, savarnikarana</i>	<i>Vata Kapha</i> <i>Dosha</i> <i>Prashaman</i>	Known as <i>Kesharaj, Kesharanjana</i> .  <i>Vranaropana, Savarnikarana, Rasayana</i>
<i>Methika</i> ( <i>Trigonella foenum</i> )	<i>Snigdha, Ushna; Katu</i>	<i>Vata Dosha</i> <i>Prashaman</i>	Popular spice in Indian Kitchens. <i>Vedana sthapana</i> and <i>Shothahara</i>
<i>Ratanjyot</i> ( <i>Alkanna</i> )	<i>Tikta, Kasaya</i>	<i>Pittashamak</i>	<i>Kesharanjana Karma, Keshya, Twacchya,</i>

<i>tinctoria</i> )			
<i>Neeli (Indigofera tinctoria)</i>	<i>Laghu, Ruksha, Ushna, Tikta, Katu</i>	<i>Vata Kapha Shamak</i>	<i>Keshya</i>
<i>Aamrabeeja (Majja) (Mangifera indica)</i>	<i>Sheeta, Laghu, Ruksha; Kashaya</i>	<i>Kapha Pitta Prashamana</i>	<i>Grahi, Raktashodhana, Vranaropana, Raktarodhaka, Dahaprashamana, Stambhana</i>

*Acharya Charaka* has clearly mentioned about *Khalitya* and *Palitya* under the diseases of *Rasavaha Srotas*. *Tikta Rasa* which is most common in the above-mentioned list is prominent in the *Chikitsa* of *RasaPradoshaja Vikara*. *Dravyas* such as *Amalaki*, *Yashtimadhu*, *Neeli* which have *Madhura*, *Tikta*, *Kashaya* and *Sheeta* attributes predominantly alleviate the aggravated *Pitta Dosha* responsible for graying of hair thereby preventing further graying of hair. It also performs *Kesharanajana Karma*. Majority of the *Yogas* indicated for *Khalitya* and *Palitya* are used as *Bahya Parimarjana Chikitsa*. They are applied externally on the scalp for their fast action.

*Dravyas* such as *Bhringaraja*, *Bibhitaka* and *Methika* remove the *Avarodha* (obstruction) caused by vitiated *Kapha* and *Rakta*. *Japa* and *Amrabeeja* have *Grahi* action which retain hair and prevent further hair fall. *Yashtimadhu* nourishes hair because of *Snigdha Guna* and *Madhura Rasa*. *Kandu* which is caused due to vitiation of *Kapha Dosha* is cured because of *Tikta*, *Kashaya* and *Ruksha* attributes of majority of *Dravyas*.

### Conclusion-

*Tikta*, *Kashayam* and *Sheeta Guna* dominant *Dravyas* which alleviate *Kapha – Pitta Doshas* plays an important role in stopping the hair-fall. *Sheeta Guna* dominant *Dravyas* prevent hair-fall. *Dravyas* like *Amalaki*, *Yashtimadhu*, *Bhringaraj* and *Neeli* provide color to gray hair because of their *Pittashamaka* action responsible for early graying of hair. Curd is a suitable medium in condition of *Ruksha* hair whereas warm water in *Ati Snigdha* hair. *Keshya Lepa* prepared of above mentioned *Dravyas* is beneficial for the nourishment of hair and can be used by people in their day-to-day life at proper intervals.

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## Chapter 11

### Clinical application of *Vishaghnamahakasaya* in *Garavisha* and *Dooshivisha*- A Review

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#### Abstract

Acharya Charak has enlisted ten herbal drugs under *Vishaghna Mahakashay*. In the current era, most of the cases of poisoning are acute emergency conditions wherein the patient is first taken to the mainstream medical facilities for immediate control over the spread of poison. Due to this reason, the drugs of the *Vishaghna Mahakashay* are not used by clinicians for its prime purpose of *Vishaghna Karma*. Therefore, an attempt has been made to utilise these drugs for the purpose it is intended to be used it for its best results. In the current era, the world is facing major health hazards due to exposure to various low potency poisons such as pesticides, preservatives, water pollution, irrigation induced plant toxicity, cosmetics, air pollution and others that is practically impossible to avoid. Therefore, the use of *Vishaghna Mahakashay* drugs in conditions of *Gara Visha* (artificial poisons) and *Dooshi Visha* (poisons of low potency) has been interpreted in order to combat the ill effects of these accumulated toxins resulting into lifestyle disorders of the current era. Proper application of these drugs will result in a healthy population which will reduce the medical burden of the country and give rise to healthier generations.

**Keywords-** *Garavisha*, *Dushi Visha*, *Vishaghna Mahakasaya*, Detoxification, Lifestyle Disorder, Pollution

#### Introduction:

*Garavisha* literally means artificial poisons. It is caused due to the combination of various substances. *Gara Visha* has *Alpa Veerya* (low potency) and hence doesn't kill the consumer instantly. Instead, it gives rise to diseases first eventually leading to death. *Acharya* Sushruta and *Acharya* Vagbhata explained it as the poison which is formulated by the combination of *Viruddha Aushadhi*, in appropriately processed *Bhasma*, waste products of human beings & low

potency toxic formulations which when administered kills the person slowly and produces many diseases<sup>1,2</sup>.

*Dushivisha* literally means flawed, spoiled, damaged, defective or ruined poison. The term *Dushi Visha* is a made up of different words *Dushi* which means denatured, attenuated, latent, vitiated. *Visha* means poison. Thus, *Dushi Visha* means denatured poison or attenuated poison. Attenuated or denatured poisons function as latent toxin in the body.

*Acharya Sushruta & Acharya Vagbhata* describe *Dushi Visha* as any kind of poison originating from inanimate or animate sources or any artificial poison (*Kritrima Visha*) retained in the body after partial expulsion. Any poison that is having low potency as compare to that of the natural ten properties of *Visha*, incapable of producing symptoms of poisoning can also be designated as *Dushi Visha*.<sup>3, 4</sup>

Both *Dushi Visha* and *Gara Visha* are responsible in the formation of *Ama*. *Acharya Vagbhat* also stated *Ama* as having properties similar to that of *Visha*<sup>5</sup> In our body; toxins are formed and released into the circulation due to faulty digestion. These toxins are not excreted by the body, they produce a pathogenesis of various types of diseases. These drugs help to neutralize the circulating toxins by their *Vishghana Karma*. It purifies the blood and excretes the toxins from the body.

*Mahakashaya* is a group of ten functional drugs. Pharmacological properties of each drug of *Vishaghna Mahakashaya* are of broad spectrum in the field of *Ayurvedic* and contemporary science. Each drug of *Vishaghna Mahakashaya* is chief ingredient of many classical preparation and *Agad* preparation (Anti-poisonous *Ayurvedic* preparation) which has large area of therapeutic uses. The term *Vishaghna* and detoxification are functionally same. *Vishaghna Mahakashaya Dravya* works both at macro and micro level, at micro level they not only denature toxics but also neutralises them from cellular level and helps in excretion from the body. So, a study was planned to analyse logically the pharmacological action of *Vishaghna Mahakasaya* in detoxification of body from *Dushivisha* and *Garavisha*

**Aim:** To study the action of *Vishaghna Mahakasaya* in detoxification of body w.s.r.t *Garavisha* and *Dushivisha*

**Objective of this study:**

- To study *Ayurvedic* and contemporary view of *Dushi Visha*, *Gara Visha* and *Vishaghna Mahakashaya*.
- To study pharmacological and detoxifying properties of *Vishaghna Mahakashaya*.
- To analyse conditions in which *Vishaghna Mahakashaya* can be prescribed for detoxification of body from *Dushivisha* and *Garavisha*.

- To classify the observations in a tabular form for convenience of study with *Ayurvedic* and modern science respectively.

### **Materials:**

- *Ayurvedic* literary study will be done from *Charak Samhita*, *Bhavprakash Nighantu* and other allied *Ayurvedic* Literature.
- Related Biomedical texts

### **Methodology:**

- All aspects of *Vishaghna Mahakashaya* were studied in detail.
- All aspects of *Gara Visha* and *Dushi Vishawas* studied in detail.
- Use of *Vishaghna Mahakasaya* in patients inflicted by *Gara Visha* and *Dushi Visha* has been projected.
- *Vishaghna* action against toxic manifestation caused by *Dushi Visha* and *Gara Visha* has been correlated and explained.
- Combating unavoidable current life style related diseases by *Vishaghna Mahakasaya* has been projected.

### **Literature Review**

#### ***Gara Visha***

*Gara Visha* According to *Acharya Charaka*, “A Poison formed by combination of different poison (*Samyogajavisha*) or concocted poison finds its reference under *Gara Visha* other than the basic classification of *Visha* as *Sthavara* and *Jangama Visha*”. Because of the delayed digestion property of this *Visha* these are not immediately fatal.<sup>6</sup>

*Acharya Sushruta* and *Acharya Vagbhata* opines that the poison which is formed from the waste materials from the animals (excreta) or combination of medicines or *Bhasmas* which are having opposite properties or the poisons having the less potency can be considered as *GaraVisha*<sup>7</sup>

It takes approximately 15days to 1 month for the signs to appear after the ingestion of the *Gara Visha*. Some of the symptoms like pale and weak body, loss of appetite, tachycardia, oedema of the limbs, *Grahani*, *Rajayakshma*, *Gulma*, *Dhatukshaya*, *Jwara*etc will start to appear and will be suggestive of *Gara Visha* poisoning.<sup>8</sup>



## ***Dushi Visha***

The term *Dushi Visha* is a combination of two different words, ‘*Dushi*’ and ‘*Visha*’. ‘*Dushi*’ means denatured, attenuated, latent, vitiated. *Visha* means poison. Thus, *Dushi Visha* means denatured poison or attenuated poison

Any poison that is devoid of the natural ten properties of *Visha*, incapable of producing acute symptoms of poisoning can also be designated *Dushi Visha*. A poison, which is having fewer properties, which means less than ten classical properties that actually a poison should have, or either the poison, which is having lesser potency of all the ten properties, attains a latent or hidden stage in the body called Latent poison (*Dushi Visha*). Low potency of all the ten qualities is said to be responsible for the delayed action and cumulative toxicity on the body<sup>9</sup>. *Dushi Visha* can cause complications like fever (*Jwara*), burning sensation (*Daha*), hiccups (*Hikka*), indigestion (*Anaha*), swelling (*Shoth*), diarrhoea (*Atisara*), decreased semen (*Shukra Samkshaye*), giddiness (*Murchha*), heart diseases (*Hrudrog*), tremours (*Vyapathu*), disorders of digestive system (*Jathara*) etc.<sup>10</sup>

## **Vishaghna Mahakashaya: -**

*Visha* means the *Dravya* which causes *Vishaad* (sorrow or depression) is known as *Visha*.<sup>11</sup>

*Laghu*, *Ruksha*, *Aashu*, *Vishad*, *Vyavayi*, *Tikshna*, *Vikaashi*, *Sookshma*, *Ushna*, *Anirdeshyarasa* are the ten properties of poisonous drugs. Drugs which act against toxic effect of substances are called as *Vishghna*.

*Acharya Charak* has described *Vishaghna Mahakashaya* which includes ten *Vishghna* drugs.

It includes *Haridra* (*Curcumalonga*), *Manjishtha* (*Rubiaccordifolia*), *Suvaha* (*Pluchealanceolata*), *Sukshama Ela* (*Elettariacardamomum*), *Paalindi* (*Operculinaturpethum*), *Chandan* (*Santalumalbum*), *Kataka* (*Strychnospotatorum*), *Shirisha* (*Albizzialebeck*), *Sinduvara* (*Vitexnegundo*), *Shleshmataka* (*Cordiadichotoma*).<sup>12</sup>

## **Observations and Results**

**Table 11.1: Description about *Vishaghna Mahakashaya***

Drug	Properties				Chief Chemical Constituents	<i>Doshaghna</i>
	<i>Rasa</i>	<i>Guna</i>	<i>Virya</i>	<i>Vipaka</i>		
<b><i>Haridra</i></b>	<i>Tikta</i> <i>Katu</i>	<i>Laghu</i> <i>Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	Curcumin	<i>Kapha-Pitta</i>
<b><i>Manjishtha</i></b>	<i>Tikta, Kashay,</i> <i>Madhura</i>	<i>Guru,</i> <i>Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	Purpurin Manjistin Garancin	<i>Rakta-Kapha-Pitta</i>
<b><i>Suvaha (Rasna)</i></b>	<i>KashayTikta</i>	<i>Guru,</i>	<i>Sheeta</i>	<i>Madhura</i>	Adiantone,	<i>Kapha-Pitta</i>

		<i>Sheetha, Ruksha</i>			Adiantoxide, Filicenol	
<b><i>SukshmaEla</i></b>	<i>Madhur, Katu</i>	<i>Laghu, Ruksha</i>	<i>Sheeta</i>	<i>Madhura</i>	Cineol Terpineole Sabinene Terpinene	<i>Vata-Pitta-Kapha</i>
<b><i>Paalindi (Shyamlata)</i></b>	<i>Tikta, Katu</i>	<i>Laghu, Ruksha, Tikshna</i>	<i>Ushna</i>	<i>Katu</i>	Turpethenic Acid, Coumerin Derivative Scopoletin	<i>Kaph- Pitta</i>
<b><i>Chandan</i></b>	<i>Tikta- Madhura</i>	<i>Laghu, Ruksha</i>	<i>Sheeta</i>	<i>Katu</i>	Alpha and Beta Santalol	<i>Kapha-Pitta</i>
<b><i>Kataka</i></b>	<i>Madhur, Kashay, Tikta</i>	<i>Laghu, Vishada, Vikasi</i>	<i>Sheeta</i>	<i>Madhura</i>	Brucine, Laganin, Mannose, Linoleic Acid, Saponins like Sitosterol	<i>Kapha- Vata</i>
<b><i>Shirisha</i></b>	<i>Madhura, Kashay, Tikta</i>	<i>Laghu, Ruksha, Tikshna</i>	<i>Ishat Ushna</i>	<i>Katu</i>	N-Benzoyl, L Phenyl Alanilol, Macrocyclic Alka- loids, Flavonols, Saponins	<i>Vata-Pitta-Kapha</i>
<b><i>Sinduvara (Nirgundi)</i></b>	<i>Tikta, Katu</i>	<i>Laghu, Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	Chrysophenol D, Casticin, Sabinene, Terpinen- 4-Ol, Globulol	<i>Kapha-Vata</i>
<b><i>Shleshmataka (Bahavar)</i></b>	<i>Kashay, Tikta, Madhura</i>	<i>Snigdha, Guru, Picchil</i>	<i>Sheeta</i>	<i>Katu</i>	Pyrrolizidine Alkaloids, Betulin, Flavonoids, Coumarins, Terpenes, Saponins	<i>Vata-Pitta</i>

## Discussion:

*DushiVisha* and *GaraVisha* both have very low potency; therefore, they do not kill the victim immediately<sup>13</sup>. Instead, it results in chronic diseases that affect the body and mind. Somatic disorders such as *Pandu*, *Alpagni*, *Kasa*, *Shwaas*, *Bhinna Pureesh* and *Moorcha* are seen and mental disorders like *Gadgada* (slurred speech) and seeing animals like mongoose, snake and rivers in dreams are observed<sup>14</sup>. These symptoms indicate the chronicity of the disease. The *Vishaghna Dravyas* mentioned by *Acharya Charaka* are majorly indicated in acute conditions of poisoning along with other treatment modalities. *Acharya Charaka* states that the *Vishaghna* action is the *Prabhav* of the *Vishaghna Dravyas*<sup>15</sup>. While some of the attributes can be analysed for its effect on *Visha*, however, not all *Dravyas* of similar attributes will have the same effect in cases of poisoning.

As per Ayurveda, all diseases are caused due to the impairment of *Agni*<sup>16</sup>. By using *Uhya Tantrayukti*, we can conclude that the primary pathogenesis begins from the alimentary canal. This is also established by *Vagbhatacharya* where he states that *Dushivisha* present in the *Amashay* causes *Kapha-Vata* diseases and the one present in *Pittashay* causes *Vata-Pitta* diseases<sup>17</sup>. In the earlier stages of chronicity, the low potency poisons lie in the alimentary canal. This is the prodromal stage. In this stage, administration of the *Vishaghna Dravyas* will nullify the effects of these poisons by its *Vishaghna Prabhava* and digestion of the poisons. However, as the pathology progresses in the absence of proper treatment, the poisons lying in the alimentary canal lose its *Drava* property due to the action of *Agni* thereby making it more immobile. This sticks to the walls of the intestines and as a compensatory mechanism, the semi permeability of the intestines gets converted into hyper permeability, thereby allowing the passage of larger molecules of toxins into the circulation. At this stage, the clinical features of *Gara Visha* and *Dooshi Visha* will be seen. Administration of *Vishaghna Dravyas* is of no use here because it is not its capacity to revert the physiological and anatomical changes at this stage of chronicity. Therefore, at this stage, the first line of action should be *Shodhan* followed by administration of *Vishaghna Dravyas*. *Shodhan* eradicates the toxins from the circulation as well as the alimentary canal. Administration of *Vishaghna Dravyas* after *Shodhan* ensures subsequent infliction by poisons and also repairs the intestines due to the dominance of *Tikta Rasa* in the *Vishaghna Dravyas*. *Tikta Rasa* is predominant in *Akash* and *Vayu Mahabhutha*, therefore, it is able to absorb the *Drava* element causing *Shaithilya* in the intestines.

## Conclusion:

Lifestyle disorders are on a high time rise in the current era owing to the toxins that seep into our daily lives through innumerable means. Pesticides in fruits and vegetables, adulterated food substances, pollution, preservatives, cosmetics, occupational poisons and toxicity of medicines due to improper purification are some of the major pathways of introducing low potency toxins into the body. These toxins get accumulated over years and leads to lifestyle disorders. By applying the treatment protocol of eradication of *Gara Visha* and *Dooshi Visha*, these lifestyle

disorders can be avoided. Seasonal detoxification and consumption of *Vishaghna Dravyas* prevents the low potency poisons from getting lodged in the body. Therefore, it must be practised regularly to keep the lifestyle disorders at bay.

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## Chapter 12

### **A critical review on *Avartana Taila Nasya Karma* with special reference to *Avartita Kshirabala Taila*.**

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#### **Abstract**

*Ayurveda* mainly comprises of two major specialties i.e., *Samshodhana* and *Samshamana Chikitsa*. *Panchakarma* treatment is considered as the best *Shodhanopaya* and also which helps in the complete elimination of disease and maintains the equilibrium of *Doshas*. *Nasya Karma* is one among the *Panchakarma* procedures has got an important role in the management of *Urdhva jatru gata Vikaras* i.e., the diseases present above the clavicular region. It will not only alleviate the vitiated *Dosha* but also causes complete eradication of the vitiated *Dosha* and the disease. In general, for *Nasya Karma*, *Taila yogas* are most commonly used as *Taila* are having the properties which are opposite to qualities of *Vata* and *Kapha Dosha*.

*Avartana* is the extended process of *Snehapakain Ayurveda* which increases drug absorption, potentiates the properties of drug formulations and reduces the classical dose of drug formulation. The classical dose of the *Nasya karma* is very high which is practically not possible for daily practice, so to reduce the classical dose of *Nasya Karma* and to get the desired effect from *Nasya Karma* we can use the *Avartita Taila*. There are many *Taila yoga* which are told in classics for *Nasya Karma* and *Ksheerbala Taila* is one among them. Present article emphasizes the importance of *Ksheerabala Avartana Taila* as a *Nasya Dravya*.

**Key Words-** *Ksheerbala Aavartan Taila, Nasya Karma, Panchakarma, Samshamana, Samshodhana.*

## Introduction-

*Nasya Karma* is the most important therapy as it is mainly used for the management of *Urdhva jatru gata Vikaras* because in the chapter of *Apamrgatanduliya*<sup>1</sup> it has been given first place in the sequence of *Panchakarma*. *Nasa* is considered to be the gateway for *Shiras*. The medicine administered through the nose spreads through the *Siras* & reaches the brain and thereby helps in the evacuation of *Dosha*, which are responsible for producing the diseases. *Nasya* can be used even in an Unconscious patient<sup>2</sup>. It is considered as the best method to eliminate & alleviate the vitiated *Doshas* of *Urdhvanganga*.

*Nasya Karma* is the only *Shodhana Karma* which can be performed for *Urdhvanga* and it is the main line of treatment for the disease above the clavicle region. According to *Rogibala* & *Rogabala*, specific type of *Nasya Karma* is indicated. It is a therapeutic measure where the medicated *Taila* or oil, *Churna* or powder, *Swarasa*, *Kalka* etc. are administered through the nose to eliminate the vitiated *Dosha* situated in the *Shiras*. It is the only procedure which can directly influence the *Indriya* or Sense organs. It can also be practiced as a part of *Dinacharya* for the promotion of health of the individual. It has lower side effects as compare to the other *Shodhana Karma*.

Based on the ingredients present in *Ksheerabala Taila* which is *Balamoola*, *Tila Taila* and *Ksheera*, all are having *Madhura Rasa* and *Madhura Vipaka* in which it helps in mitigating the *Vata* and *Pitta Dosha*. *Ksheerabala Taila* as a *Nasya Dravya*, it suppresses the nerve inflammation due to the present of *Sheeta Guna* in it and also it promotes the nerve regeneration and gives strength to muscles due to its *Balya* and *Brimhana* properties present in the *Dravya*<sup>3</sup>. *Ksheerabala Taila* is having the effects to pacify the eighty types of *Vatavyadhi* such as *Akshepa* (convulsions), *Vepathu* (tremors), *Shrama* (fatigue), *Glani* (malaise), *Vishada* (depression), *Aswapna* (insomnia), and *Anavasthithachitata* (behaviour disorders)<sup>4</sup>.

**Table 12.1: Types of *Nasya Karma* according to various *Acharya*: -**

Sl.no.	Name of Acharya	No.	Reference	Classification
1	<i>Charaka</i>	3	<b>Ch. Si. 9/89,92</b> <b>Ch. Vi. 8/154</b>	Based on Action – <i>Rechana</i> , <i>Tarpana</i> , <i>Shamana</i> .
		5		According to the method of administration- <i>Navana</i> , <i>Avapidana</i> , <i>Dhmapana</i> , <i>Dhuma</i> , <i>Pratimarsha</i> .
		7		According to various parts of drugs used- <i>Phala</i> , <i>Patra</i> , <i>Mula</i> , <i>Kanda</i> , <i>Pushpa</i> , <i>Niryasa</i> , <i>Twaka</i> .

2	<i>Sushruta</i>	5	<b>Su. Ci. 40/21</b>	<i>Shirovirechana, Pradhamana, Avapidana, Nasya, Pratimarsha</i>
3	<i>Vagbhata</i>	3	<b>A.H. Su. 20/2</b>	<i>Virechana, Brimhana, Samana.</i>
4	<i>Kashyapa</i>	2	<b>Ka. Si. 2 &amp; 4</b>	<i>Brimhana, Karshana.</i>
5	<i>Sharangadhara</i>	2	<b>Sa. Ut. 8/2,11,24</b>	<i>Rechana, Snehana</i>
6	<i>Bhoja</i>	2	<b>Dalhana Su. Ci. 40/31</b>	<i>Prayogika, Snaihika</i>
7	<i>Videha</i>	2		<i>SanjnaPrabhodaka, Stmabhana.</i>

**Table 12.2: Nasya according to Charaka:**

Sl. No	Type of Nasya	Sub-Type
1	<i>Navana</i>	<i>a) Snehana, b) Shodhana</i>
2	<i>Avapeedana</i>	<i>a) Shodhana, b) Stambhana</i>
3	<i>Dhmapana</i>	-
4	<i>Dhuma</i>	<i>a) Prayogika, b) Snaihika, c) Vairechanika</i>
5	<i>Pratimarsha</i>	-

***NavanaNasya:***

*Navana* is one of the important and most accepted types of *Nasya Karma*. It is the administration of medicated oil or ghee into the nostrils with the help of *Gokarna* and it is called “*Navana Nasya*”.

