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PHARMACEUTICAL STUDY ON *LOHA SAMANYA SHODHANA* AND ITS RATIONALITY

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ABSTRACT

Loha kalpas are the unique compound herbo-mineral formulations where *Loha* (Iron) *bhasma* is used as a prime ingredient. There are ample of references regarding the usage of iron in the treatment of various diseases along with the combination of other herbal drugs. Usage of different mineral/metallic drugs by making them fit for further therapeutic application after proper purification are very well explained in various Rasashastra text books. These books also cover the extended information about the ill effects caused by the usage of improperly purified metallic drugs. Method of processing/process of detoxification of metallic/mineral substances involves various steps like *Samanya shodhana* (General purificatory process), *Vishesha shodhana* (Specific/special purificatory process), *Marana* (Incineration) etc. All these methodologies will help to alleviate the toxicity and furnish the substance with necessary therapeutic potency. Interestingly, nowhere in the classical text books of Rasashastra mentioned about the rationality behind these methodologies used for detoxification. Hence it is a need of the hour to explore more about rationality behind these procedures. So, in this article an attempt is made to know about one such detoxification procedure inculcated in *Loha bhasma* preparation that is about *Samanya shodhana* of *Loha*.

KEYWORDS: *Loha bhasma, Shodhana*, Rationality

INTRODUCTION

Ayurveda the most popular health care system since ancient times touched new dimensions by incorporating the knowledge of Rasaushadies from 8th century A.D onwards, henceforth the metals and minerals are used abundantly in various dosage forms. In due course of time, Rasashastra became an integral part of Ayurveda. But since past few years the Rasa preparations are being targeted repeatedly in the name of heavy metal toxicity. But our Acharyas have mentioned the benefits of metallic preparations long years ago to maintain the health of healthy individual and to treat the diseases which are difficult to treat. Unique detoxification methodologies are followed to make the metallic substances fit for human therapeutic usage. However such purificatory procedures if not followed properly as per the classics or if not done, definitely lead to serious health problems. Even such probable health problems are also mentioned in Rasashastra classics. So it is very much important to carry out the purificatory procedures of metals before using them for medicinal preparations. It is equally important to know the benefits and to understand the rationality behind such procedures. Here an effort is made to compile the information about one such purificatory procedure called *Samanya shodhana* by taking *Loha* (Iron) metal. If once the rationality behind such procedures are known and understood, it may help to re-establish the faith towards Rasa preparations amongst western people and in modern community.

For the purpose of therapeutic utility, the crude iron metal is transformed into minute powder form and is named as *Loha bhasma*. This process of conversion of crude iron metal into absorbable *Bhasma* form involves various stages like *Loha Samanya shodhana* (common purificatory process of *Loha*), *Loha Vishesha shodhana* (specific/special purificatory process of *loha*), *Loha marana* (incineration) etc. Especially *Trividha paka (Bhanu paka, Sthali paka* and *Puta paka)* method is told for *Loha bhasma* preparation in Rasendra Sara Sangraha text. Among all such stages, *Samanaya shodhana* is first and foremost step where it helps to remove the physical

and chemical impurities present in crude *Loha*.

***Shodhana*[1]**

"Shodhana karma vigneyam dravya-dosha nivaranam" - R.T 2/52

Shodhana is a process intended for the removal of the impurities in a substance. It can be achieved by means of *Swedana* (Boiling), *Mardana* (Trituration), *Prakshalana* (Washing), *Nirvapa* (Quenching), *Bhavana* (Levigation), *Bharjana* (Frying), *Galana*, *Avapa* etc methods.

The process of *Shodhana* is selected depending upon the material for which *Shodhana* to be done and the material used for *Shodhana* depends upon its therapeutic importance/usage.

Shodhana of metallic drugs are divided into 2 types; *Samanya shodhana* and *Vishesha shodhana*

I. *Samanya shodhana* - *Shodhana samskara* mentioned commonly for a group of *dravyas* (metallic drugs) is called as *Samanya shodhana*.

