INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com ISSN 2230 – 8407

Research Article

STUDY OF STANDARD OPERATING PROCEDURE OF NAAG SHODHANA IN RELATION TO ITS PHYSICO-CHEMICAL PROPERTIES

Lagad C. E.[1]*, Sawant R. S.[2], Bhatambre Y. S.[3]

[1]Associate Professor, Dept. of Rasashastra & B.K., Govt. Ayurved College, Nanded, M.S., India

[2]Assistant Professor, Dept. of Rasashastra & B.K., Govt. Ayurved College, Nanded, M.S. , India

[3]Lecturer, Dept. of Rasashastra, S. M. B. T. Ayurved College, Hadapasar, Pune, M.S. , India

Article Received on: 11/12/12 Revised on: 21/01/13 Approved for publication: 10/02/13

*Email: lagadce@gmail.com

ABSTRACT

Standard operating procedures (SOPs) should to be designed, implemented and set for all Ayurvedic drugs one by one for globalization Ayurveda. In this study, an attempt has been made to introduce SOP for preparation of Naag Shodhana [NS] & its analytical study. Study was conducted in the Department of Rasa Shastra under the postgraduate research programme is being presented. The pharmaceutical processing of NS was performed by four different methods i.e. Samanya Shodhana, Vishesh Shodhana, Samanya Shodhana preceded by Vishesh Shodhana & control. Samples of unpurified & purified Naag (Pb) were analyzed physico-chemically and comparison was drawn to lay down pharmacopoeial standards. All the samples of Shodhit Naag obtained using textual references showed considerable increase in the percentage of Lead and decrease in the impurities. The Shodhana dravyas were also analyzed physico-chemically before and after Shodhana. But no significant differences were observed in their physico-chemical properties. The Naag obtained after dhalana in distilled water neither showed increase in the percentage of Lead nor decrease in the percentage of impurities. However, no significant difference was found in the Shodhit Naag obtained from various types of Shodhanas viz. Samanya Shodhana, Vishesh Shodhana and Vishesh Shodhana preceded by Samanya samples in relation to their physico-chemical properties. It can be concluded from study that it is imperative to perform Shodhana process as described in the Ayurved texts, as Shodhana Dravyas definitely play an important role in decreasing the impurities.

Key Words: Naag Shodhana, Standard Operating Procedure, AAS.

INTRODUCTION

Metals, although essential for the growth and development of human body are not suitable for consumption in their natural state. They are treated vigorously through various pharmaceutical procedures and converted into various consumable forms; one of such form is termed as Bhasma [1]. Metals are said to be very effective when used in the form of Bhasma. The preparation of Bhasma includes various processing steps. Shodhana is one of them.

Various metals are described in texts of Rasashastra viz. Suvarna (Gold), Rajat (Silver), Tamra (Copper), Naag (Lead), Vanga (Tin), Loha (Iron), etc. Among these; Naag i.e. Lead is a well known metal to Indians since the Vedic period. It is included in the category of 'Puti-Loha'. Naag is used as an important ingredient in several Metallic preparations [2]. Preparations of NB are frequently used due to its proficient therapeutic effectiveness. On the other hand, Lead is considered to be a highly toxic metal for the human body by scientists today. Toxicity of lead is also described by Ayurvedic authors, but also acknowledged its efficacy in alleviation of diseases and its role in growth and development of human body [3]. Hence, Rasashastra scholars developed systematic procedures to process the metal for removing its toxicity and potentizing its therapeutic effect. Ayurveda clearly underlines toxicity of the metals and further explains the relation of toxicity to consumption of improperly processed metallic preparations.

While reviewing Rasashastra texts, various references of Naag shodhana are found. Variations are found especially with respect to Dhalana Dravyas. However, each reference carries its own importance. While studying these references, various lacunae are found regarding the operating procedures e.g. raw material, equipments to be use etc.

All these ambiguities indicate the importance of studying the procedures in detail and set a standard operating procedure for each one of them.