**Table 12.3: Navana Nasya Dosage**

Dosage	
Type of Dose	Dosage in each Nostril
<i>AvaraMatra</i>	<i>8 Bindu</i>
<i>MadhyamaMatra</i>	<i>16 Bindu</i>
<i>UttamaMatra</i>	<i>32 Bindu</i>

**Indications of Sneha Nasya<sup>5</sup>:** *Vatika Shirashula* (tension headache), *Keshapata* (hair fall), *Dantapata* (falling of teeth), *Smasrupata* (falling of moustache), *Tivrakarnashula* (intense earache), *Timira*, *Nasaroga* (diseases of the nose), *Mukhashosha* (dryness of the mouth), *Avabahuka* (frozen shoulder), *AkalajaValita* (premature wrinkles of skin), *Akalaja Palita* (premature greying of hair), *Daruna prabodha* (difficulty in awakening) and *Vatapittaja Mukharoga*.



### ***Shodhana Nasya<sup>6</sup>:***

It is the second type of *Navana Nasya*, and in this type of *Nasya* oil which is prepared by *Shirovirechana Dravyas* is used for example *Pippali, Shigru, Vidanga, Apamarga, Shigrubeeja, Saindhava*, etc.

**Table 12.4 *Shodhana Nasya* Dosage**

Dosage	
Type of Dose	Dosage in each Nostril
<i>AvaraMatra</i>	<i>4Bindu</i>
<i>MadhyamaMatra</i>	<i>6 Bindu</i>
<i>UttamaMatra</i>	<i>8Bindu</i>

**Indications of *Shodhana Nasya*:** Accumulation of *Kapha* in palate, throat and head, *Aruchi, Shirogourava, Shirashula, Peenasa, Ardhavabhedha, Krimi, Pratishyaya, Apasmara*, Loss of smell sensation and *Jatru Urdhwagata Kaphaja Vikara*.

### ***AvapidanaNasya:***

*Avapidana Nasya* is a type of *Nasya* in which extracted juice from leaves or paste (*Kalka*) is used for installation. It is a mainly considered as *Shodhana Nasya*.

For this purpose, *Kalka* of the required medicine is prepared first, which is placed in a white and clean cloth & then is squeezed to obtain the required quantity of juice, administered directly into the nostril of the patient. The administration of the drug in this way is known as *Avapidana Nasya<sup>7</sup>*. This type of *Nasya* may also be given with *Kalka* (paste), though *Susruta* recommends it only for *Shirovirechana, Ksheera* and *Ikshurasa* have recommended for *Stambhana Nasya*.

**Table 12.5: *Avapidana Nasya* Dosage**

Dosage	
Type of Dose	Dosage in each Nostril
<i>AvaraMatra</i>	<i>4Bindu</i>
<i>MadhyamaMatra</i>	<i>6 Bindu</i>
<i>UttamaMatra</i>	<i>8Bindu</i>

**Indication<sup>8</sup>:** It is indicated in *Manasaroga, Apasamara, Sirovedana, Moha, Citta Vyakulavastha, Murccha, Sanyasa, Bhaya, Krodha, Bhiru, Sukumara, Krisa, Stri, Raktapitta, Visha, Abhighata, Apatantraka*.

### ***Dhmapana Nasya:***

Blowing of fine medicated powders into the nostrils with the help of a tube of 6 *angula* length, having the opening on both ends is called “*Dhmapana Nasya*”.

**Dose-** According to Videha the dose of *Dhmapana Nasya* is 3 *Muchuti* (3 pinch) and for the *Pottali* method, the *Churna* should be at least 2 *Tolas* i.e., 20 grams.

**Indication:** It is indicated in *Cheto Vikara* (mental disorder), *Krimi* (worm infestation), *Visha* (poisoning), *Utkata Dosha* (excessively vitiated Dosha), *Visanjna* (loss of consciousness).

### ***Dhuma Nasya:***

The process of inhaling the medicated fumes through the nostrils and expelling through the mouth with the help of a *Dhuma Yantra* is known as “*Dhuma Nasya*”.

**Indication:** It is indicated in *Siroroga*, *Nasaroga*, *Akshiroga*.

### ***Pratimarsha Nasya/ Marsha Nasya:***

*Marsha* and *Pratimarsha* both consist of instillation of oil through the nostrils.

**Table 12.6: *Pratimarsha Nasya/ Marsha Nasya* Dosage**

Dosage	
Type of Dose	Dosage in each Nostril
<i>AvaraMatra</i>	<i>6Bindu</i>
<i>MadhyamaMatra</i>	<i>8Bindu</i>
<i>UttamaMatra</i>	<i>10Bindu</i>

As the dose of *Pratimarsa Nasya* is only 2 *Bindu*, it can be given in any age, any season, even in unsuitable time and season i.e. in *Varsha Rutu* and *Durdina*.

**Indication:** It is indicated in *Bala*, *Vridhdha*, *Bhiru*, *Sukumara*, *Durbala*, *Kshata*, *Trishna*, *Mukhasosha*, *Valita*, *Palita*.

### **Importance of duration/ course of *Nasya*:**

**Table 12.7: Duration of *Nasya***

Sl no.	Name of Acharya	Days
--------	-----------------	------

1	<i>Susruta</i> <sup>9</sup>	1, 2, 7 or 21
2	<i>Bhoja</i>	9
3	<i>Vagbhata</i> <sup>10</sup>	3, 5, 7 or 8

*Acharya Charaka* has not mentioned the specific duration for Nasya therapy but suggested to give according to the severity of the disease.

### **Dose of Nasya Karma:**

*Acharya Charaka* has not prescribed the dose of the Nasya, whereas *Susruta* and *Vagbhata* have mentioned the dose in the form of *Bindupramana*. In the context of Nasya, *Bindu* doesn't mean a drop, it is the amount of oil that falls, when two phalanges of the index finger are dipped into oil & taken out is termed as "*Bindu*"<sup>11</sup>. One *Bindu* is equal to 0.5ml<sup>12</sup>.

**Table 12.8: Dose of Nasya Karma**

Sl no.	Type of Nasya	Drops in each Nostril		
		<i>HrusvaMatra</i>	<i>MadhyamaMatra</i>	<i>UttamaMatra</i>
1	<i>ShamanaNasya</i>	8	16	32
2	<i>ShodhanaNasya</i>	4	6	8
3	<i>Marsha Nasya</i>	6	8	10
4	<i>AvapidanaNasya(Kalka Nasya)</i>	2	2	2
5	<i>PratimarshaNasya</i>	2	2	2

If the Nasya is given less than the prescribed dose then it does not eliminate the *Dosha* completely and leads to heaviness, loss of appetite, cough, salivation, coryza, vomiting and diseases of the throat etc. and if it is given in excess dose then it may produce the symptoms of *Atiyoga*<sup>13</sup>.

The classical dose of Nasya Karma is very high i.e. (32 Bindu=16ml, 16Bindu=8ml, & 8Bindu=4ml for each nostril).

So, to reduce the classical dose of Nasya Karma & to get the desired effect from Nasya Karma we can use the *Avarita Taila*, as it is found that *Avarita Taila* is more potent, get easily absorbed and can be administered in a reduced dose.

**SnehaPaka:** The preparation of *Sneha* is mainly divided into 3 stages<sup>14,15,16,17</sup>:

**Table 12.9: Types of *Sneha Paka***

Stages	Types of <i>Paka</i>
Stage I	<i>Mrdu Paka</i>
Stage II	<i>Madhyama Paka</i>
Stage III	<i>Khara Paka</i>

**Table 12.10 Indications of *Sneha Paka* for Therapeutics<sup>18,19</sup>**

Sl.no	Name of <i>Paka</i>	<i>Charaka Samhita</i>	<i>Susruta Samhita</i>	<i>Ashtanga Hrudaya</i>	<i>Sarangadhara Samhita</i>	<i>Harita Samhita</i>
1	<i>Mrudu Paka</i>	<i>Nasya</i>	<i>Pana</i>	<i>Nasya</i>	<i>Nasya</i>	Not mentioned
2	<i>Madhyama Paka</i>	<i>Basti</i>	<i>Nasya</i> and <i>Abhyanga</i>	<i>Pana and Basti</i>	<i>Sarvakarma</i>	Internal and enema
3	<i>Khara Paka</i>	<i>Abhyanga</i>	<i>Basti</i> and <i>Karnapoorana</i>	<i>Abhyanga</i>	<i>Abhyanga</i>	<i>Abhyanga</i>

For *Nasya Karma* we require *Mrudu Paka* or *Madhyama Paka Sneha/ Taila* yogas but *Mrudu Paka* is generally used in practice.

We can say that *Mrudu Paka Taila* which contains even little amount of water may act as ‘*Saumya*’ and it may not produce irritation to the nasal mucosa. Secondly, it may allow only the required quantity of oil to absorb in the mucosal membrane in the nose. The active chemical constituents are present in *Madhyama Paka* and this may help to achieve the desired effect if it is administered orally. *Khara Paka Taila*, as it is free from moisture, it quickly absorbed from the skin surface.

There are various forms of Ayurvedic medicines used to treat diseases, such as *Swarasa*, *Kwatha*, *Churna*, *Vati*, *Sneha*, etc. The *Sneha Kalpana* is one among them used as *Pana*, *Abhyanga*, *Bhojana*, *Nasya* and *Basti*. i.e. it is used in both external and internal therapies. The *Sneha* cannot be prescribed for a longer duration of time and in larger doses, so to solve this problem the technique of *Avartana* was invented. *Avartana* is a kind of preparation which helps in increasing the properties of the formulations<sup>20</sup> and helps to reduce the dose.

## CONCEPT OF AVARTANA:

The meaning of the term *Avartana* is repetition<sup>21</sup>, doing over and over again<sup>22</sup>, or stirring or churning anything<sup>23</sup>. So, it is the adding of properties by continuously repeating the process. Here we can understand that this procedure acts as a 'Samskara'<sup>24</sup>. This has a great role in augmenting the *Gunas* of the particular formulation.

The term *Avartana* appears mainly in *Bhruhat-Traya* classics, where they just mentioned *Avartana* of *Ghruta* & *Taila*. The *Ratna Prabha Teeka* on *Chakradatta* is the classical book, which explains the pharmaceutical process of *Avartana* in the context of *Dasha Paka Bala Taila*<sup>25</sup>.

In the process of *Avartana* each time, the ingredients i.e., *Kashaya* and *Kalka Dravya* are added. This increases the chemical properties of the formulation. It may also help in providing the maximum surface of absorption and hence the maximum availability of drug can be seen<sup>26</sup>. The *Avartana* procedures helps in reducing the therapeutic doses told in Ayurveda classics and even we can able to achieve maximum therapeutic benefits in a minimum dose of the drug. Compared to classical preparation of *Taila* or *Ghruta* Yogas, the *Avartana* of *Taila* or *Ghruta* takes more time for preparation and this needs a maximum quantity of drugs.

## Method of preparation *Avartana Taila*:

The basic ingredients of *Snehapaka* *Vidhi* are *Kalka Dravya*, *Sneha Dravya* and *Drava Dravya*.

- 1) **The ratio of these ingredient is 1:4:16** respectively.
- 2) The procedures are similar to *Sneha Kalpana* in case of *Ghruta Kalpana* or *Taila Kalpana*.
- 3) After *Sneha Paka* i.e., after *Madhyama Sneha Paka Lakshana* are observed, then the *Sneha* is filtered & measured. As all different kinds of *Avartana taila* are indicated for both internal and external use so the *Madhyama Sneha Paka* is considered for all kinds of *Avartana taila*.
- 4) Then the quantity of *Kalka* & *Drava Dravya* for second *Avartana* is calculated i.e., quantity of *Kalka-dravya* and *Drava-dravya* are measured based on the quantity of above filtered *Sneha*.
- 5) The measured *Kalka-dravya* and *Drava-dravya* are added to the above filtered *Sneha*, *Paka* is carried out.
- 6) The *Sneha Paka* is done continuously by adding the calculated amount of *Kalka* & *Drava Dravya* every time in comparison with *Sneha* obtained from previous *Paka*.
- 7) After each *Snehapaka* the quantity of *Sneha* obtained will be less i.e. there will be loss of *Sneha* in each *paka*.
- 8) It is seen that the consistency, the colours & odour of the product changes in each *Avartana*.
- 9) For *Nasya karma mridu paka* can be considered

**Avartana** helps in: -

- Reducing the therapeutic or classical dose of Drug.
- Increased drug absorption.
- Early action.
- More drug distribution.
- Good clinical efficacy.
- Easy drug administration i.e., both internal and external use.
- Bio-transformation.
- Binding/ localization/ storage of drug.
- Easy packing and marketing.

In *Avartana* process, due to continuous application of heat and repeatedly mixing of ingredients to the filtrate obtained, it converted it into a very concentrated form, therefore a little quantity is enough for palliation of the disease and due to its high concentration of active principles of drugs, it gets absorbed quickly. The *Avartana* process changes the formulation in a very different way that even in a small dose, the formulation can exhibit its therapeutic effects quickly.

*Avartana* technique was known since *Samhita* period itself, but the application of *Avartita Taila* was limited in due course of a time period, due to increased cost, due to extra amount of time for preparation and due to requirement of more quantity of drugs. But the *Avartana* changes the molecular structure of the ingredients making them more complex resulting in their increased penetration capacity at the tissue level.

*Ksheerabala Avartana Taila* mentioned in *Sahasrayoga*<sup>27</sup> is one of the examples of *Avartita Taila* yogas which is used for *Vata vyadhi*.

***Ksheerabala Avartana Taila***: - The ingredients are:

- a) *Balamoola Kalka* = 1 part x Required Number of *Avartana*.
- b) *Murchita Tila Taila* = 4 parts x Required Number of *Avartana*.
- c) *Goksheera* = 4 parts x Required Number of *Avartana*.
- d) *Balamoola Kashaya* = 16 parts x Required Number of *Avartana*.

**Method of Preparation of 21AvartitaKsheerbalaTaila-**

- 1) 1 part of *Kalka* (i.e., 250gm of *Balamoola Churna*), 4 parts of *Sneha* (i.e., 1L *Murchit Tila Taila*), 4 parts of *Goksheera* (i.e., 1L *Goksheera*) & 16 parts of *Drava Dravya* (i.e., 4L *Balamoola Kashaya*) are to be mixed together & heated on *Mandagni*.
- 2) After *Madhyama Sneha Paka Siddhi Lakshana* are obtained the *Sneha* is filtered & measured. This completes **1Avartana**.

- 3) Again, quantity for 2<sup>nd</sup> *Aavartana*, the same ingredients i.e., 250 gm of *BalamoolaChurna*, 4L. *Goksheera* and 4L. *Balamoola Kashaya* are added to 1<sup>ST</sup> *Avartita Taila*. Heated on *Mandagni*, after *Madhyama Sneha Paka Siddhi Lakshana* are obtained the *Taila* is filtered and measured. This completes **2Avartana**.
- 4) In the same way this procedure is repeated for 19 times to get **21 Aavartita Ksheerabala Taila**.

#### **Products related to number of Avartana:-**

Ksheerbala 101, Ksheerbala 41, Ksheerbala 21 Ksheerbala 14, Ksheerbala 7, Ksheerbala 3 are Available in market.

#### **Uses-**

The main ingredients of *Ksheerabala Avartana Taila* are *Balamoola* (*Sida Cordifolia*), which is a potent and neuroprotective herb. It also has anti-inflammatory property which calms the nerves and helps in muscle strengthening. Therefore, *Ksheerabala Avartana Taila* has benefits on nerves, brain, spinal cord, bones, muscles, joints and other connective tissue in the body<sup>28</sup>.

*Acharya Charaka* has considered *Tila Taila* as the best one which imparts strength in the body and for the pacification of *Vata Dosha*<sup>29</sup>. It also has anti-inflammatory and antioxidant properties. It provides the lipophilic base to *Nasya* medicament which makes its better absorption-as lipid solvent substances and have more affinity for passive absorption through the nasal mucosa and crossing Blood Brain Barrier (BBB)<sup>30</sup>.

The cow's milk possesses the qualities like *Madhura*, *Sheeta*, *Mrudu*, *Snigdha*, *Sandra*, *Slakshna*<sup>31</sup>. Milk also alleviates *Vata* and *Pitta* dosha by the above properties. The cow's milk contains all the elements necessary for the development and nourishment of bones, nerves, muscle, and other tissues of the human body<sup>32</sup>.

*Ksheerabala Avartana Taila* is mainly used for the treatment of diseases related to the musculoskeletal system. It can be administered, both externally and internally for pacifying *Vata Dosha* in the body. It gives relief from pain, stiffness, inflammation, swelling and other symptoms of aggravated and increased *Vata Dosha*. It is rejuvenating, which helps to repair the damaged tissue. It also provides nourishment to the nerves, brain, and spinal structures.

#### **CONCLUSION:**

*Avartana* of *Taila* will help in limiting the dose, boosting the impact, fastening the activity and simplifying the drug administration. The classical doses of different types of *Nasya Karma* are very difficult to practice in the present scenario. Hence by considering both the above points, we

can use the *Avartita Sneha* or *Taila* for *Nasya Karma* in a reduced dose to avoid complications which might arise due to large classical dose.

*Ksheerbala Aavartan Taila* is *Vataghna*, *Brimhana* and *Snehan*. It is Sukshma Srotogami. *Ksheerbala Aavartan Taila* primarily mobilizes the *Kaphadi Doshas* from their *Sthanas* and afterwards, it acts as *Brimhana*. Oil compasses to minute channels and evacuate all the *Doshas*. Oleation and strengthening move takes place on tendons and ligaments of the upper part of the body.

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## Chapter 13

### Evidence based review on *Cannabis sativa*: Miracle herb of Ayurveda

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#### Abstract

Since the dawn of time, *Cannabis sativa* L., also known as *Vijaya*, has been a major herb species in Indian traditional medicine. It is classified as *Upavisha* (Toxic or narcotic herb) in ayurvedic literature, however, due to its extensive medicinal characteristics; it is employed in a variety of ayurvedic herbo-mineral formulations. The use of cannabis and cannabis leaves in the formulation of ayurveda medications is specifically recognised by Ayurveda. Many formulations concerning the pharmaco-clinical application of *vijaya* are described in Ayurveda, although many of these formulations are not in use anymore due to the restricted use of *vijaya* in practice. It is a broad-spectrum medication with a multimodal approach in different diseases in the combination of other herbs. In recent years, the use of cannabis and cannabis leaves in Indian medicine has gotten a lot of attention. It is legal for medical and scientific purposes, as long as the laws are followed. Since the discovery of the endogenous cannabinoid system two decades ago, cannabis (*vijaya*)-based medications have been the subject of intense research. As a result, progress has been made in the wide therapeutic application of cannabis through a large number of clinical trials in recent years, attracting the scientific world's attention to the ayurvedic aspect of *vijaya* and its implications. Ayurveda defined the usefulness of *vijaya* as *vajikarana* (aphrodisiac), *deepana* (enhances digestive power), *Grahanihara* (Irritable bowel syndrome), and *shula hara* (pain reliever) etc. This review is based on the evidence-based approach towards the pharmacological effects of *vijaya* in the perspective of ayurveda.

**Keywords:** *Cannabis sativa*, *vijaya*, ayurveda, aphrodisiac

#### Introduction:

Cannabis is a complex plant containing approx 500 alkaloids, including cannabinoids, some of which have adverse effects or narcotic effects on the human body. It is one of the oldest medicinal plants, having been used for medicinal, agricultural, and industrial purposes for over 10,000 years. However, because of its psychotropic components that have negative effects on human health, the plant has under the category of illegal substances<sup>1,2</sup>. The first study to disclose

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the therapeutic feature of *C. sativa L.* was published in 1843<sup>3</sup>, and it reported the use of plant extracts to treat tetanus, hydrophobia, and cholera patients. However, because of its narcotic effects, the cultivation and use of cannabis plants for pleasure, medicinal, and industrial purposes has been tightly prohibited, except for scientific study. The plant remained untapped for its amazing potential as a medicinal herb for a range of illnesses due to stringent legal limitations until it was legalized in several places across the world in the recent past. In India, the usage and consumption of cannabis and cannabis leaves are not completely outlawed. It is legal for medical and scientific purposes, as long as the laws are followed.

Ayurveda, the traditional medical system of India on the other hand, officially acknowledges the use of cannabis and cannabis leaves in the production of ayurvedic remedies. This implies that if a classical ayurvedic medication containing cannabis or cannabis leaves is to be created, no clinical trials are required before its commercial sale. As a result, the ayurveda medical system is a logical alternative for producing and selling cannabis and cannabis-based medications. But still, its practice needs some guidelines to be followed so that it's not used as substance abuse and scientific validation of its effects on the human body will be established. The production of proper documentation of *cannabis sativa* effects on the human body as prescribed in classics need basic understanding of *vijaya*, its uses, and review of modern scientific studies done on cannabis, so that miracle herb of ayurveda *vijaya* will be explored to the scientific world.

### **Material and Methods:**

A range of Ayurvedic classic literatures are used to investigate this review. Materials on *vijaya*, its qualities, effects, and other related issues were acquired, reviewed, and argued to get a full knowledge of cannabis from an ayurvedic perspective. 'Cannabis', 'Marijuana', 'Hemp', 'Tetrahydrocannabinol' (THC), 'Cannabinol' (CBN), 'Cannabidiol' (CBD), "*Bhanga*" and "*Vijaya*" were searched using keywords in search engines such Google Scholar, MEDSCAPE, BMC, Science Direct, and MEDLINE([www.PubMed.com](http://www.PubMed.com))/PubMed database. All of the papers found through an internet search were vetted by reading the title, abstract, and pertinent information, and the information needed for this review was compiled and written. To better comprehend the different impacts of cannabis on different people, we'll go through some traditional information about the *vijaya* (cannabis plant) and its effects as recorded in classics.

### ***Cannabis sativa* (Vijaya) Description:**

It is a plant that may be found in all sections of ancient India as well as most other nations. Physicians have been using its leaf juice and seeds for medicinal purposes for thousands of years. Because this plant is classified as *upvisha* in the classics and as a narcotic substance in the scientific world, it must be thoroughly purified before being used for medicinal purposes. In India, almost 17% of middle-aged persons seeking treatment for psychoactive drug use problems are currently using cannabis<sup>4</sup> as per the information collected.

It's an herbaceous annual plant. Throughout recorded history, people have grown this plant as a source of industrial fiber, seed oil, nourishment, entertainment, religious and spiritual enlightenment, and medicine. Every portion of the plant is beneficial and has a variety of impacts.

Its seeds are a significant protein source. The flower, and to a lesser extent the leaves, stems, and seeds, contain cannabinoids, which are psychoactive and physiologically active chemical compounds used for recreational, medical, and spiritual purposes.

### **General Information on Vijaya:**

**Varga:** *Upavisha*

**Sanskrit name:** *Vijaya*

**Hindi name:** *Bhanga*

**English name:** Indian Hemp

**Latin name:** *Cannabis sativa*

**Family:** Cannabaceae

### **Properties of Vijaya:**

*Vijaya* leaves process the *tikta rasa* (bitter in taste), *laghu* (light), *tikshna* (sharp), and *grahi* (absorbent) *gunas*, as well as vitiated *kapha dosha*. It serves as an appetizer as well as a digestive. It is *madakari*, or intoxicating, and enhances *pitta dosha* in the body.

### **Multimodal effects of Vijaya as described in classics:**

1. When taken wisely and refined form in internal administration, it is a fantastic appetizer and a great remedy for male reproductive health concerns, particularly erectile dysfunction. It is useful in *swapana meha* (semen discharge at night times) and it's also helpful to cure the issue of premature ejaculation.
2. It improves a person's virility and provides peaceful sleep. It gives the body sufficient nutrients, especially *shukra dhatu*. This plant induces sleep in restless people and helps them relax. It is used to soothe the patient and promote sleep in *unmade* (psychiatric conditions).
3. It helps with *dhanustambha* (body stiffness), *antra shula* (abdominal pain), and *vrikka shula* (abdominal discomfort) (pain in kidney-related disorders). It strengthens the *amashaya* (gastric area) and alleviates indigestion, anorexia, and other loose motion issues. It improves urine production and cures the issue of difficulty urinating and hematuria in *vrikka shotha* (swelling in kidney areas) linked with discomfort.
4. It relieves pain and inflammation in pile masses when applied as a topical application.
5. It may be used in any form of *jwara* (fevers).