II. *Vishesha shodhana* – After *Samanya shodhana* the special purificatory process is told for each drug and is called *Vishesha shodhana*.

Concept of *Nirvapa*[2] (Heating and quenching):

It is the key principle adopted in *Samanya shodhana* of *Loha*. The process in which the substances intended for *Shodhana* is heated to red hot and immediately dipped into the prescribed liquid media is defined as *Nirvapa*.

Table No. 01: Showing *Samanya shodhana* of *Loha* according to different references

References	***Shodhana dravyas***	Procedure	Duration
R.R.S* 5/13 Ra.Chi* 6/3-4 R.S.S* 1/245-246	*Tila taila, Takra, Gomutra, Aranala, Kulatha kwatha*	*Nirvapa* (Heating and dipping)	7 times each
R.S.S* 1/296	*Kadali moola jala*	*Nirvapa*	7 times
Rasa Ratnakara	*Triphala kwatha*	*Nirvapa*	7 times each

*R.R.S – Rasa Ratna Samucchaya, Ra.Chi – Rasendra Chintamani, R.S.S – Rasendra Sara Sangraha

Materials and Method

Selection of raw material – *Loha churna* of mesh size 325 is collected from Industrial Metal Powders (India) Pvt. Ltd., Shirur Tq. Pune District, Maharastra with 99.6% of Fe content in it. Study was carried in the Departmental Laboratory of Rasashastra and Bhaishajya kalpana, Alva's Ayurveda medical college, Vidyagiri, Moodabidre, Karnataka during the period from 27/2/2019 to 30/3/ 2019.

METHOD - *Loha Samanya shodhana* was done according to Rasa Ratna Samucchaya[3]. *Loha churna* was given *Nirvapa* with *Tila taila* (sesame oil), *Takra* (buttermilk), *Gomutra* (cow's urine), *Kanji/Aranala* (sour rice gruel) and *Kulatha kwatha* (horse gram decoction) in successive order for 7 times in each of the liquid media.

MATERIALS

- *Loha churna* (Iron powder) – 770g
- *Tila taila* – 3.5 litres
- *Takra* – 3.5 litres
- *Gomutra* – 3.5 litres
- *Kanji* – 3.5 litres
- *Kulatha kwatha* – 3.5 litres

Instruments – Steel vessels, Gas stove, Iron pan, Stirrer/Spatula etc

Procedure:

1) *Nirvapa* in *Tila taila* (Sesame oil)

770g of *Loha churna* was taken in an iron pan and heated to red hot and immediately it was quenched in *Tila taila* (Sesame oil) taken in a wide mouthed vessel and allowed for self cooling. Quantity of *Tila taila* was taken such that the *Loha churna* should completely immerse in *Taila* (500ml). This procedure was repeated for 7 times, every time fresh *Tila taila* was used.

Precautions to be taken:

- After each *Nirvapa* washing the iron powder in hot water was avoided, as it makes the further heating process difficult because of oily texture.
- Care should be taken in successive heating of *Loha churna* as it catches fire because of *Taila*.

Changes noted;

- On heating colour of *Loha churna* changes from grey to blue colour then to black colour.
- *Loha churna* becomes completely red hot within 20-25min.

- During *Nirvapa, Loha churna* was absorbing *Tila taila* which again separated on heating.
- After first *Nirvapa, Loha churna* becomes like granules.
- While doing *Nirvapa* dense fumes were coming out with boiling sound.

2) *Nirvapa* in *Takra* (Buttermilk)

Takra was prepared according to Bhavaprakasha[4] reference by adopting *Manthana* (churning) principle. Firstly curd was prepared by adding 50 ml curd to 4 litres of milk before 2 days of preparation of *Takra*. Later this curd was added with 1/4th of water i.e., about 1 litre of water and it was churned well to take out the butter part. Obtained *Takra* is used for *Nirvapa*.