Considering the importance of NB in the management of diseases and unavailability of any standard procedure in the manufacturing of NB in the present day Ayurvedic drug Industry, the need to develop a standard operating procedure of NB is directly felt. This gave an impetus to the selection of the subject for this study. It is expected that the study will definitely prove substantially contributory in this respect.

MATERIALS & METHOD

Procurement of Raw Materials

Raw Naag (Lead), Tila Tail (Sesame oil), Takra (buttermilk), Gomutra (cow urine), Kanji, Kulattha seeds, Nirgundi leaves (*Vitex nigundo* Linn.), Churnodaka (Slake lime water) were used as raw materials. Lead was considered as Naag for their similar characteristics and was collected from local market of Nanded, Maharashtra and authenticated as per classical texts mentioned.

In the present study, Naag Shodhana was performed by six different methods among which five methods are selected from the Rasashastra texts while sixth method is performed by using distilled water as the Shodhan Dravya.

In present study two types of Raw Naag were used.

- Raw Naag in triangular rod form, coded as **N-1.**
- Raw Naag in sheet form, coded as **N-2.**

Raw Naag **N-1** was used in following methods of Shodhana

- **N-6** Samanya Shodhana of Naag
- **N-7** Vishesh Shodhana, preceded by Samanya Shodhana of Naag
- **N-5** Vishesh Shodhana of Naag

Raw Naag **N-2** was used in following methods of Shodhana

- **N-8** Samanya Shodhana of Naag
- **N-4** Vishesh Shodhana of Naag
- **N-3** Distilled water used as Shodhana Dravya.

Pharmaceutical Processing

Method 1 - Samanya Shodhana of Naag

Preparation of accessory drugs: Takra, Kanji and Kulattha

kwatha were prepared as per classics for the process of Samanya Shodhana[4].

Process of Shodhana

Ingredients

Main Drug – Naag, 400 g.

Accessory Drugs –Tila taila 8.4L; Takra 8.4L; Gomutra 8.4L; Kanji 8.4 L; Kulattha kwatha 8.4L.

Procedure – Lead was heated in an iron laddle and after melting, it was poured in each liquid media for 7 times. Each time fresh liquid media was used.

Method 2 - Samanya Shodhana of Naag

Preparation of accessory drugs: Takra, Kanji and Kulattha kwatha were prepared as per classics for the process of Samanya Shodhana[5].

Process of Shodhana

Ingredients

Main Drug – Naag, 400 g.

Accessory Drugs –Kanji, 3.6L; Takra, 3.6L; Kulattha kwatha, 3.6L; Gomutra, 3.6L; Tila taila, 3.6L.

Procedure – Lead was heated in an iron laddle and after melting, it was poured in each liquid media for 3 times. Each time fresh liquid media was used.

Method 3 - Vishesh Shodhana of Naag

Main Drug – Naag, 400 g.

Ingredients – Churnodaka 8.4L.

Procedure – For this purpose Lead was heated in an iron laddle and after melting, it was poured in Churnodaka for 7 times[6].

Method 4 – Vishesh Shodhana of Naag preceded by its Samanya Shodhana.

Preparation of accessory drugs: Takra, Kanji and Kulattha kwatha were prepared as per classics for the process of Samanya Shodhana [5, 6].

Step 1 - Process of Samanya Shodhana

Ingredients

Main Drug – Naag, 400 g.

Accessory Drugs –Tila taila 4.8L; Takra 4.8L; Gomutra 4.8L; Kanji 4.8 L; Kulattha kwatha 4.8L.

Procedure – Lead was heated in an iron laddle and after melting, it was poured in each liquid media for 3 times. Each time fresh liquid media was used.

Step 2 - Vishesh Shodhana of Naag

Main Drug – Naag obtained after Samanya Shodhana procedure, 400 g.

Ingredients – Churnodaka 8.4L.

Procedure – For this purpose Lead was heated in an iron laddle and after melting, it was poured in Churnodaka for 7 times.

Method 5 - Vishesh Shodhana of Naag

Main Drug – Naag, 400 g.

Ingredients – Freshly prepared juice of Nirgundi leaves (*Vitex nigundo* Linn.) 8.4L.