6. It strengthens the nervous system and alleviates all forms of convulsive diseases and neurasthenic aches.
7. It treats menstruation abnormalities and the discomfort that comes with them, as well as acting as an antispasmodic. It can be used to treat a variety of health problems, including headaches caused by menopause. Its herbo-mineral compositions treat increased blood flow caused by miscarriages and abortions, as well as during monthly menstrual cycles.
8. It's useful in all types of *kasa* (cough) and *swasa* (breathlessness).
9. When administered in modest doses for many days, it cures mental weakness and enhances memory.
10. The blood capillaries are constricted when it is applied externally. Its proper application for internal administration increases the ability of the ears to hear and the eyes to see.

### Contemporary Evidence on Cannabis:

1. **Cannabis and female sexual health:** After correcting for race and age, Lynn, B. K. et al<sup>5</sup> found that women who used marijuana frequently, whether before or after sex, had 2.10 times greater chances of reporting good orgasms than women who used marijuana seldom, proving that marijuana appears to boost orgasm satisfaction. The number of studies<sup>6,7,8,9,10</sup> evaluating the relationship between cannabinoids and female sexual function were reviewed, and the results show that cannabis has dose-dependent effects on female sexual desire and receptivity, with low doses facilitating or having no effect while high doses inhibiting.
2. **Cannabis and male sexual health:** The ethanol extracts of *R. graveolens* and *C. sativa* reduced spermatogenesis in adult male Wistar rats, according to Sailani MR et al<sup>11</sup>. Its usage has been linked to lower sperm count and concentration in both animal and human studies. In adult male rats treated to marijuana for 75 days at a level equal to human recreational use, lower epididymal sperm concentrations were detected<sup>12</sup>. Another study on the Cannabis sativa derivative bhang found that sperm count was drastically reduced<sup>13</sup>. Similar findings have been confirmed in human research. In a study of 20 chronic marijuana users, those who smoked marijuana at a greater dose had a considerably lower average sperm count than those who took marijuana at a lower dose. Similar alterations were discovered in a Danish cohort study<sup>14</sup>. In human and animal studies, this implies a negative link between marijuana usage and sperm count. As a result, cannabis has been associated with lower sperm count and concentration, which may be linked to spermatogenesis stoppage. According to Rossato et al., cannabis harms sperm viability<sup>15</sup>. Various animal research<sup>16,17</sup> have shown that cannabis considerably lowers testosterone levels, whereas human<sup>18,19</sup> investigations have shown that testosterone levels are unaffected by cannabis usage. Androvicova et al<sup>20</sup> confirmed that cannabis may be used to treat hypoactive sexual drive. Cannabis, according to Aversa et al<sup>21</sup> causes ED by causing early endothelium damage. While cannabis might boost libido in the short term, long-term usage can affect men's erectile function.

3. **Cannabis and pain management:** From approximately 1000 B.C., several formulations of cannabis with differing degrees of strength were produced and utilized in India as an analgesic, hypnotic, sedative, antispasmodic, and anti-inflammatory drug<sup>22,23,24</sup>. Cannabis is not efficient analgesia in the acute pain<sup>25,26,27,28</sup> context, has minimal therapeutic benefits for neuropathic pain<sup>29,30,31</sup>, and is only useful in orthopedic musculoskeletal pain<sup>32,33</sup>, according to several researches.
4. **Cannabis and menstraul phase:** In a research, Lammert S et al<sup>34</sup> revealed that females who use marijuana and tobacco together may have a shorter luteal phase than females who just use tobacco. Mendelson et al<sup>35</sup> discovered that abruptly smoking marijuana cigarettes during the luteal phase reduced the blood level of luteinizing hormone by 30% compared to placebo in premenopausal women.
5. **Cannabis and gastric disorders:** Cannabinoids have a potent effect on the GI tract, suppressing gastric acid secretion, decreasing the number of transient lower esophageal sphincter relaxations (TLESRs), reducing gastric emptying, decreasing emesis, and also decreasing the lower esophageal sphincter (LES), according to animal model research<sup>36,37,38,39</sup>. Cannabis is commonly used to assist reduce symptoms in individuals with inflammatory bowel illnesses, according to studies<sup>40, 41</sup>. De Vries et al<sup>42</sup> on the patients with persistent abdominal pain found no change in abdominal pain. In another study of inflammatory bowel illness<sup>43</sup>, it was found that the majority of respondents thought marijuana was "extremely useful" for pain reduction, nausea, and diarrhea.

## Discussion:

*Cannabis sativa* is a potent aphrodisiac, as mentioned in ayurveda texts, and its popularity and prevalence of use have grown since its medicinal use became permitted. Although various studies in the modern scientific world revealed its therapeutic promise in some areas such as abdominal disorders, IBS, and chronic neuropathic pain, as well as the potential negative effects in the form of narcotic drugs, anti-spermatogenic effects, and adverse effects on several male reproductive health parameters, were also shown. All the effects shown by the contemporary researches were also mentioned in ayurveda expect the harmful effect on male reproductive health. The reason behind the same may be the dose of cannabis which is used in such cases as well as drug-drug interaction.

As ayurveda classics mentioned 193 different herb mineral formulations containing vijaya as the minor or major ingredient, out of which approx. 50 formulation acts as aphrodisiac<sup>44</sup> (Tavhare & Acharya, 2017). The classics mentioned the spermatogenic effect of *vijaya* as well as its positive impact on male sexual dysfunction which is opposite to the research conducted in the recent past. Ayurveda mentioned various other herbs, like *Ashwagandha* (*Withania somnifera*)<sup>45,46</sup>, *Shatavari* (*Asparagus recemosa*)<sup>47,48</sup>, *Talmakhana* (*Asteracantha longifolia*)<sup>49</sup>, *Dalchini* (*Cinnamomum Zeylanicum*)<sup>50,51</sup>, *Lavang* (*Syzygium Aromaticum*)<sup>52,53</sup> and *Jatiphal* (*Myristica fragrans*)<sup>54,55</sup>, etc. each of these herbs have rasayana (rejuvenating) as well as *Vajikarana* (aphrodisiac) properties. So the formulation due to drug-to-drug interaction along

with a judicious dose of *vijaya* acts as an aphrodisiac. Many of the formulations, in addition to leaves, contain *bija churna*(seed powder), which deficient in the current studies on cannabis. Secondly, Marijuana, (*ganja* and *charas*) which is the flowering or fruiting tops of the cannabis plant<sup>56</sup>, as well as the resin, is hazardous and falls under the category of narcotic drugs, are used in the majority of current cannabis research. Not any other parts of the plant are included under the heading of *bhanga* or *vijaya* except the leaves<sup>57</sup>, both technically and legally. Bhang is typically considered to be a less dangerous form of cannabis. Cannabis includes cannabinoids, which have therapeutic properties. They're abundant in the flowers and buds of the cannabis plant, but not so much in the leaves. Ayurveda's usage of cannabis, on the other hand, mostly refers to the use of cannabis leaves in medications, and ayurveda has identified the uses of leaves in most of the formulations. So cannabis is safe as an aphrodisiac if used judiciously and after purification, as mentioned in the classics.

## CONCLUSION:

*Cannabis sativa* (*vijaya*) is a versatile plant with a wide range of pharmacological qualities that may be used to treat a variety of ailments in the body, including the reproductive, digestive, and neurological systems. To achieve the desired effect, it would be used after appropriate purification and in a prudent amount.

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## Chapter 14

### **An Ayurvedic Perspective to Malnourishment in Children w.r.t Protein Energy Malnutrition (PEM) and its management by administering *Aswagandha Ksheerapak***

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#### **Abstract**

Malnourishment continues to be the global cause of concern owing to its high mortality and morbidity rates among children. It is a condition that develops when the body is deprived of vitamins, minerals and other nutrients. The Ayurvedic herb *Aswagandha* has a well-established science behind its nutritional quality with potent phytochemical contents which can be useful to make it a nutritional supplementation of every household for reducing the numbers of malnourished child in a more natural way. *Aswagandha* also known as *Withania somnifera* has been extensively described in all the *Brihatrayis* and *Laghutrayis* along with the *Nighantus* to be an excellent rejuvenator, a general health tonic and a cure for a number of health complaints including malnourishment. It is a sedative, Diuretic, Anti inflammatory and generally respected for increasing energy, endurance and acts as an adaptogen that exerts a strong immune stimulatory and anti stress agent. Ayurvedic *Acharyas* have vividly contributed to the description of such remedies which helps to maintain the health of normal individuals including children. Milk on the other hand can be used as the best *Anupana* with *Aswagandha Churna* for better results. Many studies suggest that several components of cow's milk stimulate growth in children. Considering the above facts *Aswagandha Churna* mixed with cow's milk can be given to children suffering from Protein Energy malnutrition. This particular combination generally used for debility and weakness in adults can act as an easy household solution to reduce the number of malnourished children in the country.

**Key Words-** *Aswagandha, Protein Energy Malnutrition (PEM), Anupana, Karshyata*

#### **Introduction:**

Due to lack of knowledge about food and dietetics, Malnourishment in India is flaring up day by day. Malnourishment can be considered as the leading cause of high mortality rate among children. Studies reveal that India loses up to 4% of its gross domestic product and 8% of its

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productivity due to child malnutrition. The Global Hunger Index (2020) — which is calculated on the basis of total undernourishment of the population, child stunting, wasting and child mortality — places India at the 94<sup>th</sup> spot among 107 countries <sup>1</sup>. The highest cause of concern for the country would be that the child and maternal malnutrition is responsible for 15 per cent of India's total disease burden.

According to WHO, Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers 2 broad groups of conditions. One is 'undernutrition'-which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related non communicable diseases (such as heart disease, stroke, diabetes, and cancer). <sup>2</sup>

Protein Energy Malnutrition (PEM) is the subject of concern as far as Malnourishment is concerned. WHO defines PEM as “an imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function”. <sup>3</sup> It affects particularly the preschool children (<6 years) with its dire consequences ranging from physical to cognitive growth and susceptibility to infection. This affects the child at the most crucial period of development which can lead to permanent impairment in later life. <sup>4,5</sup>

The Public Health administrative measures including “Poshan Abhiyan” by Govt. of India try to reach each and every individual of the country but the lack of knowledge regarding nutrition still continues. The age old concepts in Ayurveda can be used here as an effort to reduce the burning problem. Aswagandha, considered under *Balya* and *Brimhaniya Mahakasay* of *Charak Samhita*, mixed with Cow's milk can be an effective measure to tackle the burning issue.

### **Objective of the Study:**

1. To study about the concept of malnourishment in Ayurveda and its modern perspective with special reference to Protein Energy Malnutrition (PEM).
2. To evaluate the qualities of *Aswagandha* in relation to *Balya* (Energy giving) and *Brimhaniya* (Body building) properties.
3. To study the combined effects of *Aswagandha Ksheerapak* in the management of Protein Energy Malnutrition (PEM).

### **Materials and Methods:**

This review study is based on the concepts of malnourishment and wasting in modern medical knowledge and its direct co-relation in Ayurveda is compiled. Detailed informations are gathered referring Ayurvedic classical texts like *Charak Samhita*, *Sushrut Samhita*, *Astanga Samgraha*, *Astanga Hridaya*, *Nighantus*, *Bhavaprakash*, *Chakradutt* etc. Texts of Modern medical science like Social and Preventive Medicine, Community medicine, Public health guidelines are also

referred. Govt. statistical data are also been collected. Materials are gathered from Journal articles, Books, conference proceedings, thesis etc. Online materials are also collected using Google scholar, scopus, Researchgate, Pubmed etc. References have been collected and studied methodically.

### **Review of Literature:**

The concept of Malnutrition has been very well illustrated in all Ayurvedic classics. Ancient Acharyas explained diseases related to nutritional deficiency such as Phakka, Parigarbhika, Balashosha etc in different Samhitas. Malnutrition is such a condition where children fail to maintain natural body capacities such as growth, resisting power to infections as well as recovering from disease, learning and physical activities. Malnutrition is viewed under Apatarpanajanya Vyadhis in Ayurveda. Based on severity and aetiology they may be considered as Karshya, Phakka, Parigarbhika and Balashosha. Ayurvedic nutritional principles suitable to the current era are essential for management of malnutrition in children.<sup>6</sup>

### **Etiology of Malnutrition in Ayurveda<sup>7</sup>-**

In Ayurveda, it is mentioned that *ruksha annapana* (food which causes dryness), excessive intake of *Kashaya* (Astringent), *Katu* (spicy) and *Tikta* (Bitter) Rasa, *alpa bhojana* (inadequate food), *pramitashana* (intake of nutritionally deficient food), *anashana* (absolute no food intake), *langhana* (Fasting), *ativyayam* (excessive exercise), *mala mutra dinigraha* (Suppression of natural urges), *vatasevana* (excessive exposure to wind), *atapasevana* (Excessive exposure to sunlight), *atibhargamana*, *atichinta* (worry), *atikrodha* (anger), and *atibhaya* (fear) can be causative factor for malnutrition.<sup>8,9,10</sup>

### **Broad Categorization of Malnutrition in Ayurveda:**

Different *samhitas* of Ayurveda the following 5 diseases are described that can be correlated to malnutrition as mentioned in modern medicine.<sup>11</sup>

1. **Balshosha:** The causes of Balshosha are *Shlaishmika annasevana* (Excessive energy dense food), *Shitambu* (cold liquid items) and *diva swapna* (excessive day sleep). These factors can create impairment of *Agni*. Clinical features of Balshosha are *Arochaka* (reduced digestive capacity), *Pratishyaya* (Running nose), *Jwara* (fever) and *Kasa* (Cough); which may lead to *Shosha* (Emaciation)<sup>12,13</sup>

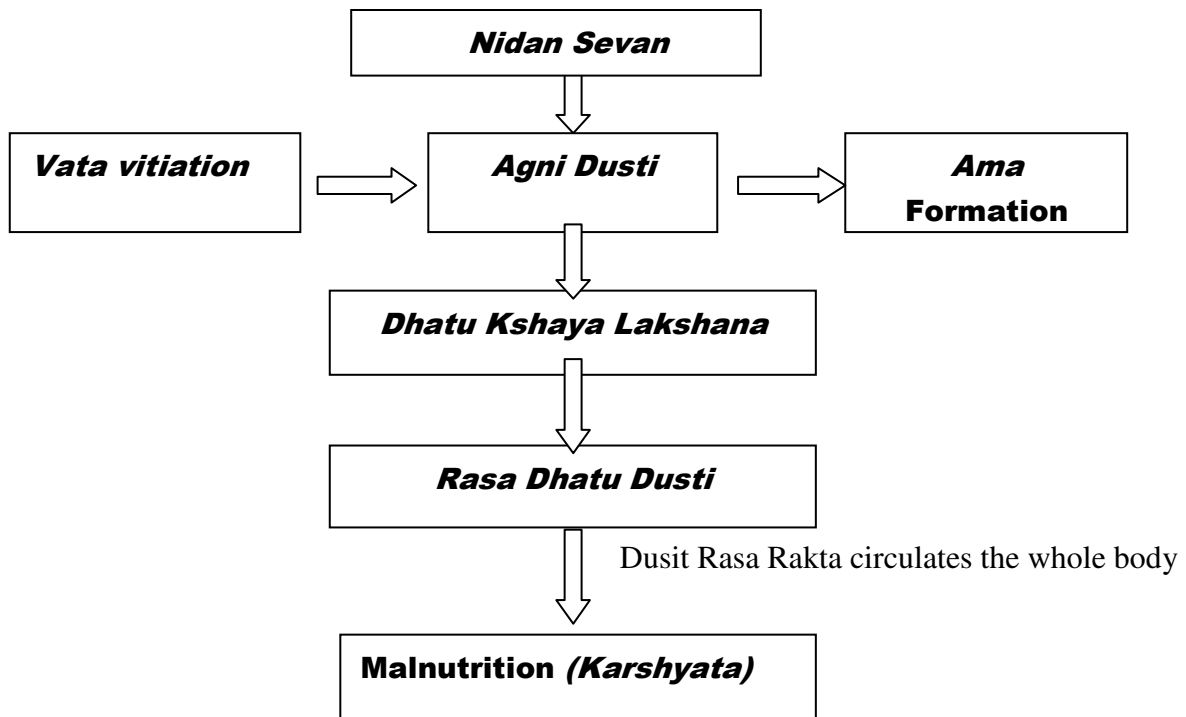
2. **Phakkaroga:** In Phakkaroga, *Ksheerajphakka*, *Garbhajphakka* and *vyadhiphakka* are described. *Ksheerajphakka* is due to intake of *Shlaishmika dughdha*. *Vyadhija Phakka* is malnutrition condition resultant of any diseases as *Graharoga* etc. *Garbhajphakka* is due to feeding of baby by pregnant lady<sup>14</sup>. Clinical features of Phakkaroga are wasting of buttocks, upper limbs and thighs, Pot belly abdomen, head appears big due to relatively wasting in body parts and baby is unable to walk.

3. **Karshya:** Karshya is under nutrition condition due to reduced food intake by the baby, if mother use *vatavardhak ahara-vihara* and baby take *vata dushit stanya* baby becomes malnourished.<sup>15</sup>

4. **Parigarbhika:** If any baby takes breast milk of pregnant women then *parigarbhika roga* can occur because that milk is believed to have poor nutrients. Clinical features of *Parigarbhika roga* are cough, impaired digestive capacity, vomiting, fever and anorexia.<sup>16</sup>

5. **Sushka Revati:** *Graha* affecting the child represents infectious spectrum of diseases resulting *Sarvanga kshaya* (Emaciation). In this child though fed with enough quantity of high quality food ends up in malnutrition. When it becomes chronic, child presents with *Anna dwesha* (aversion to food), *Vivarnata* (loss of lustre) *Nanavidha shakrita* (variegated colour stools), *Udara granthi* (abdominal nodular swellings), *Jihvayanimnata* (geographic tongue). Child shows progressive emaciation at the outset the clinical condition which can be correlated with abdominal tuberculosis.<sup>17</sup>

Figure 14.1: Diagrammatic presentation of *Samprapti*<sup>18</sup>:



### Samprapti (Pathogenesis):

*Karshyata* is the disease correlated with malnutrition which may be *Swatantra Vyadhi* or it may appear along with other diseases as a complication. It is an *Apatarpana Janya Vyadhi* (disease caused due to under nourishment) where *Vata dosha* plays an important role in the pathogenesis, along with that vitiated *Pitta*. *Pachaka Pitta* leads to *Agni Dushti* as a result of which the *Dhatus* are not nourished properly leading to *Anuloma Kshaya*



(depletion of whole body tissues). This altered function of *Vata dosha* and *Agni* leads to insufficient production of *Rasa Dhatu*. Insufficient production of *Rasa Dhatu* takes place leading to *Dhatu-kṣhaya* chronologically.<sup>19</sup>

***Samprapti Ghatak:***

*Dosa- Vata*

*Dusya- Rasa dhatu*

*Agni- Jatha-ragni (Mandagni)*

*Ama- formation of Ama due to Agnimandya*

*Vyadhi-Sthan -Amasaya*

*Srotas affected -Rasa vaha, Raktavaha, Medavaha and Mamsavaha,*

*Type of Srotodusti -Sanga*

*Rogamarga– Abhyantar-rogamarga*

*Vyaktasthan -Sphiga, Udar, Uriba, Twak, Asthi*

*Vyadhiprakar- Chirakari.*

*Sadhyasadhyata– Kricchasadhya*

The Ayurvedic features described here for Malnourishment and under nutrition can well be correlated with features of Protein Energy Malnutrition (PEM)

**Protein Energy Malnutrition (PEM)**

It has been identified as a major health and Nutrition problem in India. It occurs in children in the first years of life. It is characterized by low birth weight if the mother is malnourished, poor growth in children and high level of mortality in children between 12 and 24 months and estimated to be underlying cause in 30 percent of death among children under age 5. It is not only an important cause of childhood mortality, but leads also to permanent impairment of physical and mental health.

Insufficiency of food-the so called “food gap” appears to be the chief cause of PEM the great majority of cases of PEM nearly 80 percent are mild and moderate cases, which goes unnoticed. The incidence of severe PEM is 1-2% in preschool age children.<sup>20</sup>

**Classification Malnutrition<sup>21</sup>**

**Table 14.1: Internationally accepted classification of Malnutrition**

Nutritional Status	%RWA (Weight as % of reference weight for age)
Normal	≥ 80%
Grade- I Malnutrition	70-79.9%

Grade II Malnutrition	60-69.9%
Grade III Malnutrition	<60 %

Severe Malnutrition can take two extreme forms, viz, Marasmus and Kwashiorkor. Maximum mortality is found when both are present together in a single child.

**Table 14.2: Classification of Severe PEM**

% Weight for age	Edema	
	Present	Absent
80-60	Kwashiorkor	Undernourished Marasmas
Below 60	Marasmic Kwashiorkor	

There are many government programs and schemes dedicated completely to eradicate malnutrition and to reduce the child mortality rate. Ayurveda here can play a pivotal role to compensate the stress of Malnutrition.

*Aswagandha*, considered as an Ayurvedic *Rasayana* herb mixed with pure cow's milk can be an easily available drug of choice for the management of Protein Energy Malnutrition (PEM). Here in this review paper the combined effect of *Aswagandha Ksheerapan* is studied.

The preparation *Aswagandha Ksheerapak* is first mentioned by *Acharya Sushruta* in *Sushrut Samhita, Uttartantra* 41<sup>st</sup> Chapter, “*Sosha Pratishedha Adhyay*” 41 & 42<sup>nd</sup> verse in relation to *Sosha Chikitsa*. *Aswagandha* powder mixed with milk and water in a specific ratio of 1:4:8 processed by *Ksheerapak vidhi* can be given to children suffering from Emaciation more specifically protein energy malnutrition.<sup>22</sup> This preparation can be useful in giving nourishment to each and every tissue of the body hence providing an easy recovery from the symptoms associated with PEM.

## Results:

In this review study it is seen that Ayurvedic Acharyas have very vividly described the management of malnourishment and *Aswagandha Ksheerapak* can be considered as an alternative solution for those suffering from Protein Energy Malnutrition (PEM). Malnourishment is a very common deficiency disorder usually seen in the age group of six months to 5 years of age. *Aswagandha* and its nutritive qualities enhanced by the presence *godugdha* helps to provide required nutritional benefits to children of low weight for age category. The description of Malnutrition obtained from the contemporary science can well be

correlated with *Karshya*, *Bala Sosh*, *Phakka Roga*, *Parigarbhika* and *Sushka Revati*. All these diseases come under the broad category of *Apatarpanjanya Rogas*. *Dhatu Khshaya* being one of the most important factor in *Apatarpanjanya rogas*, it can be reversed by proper *Agni dipan* and *Santarpan chikitsa*. *Aswagandha* having *Rasayana* (Rejuvenative) and *Brimhaniya* (tissue nourishing) properties can serve this purpose of *Dhatu Poshan* in children.