After *Tila taila nirvapa*, *Loha churna* was heated to red hot and quenched immediately in *Takra*. This procedure was repeated for 7 times. Each time fresh *Takra* was used and after every *Nirvapa, Loha churna* was washed in hot water.

3) *Nirvapa* in *Gomutra* (Cow's urine)

Takra nirvapita loha was taken in an iron pan and subjected to heat till it attains red hot. It was immediately quenched into *Gomutra*. After cooling *Loha churna* was taken out and washed with hot water. This procedure is repeated for 7 times. Each time fresh *Gomutra* was used.

4) *Nirvapa* in *Kanji/Aranala* (Sour ricegruel)

Kanji is prepared according to Sharangadhara samhita[5]. 1 *Prastha* (768g) *Rakta shali* (red rice) was made into *Yavakuta churna* (coarse powder) and was kept for fermentation along with 1 *Kudava* (3.7 litres) of water in a properly fumigated porcelain jar for 21 days. First 3 days, mouth of the porcelain jar was not sealed and observed for initiation of fermentation. After onset of fermentation, sealing was done and kept for fermentation in dark place.

Gomutra nirvapita loha churna was heated to red hot and immediately dipped in *Kanji*. Same procedure was repeated for 7 times and each time fresh *Kanji* was taken.

5) *Nirvapa* in *Kulatha kwatha* (Horse gram decoction)

Kulatha kwatha was prepared according to general method of preparation of *kwatha* as told by Sharangadhara[6].1 kg of coarsely powdered horse gram was boiled in 16

litres of water and reduced to (1/4 part) 4 litres.

Kanji nirvapita loha churna was heated to red hot and quenched in *Kulatha kwatha*. Same procedure was repeated for 7 times and each time fresh *Kulatha kwatha* was taken.

OBSERVATIONS AND RESULTS

Changes observed in *Loha churna*

No. of *Nirvapa*	Liquid medias used	Weight in grams		Colour	
		BN*	AN*	BN*	AN*
1-7	*Tila taila*	770	815	Grey	Black
8-14	*Takra*	815	811	Black	Black
15-21	*Gomutra*	811	808	Black	Black
22- 28	*Kanji/Aranala*	808	806	Black	Black
29-35	*Kulatha kwatha*	806	804	Black	Black

Changes observed in Liquid media

Liquid medias used	Total quantity of liquid in ml		PH		Colour		Consistency	
	BN*	AN*	BN*	AN*	BN*	AN*	BN*	AN*
Tila taila	*3500*	*580*	6	5	Golden yellow	Black	Sticky	Non-sticky
Takra	*3500*	*2700*	5	6	White	Black	Clear	Cloudy
Gomutra	*3500*	*2400*	8	9	Yellow brown	Dark	Limpid	Turbid
Kanji/Aranala	*3500*	*2700*	6	5	Pale yellow yellow	Dark	Thin	Thick
Kulatha kwatha	*3500*	*1800*	5	5	Dark brown	Blackish brown	Thin	Thick

*__BN__ – Before *Nirvapa* ; __AN__ – After *Nirvapa*

Special observations

- After 1st *Nirvapa* with *Tila taila* it was noticed that the *Loha churna* turns into granule form and gained weight of about 45g. Later gradual decrease in weight was observed.
- Later in successive *Nirvapas* reduction in particle size of *Loha churna* was noticed.
- Peculiar sound and characteristics odour was noticed during each quenching.

DISCUSSION

1) Rationality behind *Tila taila* (Sesame oil) *nirvapa*

Tila taila is having *Ushna veerya* and *Sukshma guna.*

Sesame oil contains Sesamin, Sesamatine and a most potent active component called Sesamol which acts as a chelating agent. Chelating agent

are the chemical compounds that react with metal ions to form a stable, water-soluble complex which in turn helps to convert the heavy metals/mineral into absorbable form in the body.