Procedure – For this purpose Lead was heated in an iron laddle and after melting, it was poured in Nirgundi juice for 7 times[7].

Method 6 - Shodhana of Naag in Distilled Water (Control)

Main Drug – Naag, 400 g.

Ingredients – Distilled water 8.4L.

Procedure – For this purpose Lead was heated in an iron laddle and after melting, it was poured in distilled water for 7 times.

Table 1: Analysis report of market samples of Lead using AAS technique

Sample ID	Sample	Unit	Lead	Tin	Arsenic	Cadmium	Antimony
N-1	Market Sample I (rod)	%	96.9021	0.0513	0.00078	Nil	3.0147
N-2	Market Sample II (sheet)	%	96.1082	0.4874	0.0018	0.00079	3.1327

Table 2: Analysis of Sesame oil used for Shodhana procedure before and after purification

Media	Sesame oil		
	Specific gravity at 30°C	Acid value	Saponification value
Before purification	0.915	4.40	194.36
After purification	0.916	4.46	195.47

Table 3: Analysis of Butter milk used for Shodhana procedure before and after purification

Media	Butter milk		
	Specific gravity at 30°C	% acidity	pH value
Before purification	1.011	1.737	3.56
After purification	1.013	1.737	3.59

Table 4: Analysis of Cow urine used for Shodhana procedure before and after purification

Media	Cow urine	
	Specific gravity at 30°C	pH value
Before purification	1.0332	7.45
After purification	1.0351	7.61

Table 5: Analysis of kanji used for Shodhana procedure before and after purification

Media	Kanji		
	Specific gravity at 30°C	% acidity	pH value
Before purification	1.002	0.7038	3.02
After purification	1.003	0.7039	3.19

Table 6: Analysis of decoction of Kulittha used for Shodhana procedure before and after purification

Media	Decoction of Kulittha	
	Specific gravity at 30°C	pH value
Before purification	1.021	6.67
After purification	1.020	6.79

Table 7: Analysis of Nirgundi juice & Churnodaka used for Shodhana procedure before and after purification

Media	pH Value	
	Before purification	After purification
Nirgundi juice	6.04	6.18
Churnodaka	11.37	11.62

Table 8: Analysis of Different samples of Naag N-1 with different purification methods, AAS method

Method	Sample ID	Sample	Unit	Lead	Tin	Arsenic	Cadmium	Antimony
	N-1	Raw Naag market sample - rod	%	96.9021	0.0513	0.00078	Nil	3.0147
V	N-5	Vishesh Shodhit Naag – R.T. 19/7-8	%	98.3205	0.1341	0.00073	0.00042	1.5199
II	N-6	Samanya Shodhit Naag – R.T. 15/5	%	98.9206	0.8932	0.00063	0.00047	0.1514
IV	N-7	Samanya and Vishesh Shodhit Naag –R.T.15/5, R.T.19/10	%	98.3111	1.3723	0.00066	0.00048	0.2919

Table 9: Analysis of Different samples of Naag N-2 with different purification methods, AAS method

Method	Sample ID	Sample	Unit	Lead	Tin	Arsenic	Cadmium	Antimony
	N-2	Ashodhit Naag market sample – sheet	%	96.1082	0.4874	0.0018	0.00079	3.1327
I	N-8	Samanya Shodhit Naag – R.R.S.5/29	%	96.0320	0.8570	Nil	0.00178	3.0768
III	N-4	Vishesh Shodhit Naag – R.T. 19/10	%	98.7301	0.6374	0.00175	0.0108	1.591
VI	N-3	Distilled water	%	96.3988	0.4108	0.0015	0.00046	3.1692

OBSERVATIONS

Physico-chemical Analysis

Following are the physico-chemical tests were employed for the study of Naag Shodhana & results obtained summarized in Table 1 to 9.