### Discussion:

According to Indian Herbal System, *Ashwagandha* is considered as one of the most important herbs of Ayurveda. *Ashwagandha* has long been considered as an excellent rejuvenator, a general health tonic and a cure for a number of health complaints. It is a sedative, diuretic, anti-inflammatory and generally respected for increasing energy, endurance, and acts as an adaptogen that exerts a strong immune-stimulatory and anti-stress agent. *Aswagandha* has been found to be mentioned in almost all classical texts of Ayurveda.<sup>23</sup>

In *Charak Samhita Sutrasthan* 4<sup>th</sup> Chapter, “*Sadvirechan Satashritiya Adhyaya*” *Aswagandha* has been mentioned under the *Balya* and *Brimhaniya mahakasay*.<sup>24</sup> That is, herbs under the *Balya Mahakasay* Group helps to provide Energy while those Ayurvedic herbs under the *Brimhaniya* group builds cells and tissues thereby providing nourishment to the body. As per the contemporary medical knowledge Protein is the main component of the food that helps to build tissues and thus known as Body building component while Energy is obtained from those ingredients which have high carbohydrate content. As per phyto-chemical analysis the nutritional composition of *Aswagandha* root powder (100g) can be shown in the following way<sup>25</sup>

**Table 14.3: Composition of *Aswagandha* Root Powder(100g)**

Nutritional Component	Nutritive Value
Moisture (%)	7.45
Ash (g)	4.41
Protein (g)	3.9
Fat (g)	0.3
Crude Fibre (g)	32.3
Energy (kcal)	245
Carbohydrate (g)	49.9
Iron (mg)	3.3
Calcium (mg)	23

Total Carotene (µg)	75.7
Vitamin C (mg)	3.7

As per the above result of phyto-chemical analysis of *Aswagandha* root powder, it shows that the protein and the carbohydrate components present can provide adequate protein and energy required to maintain a healthy body weight.

Again *Charak Samhita Sutrasthan* 25<sup>th</sup> Chapter, while describing about the preparation of *Mulakasav*, *Aswagandha* has been mentioned as the herb that induces *Dipaniya* and *Pachaniya* effect.<sup>26</sup> Carminative and Digestive qualities of this specific herb can be an added benefit to those suffering from malnourishment caused by PEM because *Dhatukshaya* occurs as a result of *Agnimandya* and *Aswagandha* by its *deepaniya* and *Pachaniya* properties can reduce *Agnimandyata* thereby facilitating *Dhatuposhan*.

*Sushruta Samhita, Sutrasthan* 15<sup>th</sup> Chapter while describing the management of *Karshyata*, *Aswagandha* and *Ksheerapana* has been mentioned in the same verse.<sup>27</sup> *Aswagandha* and *Ksheera* together can replenish the degenerated tissues of the body. Again in *Sushrut Samhita, Sutrasthan* *Aswagandha* has been mentioned as *Balavardhak* and *Pushtikarak Anupan*.<sup>28</sup>

*Acharya Vagbhat* in *Astanga Hridaya*, mentioned *Aswagandha* several times. In the management of *Rajayakshma* as *Soshanashak*<sup>29</sup> *Balapushtikarak*<sup>30</sup>, as a *Rasayan* in *Vataja diseases*<sup>31</sup>. *Lehya* and *Kwath* preparations of *Aswagandha* are mentioned as *Balavardhak* and *Pushtikarak* in relation to the treatment of *Balasosha*.<sup>32</sup> In the management of *Sushka Revati Graha*, *Aswagandha ghrita* has been mentioned in *Astanaga Hridaya Uttarasthan*.<sup>33</sup>

From the above facts extracted from the Ayurvedic classical texts, a solution for the management of Protein Energy malnutrition can be retrieved. The combined effect of *Aswagandha Kshirapak* can pave the way for a significant result in the management of Protein Energy Malnutrition (PEM).

### Conclusion:

Malnourishment leading to child mortality is the threat to the mankind. Global scenario of malnourishment is still the same although universal health authorities like Unicef, WHO, Local govts are working rigourously for the management of the dreadful condition. The ancient health science Ayurveda, in this deplorable condition, can contribute significantly to reduce the number of malnourishment cases by simple and easy administration of *Aswagandha Ksheerapak* to children. Clinical studies related to this topic can be planned with higher number of subjects to make it impactful in the society.

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## Chapter 15

### Literary Study of *Medhya* action of *Siddha Ghrita* w.s.r.t. *Jara* mentioned in *Sushruta Samhita* and *Ashtanga Samgraha*

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#### Abstract

Ageing is one of the three phases of life through which every human being has to pass through. Process of ageing involves gradual and insidious changes at both physical and mental level. Old age or *Jara* is characterised by several health issues such as refractive errors, hearing loss, osteoarthritis, dementia, etc. Loss in memory affects physical, mental and social life of an individual. *Sneha* formulations especially *Ghrita* prepared with certain herbal drugs are used to prevent and cure these changes. Therefore, study of such formulations with similar indications is useful in today's clinical era. Concept of *Medha* was studied. *Siddha Ghrita Kalpas* which are indicated for *Medha*, *Smriti* and related actions are compiled. These *Kalpas* have been theoretically analysed on the basis of *Ayurvedic* principles (*Dravya-Guna Siddhanta*). All compiled *Kalpas* are presented in a tabular form. *Siddha Ghrita Kalpas* indicated for *Medha*, *Smriti* are prepared with *Dravyas* dominant in *Kashaya*, *Madhura* and *Tikta Rasa*. They are used in *Santarpanajanya* and *Apatarpanajanya* decline of *Medha* on the basis of dominance of *Dravyas* present in them. *Kalpas* are prepared in the form of *Sneha* to balance the vitiated *Vata* prominent in old age. *Ghrita* is the ideal choice of formulation for actions like *Medhya*, *Smritivardhana* due to its varied properties and broad spectrum of actions. *Siddha Ghrita* for *Medha*, *Smritivardhana* are found in abundance in *Samhitas*. *Dravyas* play an important role to increase the efficiency of *Kalpa*.

**Keywords-** *Medha*, *Medhya Ghrita*, *Jara*, *Jaranashana*, *Smriti*, *Smritibhramsha*, *Ghrita*, Old age

#### Introduction-

Increase in aged population is one of the serious global concerns, as ageing comes with many severe health problems. So, it becomes necessary to approach towards ageing in a healthy and graceful way. *Jara* approaches with limitations in functional ability and growing risk of diseases.

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This occurs as a result of vitiation of *Doshas* with dominance of *Vata* along with diminution of *Dhatu*, *Indriya*, *Agni* and other factors necessary for a healthy body and mind.

*Medha* and *Smriti* may undergo gradual decline as the age advances. Loss in memory and other cognitive abilities interfere with a person's ability to maintain their daily life activities. Form of drug used to cure and prevent such health problems of ageing should be user friendly, accelerate the process of healing and effective against multiple factors responsible for ageing.

*Siddha Ghrita* is a type of formulation which fulfil above mentioned criteria. Therefore, their study with respect to their indications in conditions of ageing like *Smritibhramsha* is important.

The word *Medha* means intellect. *Medha* can be defined as the capacity to grasp or retain the knowledge of any subject.<sup>1</sup> It may also refer to as wisdom meaning the ability to use one's knowledge and experience to make good decisions<sup>2</sup>.

*Medhya Karma* is controlled by following factors of body-

1. *Medha* is the *Aagneya Bhava* of *Sharira*
2. Normal function (*Dharana*) of *Buddhi* is controlled by *Prana Vayu*
3. Normal functioning of *Dhee*, *Dhruti* and *Smruti* is controlled by *Udana Vayu*.
4. *Pitta Dosha* especially *Sadhaka Pitta* removes increased *Kapha* and *Tama* residing in *Hrudaya* and attends to mental functions such as *Buddhi*, *Medha*.
5. *Tarpaka Kapha*- Nourishes the *Indriyas*

Hence, Balance of *Agni*, *Prana Vayu*, *Udana Vayu*, *Sadhaka Pitta* and *Tarpaka Kapha* is necessary to exhibit *Medhya Karma*. At the level of *Dhatu*, *Sarata* of *Rasa Dhatu* is related to *Buddhi* and *Sarata* of *Rakta Dhatu* is related to *Medha*

Cause of *Smritibhramsha*

*Smritibhramsha* takes place due to reduced *Sattva* and *Avarana* of *Raja* and *Tama* on *Mana* leading to destruction of true knowledge. In old age, there is gradual reduction in grasping, retaining and memory ability of an individual. *Medha* and *Buddhi* deteriorate in the fourth and ninth decade of life.<sup>3</sup> Hence, *Medhya Kalpas* are helpful to prevent the decline of *Medha* if used before the beginning of the fourth decade. *Smritibhramsha* occurring because of *Jara* is difficult to cure but can be prolonged.

### Objectives-

1. To understand the *Medhya Karma* and its importance.

2. To compile the scattered references of *Siddha Ghrita* present in *Sushruta Samhita* and *Ashtanga Samgraha* indicated for *Medha*, *Smriti* and related actions like *Buddhi*, *Dhee*, *Pradnya*.
3. Interpretation of these *Kalpas* on the basis of *Ayurvedic* principles.
4. To promote the use of other *Siddha Ghrita* part from the traditional formulations used in routine.

### **Materials and Method-**

- 1) *Sushruta Samhita* with *Nibandha Samgraha* commentary by *Dalhana*
  - 2) *Ashtanga Samgraha* with *Shashilekha* commentary by *Indu*
  - 3) Other allied literature
- References of *Siddha Ghrita* with desired actions were compiled from *Sushruta Samhita* and *Ashtanga Samgraha*.
  - Factors responsible for *Medhya Karma* were studied.
  - Action of *Siddha Ghrita* on *Medha*, *Smriti*, *Buddhi* was analysed .
  - All related *Kalpas* are presented in a tabular form.

### **Literature review-**

Attributes and actions of *Ghrita*

*Rasa- Madhura*

*Guna- Saumya, Mridu, Guru, Anabhishtyandi*

*Virya- Sheeta*

*Vipaka- Sheeta*

*Doshakarma- Ghrita* alleviates *Vata* and *Pitta* and increases *Kapha*. According to *Acharya Dalhana*, *Ghrita* performs *Tridoshapakarshana* which means removal of all three *Dosha*. Removal of *Kapha Dosha* is likely to take place because of *Ghrita* prepared with *Katu* and *Ushna* dominant *Dravyas* which bear *Shodhana* action.

*Vyadhinashan Karma-* *Ghrita* is profoundly used in diseases such as *Udavarta*, *Anaha* where there is dominance of *Vata*; *Manasa Vyadhi* such as *Unmada* and *Apasmara*; Degenerative diseases such as *Kshata-Ksheena*, *Shosha*. It is also used in the condition of *Jeerna Jwara* and in those who are afflicted by weapon or fire. It is also acts as *Vishahara* and *Rakshoghna*<sup>4</sup>.

*Ghrita* has been considered best amongst all kinds of *Sneha*.<sup>4</sup>The reason is explained below-  
Sahastra-virya–*Sahastra Virya* literally means that there are 1000 *Viryas* of *Ghrita*. It is explained by the term “*Vidhivat*” which means it can be processed with several number of *Aushadhi* efficiently than any other *Sneha*. This is possible because of *Samskara Anuvartana* and its *Yogavahi* nature. Hence, *Siddha Ghrita* (*Ghrita* processed with medicines) possesses more than one *Virya* or active principles, and therefore it is able to perform several actions. (*Karma Sahastrakrut*)<sup>5</sup>

*Jaranashana* and related actions of *Ghrita*

1. *Agnideepana*
2. Enhances *Dhee, Smruti, Mati* and *Medha*
3. Improves *Kanti, Swara, Laavanya* and *Saukumarya*
4. Improves *Oja* and *Teja*
5. *Balakara*
6. *Aayushya*
7. *Vrushya*
8. *Vayasthapana*
9. *Chakshushya*
10. *Medhya (Pavitra), Paap-Alakshmi prashamana*
11. *Varna prasadana*

## Observations and Results-

**Table 15.1: Contents of *Ghrita* along with its indications and reference.**

S.no.	Kalpa	Contents	Reference	Indications
1.	<i>Kalyanaka Ghrita</i>	<i>Vidanga, Triphala, Musta, Utpala, Priyangu, Sukshma-ela, Elavaluka, Rakta Chandana, Kushtha, Dwya Sariva, Trivrut, Danti, Talisa, Keshara, Malati Kusum Kshira, etc.</i>	Su.U. 39/230-234	<i>Medhya, Aayushya, Alakshmi, Mangalya, Papanut</i>  <i>Jirna Jwara, Gulma, Unmada, Apasmara, Retomarga shodhana, Garavisha, Agnimandya</i>

2.	<i>Mahabala Ghrita</i>	<i>Chitraka, Sariva, Bala, Krushnasariva, Draksha, Vishala, Pippali, Chitraphala, Madhuka, Pathya, Amalaka, Ghrita, Dugdha, Sharkara, Tugaksheeri</i>	Su.Ut. 58/65-72	<i>Jivaniya, Vrushya, Balya, Pradnyahitam, Dhanya, Shivam, Vata/ Pitta /Kaphal/ Granthi Reta, Asrug Dosha, Yoni Dosha, MutraDosha</i>
3.	<i>Panchagavyadi Ghrita</i>	<i>Katurohini, Manjishtha, Vrusha, Granthika, Chitraka, Patha, Swagupta, Rajnidwaya, Panchagavya, Ghrita</i>	A.S.Chi. 2/117	<i>Vaak, Swara, Smruti, Medha, Agni, Bala, Aarogya, Vrushatvakrut Visham Jwara</i>
4.	<i>Aavartaki Ghrita</i>	<i>Avartaki, Ghrita</i>	A.S.Chi.2 1/9	<i>Medhya; Causes vamana and virechana. When Trushna, Sheetalavanaaarnala and When Jeerna, Kodravaodana is consumed.</i>
5.	<i>Brahmi Ghrita</i>	<i>Brahmi, Siddharthaka, Vacha, Sariva, Kushtha, Saindhava, Pippali</i>	A.S.U.1/9 0	<i>Medha, Smritikrut, Aayushya, Paapma-Rakshoghna; Bhootonmada, Vaak</i>
6.	<i>Saraswata Ghrita</i>	<i>Triphala, Lakshmana, Ananta, Samanga, Sariva, Vacha, Brahmi, Patha, Kaunti, Vacha, Kushtha, Krushna, Sarshap, Saindhav, Dugdha, Sahemashakal, Ghrita, etc. (Paana and Abhyanga)</i>	A.S.U.1/9 2-95	<i>Medha-Smriti-Aayu-Pushti-Buddhidam, Rakshoghna, Vishaghna</i>
7.	<i>Brahmi Ghrita</i>	<i>Brahmi Swarasa, Ghrita, Kalka of Trikatu, Trivrut, Bimbi, Shankhapushpi, Nrupdruma, Sasaptala, Vidanga</i>	A.S.U.9/2 3	<i>Swara, Smruti, Medhakrut; Unmada, Kushtha, Apasmara, Vandhyasutapradam, Vaak</i>
8.	<i>Kalyanaka Ghrita</i>	<i>Triphala, Vishala, Bruhatela, Manjishtha, Dadima, Utpala,</i>	A.S.U.9/2 8	<i>Useful in Amedha, Skhalita Vaak,</i>

		<i>Priyangu, sukshma-ela, Elavaluka, Rakta Chandana, Devdaru, Tagara, Bruhati, Kushtha, DwiRajni, DwiParnini, DwiSariva, Padmakh, Danti, Talisapatra, Nagkeshara, Vidanga, Malatimukul and Ghrita</i>		<i>Desirous of smriti. Balya, Mangalya, Aayushya, Kanti-saubhagyapushtidam Bhoot-Grahonmada, Kasa, Apasmar, Pandu, Kandu, Visha, Shosha, Meha, Mohajwar, Gara, Aretas, Alparajasi, Daiv-upahat-chetasa, Pumsavan</i>
9.	<i>Mahapaishachika Ghrita</i>	<i>Mamsi, Gandhamaamsi, Shatavari, Padmacharini, Markati, Vacha, Trayamana, Jaya, Veera, Choraka, Katurohini, Kayastha, Sookri, Chatra, Palanksha, Vayastha, Shaliparni, Ghrita, etc.</i>	<i>A.S.U.9/34</i>	<i>Buddhi, Medha, Smriti</i>
10.	<i>Brahmi Ghrita</i>	<i>Brahmi Swarasa, Vacha, Kushtha, Shankhapushpi, Purana Ghrita</i>	<i>A.S.U.10/38</i>	<i>Medha</i>
11.	<i>Kushmanda Ghrita</i>	<i>Kushmandaswarasa (18 time smore than Ghrita), Yashtikalka</i>	<i>A.S.U.10/43</i>	<i>Dhee, Swarapradam; Apasmara, Vaak</i>
12.	<i>Phala Ghrita</i>	<i>Manjishtha, Kushtha, Tagara, Triphala, Sharkara, Vacha, Nishadwya, Madhuka, Meda, Dipyaka, Katurohini, Payasya, Hingu, Kakoli, Vajigandha, Shatavari, Ghrita, Kshira</i>	<i>A.S.U.39/111</i>	<i>Aayushya, Paushtika, Medhya, Dhanya, Dehavardhak Pumsavana</i>
13.	<i>Chatushkuvalya Ghrita</i>	<i>Naal, Kanda, Dala (Patra) and Kesara of Neelotpala siddha with Ghrita</i>	<i>A.S.U.39/111</i>	<i>Medha</i>
14.	<i>Martyamruta Ghrita</i>	<i>Kanchuki Kwatha, Ghrita, Kshira, Shankhapushpi, Vacha, Kushtha, Trivrut, Devdaru, Triphala, Yashti, Sita, Draksha, Guggula, Madhu</i>	<i>A.S.U.49/250</i>	<i>Chakshushya, Brumhana, Medhya, Varnya, 100 yrs life span</i>
15.	<i>Somamruta</i>	<i>Kwatha of Kanchuki (3 pala), Lohasukshma Churna (3 pala),</i>	<i>A.S.Ut.49/</i>	<i>Suvaak, Sudhi, Sudrudha, Subala,</i>

	<i>Ghrita</i>	<i>Palashabeeja (4 pala), Triphala (12 pala), Shatavari (18 pala), Beejak (21 pala), Jeevanti (16 pala) on Purnima, Kanji and Musta, Ghrita, Shatavha, Bhallataka, Vacha, Kushtha, Ela, Vidanga, Hingu, Sauvarchala, Padmakesar, Padmabeej, Padma</i>	256	<i>Subhaga, Jararahita, 200 yrs life span</i>
16.	<i>Narasimha Ghrita</i>	<i>Khadira, Chitraka, Sinshapa, Asana, Haritaki, Vidanga, Aksha, Bhallatak (all 8 in equal qty.) are stored in Lauhapatra and few pieces of Lauha are put in it. Pachana in Sunlight for 3 days. 4<sup>th</sup> day Loha pieces are macerated and Pachana on Agni till 1/4<sup>th</sup> reduction. Add Kshira in equal qty of Kwatha. Twice qty of Bhanga Rasa, thrice qty of Shatavarirasa, four times qty of Hangaveen (Navaneeta). Later add Madhu or Sita</i>	A.S.Ut. 49/394-398	<i>Shrimaan, Paaprahita, Vajivega, Sthiranga, Black kasha like Bhramara, Surabhimukha, Vaak. Medha, Dhee, Agni. Created by Narasimha God</i>
17.	<i>Bhallataka Sarpi</i>	<i>Bhallataka, Sarpi, Kshira, Sharkara.</i>  <i>Consumed early morning. Anupana- Jala, Kshira, Mamsa Rasa</i>	A.S.U.49/109	<i>Smriti, Mati, Bala, Medha, Sattva-Sara yukta, Varnya, Deerghayu, Kanakanikashagaur</i>
18.	<i>Naladadi Ghrita</i>	<i>Nalada, Katurohini, Payasya, Madhuka, Chandana, Sariva, Vacha, Triphala, Trikatu, Haridradwaya, Patola, Saindhava, Shankhapushpi Swarasa, Dugdha and Ghrita</i>	A.S.U.49/66	<i>Vagmi, Shrutdhari, Pratibhavaan</i>

### Discussion-

Decline of *Medhya* action can occur in either *Santarpana* or *Apatarpana*. Detailed analysis of two *Kalpas* along with few other examples is given below on the basis of this.

## 1. *Santpranjanya decline of Medha*

Due to *Atisantarpana*, there is *Upalepa* on *Indriya* and *Srotasa* and *Moha* is obtained over *Buddhi*. This leads to reduced grasping of knowledge due to obstruction.

Example of a *Kalpa* suitable in this condition is given below in detail form.

*Panchagavyadi Ghrita*- Reference- A.S.Chi. 2/117

Ingredients- *Katurohini*, *Manjishtha*, *Vrusha*, *Granthika* (*Pippalimula*), *Chitraka*, *Patha*, *Swagupta*, *Rajnidwaya*, *Panchagavya Siddha* with *Ghrita*

Actions- *Vaak*, *Swara*, *Smruti*, *Medha*, *Agni*, *Bala*, *Aarogya*, *Vrushatvakrut*, *Visham Jwara*

Theoretical Analysis- Dominant *Rasa* is *Katu* and *Tikta Rasa*.

*Panchgavyadi Ghrita* is *Snigdha*, *Anabhishyandi* and does *Srotoshodhana* due to the presence of *Tikta* and *Katu Rasa* dominant *Dravyas*. Due to this, it may remove the *Avarana* of *Kapha* over *Udana Vayu* and does *Agnideepana Karma*. Due to *Srotoshodhana*, *Vayu* may flow in its normal pathway and its normal functions especially of *Udana Vayu* are restored such as *Vaak*, *Swara*, *Smruti*. *Katu Rasa* clears and sharpens the *Indriya* which help in the grasping of knowledge more efficiently. *Tikta Rasa* does the *Shoshana* of *Doshas* from *Rasavaha* and *Raktavaha Srotas* and makes the respective *Rasa* and *Rakta Dhatu* more efficient, thus exhibiting *Medhya* action. Because of above all attributes, *Panchagavyadi Ghrita* is more suitable in *Santarpanjanya* decline of *Medha*. *Kalpas* such as *Avarataki Ghrita* mentioned in *Kushtha Chikitsa* and *Kalyanaka Ghrita* mentioned in *Unmada Chikitsa* perform *Shodhana* of *Dosha* which are obstructed in *Srotas* and lead to *Medhya* action.

## 2. *Apatarpanjanya decline of Medha* Excess of *Apatarpana* leads to *Vata Prakopa* and *Dhatu Kshaya*. There is reduced grasping and retaining of Knowledge due to under-nourishment (*Indriya- Upahanti*).

Example of a *Kalpa* suitable in this condition is given below in detail form.

*Kushmanda Ghrita* Reference- A.S.U.10/43

Ingredients- *Kushmanda* and *Yashti Kalka*;

Indications- *Dhee*, *Vaak*, *Swarapradam*;

Theoretical Analysis- *Kushmanda* and *Yashti* both are *Madhura* and *Snigdha*. *Kushmanda* is itself a *Medhya Rasayana* and *Yashti* is *Swarya*. *Madhura Rasa* nourishes the *Dhatu*, especially it does the *Prasadana* of *Rakta Dhatu* leading to *Indriya Prasadana* which helps in the grasping of knowledge. *Snigdha Guna* does *Indriyadrudhikarana*.

They are used in *Vata-Pitta* dominant *Sampraptibhy* alleviating the respective *Doshas* and thus, imparting *Bala* to *Mastulunga Avayava*.

Such *Kalpas* can be started at the beginning of fourth decade of life to prevent the decline of *Medha* (*Kalaja Jara*) considering *Dosha- Avastha*.

3. Sudden decline of *Medha* can also occur due to *Grahabadha* when there is *Avarana* of *Raja* and *Tama* on *Mana* due to the attack of *Graha*. In such conditions following *Kalpas* are ideal to use-

a) *Kalyanaka Ghrita*

b) *Mahapaishachika Ghrita*

- There are a few *Kalpas* which increases the grasping, retaining and memory skill when information is perceived through *Shrotrendriya*. They are listed below and termed as *Shrutanigadi*, *Shrutsampannor* *Shrutadhara*.

1. *Brahmi Ghrita Rasayana-Shrutanigadi* (*Shruta Grahana Shaktimana*)

2. *Naladadi Ghrita- Shrutdhaari*

### Conclusion-

*Medhya Ghrita* are found maximum in number than any other form of *Sneha Kalpana*. *Ghrita* is said to be lipophilic in nature and easily crosses the Blood Brain Barrier.<sup>6</sup> *Katu*, *Tikta* and *Ushna Dravyas* such as *Vacha*, *Vidanga*, *Kushtha*, *Shankhapushi* present in many *Siddha Ghrita* remove the *Avarana* of *Raja* and *Tama* over *Mana* and *Buddhi* and exhibit *Medhya* and *Smritivardhana* action. Presence of *Madhura* and *Snigdha Dravyas* such as *Yashtimadhu*, *Brahmi*, *Jeevaniya Gana Dravyas* alleviate the aggravated *Vata Dosha* and nourish *Mastulunga Avayava*. This also leads to *Medhya* and *Smritivardhana* action.