A study shows that sesamol is effective anti-oxidant and it is anti-photooxidative because it scavenges single oxygen. Sesame oil attenuates lead and iron-induced hepatic toxicity. It exhibits the protective effect by inhibiting pro-inflammatory mediators, free radical generation, oxidative stress and lipid peroxidation thus increasing the anti-oxidant effect. By doing *Shodhana* with sesame oil, the probable toxic effect that would be caused by iron is inhibited/nullified. So, *Nirvapa* with sesame oil will make the drug effective both prophylactically and therapeutically[7].

2) Rationality behind *Takra* (Buttermilk) *nirvapa*

Takra is *Ushna* in nature. Buttermilk contains casein, whey proteins and small amount of fat.

Studies show that buttermilk is having Hydroxyl radical scavenging property and Anti-oxidant activity. It also helps in inhibition of lipid peroxidation. On administration of improperly purified *Loha bhasma* as a medicine, it may acts as a catalysts for production of hydroxyl radical (.OH), thus leading to lipid oxidation which may cause cell damage.

Buttermilk contains certain amount of iron in it. When it is used for *Nirvapa* of iron metal, the iron molecules present in buttermilk and the iron molecules in

Loha churna undergo iron-binding activity leading to saturation of bound ion. Buttermilk is having the capacity to retard lipid oxidation reactions as it is having affinity to sequester Fe_2+ and Fe_3+ ions[8].

3) Rationality behind *Gomutra* (Cow's urine) *nirvapa*

Gomutra is having *Ushna veerya, Teekshna guna* and *Kshara* quality. It is found that Cow's urine contains various inorganic elements like Silver, traces of Gold, Vit A,B,C,D,E, Calcium salts, Sulphur, Phosphate, Na, Fe etc. It also constitutes Ammonia, Uric acid and Hippuric acid. Among them Ammoniated citric acid is known to dissolve Fe_2O_3 and form water soluble Fe^{2+} and Fe^{3+} complexes. Uric acid is also known to form Ureate-Fe^{3+} and Ureate-Fe^{2+} complexes. Thus the presence of Ammonia and Uric acid in Cow's urine results in formation of complexes with iron those are soluble in water. Studies also show that Cow's urine is having Hepato-protective activity and Bio-enhancing property[9].

4) Rationality behind *Kanji/Aranala* (Sour rice gruel) *nirvapa*

Kanji/Aranala is having *Ushna veerya, Teekshna guna* and *Bhedana* property. Sour rice gruel contains high levels of phytic acid, a chelating agent and it is found that it reacts with Fe^{2+} or Fe^{3+} salts giving rise to iron complexes. Thus *Nirvapa* in *Kanji* may help to remove Fe^{3+} through formation of coordination compounds[9].

5) Rationality behind *Kulatha kwatha* (Horse gram decoction) *nirvapa*

Kulatha is having *Ushna veerya* and *Bhedana* property. One of the major constituents of horse gram is gallic acid.Gallic acid (3,4,5-trihydroxybenzoic acid) is one of the naturally occurring polyphenols abundently present in most of the herbal and Ayurvedic preparations. It possesses various pharmacological activities such as Anti-inflammatory, Anti-oxidant, Anti-cancer, Radio-protective, Anti-Hypercholesterolemic, Hepatoprotective and Anti-mutagenic activities. Gallic acid is also used for the treatment of internal Haemorrhage, Albuminuria and diabetes.

A study was done to understand the role of gallic acid present in *Kulatha kwatha* in the preparation of *Loha bhasma*. And the study showed that gallic acid, which has one $–CO_2H$ and 3 phenolic groups, coordinates with iron

through the two phenolic groups giving rise to an octahedral complex with D_3 symmetry. The thermal analysis showed that the complex was stable up to 850^0 C and the complex formed was soluble in water. Thus gallic acid present in *Kulatha* is responsible in removing Fe_3 present in the raw material there by reducing the toxicity of Loha[10].