1. Organoleptic characters of raw samples of raw Naag and samples of Shodhit Naag.
2. Acid value and Saponification value of Til Taila, before and after Shodhana.
3. Percent acidity of Takra and Kanji, before and after Shodhana.
4. Specific gravity of all Shodhana Dravyas, before Shodhana and after Shodhana.
5. pH of all Shodhana Dravyas, before Shodhana and after Shodhana.
6. Atomic Absorption Spectroscopy (AAS) of raw as well as Shodhit Naag.
7. Measurements of temperature during Shodhana process of Naag using Pyrometer (Thermocouple).

DISCUSSION

Processing Naag through the Shodhana procedure induces specific physical and chemical changes in it. There was a need to study these changes. The development and use of SOP promotes quality through consistent implementation of a process or procedure. SOP can be valuable for reconstructing project activities when no other references are available. Also it is useful when historical data are being evaluated for current use.

Operating procedures are written with sufficient details so that someone with limited experience or knowledge of procedure, but with a basic understanding can successfully reproduce the procedure when unsupervised. In this context, study of physico-chemical characteristics of Ashodhit Naag and Shodhit Naag was undertaken. Raw Naag i.e. Lead procured was available in two different forms viz. triangular rod form and sheet form. Both these forms were selected by comparing their characters with that of acceptable qualities of Naag described in Rasashastra texts. Both the samples of Naag possessed these characters. However, the character Putigandhatva i.e. emitting putrid odor could not be observed with both of the samples. Both these samples were then analyzed chemically. Purity of Lead was found 96.9021% in the rod shaped Naag while 96.1082% in the Naag in sheet form. As these samples show almost same percent purity, these were decided to use for the present study of 'Naag Shodhana'. Generally two types of Shodhana are practiced viz. Samanya Shodhana and

Vishesh Shodhana. According to Acharya Nagarjuna, after performing Samanya Shodhana, Vishesh Shodhana is performed for deriving specific properties in the Dravya. However, various opinions are found regarding the type of Shodhana to be adopted for the Putilohas i.e. Naag, Vanga and Yashad. Some prefer only Samanya; some prefer only Vishesh one while others stress Vishesh Shodhana preceded by Samanya one. So in the present study, references of Shodhana of these three types were selected. In this context, references of Naag Shodhana, which are commonly practiced, were selected.

It was found that the time required to melt Naag during successive Dhalanas goes on increasing. It may be due to the additional time required for the burning of Shodhana Dravyas adhered to the Naag. So care was taken that minimum quantity Shodhana Dravya would remain adhered to the Naag before subjecting it to melting. After completing Dhalanas in Til Taila, Naag became soft probably due to the Snehana' property of Til Taila. After completing Dhalanas in Takra, Naag became somewhat Ruksha probably due to the 'Ruksha' property of Takra. After completing

Dhalanas in Kulitha Kwath, Naag became more brittle may be due to the 'Bhedana' property of Kulittha Kwath. Gomutra and Churnodaka may have been used for removing the impurities in Naag as these are having 'Kshaariya' property. Likewise, Takra and Kanji may have been used for the Shodhana, as these are the Amla Dravyas. Probable action of these Shodhana Dravyas can be discussed as – presence of acidic content in the liquid reacts with Naag to liberate Hydrogen. Similarly with other liquids, it may forms salts, complexes or compounds up to some extent. These liquids may serve as solvents for other contents. Though the Organoleptic tests are subjective, they carry more importance regarding the raw materials to be used and to identify the changes during the Shodhana process. Not much difference is found in the organoleptic characters of all the six samples of Shodhit Naag. There was a slight difference in the acid values of Til Taila before Shodhana and after Shodhana. But the difference was not significant. So this test is merely useful in determining the quality of Til Taila. There was a slight difference in the saponification values of Til Taila before Shodhana and after Shodhana. But the difference was not significant. So this test is merely useful in determining the quality of Til Taila. In the present study no significant