In Parkinson disease, motor symptoms are affected along with changes in voice and other factors and patient falls under depression due to social isolation. *Kalpas* such as *Brahmi Ghrita* and *Kalyanaka Ghrita* in *Unmada Pratishedha Adhyaya* which improve the condition of *Kshyeemana Indriya* and also act on *Medha* and *Buddhi* may be useful in the condition of Parkinson disease.

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## Chapter 16

### Observational study on *Kutaja Siddha Krushara* as a Vamaka Yoga

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#### Abstract:

Expulsion of *Doshas* through oral route is termed as *Vamana Karma*. Generally for inducing *Vamana Karma* *Kalpanas* prepared from *Madanaphala* are seen to be widely in practice. *Kutaja Beeja* is also mentioned and is stated as to have lesser complications and can be used for *Vamana* in *Sukumara* and *Kapha Pittaja* disorders. However so far, its utility for *Vamana* is not explored in detail, therefore there is a need to revalidate the utility of *Kutaja Beeja* for *Vamana*. Among the *Kutaja Kalpas*, *Kutaja Siddha Krushara* is one of the *Kalpa* which was tried to be validated as a *Vamaka yoga* in practice. 30 Subjects fulfilling inclusion criteria were taken for the study and *Vamana* with *Kutaja Siddha Krushara* was conducted, and *Vamana Karma* was assessed using the classical *lakshanas* like *Anthiki Shudhi*, *Vaigiki Shudhi*, *Maniki Shudhi*, *Vyapats* etc in *vamanakarma* mean number of *vegass* was 6.91. 66% patients showing *manikisuddhi* between 301-600ml. 73.33% showed all *langhiki lakshanas*. 73.33% patients showed *kaph antavamana*. In level of *suddhi* 66.66% patients showed *madhyamasuddhi*.

**Keywords:** *Vamana, Kutaja, Krushara, Suddhi*

#### Introduction:

*Vamana karma* is the first measure amongst *Panchakarma*, has been considered as the best line of treatment for the *Kaphaja disorders*.<sup>1</sup> *Vamana* is the process in which *Kapha* and *Apakva Pitta* is expelled out forcefully through oral route.<sup>2</sup> In the classical texts large numbers of formulations are described for the *Vamana Karma* but only few are in practice. *Shodhita Madanaphala Pippali* (*Randia dumentorum*) is being very commonly used drug for *Vamana karma* as it is having less complication<sup>3</sup>, but *Shodhana* of *Madanaphala Pippali* is time consuming and expensive. Approximately 5 kg of *Madanaphala* fruit is required to get 1 kg of *Shodhita Madanaphalam Pippali*. *Kutaja Beeja* is also mentioned and is stated as to have lesser complications and can be used for *Vamana* in *Sukumara* and *Kapha Pittaja* disorders<sup>4</sup> *Charaka* has mentioned a total of 18 *Vamaka Yogas* involving *Kutaja beeja*.<sup>5</sup> However so far, its utility for *Vamana* is not explored in detail, therefore there is a need to revalidate the utility of *Kutaja*

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*Beeja* for *Vamana*. Among the *Kutakja Kalpas*, *Kutaja Siddha Krushara* is one of the *Kalpa* which is yet to be validated as a *Vamaka yoga* in practice. Hence, there arises a need to make an in-depth trial of this *yoga* so that it can be brought into practice.

### **Objectives of Study**

To evaluate the efficacy of *Kutaja Siddha Krushara* as *Vamaka yoga*.

### **Materials and Methods**

#### **Source of Data**

Subjects from OPD/IPD of SDM college of Ayurveda and hospital, Hassan were selected for this study.

#### **Method of Collection of Data**

30 subjects who were full filling the criteria were selected for study.

#### **Source of Drug**

*Pum Kutaja Beeja Churna* was collected from market. The drug was sent to SDM Centre of Research in Ayurveda & Allied Science, Udupi for Physical and chemical study.

#### **Inclusion Criteria:**

1. Between the age group of 20 -60 years.
2. Fit for *Vamana*.

#### **Exclusion Criteria:**

Subjects suffering from any other systemic disorders like Hypertension, Diabetes Mellitus.

#### **Investigations: -**

1. Blood routine
2. ECG

#### **Plan for Treatment**

It was a single group clinical study includes pre-test post test design wherein 30 subjects were selected irrespective of their gender, caste or creed. All subjects were administered *Vamana* in the following schedule: *Panchakolachurna* 5g thrice daily before food with luke warm water till *Niramavastha* was obtained.

#### ***Deepana, Pachana***

#### ***Snehapana-***

*Arohana Krama Shodhananga Snehapana* was administered with *Moorchita Ghrita* till the

*Samyak Snigdha Lakshana* or 7 days whichever was earlier.

### ***Vishrama Kala-***

One day *Sarvanga abhyanga* with *Moorchitaitala* and *Ushna jala snana* was done. In *Vishrama Kala Kapha Utkleshakar* diet- Morning- *Idly, Vada*, Lunch- Curd Rice , Dinner- milk and rice . *Masha- Payasa, Tila Laddu*(100gms) & Milk sweets(250gms) was advised to be taken within the whole day.

### **Purva Karma**

On *Vamana* day the patient was prepared with *Sarvanga Abhyanga* with *Moorchita taila* and *Ushnajala Snana*.

### **Pradhana Karma**

*Akanthapana* of milk was given prior to administration of *Vamana Yoga*.

### ***Vamana Yoga***

***Kutaja Siddha Krushara-*** 50 grams of *Krushara* mixed with *Kutaja beeja choorna-* 12 gm

### **Method of Preparation:**

The *Krushara* was prepared by taking *Tandula* (rice) 1 part, *Mudga* ¼ parts, *Saindhava Lavana*, *Adraaka*, *Hingu*, *Haridra* in according to taste and adding water 6 parts and cooked well. *Kutaja Beeja Churna* mixed with honey and *Saindhava* was added to this *Krushara*. The *krushara* was administered in *sukhoshna* condition.

*Yashtimadhu Phanta* & *Saindhava Jala* as *Vamanopaga* was given.

### ***Samsarjana Krama –***

*Samsarjana Karma* depending on *Shuddhi* was advised.

### **Duration of the Study**

Maximum of 16 days including *Samsarjana karma*.

### **Assessment Criteria**

#### **Assesment of Vamna Effect**

1. Number of *Vamana Vegas*
2. Time taken to start *Vamana*
3. Duration of *Vamana*
4. Automatic commencement and stopping of vomiting
5. Achievement of *PittantakaShuddhi*

6. *Laingiki shuddhi*
7. *Maniki shuddhi*
8. Type of *shuddhi*
9. Drug palatability
10. Any side effect\ Vyapat

### Statistical Analysis

Paired t- test will be used to assess the effect of *Vamana* within the group.

### Results

#### Observations on *Snehapana*

**Table 16.1: Number of days of *Snehapana* in 30 subjects**

No of days <i>Snehapana</i>	N	Minimum days	Maximum days	Mean days
	30	3.00	6.00	4.6032

The number of days of *Snehapana* was 6 days and minimum of 3 days with mean of 4.60 days.

**Table 16.2: Dosage of *Snehapana* in 30 subjects**

Days	N	Minimum dose in ml	Maximum dose in ml	Mean dose in ml
Day1	30	30.00	30.00	30.00
Day2	30	30.00	90.00	60.00
Day3	30	60.00	150.00	97.58
Day4	30	80.00	180.00	142.26
Day5	7	100.00	220.00	152.67
Day6	2	140.00	230.00	193.75

With regards to dosage of *Snehapana* on day 1 minimum dosage was 30 ml and maximum dosage was 30 ml with mean being 30 ml. On the second day minimum dose was 30 ml and maximum dosage was 90 ml with mean being 60 ml. on the third day minimum dosage of

*Snehapana* was 60 ml and maximum dosage was 150 ml with mean being 97.58 ml. On the 4<sup>th</sup> day minimum *Sneha* dosage was 80 ml and maximum dosage was 180 ml with mean of 142.26 ml. On 5<sup>th</sup> day the minimum dose was 100ml and maximum was 220 ml with mean of 152.67 ml and on 6<sup>th</sup> day minimum dose was 140ml and maximum was 230 ml with mean of 193.75 ml.

**Table 16.3: Time taken for digestion of *Sneha* in 30 subjects**

Time taken for digestion	N	Minimum time in Hrs	Maximum time in Hrs	Mean time in Hrs
Day1	30	3.00	8.45	5.32
Day2	30	3.45	7.55	6.00
Day3	30	4.30	8.00	6.08
Day4	30	3.00	9.15	6.53
Day5	7	5.00	10.00	7.00
Day6	2	6.00	10.30	8.00

Regarding time for digestion of *sneha* on day 1 minimum time was 3 hours and maximum time was 8.45 hours with mean of 5.32 hours. On 2nd day minimum time for digestion was 3.45 hours and maximum of 7.55 hours with mean of 6 hours. On 3<sup>rd</sup> day the minimum time of digestion of *sneha* was 4.30 hours and maximum of 8 hours with mean of 6.08 hours. On 4<sup>th</sup> day minimum hours of digestion was 3 hours whereas 9.15 hours was maximum time with mean of 6.53 hours. On the 5<sup>th</sup> day the minimum time for digestion of *sneha* was 5 hours and maximum time was 10 hours with mean of 7 hours. On the 6<sup>th</sup> day the minimum time of digestion of *Sneha* was 6 hours and maximum was 10.30 ours with mean value of 8 hours.

### Results on Vamana

**Table 16.4: Number of Vamana Vegas in 30 Subjects**

	N	Minimum	Maximum	Mean	Std. Deviation
Number of Vamana Vegas	30	4	8	6.913	1.2761

In relation to number of *vamana vegas* the maximum was 4 *vegas* and maximum was 8 *vegas* with mean of 6.91 and sd 1.2761.

**Table – 16.5: Time for commencement of *Vamana* in 30 subjects**

	N	Minimum	Maximum	Mean	Std. Deviation
Time for Commencement Of Vamana	30	10	30	17.3043	6.2263

With regards to commencement of *vamana* the minimum time for commencement of *vamana* was 10 mins and maximum of 30 mins with mean value of 17.30 mins and SD of 6.22 mins.

**Table 16.6: Duration of *Vamana* in 30 Subjects**

	N	Minimum	Maximum	Mean	Std. Deviation
Duration of Vamana	30	38	70	49.4783	6.66653

With regards to duration of *vamana* the minimum duration of *vamana* was 38mins and maximum of 70 mins with mean value of 49.48mins and SD of 6.67mins.

**Table 16.7 Self Commencement of *vamana* in 30 Subjects**

	Self-Commencement of Vamana	
	No of Subjects	Percent
Yes	17	56.6666
No	13	43.3333
Total	30	100

On self commencement of *Vamana* 56.66% subjects i.e., 17 subjects it was observed and in 43.33% subjects i.e., 13 subjects it had to be initiated.

**Table 16.8: Self Stopping of *vamana* In 30 Subjects**

	No of Subjects	Percent
Yes	30	100

In all the 30 subjects i.e. 100% self-stopping of *vamana* was observed.

**Table 16.9: Condition during *vegas* in 30 Subjects**

	No Of Subjects	Percent
Forceful Vega	18	60.0000
Not Forceful	12	40.0000
Total	30	100

With regards to condition during *vegas* forceful *Vegas* were observed in 18 subjects i.e. 60% and in 40% ie 12 Subjects forceful *vegas* were not observed.

**Table 16.10: *Kramat Kapha Pitta Anila* in 30 Subjects**

	No Of Subjects	Percent
Yes	28	93.3333
No	2	6.6666
Total	30	100

In the *samyak vamaana lakshana* of *Kramat kapha pitta anila*, 28 subjects ie 93.33% it was observed while it was not observed in 2 subjects or 6.66%..

**Table 16.11: *Hrut Suddhi* in 30 Subjects**

	No Of Subjects	Percent
Yes	28	93.3333
No	2	6.6666
Total	30	100

In the *samyak vamaana lakshana* of *Hrut suddhi*, 28 subjectsie 93.33% it was observed while it was not observed in 2 subjects or 6.66%.



**Table 16.12: *Murdha Suddhi* in 30 Subjects**

	No Of Subjects	Percent
Yes	28	93.3333
No	2	6.6666
Total	30	100

In the *samyak vamaṇa lakṣhaṇa* of *murdha suddhi* , 28 subjects ie 93.33% it was observed while it was not observed in 2 subjects or 6.66%.

**Table 16.13: *Marga Suddhi* in 30 Subjects**

	No Of Subjects	Percent
Yes	22	73.3333
No	8	26.6666
Total	30	100

In the *samyak vamaṇa lakṣhaṇa* of *marga suddhi* , 22 subjects ie 73.33% it was observed while it was not observed in 8 subjects or 26.66%.

**Table 16.14: *Indriya Suddhi* in 30 Subjects**

	No Of Subjects	Percent
Yes	27	90.0000
No	3	10.0000
Total	30	100

In the *samyak vamaṇa lakṣhaṇa* of *indriya suddhi* , 27 subjects ie 90% it was observed while it was not observed in 3 subjects or 10%.

**Table 16.15: *Laghuta* in 30 Subjects**

	No Of Subjects	Percent
Yes	30	100

In the samyak vamaṇa lakṣhaṇa of *laghuta*, 30 subjects ie 100% it was observed.

**Table 16.16: *Antiki Suddhi* in 30 Subjects**

	No Of Subjects	Percent
Pittanta	8	26.6666
Kaphanta	22	73.3333
Total	30	100

In *Antiki* 22 subjects ie 73.33% had *kaphanta* whereas in 26.66% ie 8 subjects *pittanta* was observed.

**Table 16.17: *Maniki Suddhi* in 30 Subjects**

	No Of Subjects	Percent
100 - 300 ml	4	13.3333
301- 600 ml	20	66.6666
601- 900 ml	6	20.0000
Total	30	100

In *Maniki suddhi* 20 subjects ie 66.66% subjects had volume of vomitus between 301-600 ml, 20% patient had volume of vomitus between 601-900 ml ie 6 subjects whereas 4 subjects or 13.33% subjects had volume of vomitus between 100-300 ml.

**Table 16.18: Type of *Suddhi* in 30 Subjects**

	No Of Subjects	Percent
Pravara	8	26.6666
Madhyama	20	66.666
Avara	2	6.6666
Total	30	100

In relation to suddhi, 20 subjects with 66,66% had madhyamasuddhi, 26.66% ie 8 subjects had pravarasuddhi and 6.66% ie 2 subjects had avarasuddhi.

**Table 16.19: Drug Palatibility in 30 Subjects**

	No Of Subjects	Percent
Not Palatable	9	30.0000
Moderately Palatable	17	56.6666
Palatable	4	13.3333
Total	30	100

Regarding drug palatability in 17 subjects ie 56.66% subjects it was moderately palatable, 9 subjects or 30% it was not palatable and it was palatable for 4 subjects ie 13.33%.

**Table16.20: Complications in 30 Subjects**

	No Of Subjects	Percent
No	30	100

In 100% or all 30 subjects no complication or *vyapad* of *vamana* was observed.

## Discussion

**Vegiki Suddhi:** In relation to number of *vamana vegas* the maximum was 4 *vegas* and maximum was 8 *vegas* with mean of 6.91.

It is indicative that *Kutaja siddha krushara* was able to produce to an average of 6.91 *vegas* ie it was able to give *madhyama suddhi* according to *vegiki suddhi*.<sup>6</sup>

**Time for commencement of Vamana:** With regards to commencement of *vamana* the minimum time for commencement of *vamana* was 10 mins and maximum of 30 mins with mean value of 17.30 mins.

Thus it is seen that *Kutaja siddha krushara* was able to initiate *Vamana vegas* within the stipulated time of 1 *muhurta* i.e. 48 minutes with an average of 17.30 minutes.<sup>7</sup>

**Duration of Vamana:** With regards to duration of *vamana* the minimum duration of *vamana* was 38 mins and maximum of 70 mins with mean value of 49.48 mins.

Thus, it was seen that with *kutaja siddha krushara Vamana karma* was able to be completed within 1 *muhurtha* ie is 48 mins with average time being 49.48 minutes which is close to 1 *muhurtha*.<sup>7</sup>

**Self commencement of vamana:** On self commencement of *Vamana* 56.66% subjects i.e. 17 subjects it was observed and in 43.33% subjects ie 13 subjects it had to be initiated.

This indicates the efficacy of *kutaja siddha krushara* as a *vamaka yoga* whereas in the subjects in which it had to be initiated it may be due to the fact that the dosage of medicine was not sufficient according to *desha, kala* and *avastha* of the patient.<sup>8</sup>

**Self stopping of vamana:** In all the 30 subjects ie 100% self stopping of *vamana* was observed. Thus, it can be concluded that *kutaja siddha krushara* as a *vamaka yoga* did not cause any complication.<sup>9</sup>

**Condition during vega:** With regards to condition during *vegas* forceful *vegas* were observed in 18 subjects i.e. 60% and in 40% i.e. 12 Subjects forceful *vegas* were not observed.

Thus, *kutaja siddha krushara* was able to cause forceful *vegas* in general but in those in which *vegas* were not forceful, it may be due to the reason that the dosage of medicine was not sufficient to expel doshas forcefully<sup>8</sup>

**Laingiki Shudhi:** During *vamana karma* 22 subjects accounting for 73.33% subjects all the *laingiki lakshanas* were invariably observed,

*Laingiki lakshans* mentioned like *Kale Pravritti, Hrut Shudhi, Murdha Shudhi, Indriya Shudhi, Laghuta Swayam Pravrutta*, chronological expulsion of Dosha were taken for assessment.

**Antiki:** In *Antiki* 22 subjects ie 73.33% had *kaphanta* whereas in 26.66% ie 8 subjects *pittanta* was observed.

Thus, it was observed that in majority of the subjects 73.33% subjects *pittanta* could not appreciated.

#### **Maniki Shudhi:**

In *Maniki suddhi* 20 subjects ie 66.66% subjects had volume of vomitus between 301-600ml, 20% patient had volume of vomitus between 601-900ml ie 6 subjects whereas 4 subjects or 13.33% subjects had volume of vomitus between 100-300ml.

*Maniki Criteria* by saying that there is a huge diversification in the texture, Consistency, Composition of various individuals regarding the factors like tallness, dwarfism, obesity, emaciation, body consistency, *Prakriti*, *Satva* and by the fact that *Dosha*, *Dhatu*, *Mala* have no dimensions<sup>9</sup>

So the *Maniki Pariksha* highlights the quantitative analysis of the vomitus i.e. the quantity of *Kapha* or *Pitta* that is to be expelled out.

**Type of shudhi (overall outcome of *vamana karma*):** In relation to *suddhi*, 20 subjects with 66, 66% had *madhyama suddhi*, 26.66% ie 8 subjects had *pravara suddhi* and 6.66% ie 2 subjects had *avara suddhi*. Thus, *Kutaja siddha krushara* as a *Vamaka yoga* was able to give *madhyama suddhi* i.e. in 66.66% subjects.

The *Pravara*, *Madhyama* and *Ayoga* should be confirmed on the basis of the symptoms and signs i.e. *Vaigiki*, *Maniki* and *Laingiki Shudhi* described for this purpose. According to Chakrapani out of the four types of *Shuddhi* symptoms, the main importance should be given to the symptoms described for *Samyak Yoga* of *Vamana*. Sushruta has mentioned only *Laingiki Shuddhi*. According to *Dalhana Vaigiki* and *Maniki Shuddhi* may be discarded as the patient having different types of *Prakriti*, *Sara*, *Samhanana*, *Vayu* and *Bala* etc. May not have *Pravara Shuddhi* only by 8 Vegas but have *Pravara Shuddhi* by more of less than 8 Vegas also. Thus, more importance has been given to *Laingiki Shuddhi*.<sup>9</sup>

#### **Drug Palatability:**

Regarding drug palatability in 17 subjects ie 56.66% subjects it was moderately palatable, 9 subjects or 30% it was not palatable and it was palatable for 4 subjects i.e. 13.33%.

Thus, *Kutaja siddha krushara* as *vamaka yoga* was mostly moderately palatable or not palatable amongst most of the subjects which defines the qualities of *Vamaka yogas*.<sup>10</sup> *Vamana* drug preparation should be such that it has unpleasant taste and smell and looks ugly and disgusted as *Vamana Yoga* generally has unpleasant smell and ugly appearance the patient should be advised to take it as quickly as possible, but practically it is not possible to prepare

unpleasant taste and smell and looks ugly because most of the time if patient vomited *Vamana Yoga* during administration of *Aushadhi*, then it is not possible to achieve *Samyaka Vamana Lakshana*.

### **Complications:**

In 100% or all 30 subjects no complication or *vyapad* of *vamana* was observed. It indicates the safety of *Kutaja siddha krusharaas avamaka yoga*. *Kutaja Beeja* is also mentioned and is stated as to have lesser complications and can be used for *Vamana* in *Sukumara*. Hence, chances of complications were invariably less.<sup>4</sup>

### **Conclusion**

It was concluded that with *Kutaja siddha Krushara madhyam asuddhi* is invariably achieved irrespective of the *prakruti* or *kostha* of the subjects. However, the other *yogas* of *kutaja* can be taken up for further studies as well as comparative studies of *Kutaja siddha krushara* with other *yogas* can be carried out to further validate its efficacy.

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## Chapter 17

### Recent advances in *Panchakarma* Instruments

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#### Abstract

*Panchakarma* is a branch of *Ayurveda* which deals with Detoxification and healing of body with penta-purificatory measures. Lots of manpower and instruments are used with the medicaments which consumes energy and time. Mechanisation is much needed aspect of this branch to meet with modern life style. To treat maximum number patient with accuracy and efficiency is impossible without modern equipment. So there are so many advancement have been made in instruments which will be discussed in this article.

**Keywords:** *Panchakarma*, Recent Advancement, *Panchakarma* equipments, *Ayurveda*.

#### Introduction

*Panchakarma* can be considered as a super-speciality branch of *Ayurveda* which has renowned potency of healing and pacifying the disease from its root cause. With increased number of diseases and patients there is a need to make advancement in *Panchakarma* instruments which may cope with modern lifestyle and demand. The traditional instruments need lot of space and manpower to perform the procedures effectively. There are lot of efforts has been made by different institutions and research scholars to develop best *Panchakarma* instruments which has better hygiene and efficiency as compared to the traditional ones.

Need of advancement in *Panchakarma*<sup>1</sup>

1. To make the therapies economic or cost effective.
2. To enhance the effectiveness of the therapy.
3. To save manpower and time.
4. To maintain the uniformity.

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5. To reduce man made errors during therapy.
6. To increase the quality and hygiene during *Panchakarma* treatment.

#### **List of *Panchakarma* instruments<sup>2</sup>**

There are different types of instruments which are used in *Panchakarma* pre-operative and operative procedures for proper treatment. *Droni* or massage table is the platform on which majority of procedures are being done with help of different instruments. The list of instruments which are used in a *Panchakarma* Therapy room is in table (Table 17.1).

**Table 17.1: List of instruments which are used in a *Panchakarma* therapy room**

Sl. No	Basic Instruments required in <i>Panchakarma</i> therapy room
1.	<i>Droni</i>
2.	<i>Vastiyantara</i>
3.	<i>Hot Plates</i>
4.	<i>Gyser</i>
5.	<i>AvgahanYantra</i>
6.	<i>SwedanYantra</i>
7.	<i>ShirodharaYantra</i>

1. **Recent advancement in *Droni*:** Traditional *Droni* were made with single wood which were so costly and was not eco-friendly. Besides that maintaining hygiene and cleaning of wooden *Droni* is very difficult in a busy *Panchakarma* theatre. The advancement is made and the wooden *Droni* (Figure 17.1) has been replaced with FRP material. The FRP *Droni* (Figure 17.2) gives more options of customisation for eg. Adjustable Height (Figure 17.3) with desired colour and better finish.