CONCLUSION

- *Shodhana* of *Loha* is important to counteract against 7 *Svabhavika/Naisargika doshas* of *Loha dhatu* as told by Ayurveda prakasha[11] like *Guruthva* – Heaviness, *Utkleda* – Nauseating tendency, *Glani* – Timidness, *Dahakaritva* – Causing burning sensation, *Asmadosha* – Leading to calculus formation and *Durgandhatva* – Bad odour.
- All the *Drava dravyas* used for *Samanya shodhana* of metals are having *Ushna veerya, Teekshna* and *Sukshma guna* with *Bhedana* quality. Most of them are acidic/alkaline in nature and they acts as a chelating agents. So *Shodhana* of *Loha* by *Nirvapa* method makes metal free from soluble, Volatile, washable and Thermo-stable impurities thus metal become fragile.
- Heating the iron metal to red hot cause linear expansion of the matter by increasing inter-atomic distance and inter-molecular space this in turn leads to weakening of electrostatic force and crystal lattice of metal.
- On immediate quenching the red hot metal in different liquid media will lead to instant cooling. The sudden change in temperature breaks the strong bond between the molecules which reduces the hardness and increases the brittleness of *Loha*. This process helps in particle size reduction.
- Reduced particle size exposes more surface of the drug to an acidic/alkaline/oil media which enhances the potency and Bio-availability of metallic drug. *Samanya shodhana* of *Loha* enables the material suitable for further processing and converts the iron metal into therapeutically more potent one.
- Performing the detoxification procedures with at most care by knowing their benefits and the rationality behind such procedures will increase the confidence of pharmaceutical person for its generous usage without any hesitation.

REFERENCES

1) Sharma Sadananda, Rasa Tarangini, Edited by Shastri Kashinath, Delhi; Motilal Banarasidas publication, Edition – 1979, Chapter - 2, Sholka No.52, Pg No.22
2) Vagbhata *virachita* Rasa Ratna Samucchaya, Hindi commentary by Mishra Siddhinanda, Varanasi; Chaukhambha Orientalia; First edition – 2011, Chapter – 8, Shloka No.53, Pg No.217
3) Ibid, Pg No.143
4) Bhavamishra, Bhavaprakasha, Commentary by Sitaram Bulusu, Varanasi; Chaukhambha Orientalia publication; Volume 1, Edition reprint – 2012, Chapter – 6, Shloka No.1, Pg No.533
5) Sharandhara, Sharangadhara Samhita, Jiwanprada Hindi Commentary by Srivastava Shailaja, Chaukhambha Orientalia; Varanasi; Reprint edition – 2011, Chapter – 10, Shloka No.12, Pg No.246
6) Ibid Pg No.135
7) Victorrajmohan Chandrasekaran and Dur-Zong Hsu, Beneficial Effect of Sesame Oil on Heavy Metal Toxicity, Journal of Parenteral and Enteral Nutrition – June 2013, / Dated on 05/03/2019
8) P.Y.Y. Wong and D.D. Kitts, Chemistry of Buttermilk Solid Antioxidant Activity, Journal of Dairy Science, American Dairy Science Association – 2003, Vol. 86, No.5/ Dated on 06/03/2019
9) Shoghganga.inflib.ac.in, Chapter 3 – Preparation of *Lauha Bhasma* and stage-wise physico-chemical characterization, Pg No.59-60 / Dated on 06/03/2019
10) Narendran Rajendran, Brindha Pemiah et al, Role of Gallic acid in the preparation of an Iron-based Indian traditional medicine – Lauha Bhasma, International Journal of Pharmacy and Pharmaceutical Sciences– 2012, Vol 4, Suppl 2 / Dated on 06/03/2019
11) Sri Madhava, Ayurveda Prakasha, Hindi Commentary by Mishra Gulrajsharma, Edited with the *Arthavidyotini* and *Arthaprakshini* Sanskrit; Varanasi; Chaukhamba Bharati Academy publication; Reprint edition - 1999, Chapter – 3, Shloka No.223, Pg No.363

Photographs of different stages of *Samanya shodhana* of *Loha*

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