**Figure17.1: Traditional *Droni* -Massage Table**



**Figure 17.2: Fibre *Droni* - Massage Table**



**Figure 17.3. Height Adjustable *Droni***

#### **Advantage**

- Easy to clean for better hygiene
- No absorption of body fluid or oil during the therapy which controls the cross infection.
- Light weight.
- Can be made in different shape and sizes as per the need.
- Cost effective, saves the cost up to 70%.
- Height adjustment is an optional feature that is very useful for immobile patients or bed ridden patients.

2. **Advancement in *Snehapana*:** Earlier in ancient times the *Sneha* was measured in Indian units of measurement<sup>3</sup> *Pala*, *Tola* and *Shukti* etc. now a days it is very difficult to explain the terminologies to the patients, so the *Sneha* quantity is now practiced in metric system ie millilitre and the modern measuring instruments are used for it (Figure 17.4).The medicated oil or ghee cannot be directly heated, in ancient time the water was heated and with help of that hot water the Ghee or oil was indirectly heated. Now a day's special oil heaters (Figure 17.5) are available in which the oil can be heated directly with the help of electricity.



**Figure 17.4: Measuring flask for *Snehapana***



**Figure 17.5: Oil Heater**

3. ***Akshi-tarpan:*** In this procedure a pool of oil is made over patient's eye and warm oil or ghee is poured in it. *Masha* (Black gram) dough is used to make pool around the eyes but now days it has been replaced with *Akshi Tarpan Yantra* (Figure 17.6).



**Figure 17.6: *Akshitarpan Yantra***

#### **Advantages**

- a. Can be used multiple times
- b. Easy to use.
- c. No problem of leakage.

4. ***Svedana Yantra***: Traditionally wooden cabinet were used for full body steam therapy that wooden cabinet were not lasting for long period due to continuous exposure with condensed water. The *Svedana* setup has been replaced with Advanced FRP<sup>4</sup> cabinet and steam generator with temperature control mechanism. (Figure 17.7)



**Figure 17.7: *Baspa-Swedana Yantra***

**Advantages:**

- a. Automated temperature control.
- b. Easy to clean.
- c. Long Lasting.



5. ***Sarvanga Dhara:*** *Sarvanga Dhara* is the procedure which needs more manpower and energy with manual method or traditional one. Advancement has been made by developing fully automated *Dhara yantra*. There is no need of man power once the machine is started; it performs all the procedure by its own. (Figure 17.8)



**Figure 17.8 *Sarvanga Dhara Yantra***

**Advantages:**

- a. Needs only one therapist to observe the procedure.
- b. Saves manpower.
- c. Maintains uniform temperature throughout the procedure.

6. ***Shiro dhara:*** Automated *Shiro dhara* instrument has been developed which has control over temperature and number of oscillations. That makes the procedure accurate and gives maximum benefit. (Figure 17.9)



**Figure 17.9 : Automatic Shirodhara Yantra**



**Discussion:**

Technology helps in betterment of healthcare system in the direction towards excellence, for standardisation and uniformity of *Ayurveda* therapies we must start using the modernised instruments with traditional concept and values. The basic therapeutic effect should be achieved in modern way with better accuracy and efficiency.<sup>5</sup>

**Conclusion:**

Advancement of *Panchakarma* therapy, which is most needed in upcoming era where as *Maharshi Vagbhata* also told to revise, renew the older methodology and replace them according to the need. In order to compete with growing global market of *Ayurveda*, definitely there is a need of mechanisation of therapies. But before inventing new instrument, the basic concept and mode of action must be considered as a priority.

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### ***Virechana* in Hypothyroidism -A Case Series**

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#### **Abstract**

The changed lifestyle and stress filled modern era has led to alterations in the activities of neuro-endocrine systems causing surge of newer metabolic health challenges like hypothyroidism. It is emerging health concern affecting millions of people worldwide affecting work and productivity. As there no direct reference of hypothyroidism in the classical treatises the disease can be previewed as a *tridoshaja vyadhi* with *agnimandya* at the level of *dhatu* and *srotodusti*. *Virechana* is commonly employed procedure in panchakarma for *srotoshodhana*, *agni* correction and for evacuation of *bahudosh* from the body. Hence, *virechana* with *rookshana poorvaka snehana* is planned to evaluate and validate clinically its effect in hypothyroidism. The present study was intended to evaluate the effectiveness of *virechana* karma in hypothyroid patients. 10 subjects diagnosed with hypothyroidism were selected based on convenient sampling method. *Bahya rookshana* was done by *udwartana* with *triphaladi choorna* along with *abhyantara rookshana* was done by *deepana pachana* with *chitrakadi vati* 500gms twice daily before food and *panchakola phanta* 50 ml twice daily before food till appearance of *samyak rookshana lakshanas*. They were administered *snehapana* with *varunadi ghrita* till the appearance of *samyak snigdha lakshanas* followed by *vishrama kala* for 3 days. *Virechana* with *avippatikara choorna*, 25 grams was given with *madhu* as *anupana*. Subjects were administered *Kanchanara guggulu* after completion of *Samarjana krama*. Subjects were assessed 15 days after completion of *samarjana krama*. There were statistically significant improvement in signs and symptoms along with reduction in serum TSH values. *Virechana* is effective in management of hypothyroidism, so this new modality of treatment needs to be validated through a well planned study on a large sample size.

**Keywords:** Hypothyroidism, *virechana*, *mandagni*, *avippatikara choorna*, *srotosodhana*

## Introduction:

According to projection from various studies on thyroid disease, in India 42 million people suffer from thyroid disorders, out of which hypothyroidism is the most common with prevalence of 5.4%<sup>1</sup>. Considering the high prevalence rate of this disease in this stress bound busy life, its effect on the quality of life of the individual and overlooking the tedious process of consumption of thyroid supplements lifelong, an alternative management seems to be the need of the hour.

Hypothyroidism refers to any state that results in deficiency of thyroid hormone, including hypothalamic or pituitary disease and generalized tissue resistance to thyroid hormone and disorders that affect the gland directly.<sup>2</sup> It is characterized by a broad clinical spectrum ranging from an asymptomatic or subclinical condition with normal levels of thyroxine (T4) and tri-iodothyronine (T3) and mildly elevated levels of serum TSH to an overt state of myxoedema, and multi-system failure<sup>3</sup>. Though direct resemblance of any disease is absent but it possible to relate the presentation of the disease with some concepts mentioned in the classics e.g. *asthaninditiya purush* includes many endocrinal presentations, *galaganda* resembles the goitre manifestation of hypothyroidism, symptoms in hypothyroidism matches with different conditions like *rasa pradoshaja vikara*, *kaphaja grahani*, *kaphaavrit vata* and *bahu dosha avastha* symptoms are grossly seen in this condition. *Acharya Charaka* told in *rasa pradoshaja vikara langhana* is the *chikitsa*, among *shodanarupi langhana* one is *virechana*. *Virechana* is the ideal procedure for *pitta samsrushta vata & kapha dosha* and even in *sannipataja* conditions<sup>4</sup>.

## Materials and Methods:

**Source of data:** Patients attending the in-patient department of Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan.

**Method of collection of data:** A. **Screening:** Subjects with diagnostic criteria mentioned below will be screened using screening form and data of patients will be collected using specially prepared case report form (CRF).

**Diagnostic criteria:** Thyroid stimulating hormone (serum TSH) value more than 4.5m IU 25 which may or may not be associated with decreased levels of T3 and T4

**Research design:** Open label, single arm, prospective clinical study of hypothyroidism in minimum of 10 patients from in-patient department of a tertiary Ayurveda hospital attached Ayurveda Medical College located in district headquarters of Southern India, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan

## Clinical study protocol

**Sampling method:** A minimum of 10 patients fulfilling the diagnostic and inclusion criteria will be selected by convenient sampling method and will be considered in a single group.

## Intervention

### Poorva karma:

- a) **Abhyantara rookshana**- *Deepana -pachana* with *chitrakadi vati*<sup>5</sup> 500mgs twice daily before food *Panchakola phanta*<sup>6</sup> 50ml twice daily before food till the appearance of *samyak rookshana lakshanas*.
  - b) **Bahya rookshana**: *Udwartana* was done with triphaladi choorna followed by *baspa sweda* till the appearance of *samyak rookshana lakshana*
- **Snehapana**
  - It was done with *varunadi ghrita*<sup>7</sup> in *arohanakrama matra* till appearance of *samyak snigdha lakshanas*
  - **Abhyanga and swedana**
  - During *vishama kala abhyanga* with *moorchitatila taila*<sup>8</sup> was done followed by *baspa sweda*
  - **Pradhana karma**: *Sarvanga abhyanga* with *moorchitatilataila* followed by *baspa sweda*
  - **Virechana** with *avippatikara choorna*<sup>9</sup> 25gms, with *madhu* as *anupana*

### Paschat karma

- **Paschat karma**: *Samsarjana krama* was based on the type of *shuddhi*

**Follow up medicine**: *Kanchanara guggulu*<sup>10</sup> 500 gms twice daily before food was given for 15 days after completion of *samsarjana krama*

- **Duration of study**: *Rookshana Karma* (1st - 3rd) day until *samyak rookshana lakshanas* appear
- *Snehapana* (4th- 10th) day or till *Samyak Snigdha lakshanas* appears.
- *Vishrama kala* after *Samyak Snigdha lakshanas* (11th -13th) day for 3 days
- *Virechana karma*-14th day.
- *Samsarjana krama*-(15th -21st) day based on the *shuddhi* attained.

## Diagnostic criteria

### Inclusion criteria:

1. Subjects who are diagnosed with hypothyroidism with or without oral thyroxin therapy.
2. Subjects fit for *virechana karma*.

3. Those subjects who are willing to participate in the study and are ready to sign the consent form.
4. Age of the subject should be between (18-60) years.
5. Inclusion of subjects in the study will be done irrespective of gender

**Exclusion criteria:**

1. Patients who have undergone any type of thyroid surgery.
2. Patients suffering from congenital hypothyroidism, drug induced hypothyroidism, progressive case of myxoedema, secondary hypothyroidism.
3. Systemic diseases like ischemic heart disease, renal impairment and hepatic impairment.
4. Hypothyroidism in pregnancy and during lactation.

**Assessment criteria: Primary outcome measure:** Assessment of objective parameters was based on the changes in laboratory parameter serum TSH on 1st day and 15 days after *samsarjana karma*.

**Secondary outcome measure:** Assessment of subjective parameters will be done with the help of a suitable clinical scoring of hypothyroidism- 'BILLEWICZ SCORE'<sup>11</sup> on 1st day and 15days after *samsarjana karma*.

**Statistical analysis:** Results were analysed using appropriate statistical test based upon type of data like Friedman's test and post hoc Wilcoxon sign rank test using SPSS version.

- **Paired T Test** is used to analyze the significance of change in TSH values before and after treatment.
- **Wilcoxon sign rank test** was used to assess BILLEWICZ SCORE before and after treatment.

**Observations**

**Table 18.1: Showing the incidence of disease of with relation to age**

Parameter (Age)	Frequency	Percentage
20-30	5	50
31-40	2	20
41-50	3	30
<b>TOTAL</b>	10	100

**Table 18.2: Showing the incidence of disease with relation to gender**

<b>Parameter (Gender)</b>	<b>Frequency</b>	<b>Percentage</b>
Male	2	20
Female	8	80
<b>TOTAL</b>	10	100

**Table 18.3: Showing the incidence of disease in relation to marital status**

<b>Parameter (Marital status)</b>	<b>Frequency</b>	<b>Percentage</b>
Single	3	30
Married	5	50
Widow	2	20
<b>TOTAL</b>	10	100

**Table 18.4: Showing the incidence of disease in relation to hormonal supplements**

<b>Parameter (Intake of hormonal supplements)</b>	<b>Frequency</b>	<b>Percentage</b>
Absent	3	30
Present	7	70
<b>TOTAL</b>	10	100

**Table 18.5: Showing the incidence of disease of with relation to family history of hypothyroidism**

<b>Parameter (Family history)</b>	<b>Frequency</b>	<b>Percentage</b>
Present	5	50
Absent	2	20
<b>TOTAL</b>	10	100

**Table 18.6: Showing the incidence of disease of with relation to *kostha* of subjects**

Parameter ( <i>Kostha</i> )	Frequency	Percentage
<i>Mridu</i>	2	20
<i>Madhyama</i>	7	70
<i>Krura</i>	1	10
<b>TOTAL</b>	10	100

**Table 18.7: Showing the incidence of disease of with relation to type of *agni***

Parameter ( <i>Agni</i> )	Frequency	Percentage
<i>Samagni</i>	1	10
<i>Vishamagni</i>	3	30
<i>Mandagni</i>	6	60
<b>TOTAL</b>	10	100

**Table 18.8: Showing the incidence of disease of in relation to palpable thyroid gland**

Parameter (Enlarged thyroid gland)	Frequency	Percentage
Present	1	10
Absent	9	90
<b>TOTAL</b>	10	100

**Table 18.9: Showing the incidence of disease of with relation to pattern of diet**

Parameter (Dietetic habit)	Frequency	Percentage
<i>Akal bhojana</i>	2	20
<i>Adhyasana</i>	2	20
<i>Vishamsana</i>	6	60
<b>TOTAL</b>	10	100

**Table 18.10: Showing the incidence of disease in relation to consistency of bowel**

<b>Parameter (consistency of mala)</b>	<b>Frequency</b>	<b>Percentage</b>
Normal	4	40
Hard stool	6	60
<b>TOTAL</b>	10	100

**Table 18.11: Showing the incidence of disease in relation to regularity of menstruation**

<b>Parameter (<i>Rajo pravrtitti</i>)</b>	<b>Frequency</b>	<b>Percentage</b>
Regular	6	60
Irregular	2	20
Not applicable	2	20
Menopause	1	10
<b>TOTAL</b>	10	100

**Table 18.12: Showing the incidence of disease in relation to menstrual flow**

<b>Parameter (Menstrual flow)</b>	<b>Frequency</b>	<b>Percentage</b>
Normal flow	4	40
Heavy flow	2	20
Scanty flow	1	10
Not applicable	3	30
<b>TOTAL</b>	10	100



**Table 18.13: Showing the incidence of disease in relation to BMI of subjects**

<b>Parameter (BMI)</b>	<b>Frequency</b>	<b>Percentage</b>
Overweight	6	60
Normal	2	20
Obese	2	20
<b>TOTAL</b>	<b>10</b>	<b>100</b>

**Table 18.14: Showing the incidence of number of *virechana vegas***

<b>Parameter (No of vegas)</b>	<b>Frequency</b>	<b>Percentage</b>
9-15	4	40
16-23	6	60
<b>TOTAL</b>	<b>10</b>	<b>100</b>

**Table 18.15: Showing the incidence of disease in relation to presence of *virechana vyapath***

<b>Parameter (<i>virechana vyapath</i>)</b>	<b>Frequency</b>	<b>Percentage</b>
Absent	10	100
<b>TOTAL</b>	<b>10</b>	<b>100</b>

**Table 18.16: Showing the incidence of disease in relation *antiki shuddhi***

<b>Parameter (<i>kapha antiki</i>)</b>	<b>Frequency</b>	<b>Percentage</b>
Absent	10	100
<b>TOTAL</b>	<b>10</b>	<b>100</b>

**Table 18.17: Showing the incidence of disease in relation to type of *shuddhi***

Parameter ( <i>shuddhi</i> )	Frequency	Percentage
<i>Avara</i>	2	20
<i>Madhyama</i>	8	80
<b>TOTAL</b>	10	100

**Results:****Table 18.18: Table showing effect of *virechana* on TSH**

Parameter	Mean		Mean diff	SD	SE	T	p	Remarks
	BT	AT						
Serum TSH	13.29	5.59	7.695	3.095	.979	7.863	.001	Significant

S = Significant, SD= standard deviation, SE= standard error

Serum TSH: In 20 patients of hypothyroidism, serum TSH was 13.29 micro IU/ml before treatment and it decreased to 5.59 micro IU/ml after treatment with decrease of 7.695 micro IU/ml. The decrease in the value is statistically significant ( $P < 0.05$ )

**Table 18.19: Table showing effect of *virechana* on Gross BILLEWICZ SCORE**

Parameter			Mean rank	Sum of rank	Z value	P value	REMARKS
BILLEWICZ SCORE	<i>Negative rank</i>	10	5.50	55	-2.805	<0.05	Significant
	<i>Positive rank</i>	0	.00	.00			
	<i>Ties</i>	0	-	-			
	<i>Total</i>	10	-	-			

In all the 10 patients there was significant relief ( $p < 0.05$ ) in Billewicz score before and after treatment. None of the patients total score increased after treatment and also there were no patient with no changes before and after treatment.

## Discussion

Even if it is a *anukta vyadhi* we can interpret the pathogenesis of hypothyroidism based on clinical manifestations. Thyroid hormones stimulate various metabolic activities in the tissues increasing the basal metabolic rate, so its action is similar to *agni*. Due to various ill dietary habits and lifestyle modifications, *agni dushti* occurs and thus there is the formation of ama resulting in symptoms like *bala bhramsa* (tiredness), *mala sanga* (constipation) *gaurava* (fatigue). *Mandagni* to a specific *dhatu* results in the manifestation of *srotodushti lakshanas* which can be interpreted as the signs and symptoms of hypothyroidism. Along with *rasa dhatu uttarotara dhatus* also get vitiated and produces the clinical features.

*Agni mandya* at *rasa dhatu* level results in the manifestation of *lakshanas* like *aruchi*, *gaurava*, *tandra*, *angamarda*, *panduta*, *klaibya*, and *saada*. This can be understood by the signs and symptoms of hypothyroidism namely loss of appetite, fatigue, anaemia, puffiness of eyes, loss of libido and puffiness of the face. *Atrakta dhatu* level results in the manifestation of *lakshanas* namely *twak vikara*, *svitra andvyanga* which are manifested in hypothyroid patients as dry, coarse skin, and hyperpigmentation of the face. At *mamsa dhatu* results in the manifestation of *lakshanas* are *galaganda* and *gandamala* which can be interpreted with the manifestations of different types of goiter. *Mandagni* at *medodhatu* results in the manifestation of *lakshanas* namely *sthoullya* and *swasa* during *alpacheshta*, which can be understood by the signs and symptoms of hypothyroidism namely weight gain and dyspnea. *Mandagni* at *asthi dhatu* results in the manifestation of *lakshanas* namely *keshadosha*, *nakhadosha* and *asthibheda* hair loss and brittle nails in hypothyroid subjects. *Mandagni* at *majja dhatu* results in the manifestation of *lakshana* namely *parva ruk* which is arthralgia, muscle stiffness in hypothyroidism. *Mandagni* at *shukra dhatu* results in the manifestation of *lakshana* namely *klaibya*, *aharshana*, *garbhapata* and *garbhasraava* which is loss of libido, menstrual abnormality erectile dysfunction and infertility.

**Probable mode of action of virechana:** As in case of hypothyroidism, there is involvement of bahu dosha, so *dosha avsechan* in the form of *virechana* was planned. It was planned so as hypothyroidism is basically a metabolic disorder with disturbed metabolism at cellular level. *Virechana* act at microcellular level and help to maintain the normal physiology of tissue, by removing the metabolic toxins, the waste products present in the body either in extracellular, intracellular or in plasma are brought into intestine and eliminated out of the body. *Virechana* helped in increasing the production and proper release of thyroid hormones through the activation of metabolic enzymes namely peroxidase As a result the TSH level was reduced due to the negative feedback mechanism through Hypothalamo-Pituitary Thyroid axis.

**Mode of action of trial drugs:** The trial drug *varunadi ghrita* with which *snehapana* was conducted is cited in *Astanga hridaya* consists of drugs having *tikta rasa pradhana*, *laghu*, *ruksha guna* & *ushna veerya* drugs. The ingredients of *varunadi ghrita* were chiefly having *kapha medo hara*, *mand agni nashaka*, *tridosahara* properties.

*Avippatikkara churna* mentioned in *Bhesajya Ratnawali*, *amla pitta rogadhikar* has *katu*, *tikta*, *laghu*, *ruksha*, *ushna*, *sheeta veerya*, *madhur* and *katu vipaka*. The main component is *Trivruth* which comprises of 44 parts of the whole formulation. In hypothyroidism, there is *agni mandya* due to *kapha sanchaya* and a consequence of the *sanchita kapha*, there is *vata pratilomata* due to *avarana*. *Trivrit* does *ruksha virechana* which will help in removing the *kapha sanchaya* and brings *vata anulomana*.

*Kanchanara guggulu* has drugs having *deepana*, *pachana*, *lekhana*, *strotoshodhan*, *anulomana* and *kaphashamaka* properties are likely to check the basic pathogenesis of hypothyroidism i.e., hypo-metabolism

## Conclusion

No adverse reactions were seen in this study. The dosage of thyroxin supplement intake for the subjects was reduced in subsequent follow ups. The trial drugs showed significant results on both primary and secondary outcome measures. From the clinical trial, it can be concluded that *virechana* is effective in the management of hypothyroidism.

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## Chapter 19

### Recent Advances in *Netra Kriyakalpa* - Ocular Therapeutic Procedures and Para-Surgical Techniques in the Management of Eye Disorders

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#### Abstract:

The *Shalakya Tantra* is a branch of *Ashtanga Ayurveda* that focuses on the analyses and management of diseases that occur above the clavicle. It states “*Sarvendriyanam nayanam pradhanam*”, which means that eyes are the prime sense organ in the human body, and utmost care should be made to protect them because without sight, the individual’s world becomes dark. Ayurveda provides a detailed explanation of not only the curative but also the preventive aspects of eye diseases. The main treatment procedures for both treatment and prevention of the eye diseases are described as *Netra Kriyakalpa*. The major goal of any pharmaco-therapeutics is to provide a correct pharmacological response by maintaining an effective concentration at the site of action for an extended time period. When oral medicines are ineffective, surgical interventions are not feasible, or there is a significant risk of recurrence, the para-surgical procedures (*Anushastra*) such as *Raktamokshana* (Blood-letting), *Kshara karma* (Alkali burn), *Agni karma* (Heat cauterization) etc., prove to be miraculous, with minimal pain, hemorrhage, and a lower risk of recurrence. This article deals with the various aspects of ocular therapeutic procedures (*Netra kriyakalpa*) and para-surgical techniques (*Anushastra*) being used to treat the eye diseases in Ayurveda science.

**KEYWORDS:** *Netra Kriyakalpa*, *Raktamokshana*, *Ksharakarma*, *Agni karma*, Ocular therapeutic procedure, Ocular para-surgical procedure.

#### Introduction:

The eyes are amongst the most vital organs in the human body because they allow individuals to obtain knowledge, engage socially and, develop intellectually. The ability to perceive this lovely world through one's eyesight is the most crucial thing. Because for people who are blind, day and night are interchangeable. Even *Acharya Vagbhata* remarked that the precision of the other sense organs is dependent on vision.<sup>1</sup> As a result, maintaining the normal functioning of the eyes

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through *Kriyakalpa* (Ocular therapeutic procedures) is crucial. The terms "*Kriya*" and "*Kalpa*" are two different and separate words that make up the phrase "*Kriyakalpa*." The term '*Kriya*' refers to the therapeutic processes that are performed to cure the disorder, whereas '*Kalpa*' refers to the specific drug or formulation that is chosen for usage in that specific disease indication. In Ayurveda, "*Chikitsa*" refers to the treatment that is used, and it is divided into three types, known as *Trividha Chikitsa*, which include *Antahparimarjana* (treatment to cleanse or purify from within), *Bahyaparimarjana* (treatment to cleanse from external means), and *Shastrapranidhana* (treatment that involves surgical intervention)<sup>2</sup> *Kriyakalpa* is a *Bahyaparimarjana Chikitsa* that treats the eyes directly and has a number of benefits. Because the eye is such an important and delicate organ in the body, *Kriyakalpa* was created to cure the diseases of the eyes. When *Kriyakalpa* procedures are used, they follow the *Purvakarma* (pre-therapy), *Pradhana karma* (main treatment), and *Paschata karma* (post-treatment) protocols. *Purvakarma* involves *Snehana*, *Swedana* and some *Panchakarma* procedure to eliminate vitiated *Dosha* from the body, after which the chosen *Kriyakalpa* is administered as *BahyaparimarjanaChikitsa* to remove any leftover *dosha*. The actual sort of *Kriyakalpa* administered is *Pradhana karma*, while *Paschata karma* refers to the rules and regimens that must be followed after the treatment, such as *Samsarjana Krama* (Dietary regime). *Kriyakalpa* has been stated by various Acharyas, and some of them correspond to one another, which effectively benchmarks and concretizes its efficiency and utility in preserving and curing disorders of the eyes. When oral medications become ineffective, surgical interventions are not feasible, or there is a high risk of recurrence, para-surgical procedures (*Anushastra*) such as *Raktamokshana* (Blood-letting), *Ksharakarma* (Alkali burn), *Agni karma* (Heat cauterization), and others, can be life-changing, with minimal pain, haemorrhage, and a lower risk of recurrence. *Acharya Sushruta* described para-surgical treatments in the management of various eye diseases such as *Puyalasa*, *Pakshmakopa*, *Abhishyanda*, *Adhimantha*, *Timira*, *Pilla roga*, etc. These techniques were introduced in *Ayurveda* far before modern science found their utility. Although techniques and equipment have advanced, the principles remain the same.

## **Aims & Objectives**

The aim of the present review is to study, analyse and understand the concept of ocular therapeutic procedures (*Netra kriyakalpa*) and para-surgical techniques (*Raktamokshana*, *Jalaukavacharana*, *Kshara karma* and *Agni karma*) used for the management of various eye disorders.

## **Material and Methods**

For the better understanding of the topic, various Ayurveda classical texts and published literature related to *Kriyakalpa* and *Anushastra*, were searched, studied in depth and discussed thoroughly. The conclusions drawn from the collected data are being presented here.

## ***Kriyakalpa***

*Kriyakalpa* refers to a set of techniques in which medicated *Ghee*, *Swarasa*, *kwatha* (decoction), *Kalka* (paste) or *Churna* (powdered formulations) are applied to the eyes either directly (above eyelids) or indirectly (around eyelids) as a therapy modality.<sup>3</sup> According to *Acharya Sushruta*, there are five different types of *Kriyakalpa*.<sup>4</sup>

1. *Tarpana* (Therapeutic retention of medicated *Ghrita* over the eyes),
2. *Putapaka* (Installation of medicated juices in the eyes, which is extracted after heating a bolus of herbs, along with goat meat, to get the concentrate juice of the herbs),
3. *Seka* (Ocular therapy by streaming),
4. *Anjana* (Collyrium),
5. *Aschyotana* (Eye drops),

*Acharya Sharangdhara* added the following two to the list in addition to these five *Kriyakalpas*.<sup>5</sup>

6. *Pindi* (Fastening medicinal bolus to the eyes) and,
7. *Bidalaka* (Application of medicated paste on the outer part of eyes).

*Acharya Sharangdhara* called them "*Netra Prasadan Karma*" (The treatment that is helpful to the eyes, without producing any harmful or untoward side effects).<sup>6</sup>

## **Seka:**

According to the *Dosha* involved, medicine is poured in *Suksma Dhara* (Thin stream) over closed eyes continuously for a certain time from a recommended height of 4 *Angula*.<sup>7</sup> It is usually conducted during the day time; however, it can also be done at night in an emergency. It's used to treat itchy, watery, burning, dry, and photophobic eye disorders such as conjunctivitis. *Seka* is useful for diseases that cannot be treated with *Aschyotana*. After this process, the eyes should be rinsed with lukewarm water and bright objects such as mobile phones, computers etc., should be avoided.<sup>8</sup>

## **Classification**

1. *Snehana Seka* in *Vataja Dosha* for 400 *Matra Kaal*,
2. *Ropana Seka* in *Pittaja & Raktaj Dosha* for 600 *Matra Kaal*,
3. *Lekhana Seka* in *Kaphaja Dosha* for 300 *Matra Kaal*.

***Samyaka Lakshana*** - *Roga Nivrutti* (Gets relief from disease), *Swabhavika Varna* (Gets natural colour), *Karya Patutwam* (Normal eye functioning), and *Vedhana Shanti* (Relief from pain) etc. are some of the signs that *Seka* has been effectively done. According to *Acharya Sushruta*, the *Samyaka yoga* and *Mithyayogalakshana* are similar to those of *Tarpana* and *Putapaka*. *Acharya*



*Dalhana* states that if Ghrita is used for the Seka procedure, the features will be same as that of *Tarpana* but, if milk, sugarcane juice or other decoctions are used for *Seka* procedure, the features of *Yoga* and *Ayoga* of *Putapaka* will be applicable.<sup>9</sup>

## ASCHYOTANA

*Aschyotana* is a process in which medicine is given to the eye drop by drop, hence the medicine must be liquid. In all forms of *Netraroga*, *Aschyotana* is the primary line of treatment.<sup>10</sup> It is an Ayurveda treatment approach that is utilised for both disease prevention and treatment. In most cases, *Aschyotana* is recommended in the early stages of disease. *Abhishyanda* is clearly the first pathogenic change in the development of eye illnesses. It relieves discomfort, itching, rubbing of the eyes, burning sensations, and redness.<sup>11</sup> Excessive *Tarpana* use also causes a variety of symptoms, including heaviness in the eyes and adhering of the eyelids. *Aschyotana* and *Anjana* can help to alleviate these symptoms. The various types of medicines used in *Aschyotana* based on vitiated *dosha* are as follows:<sup>12</sup>

1. In *Vataja* condition - *Tikta* and *Snigdha*
2. In *Pittaja* condition - *Madhura* and *Sheeta*
3. In *Kaphaja* condition - *Tikta*, *Ushna* and *Ruksha*

*Acharya Vagbhatta* further stated that *Ushna Aschyotana* should be performed in *Vataja Netraroga*, *Sheeta Aschyotana* in *Pittaja Netraroga* and *Raktaja Netraroga*, and *Koshna* (lukewarm) *Aschyotana* in *Kaphaja Netraroga*. According to *Acharya Sharangdhara*, various *Aschyotana* are performed in various *Ritus* (seasons), such as *Ushna Aschyotana* in *Sheeta Ritu* and *Sheeta Aschyotana* in *Ushna Ritu*.

**Classification:** *Aschyotana* is classified into 3 types based on action<sup>13</sup>

**Table 19.1: *Aschyotana* classification**

S. No.	Type	Dosha	Matra	Dharana kala
1.	<i>Snehana Aschyotana</i>	<i>Vata</i>	10 Bindu	200 Matra kala
2.	<i>Ropana Aschyotana</i>	<i>Pitta</i>	12 Bindu	300 Matra kala
3.	<i>Lekhana Aschyotana</i>	<i>Kapha</i>	7-8 Bindu	100 Matra kala

**Note:** *Acharya Sharangdhara* has advised to perform all types of *Aschyotana* for a period of 100 *Vaak matra*<sup>14</sup>

## Procedure:

**Purvakarma:** When indications and symptoms are severe (*Tivra*), *Acharya Videha* recommends taking light food for the first three days, and in *Pakwa Avastha*, *Aschyotana* or *Parisheka* should

be recommended based on *Dosha Bala* i.e., *Aschyotana* in *Alpa Bala Dosha* and *Parisheka* in *Prabala Dosha*.

**Pradhana karma:** The patient should be kept in a calm and quiet room in a supine position. The eyelids then are opened with the left hand, and the drops are instilled with the right. *Kaneenaka Sandhi* is used to apply the prepared medicine from a convenient height of 2 *Angula*.<sup>15, 16</sup>

**Paschat karma:** The excess drops outside the eyeball are cleansed, and then fomentation (*swedanakarma*) is done using cotton cloth drenched in lukewarm water; this *swedana* should only be done in *Kapha* and *Vata* dominating disorders.

*Aschyotana* is not recommended at night. It can be used at any time during the day. However, *Acharya Yogaratnakara* and *Sharangdhara* advise not to do it at night. *Acharya Dalhana* has specified the time when *Aschyotana* to be performed based on the vitiated *Dosha* and the kind of *Aschyotana* to be employed as follows:

- *Kaphaj* disease or *Lekhana* - Morning
- *Pittaja/Raktaja* disease or *Ropana*- Afternoon
- *Vataja* disease or *Snehana* - Evening
- In emergency circumstances - any time of day or night.

**Complications:** It shouldn't be too irritating, hot or cold, and the quantity shouldn't be too much or too little, and it should be thoroughly filtered. Various issues will arise if these qualities are not maintained, as shown below.<sup>17</sup>

- *Ati-Ushna-Tikshna* - Burning, Redness, Suppuration, Vision loss
- *Ati-Sheeta* - Pricking pain, Restricted movements
- *Ati-Matra* - Dry eyelids, Grittiness in eyes, involuntary eye Movements
- *Alpa-Matra* - Increase in severity of disease
- *Aparisruta* - Lacrimation, Grittiness in eyes

**Mode of action of *Aschyotana*:** The drug utilised in various eye drops, according to *Acharya Vagbhata*. Medicine is used in the *Kaneenika Sandhi* in *Aschyotana*. This is a highly vascularized tissue, and the medicine is absorbed through the vessels and sent to the vessels of the head region via the circulatory system. The *Urdhwajatrugata* diseases are cured when it reaches the *Sandhi*, *Shirah*, *nose*, and *mouth*, as well as its *Srotasas*. *Doshas* are first confined to vessels, particularly those in the head area. As a result, *Aschyotana* is particularly effective in the early phases of eye illnesses.

## ***Vidalaka***

The application of medicinal paste to the outer surface of the eye lids is known as *Vidalaka*. This paste should only be used on the lids and not on the lashes.<sup>18, 19, 20</sup>

### **Indications:<sup>21</sup>**

- *Daha* - Burning
- *Upadeha* - Discharges
- *Asru* - Excessive tears
- *Sopha* - Swelling
- *Raga* - Redness/congestion
- *Toda/ bheda/ ruka* - Different types of pain
- *Kandu* - Itching
- *Gharsa* - Sensation of a foreign body

Only the right ingredients in *Vidalaka* can manage such a wide spectrum of early signs of eye illness.

**Thickness:** *Vidalaka* paste is similar in thickness to *Mukhalepa* paste.<sup>22</sup>

- *Doshagna* - 4 *Angula*
- *Vishagna* - 2 *Angula*
- *Varnya* - ½ *Angula*

**Contra-indications:** Excessive talking, humour, rage, grief, crying, sleeping in daytime, wandering beneath the sun etc., are prohibited after the administration of medicines. Otherwise, they may cause skin itching/dryness, *Pinasa*, and eyesight problems. After the paste has dried, it should be moistened with water before being removed. Oil should be applied to the eyelid later. It can be used at any time of the day (or when there are symptoms of eye disease).<sup>23</sup>

**Mode of action:** Medication processes are adjusted to ensure optimal absorption. The drug is taken directly into the circulatory system through the blood vessels. It is affected by permeability of vessel walls, the consistency of the fluid inside the vessels, nature and consistency of the medicines being used.

## ***Pindi***

*Pindi* is a slightly modified form of *Bidalaka* in which the medicated paste is wrapped in a thick cotton bandage or *Doshaghna* leaves and tightened over the closed eyes rather than being applied

directly to the eyelids. *Pindi* is also known by the terms '*Kawalika*' and '*Gundana*'.<sup>24</sup> It eliminates symptoms like *Netra Abhishyanda*, *Adhimantha*, *Shotha*, *Netra Kandū*, and others, but it's also useful in the early stages of all eye illnesses. *Avagunthana* was a similar method used by *Acharya Vagbhata*.<sup>25</sup>

### ***Tarpana***

*Tarpana*, is the most revered *Kriyakalpa*, often employed in the treatment of eye disorders. The literary meaning of *Tarpana* is to hydrate or nourish the eye with *Ghrita*, *Ghritamanda*, medicated *Ghritas*, *Vasa*, *Majja* (bone marrow), etc.<sup>26</sup>

**Indications:** According to *Acharya Sushruta*, *Tarpana* is advisable in case of<sup>27</sup>

- When a patient notices darkness or blackouts in front of their eyes,
- When your eyes are really dry,
- Eyes that are very harsh,
- Eyelids that are stiff,
- Falling of eye lashes / Madarosis,
- Dirty eyes/Altered or lost lustre of the ocular surface,
- Squint/deviated eyeball,
- In cases of severe provocation of eye diseases,
- Eye injury or traumatic condition, and,
- Diseases with *Vata-Pitta* predominance.

In addition, *Acharya Vagbhata* has included a list of disorders in the *Akshi Tarpana* indications.<sup>28</sup>

- *Kricchronmeelana* (difficulty in opening eyes),
- *Siraharsha* (congestion of conjunctival blood vessels),
- *Sirotapata* (episcleritis),
- *Arjuna* (sub-conjunctival haemorrhages),
- *Shukra* (corneal opacity),
- *Timira*,
- *Abhishyanda* (Conjunctivitis),

- *Adhimantha* (Glaucoma),
- *Anyatovata* (referred pain in the eye or sphenoidal sinusitis),
- *Vataparyaya*,
- *Vata-Pittaja* diseases of eyes,
- Injured eyes due to *Abhighata* (trauma).

**Contra-indications:** *Acharya Sushruta* prohibited *Tarpana* in the following situations:<sup>29</sup>

- *Durdina* (On an overcast day),
- *Ati-Ushna-Sheete* (During particularly hot or cold seasons),
- *Chinta* (When you're worried or anxious),
- *Aayasa* (In the case of weariness and giddiness of the eyes),
- *Ashanta upadrava* (In the case of complications from eye diseases)

#### **Procedure:**

**Purvakarma:** Purification of body and head (*Sanshudha Deha Shiraso*): It is recommended in *Sushruta Samhita*; *Tarpana* should be conducted after the previously ingested meals have totally digested. This also means that the treatment should be performed before meals and after the preceding meal has been thoroughly digested.<sup>30</sup> It has been described as follows by commentators: Before *Pradhana Karma*, *Acharya Dalhana* recommends performing *Siramokshna*, *Virechana*, *Niruha Basti*, and *Shirovirechana*. According to *Arundatta*: Before the surgery, perform *Vamana*, *Virechana*, and *Nasya*. According to *Hemadri*: perform *Nasya* and other rituals prior to the procedure.<sup>31</sup>

**Pradhana karma:** The patient should be placed in a supine position in a room away from direct sunlight, wind, and dust, and mild fomentation with lukewarm water soaked in cotton should be administered. The eyes are then enclosed with a sturdy, leak-proof wall formed of powdered *Masha* pulse paste (black gram). The patient is requested to close his or her eyes, and then liquefied *Ghrta* is slowly poured over the eyelids until all of the eyelashes are covered. The patient is told to blink his or her eyes (*Unmesha & Nimesha*). The *Ghrta* is drained out through a hole near the outer can thus after a set amount of time has passed, and the eye is irrigated with lukewarm water fomentation.<sup>32</sup>

**Paschata karma:** After the main treatment of *Akshi-tarpana*, the patient is administered *Dhoompana*, which is medicated smoke (*Dhoompana* is recommended by all *Acharyas* to soothe the vitiated *Kapha Dosha*), as well as advice to avoid direct exposure to direct wind, high heat and lustrous and shiny objects.<sup>33, 34</sup>

**Snehadharana kala:** The time period for retention of *Ghrita* is decided considering site (*Adhithana*) of the disease and severity of the *dosha-prakopa*.

**Table 19.2: Snehadharana kala according to dosha-prakopa<sup>35</sup>**

	<i>Vata dosha</i>	<i>Pitta dosha</i>	<i>Kapha dosha</i>	<i>Healthy eye</i>
<i>Sushruta</i>	1000	800	600	500
<i>Ashtanga Hridaya</i>	1000	600	500	500
<i>Sharangdhara</i>	1000	-	500	500
<i>Bhavaprakash</i>	1000	600	500	500

**Table 19.3: Snehadharana kala according to site (*Adhithana*) of the disease<sup>36</sup>**

<i>Adhithana</i>	<i>Sushruta</i>	<i>Ashtanga Hridaya</i>	<i>Sharangdhara</i>	<i>Bhavaprakash</i>
<i>Vartmagata</i>	100	100	100	100
<i>Sandhigata</i>	300	300	500	500
<i>Shuklagata</i>	500	500	600	-
<i>Krishnagata</i>	700	700	700	700
<i>Drishtigata</i>	800/1000	800	800	800
<i>Sarvagata</i>	1000	1000	1000	1000

**Tarpana Avadhi:** Without elaborating on the state of the eyes, *Acharya Sushruta* recommends that the treatment be performed for one day, three days, or five days, or until the *Samyaka Tarpita Lakshanas* arise. According to *Acharya Jejjata* in *Vataja*, *Pittaja*, and *Kaphaja* predominant diseases, *Tarpana* can be performed for 1 day, 3 days, or 5 days respectively. According to *Acharya Videha*, *Tarpana* can be performed daily (*Niranthara*), every other day, or with two or three days off depending on the severity of the sickness, as well as in *Swasthya* (healthy eye). According to *Acharya Vagbhatta* *Tarpana* should be done every day in *Vata* vitiation, on alternate days in *Pitta* vitiation, with a two-day gap in *Kapha* and *Swastha* (healthy individual), or until the eyes are entirely satiated.<sup>37</sup>

**Samyaka Tarpita Lakshana:**<sup>38,39</sup>

- *Sukhaswapana* - A good night's sleep
- *Avabodhatva* - Blissful Awakening

- *Vaishadhya* - clear eyes
- *Varnapatava* - Individual colour recognition
- *Nivriti* - comfort
- *Vyadhidhvansa* - Disease-curing
- *Kriyalaghvama* - Ease in closing and opening the eyes
- *Prakashkshamta* - Susceptibility to bright light

***Ati-Tarpita Lakshanas:*<sup>40,41</sup>**

- *Netragaurava* - Heaviness in the eyes
- *Avilta* - Irregular eyesight
- *Atisnigdha* - Excessive oiliness
- *Ashrusrava* - Lacrimation
- *Kandu* - Itching
- *Upadeha* - Stickiness
- *Dosha-samutklishta* - Dosha aggravation

***Heena-Tarpita Lakshanas:*<sup>42</sup>**

- *Netrarukshata* - Eye Dryness
- *Avilta* - Irregular eyesight
- *Ashrusrava* - Lacrimation
- *Asahyaroopdarshan* - Vision difficulty
- *Vyadhivridhi* - Disease aggravation

**Treatment of Insufficient and Excessive *Tarpana*:** *Dhoompana, Nasya, Anjana, Seka, Ruksha*, or *Snighdha* treatments are required to treat both insufficient and Excessive *Tarpana* disorders, depending on Dosha predominance. *Snighdha Seka* is recommended for *Vata* predominance problems, *Ruksha* for *Kapha* predominance disorders, and *Sheeta Seka* for *Pitta* predominance disorders.<sup>43, 44</sup>

**Mode of action of *Tarpana*:** In *Jangama Sneha*, *Ghrita* is supreme and is *Balavardhaka* (increases bodily strength), *Ojovardhaka* (immunity buster), *Vayasthapana* (rejuvenation), *Agni Deepana* (increases digestive power), and *Dhatuposhaka* (nourishes body tissues). It acquires the qualities of ingredients through its *Sanskaranuvartana* property without losing its own. In

*Sutrasthana Snehadhyaya*, Acharya Charaka taught that “*sneho anilam hanti*” signifies that *Snehana* is the ultimate therapy for *Vata Dosha*. In the *Sutra sthana* 13<sup>th</sup> chapter, he identified *Akshi-Tarpana* as one of the 24 *Sneha pravicharana*. *Ghrita*, according to *Charaka*, is useful in alleviating *Pittaja* and *Vataja* problems, as well as enhancing *Dhatus* and general *Ojas*. The mechanism of action of *Kriyakalpa* can be deduced from the following current pharmacology fundamentals.

4. **Drug administration routes include:** Mucosal and cutaneous routes are often used in *Kriyakalpa*. Mucus membranes are thought to have excellent absorbing surfaces.
5. **Drug absorption:** Drugs that are water or lipid soluble should be absorbed through the mucus membrane and skin. The medicine is provided as minute particles suspended in an aqueous media by a dispersing agent in suspension (medicated ghee or oil). Particles do not exit the eye as quickly as solutions; therefore, *Tarpana Karma* requires more tissue contact time. The main absorbent surfaces in ocular therapy are the conjunctiva and cornea. Because the corneal epithelium and endothelium are lipophilic, fat-soluble medicines can easily pass through. Because the stroma is hydrophilic, water-soluble medicines can easily pass through it. To permeate all layers of the cornea, a medication should be amphiphilic, meaning it has both lipophilic and hydrophilic properties. The duration of drug interaction has an impact on medication absorption and penetration. As a result, *Acharyas* has stated various time periods in relation to specific diseases.
6. **Absorbing surface vascularity:** Local massage or local heat improves drug absorption, and *Tarpana Karma* increases vascularity.
7. **Drug absorption time:** *Tarpana* compounds high in fat soluble ingredients are held for longer periods of time because fat soluble ingredients reach the blood more slowly than water soluble ingredients. Only non-ionised medications can pass through the lipid layer, but ionised drugs can pass through the water-soluble stroma. As a result, a medication can permeate the cornea in both ionised and non-ionised forms. Ghee or oil formulations are utilised in *Tarpana*. The active ingredients of lipid soluble medicines can get through the corneal epithelium's lipophilic barrier and reach the target site. The absorption rate will be higher due to the extended tissue contact time. As a result, the therapy is more appropriate in chronic conditions where *Vata-Pitta* is the dominant *Dosha*.

### ***Putapaka***

*Putapaka* is a method of administering medications in which the various ingredients are wrapped in leaves and covered with clay before being roasted in the fire. *Putapaka* when used properly, relieves burning sensations, inflammation, discomfort, friction, discharges, itchy sensations, stickiness, dirty secretions, and blood vessel congestion.<sup>45</sup>

**Indications:** *Putapaka* is indicated when *tarpana* is indicated, but it is contraindicated when *nasya* is contraindicated, as well as in people who have been deemed unfit for *tarpana* and



cannot resist internal oleation. *Putapaka* is prescribed when the patient perceives darkness. In the front, the eye lacks lacrimation, is dry, has very hard lids with dropping eyelashes, seems unclean, squinting, and appears to be very ill; such an eye receives energy from lubrication. *Snehana* (Oleating) *putapaka* is used to treat excessively dry eyes, *lekhana* (scrapping) *putapaka* is used to treat overly oleated eyes, and *ropana* (healing) *putapaka* is used to treat ulcers caused by *pitta* and *rakta*, as well as vitiated *vata*.<sup>46</sup>

**Contra-indications:** *Putapaka* is contraindicated on bad days (cloudy weather), on days that are too hot or too cold, as well as in situations of worry, exhaustion, giddiness, and in the eye that has not recovered from difficulties.<sup>47</sup>

***Putapaka* types include:** According to *Sushruta*, there are three forms of *putapaka*:<sup>48</sup>

1. *Snehana* (Oleating) *putapaka*
2. *Lekhana* (scrapping) *putapaka*
3. *Ropana* (healing) *putapaka*

*Acharya Vagbhata* considers *Prasadana* (Soothing) *putapakatypes* in place of *Ropana**putapaka*.<sup>49</sup>

**Composition of *Putapaka*:**<sup>50</sup>

1. ***Snehana* (oleating) *putapaka*:** It is made up of vegetable and animal fats, flesh, bone marrow, lard, *medas*, and *madhura* group medications.
2. ***Lekhana* (scrapping) *putapaka*:** The scrapping *putapaka* is made from the liver and flesh of wild animals, along with *lekhana* group medications, rock salt, *samudraphena*, *kasisa*, *srotonjana*, and a watery piece of yoghurt.
3. ***Ropana* (healing) *putapaka*:** The healing *putapaka* is made by combining human milk (cow's milk), wild animal flesh, honey, *ghrita*, and bitter-tasting medications (*tikta rasa*).
4. ***Prasadana* (soothing) *putapaka*:** Soothing *putapaka* is made up of animal and bird liver, *vasa*, *majja*, intestine, heart, and meat, as well as *Madhura* medications made from *ghrita* and human milk (cow's milk).

***Putapaka* retention time:**<sup>51</sup>

- *Snehanaputapaka* should be kept in the eyes for at least 200 syllables.
- *Lekhanaputapaka* should be retained in eyes for counting up to 100 syllables.
- *Ropana**putapaka* should be retained in the eyes for counting up to 300 syllables.

***Putapaka* periods:** The *putapaka* should be used for one day, two days, or three days (as needed), and the aftercare time is believed to be double that of the main treatment.<sup>52</sup>

### **Procedures to be done prior to and after *putapaka* therapy:**

Before and after the therapy, fomentation with hot water-soaked cloth is beneficial. In cases where *kapha* is notably vitiated, fumigation is also effective towards the end.

**Preparation method:** Two *pala* measures of cleansed and minced meat, one *pala* measure of medications (based on *Putapakakind*), and one *kudava* of fluids should all be pasted together and shaped into a ball. This should be wrapped with *Gambhari*, water-lilies, *Eranda*, *Kamalini*, banana, and *Vat patra* leaves and then coated with clay layers before being carefully cooked on pieces of burning charcoal from *Khadira*, *Vasa*, *Badara*, or milk extruding plants, or else on burning cow dung exclusively. When the ball is fully cooked, it should be removed and the juice extracted using compression.<sup>53</sup>

### **Procedure<sup>54</sup>**

***Purva karma:*** After the patient's food has been digested and his head and entire body have been appropriately treated with purification methods, the *putapaka* therapy should be performed in the forenoon or afternoon on an auspicious day.

***Pradhana karma:*** The patient should be placed in a supine position in a room free of dust, wind, and direct sunlight. Two compact rings of powdered and pasted *masha* should be made, one around each orbital fossa, and filled with *putapaka* extract melted in lukewarm water up to eye lashes. The circles should be 2 *Angula* in diameter.

### **Retention time:**

- *Snehana* (Oleating) *putapaka* - 200 *Matrakaal*
- *Lekhana* (scrapping) *putapaka* - 100 *Matrakaal*
- *Ropana* (healing) *putapaka* - 300 *Matrakaal*

**Precautions:** The treatment should come from the inner canthus. It should be used after it has cooled down if you have *pitta* or *rakta* problems. The fluid in the outer canthus should be removed.

***Putapaka* therapy aftercare:** A person who has received *putapaka* therapy should avoid bright lights, wind, sky, mirrors, and luminous bodies.<sup>55</sup>

**Proper *putapaka* features:** Pleasant (normal) colour, clarity, ability to withstand wind and sunlight, lightness, restful sleep, and happy waking up are all characteristics of an eye that has received *putapaka* therapy. When used properly, *putapaka* relieves burning sensations, inflammation, discomfort, friction, discharges, itchy sensations, stickiness, dirty secretions, and blood vessel congestion.

**Excessive and insufficient *putapaka* features:** Excessive *putapaka* therapy causes pain, irritation, vesicles, and eventually refraction defects (*Timira*). Insufficient *putapaka* therapy, on the other hand, causes suppression, lacrimation, horripilation, and aggravation of doshas.<sup>56</sup>

**Complications and their treatment:** When used too hot and strong, *putapaka* causes a constant burning sensation and induces suppuration; when used too oily and cold, it causes lacrimation to stop, pain, and friction; when used in excess quantity, it causes redness, contraction, and twitching; when used in insufficient quantity, it causes accentuation and aggravation of doshas.<sup>57</sup> Collyrium, eye drops, and fomentation should be used to alleviate difficulties that may emerge as a result of inappropriate usage of *putapaka* treatment, depending on the dosha involved.<sup>58</sup>

### ***Anjana***

*Anjana* is the name given to the procedure of applying medicine to the eyelid edges. *Anjana* literally means "medication applied to the inner surface of the eyelid edge." *Anjana Karma* is a method of applying certain medicines to the marginal conjunctiva in a methodical manner, from *Kaneenaka Sandhi* to *Apanga* and vice versa.

### **Classification**

The following is a summary of the different *Acharaya*'s descriptions of *Anjana*:

- **On the basis of their therapeutic value:** According to *Sushruta*, there are three types of *Anjana*:<sup>59</sup>
  1. *Lekhana Anjana*,
  2. *Ropana Anjana*, and,
  3. *Drishti Prasadana*

According to *Vridhdha Vagbhata*, *Snehana Anjana* is the fourth category.<sup>60</sup> This *Snehana* kind is included in the *Drishti Prasadana* variation, according to *Sushruta*.

- **Based on the *Karma* (potency of drug):** Two varieties of *Anjana* have been described by *Vagbhata Acharya*.
  1. *Tikshna*,
  2. *Mrudhu*

*Tikshana* includes *Lekhana*, while *Mrudhu* includes *Snehana*, *Ropana*, and *Prasadana*.

- **Based on the form for use:** As per the form of *Anjana* it has been described as:<sup>61</sup>
  1. *Gutika (Pindi)*,
  2. *Rasakriya*, and,

### 3. Choorna

Their strength increases in ascending order, with *gutikanjana* being the strongest.

According to *Acharya Dalhana*, *Gutikanjana*, *Rasakriyanjana*, and *Choornanjanana* should be used in the severe, intermediate, and mild stages of the disease, respectively. All of these varieties of *Anjana* are further divided into three categories, which are described below.

***Lekhananjanana*:** Except for *Madhura*, every *Rasa* should be produced. It contains *Kshara*, *Tikshana*, and *Amla Rasa Dravya*, according to *Sharangdhara*. They should be chosen based on the quantity of vitiated *Doshas*, i.e.,

- *Vataja roga* - *Amla and Lavana Rasadravya*
- *Pittaja roga* - *Tikta and Kashaya rasa dravya*
- *Kaphaja roga* - *Katu, Tikta and Kashaya rasa dravya*
- *Raktaja roga* - *Tikta, Kashaya rasa dravya* should be selected

If there are two or three vitiated *Doshas*, two or more types of *rasa dravya* can be chosen in combination. Through the mouth, nose, and eye, *Lekhana Anjana* scrapes and expels the *Doshas* from the *Netra*, *Vartma*, *Sira*, *NetraKosha*, and *Ashruvaha Srotas*.

***Ropana Anjana*:** *Kashaya*, *Tikta Rasa Dravyas*, and *Sneha* are used to make *Ropana Anjana* (ghee etc.)

***Dristhiprasadana Anjana*:** *Madhura Rasa Dravyas* and *Sneha Dravyas* should be used to make it. It's utilised for *Dristhi Prasadana* (vision enhancement) and to smooth out *Dristhi* roughness (*Dristhi Snehartha*).

**Right time for *Anjana Karma*:**<sup>62</sup>

**According to *Doshadikya*:**

- *Kaphaja Roga* - *Poorvahna* (Morning)
- *Raktaja and Pittaja Roga* - *Madyahna* (Noon)
- *Vataja Roga* - *Aparahna* (evening)

**According to type of *Anjana*:**

- *Snehana* - *Aparahna*
- *Ropana* - *Poorvahna*
- *Lekhana* - *Madyahna*

### According to *Ritu*

*Acharya Sharangdhara* has described the time for applying *Anjana* based on the season as follows:

- *Hemanta ritu* - *Madhyama*
- *Sharada & Grishma ritu* - *Apranha&Purvanha*
- *Varsha ritu* - When there are no clouds i.e., In Sunlight
- *Basanta ritu* - At any time

**Table 19.4: Dose of various kinds of *Anjana*:<sup>63</sup>**

S.No.	Type of <i>Anjana</i>	<i>Lekhana</i>	<i>Ropana</i>	<i>Prasadana</i>
1.	<i>Gutika</i>	1 <i>Harenu</i>	1 ½ <i>Harenu</i>	2 <i>Harenu</i>
2.	<i>Rasakriya</i>	1 <i>Harenu</i>	1 ½ <i>Harenu</i>	2 <i>Harenu</i>
3.	<i>Choorna</i>	2 <i>Shalaka</i>	3 <i>Shalaka</i>	4 <i>Shalaka</i>

**Contra-indications:** The application of *Anjana* is contra-indicated people suffering from *Udavartha*, *Bhaya*, *Shoka*, *Jwara*, *Vegaghatha*, *Shiroroga*, fatigue, and, insomnia. It is also contra-indicated on a windy and cloudy day. In these cases, if *Anjana* is performed then may cause redness, irritation, visual problems, discharge, pain, and, congestion.<sup>64</sup>

### Requirements in *Anjana Karma*:

- *Anjana Patra*
- *Anjana Shalaka*
- *Anjana Aushadha*

***Anjana Patra*:** It is a container for storing *Anjana* and *Anjana Shalaka* in preparation for use. According to *Dalhana*, the jars used to retain the *Anjana* must have attributes identical to those used afterwards.<sup>65</sup>

- *Madhura rasa* - *Swarna patra*
- *Amla rasa* - *Roupya patra*
- *Lavana rasa* - *Meshashringa patra*
- *Katu rasa* - *Vaidurya patra*
- *Tikta rasa* - *Kamsya patra*

- *Kashaya rasa* - *Tamra or Lauha patra*

**Anjana Shalaka:** Also known as collyrium probe, is a metallic cylindrical rod having 8 *Angula* in length and a diameter of *Kalaya pramana*. It should be simple to handle and not rough, thin, hard, or breakable, with both ends slightly swollen and bluntly pointed like a flower bud. It should be according to the kind of *Anjana* used as:<sup>66</sup>

- *Madhura rasa anjana* - *Swarna shalaka*
- *Lekhana Anjana* - *Tamra or Lauha or Patra shalaka*
- *Ropana Anjana* - *Lauha shalaka or Anguli*
- *Prasadana Anjana* - *Swarna or Roupya shalaka*

*Anguli shalaka* should be used in painful condition of the eyes.

**Procedure:** We must think about a few things before choosing the *Anjana Karma*. The *Doshas* that have become vitiated must be in *Pakwavastha*.<sup>67</sup> This can be determined by observing the following symptoms:

- Mild oedema and flushing
- Itching and a sticky sensation in the eyes
- Having a heavy discharge from the eyes
- This is particularly true in *Kaphaja Netra Rogas*.

Patients must practise *Virechna*, *Nasya*, *Vasti*, *Siravyadha*, or other forms of *Samshodhana*, as well as *Aschyotana*. After that the *Anjana karma* is performed in the following manner:

**Purva karma:** The pre-requisites for *Anjana Karma* are:

- *Anjana* should be administered in the morning and evening,
- The procedure should be described to the patient to reduce their concern.
- The patient should lie down in a comfortable bed in a supine position.

**Pradhana karma:**<sup>68</sup>

- The patient's eye lids are gently moved apart using the thumb and index fingers of the left hand.
- The medicine is given with the right hand across the Palpebral conjunctiva, commencing from the inner canthus to the outer canthus and vice versa, at the tip of the *Anjana Shalaka*.
- This procedure should be repeated two or three times more. As a result, the medication has a good hold on the eyelids.

- Collyrium should not be applied excessively at both ends or with unpleasant manipulation by the physician.

***Pashchata karma:***<sup>69</sup>

- For proper spread of *Anjana*, the patient is advised to close his eyes and roll his eyeball in all directions after the application.
- It is not permissible for him to open or wipe his eyes.
- The eyes are cleaned with adequate *Kashayas* or lukewarm water after 5 to 10 minutes.
- Following irrigation, the lids are carefully separated and screened for drug precipitants.
- If any are present, carefully remove them with dry cotton wool. Otherwise, any particles that remain will cause irritation.

***Samyaka yoga lakshana:*** If *Lekhana Anjana* is properly applied, the eyes will be free of contaminants, *Laghu* (light), discharge-free, able to perform their functions properly, pure, and without difficulties.<sup>70</sup>

***Ati-yoga lakshana:*** Excessive use of *Lekhana Anjana* causes distorted vision, hardness of touch, discoloration, a lot of dryness, and a lot of fluid flow from the eyes.<sup>71</sup>

**Measures to be taken in *Atiyoga*:** *Santarpana Chikitsa*, *Aschyotana*, and *Madhura Anjana* are indicated in this instance.<sup>72</sup>

***Heenyoga lakshana:*** If *Lekhana Anjana* is used in insufficient amounts, the *Doshas* will not be purified and disease will not be properly alleviated.<sup>73</sup>

**Measures to be taken in *Ayoga*:** It should be used once more.<sup>74</sup>

***RAKTAMOKSHANA***

In *Shalya Tantra*, *Raktamokshana* is an important therapeutic practice.<sup>75</sup> If done at regular intervals; it prevents skin illnesses, swollen glands, overall oedema, and blood disorders. Eye problems benefit from *Siravedha* and *Jalaukavacharana*.

**Indications:** *Raktamokshana* is used to treat inflammations, hard, painful irregular ulcers, and poisonous ulcers. It is used to treat the following eye diseases:

- *Puyalasa*,
- Complicated *Arma*,
- *Abhishyanda*,
- *Savrana Shukla*,
- *Pittaja* and *Kaphaja Timira*,

- *Pilla roga* etc

**Contraindications:** *Raktamokshana* is contra-indicated in following conditions:

- Extremely young, elderly, malnourished, and fear.
- If you have a high fever, seizures, or are unconscious.
- Wasting as a result of a malnourishment.
- When there is oedema all over the body.
- Anaemia, piles, a bloated tummy, and pregnancy.

**Time for *Raktamokshana*:** In the rainy season, on a cloudless day; in the summer, on a cool day; and in the winter, at noon.

**Site for *Raktamokshana*:** The vein to be opened is usually one close to the illness site. But, in eye disorders, the frontal area, the outer-canthus, or the inner-canthus are the ideal sites for *Siravedha*. To open the veins in the head and neck, the patient places his fists on the area, and an aide wraps a bandage around the neck and fists, pulling it tight to make the vein stick out.<sup>76</sup>

### ***Jalaukavacharana* (Leech Therapy)**

*Jalaukavacharana* (Leech therapy) is a natural, minimally intrusive approach for the treatment of the eye disorders. It is a method of removing vitiated *Dosha* from the body. For all types of inflammatory diseases of the eye, such as conjunctivitis, scleritis, keratitis, and glaucoma, the treatment is a safe, cost-effective, and almost painless procedure.

### **Materials required for *Jalaukavacharana*:**

1. *Jalauka* (*Nirvisha*),
2. Kidney tray
3. Turmeric
4. *Saindhava*
5. Cotton
6. *Rakta-stambhaka* drugs
7. Bandage
8. Micropore
9. Gloves
10. Fresh water



**Procedure:** Firstly, *Nirvisha Jalauka* must be identified and obtained from a clean pond and preserved in a large, new pot with clear, pure water.

***Purvakarma:***

**Preparation of patient:** For a better impact, *Jalauka* should be applied after 7 days of *Snehana* and *Swedana*. The affected part should be devoid of any ointment or other substance on the day of *Jalaukavacharana*. *Rogi* (patients) receiving *Jalaukavacharana* treatment should be positioned in a comfortable position, preferably supine, and the affected area should be washed.

**Preparation of *Jalauka*:** The leeches are removed from their pots and sprayed with a mixture of water, mustard seed powder, and powdered turmeric. Then they should be placed in a pot or tank filled with Curcumin water (water containing *Haridra* powder) for a short period of time till they restore their natural cheerfulness and freshness (*Vigata Klama*) and are free of natural cravings (*Muktapurisha*). This *Jalauka* should then be applied to the afflicted area.

***Pradhana karma:***

After preparing the chosen area, the *Jalauka* must be applied over it. When it forms its jaws into the shape of a horse's foot and raises its neck, it is clear that it has bit at the appropriate location. The body must next be covered with a little piece of wet cotton. If it does not suck blood, a drop of milk or blood should be applied to the affected area, or a little prick should be done. If it still won't suck, a different one should be used.

***Paschata karma:***

**Leech Removal:** Powdered *Saindhava* (rock salt) should be sprinkled at the mouth of the leech if it does not fall off after achieving the intended effect or if we discover them sticking to the affected part due to their affinity for the smell of blood or due to their covetous character (*Laulya*) or eagerness.

**Vomiting of Leech:** The leeches should be coated with rice powder once they have fallen off, and their mouths should be greased with a mixture of oil and common salt. Then they should be held from the tail end with the thumb and forefinger of the left hand, and their back line tenderly massaged from the tail upward to the mouth with the same finger of the right hand, in order to make them vomit or eject the full quantity of blood that they had sucked from the seat of disease. The procedure should be repeated until they show the full extent of the disgorging symptom. If placed in water, leeches that had vomited the whole amount of blood sucked as above would swiftly move in search of food, whereas the opposite should be inferred from their lying dull and motionless. They should be forced to vomit once again. Leeches that do not release the complete amount of sucked blood are at risk of contracting '*Indramada*,' an incurable disease unique to their genus.

**Dressing of the patient:** After the leeches have been removed, the affected area should be cleansed with cotton. According to the amount of blood taken from the part, an ulcer wound

caused by the application of leech should be rubbed with honey, cleaned with cold water, or bound up with an astringent (*Kashaya*), sweet, and cooling plaster. In the event of complete and proper bleeding (*SamyakaYoga*), the wound should be treated with *Shatadhauta Ghrita* or a compress made of cotton soaked in the same substance given to the part.

**Mode of action:** Antiplatelet aggregation factor, anti-inflammatory, anaesthetic, and antibiotic compounds are all found in the saliva of leeches. Swelling is reduced as a result of the Leeches sucking up excess blood, and fresh oxygenated blood is delivered to the damaged area, restoring natural circulation. It aids in the repair of the body part and boosts the body's immunity. Bioactive chemicals included in leech saliva aid in the absorption of important nutrients by the cells and helps in removing toxins.

### **KSHARA KARMA**

*Kshara karma* is one of the most essential para-surgical techniques since it has the advantage of excising and scraping.<sup>77</sup>

**Indications:** In ophthalmic disorders, it is indicated to be effective in *Vartmagataroga* (eyelid disorders) such as *Lagana*, *Arsho vartma*, *Shushka Arsha*, *Vartmarbuda*, *Pakshmakopa*, *Upapakshmamala*, and others.<sup>78</sup>

**Mode of action:** The *Shodhana*, *Ropana*, *Shoshana*, and *Lekhana* characteristics of *Kshara* help in treatment of the eye disorders. It aids in the removal or evacuation of toxic substances from wounds near the eyes. The *Shodhana* property of *Kshara* aids in the evacuation of sloughs and pus. The antiseptic activity of *Kshara*, which is attributable to its *Ropana* virtue, aids wound healing. *Shoshana* aids in the drying and absorption of mucus discharge that gathers in the ulcer bed, promoting granulation. *Vilyana* induces liquification and breakdown of localised sick tissue, whilst *Kshara's Sthambhana* property aids in the constriction of opposing ulcer edges to aid healing. As a result, the healing is accelerated due to all the properties of *Kshara*.<sup>79</sup>

### **AGNI KARMA**

When *Bhesaja*, *Sastra*, and *Kshara karma* are unable to cure a disease, *Agnikarma* plays a critical role in its treatment. *Agnikarma* is one of the strategies for controlling haemorrhage when other treatments have failed, and it also plays a key role in sterilising. According to *Dalhana*, the *Agnitaptashastra*, prevents sepsis during surgical procedures. *Agnikarma* can also be used to avoid recurrence following a *Sastra karma*. *Vata-kaphaja* diseases are best treated by this because *vata* and *kapha* have *sheeta guna*. To neutralise the *vata* and *kaphadosha*, the opposing *guna* treatment is *ushna chikitsa*. The *ushna guna*, and *agni* has *anyonyasritabhava*, thus *Agnikarma*, by virtue of its *ushna*, *tikshna*, *laghu* and *Sukshma guna* breaks the *srotorodha* caused by the vitiated *Vata* and *Kapha dosha*. Thus, *Nirama kapha* and *vata dosha* are eliminated.<sup>80</sup>

It is an ambulatory treatment option that is accessible to the general public. It is concerned with how thermal energy interacts with the human body. It is a highly effective and minimally invasive para-surgical method that has a wide range of applications in the treatment of pain, repeated occurrences, and undesired growth problems.

## DISCUSSION

*Netra Kriyakalpa* are a treasure to Ayurvedic ophthalmology and the foundation of Ayurvedic ocular treatment. The many ocular treatments performed in *Kriyakalpa* each have their own mechanism of action that aids in the treatment of eye disorders. The goal of *Kriyakalpa* operations appears to be tissue-oriented, with therapeutic drug values obtained by drug concentration, tissue contact time, drug molecular structure, permeation, and drug bioavailability. In *Kriyakalpa*, several medications can be chosen for processes based on vitiated dosha and disease subtypes. Medication practises are adjusted to enable maximum drug absorption. Compared to oral delivery, *netra kriyakalpas* offers various advantages.

1. Under the influence of *pachaka pitta*, the medications administered orally will be digested. The pharmaceuticals given by *kriyakalpa* are not absorbed by it; hence they may help to correct accumulated dosha.
2. The three principal anatomical barriers in the eye, the blood-aqueous barrier, blood-vitreous barrier, and blood-retinal barrier, make it difficult for oral medications to reach the target tissues of the eye. Topical medicines can penetrate and reach the target tissue, resulting in increased bioavailability and the intended effect.
3. The corneal layers have a unique pharmacokinetic absorption process. The epithelium of the cornea is lipophilic, while the stroma is hydrophilic and the endothelium is lipophilic. As a result, when considering medication absorption across the cornea, one must consider the tri laminar domain of various anatomical layers, i.e. lipid – water –lipid. For all *netrakriyakalpas*, *mrudupaka* or *madhyamapaka ghrita* preparations are employed.
4. In *kriyakalpa*, the drug contact time with the tissue can be managed, and the medications are chosen based on the stage and severity of the disease.
5. The drugs can be carefully chosen, for example, to boost *ushna* or *sheeta*, *snigdha* or *ruksha* in the surrounding area. By applying the drugs, a high concentration of the substance can be achieved.
6. Internal medicine's activity is slow and time-consuming, whereas *kriyakal* have quick action.

Thus, by applying the drugs to the eyes, a high concentration of the medicament can be achieved. External segmental eye illnesses (*vartmagata*, *sandhigata*, *shuklagata*, *Krishna mandalagata* diseases) and as a *purva upakrama* of *anjana tarpana* and *Putapaka* are treated using *Seka*, *Aschotana*, *Pindi*, and *Bidalaka* procedures. Internal segmental diseases (*sarvagata* and *drustimandala*) of the eye are treated with *anjana*, *putapaka*, and *tarpana*.

*Acharya Sushruta* has referred to the indication of *Kshara*, *Agni*, and *Raktamokshana* to treat many eye illnesses, suggests its importance in *Shalakya Tantra*. These methods are easy, secure, effective and with minimal or no complications, un-hazardous and free from complications, desirable with the aid of the patients. There is minimal interference in affected person's daily routine work. The para-surgical procedures which are described by our *Acharyas* are effective, easily achievable and might keep away from the recurrence.

## Conclusion

The definition, indication, contraindication, kinds, duration, dose, and mode of action of *Netra kriyakalpa* have been illuminated in this review. It is also being attempted to connect Ayurvedic ocular therapeutic treatments, such as *Kriyakalpa*, *Raktamokshana*, *Kshara karma*, *Agni karma* etc., with current pharmaco-therapeutics. The primary goal of any pharmaco-therapeutic is to get a proper pharmacological response by maintaining an effective concentration at the site of action for an extended period of time. All *Kriyakalpas* have been found to be therapeutically helpful in daily practise. All of the Ayurvedic *Netra Kriyakalpas* are important in light of the foregoing basics of modern pharmacology. It is simple to analyse and practice the para-surgical techniques in the management of different ophthalmic situations wherein surgery isn't feasible or there may be a notable risk of recurrence. Those procedures offer lot of alternatives for the doctor as it is simple to perform, much less possibilities of recurrence, lesser tissue loss, much less post-operative haemorrhage and minimal pain.

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