changes were observed in the percent acidity of Takra and Kanji, before
Shodhana and that of after Shodhana. However, this test is also helpful in determining the quality of Shodhana Dravyas viz. Takra and Kanji. In the present study no significant change between the specific gravity of all the liquid samples i.e. Shodhana Dravyas, before Shodhana and that of after Shodhana was found. In the present study pH of Takra, Gomutra, Kanji, Kulittha Kwath, Nirgundi Swaras and Churnodaka were recorded before Shodhana and after Shodhana. It was observed that there was no significant change in the pH values of these liquids before and after Shodhana. However, this test remains as quality control test for Shodhana Dravyas. In the present study, two raw samples of Naag and six samples of Shodhit Naag were analyzed using AAS technique, as shown in the Table no 8 and 9.
Raw Naag i.e. N – 1 contains Lead in 96.9021%. After Shodhana in N-5, N-6 and N-7 percentage of Lead was found increased up to 98.5%.Percentage of Tin in N-5, N-6 and N-7 was found increased as compared to that of raw Naag. Percentage of Arsenic in N-5, N-6 and N-7 was found decreased after Shodhana. Percentage of Cadmium in N-5, N-6 and N-7 was found increased. Percentage of Antimony in N-5, N-6 and N-7 was found decreased.
Raw Naag i.e. N – 2 contains Lead in 96.1082%. After Shodhana in N-4, percentage of Lead was found increased up to 98.7301%. While in N-8, it was decreased slightly up to 96.0320%, in N-3 it was increased slightly i.e. up to 96.3988%. Percentage of Tin in N-4 and N-8 was found increased while it was decreased in N-3. Percentage of Arsenic in N-4 was found decreased. While in N-8, it became nil and in N-3 it remained constant. Percentage of Cadmium in N-4 and N-8 was found increased in N-3 it remained approximately constant. Percentage of Antimony in N-4 was decreased; in N-8 slightly decreased and in N-3 it remained approximately constant.
Above description shows that percentage of Lead has been increased after Shodhana performed using Shodhana Dravyas. Ultimately percentage of the impurities has been decreased to some extent. But after the Shodhana in distilled water, no significant increase in the percentage of lead was found and also the impurities have not been decreased like that have in Shodhana Dravyas.
It clearly stresses the importance of Shodhana as well as the importance of Shodhana Dravyas. However, chemically no significant difference was seen among the samples of Shodhit Naag from different methods i.e. Samanya Shodhana, Vishesh Shodhana and Vishesh Shodhana preceded by Samanya Shodhana. Though the numbers of Dhalanas in the samples N-5, N-6 and N-7 are respectively 7, 15 and 22, they have shown no significant changes in their physicochemical properties. So it helps us to state that no. of Dhalanas have no role to play in changing the Physico chemical properties of Shodhit Naag. Reduction in the number of Dhalanas will not affect its physico-chemical properties. Also it will help to minimize time, cost, etc. required for Shodhana process.

CONCLUSION

Purpose was to study the actual difference in the physico-chemical properties of the Shodhit Naag from only Samanya Shodhana, that from only Vishesh one and that from Vishesh Shodhana preceded by Samanya one. But not much difference was observed in this concern. Similar physical changes were observed in the Shodhit Naag from all these methods. Shodhit Naag was having various irregular shapes like pointed bullets, cones, powder, etc. A considerable increase in the percentage of Lead, obviously along with the decrease in the percentage of impurities was found in all the above samples of Shodhit Naag. The Shodhan Dravyas were also analyzed physico-chemically before Shodhana and after Shodhana. But no significant difference in their properties was observed.

REFERENCES

1. Jha C B, Ayurvediya Rasashastra, 1st ed, Chapter 3, Varanasi, Chaukhambha Surabharati publication 2000 pg 73.
2. Vagbhata, Rasaratnasamucchaya, 1st ed, Chapter 5, Verse 5/1, Kolhapur, Shivaji University printing press 1970 pg. 92
3. Sharma S. Rasatarangini, 11th ed, Chapter-19, Verse 19/4-5, Varanasi, Motilal Banarasidas publications 2004 pg 457.
4. Shastri A. Rasaratna Samucchya, 2nd ed, Chapter-5, Verse 5/29, Varanasi, Chaukhambha Orientalia 2004 pg 99.
5. Sharma S. Rasatarangini, 11th ed, Chapter-15, Verse 15/4-6, Varanasi, Motilal Banarasidas publications 2004 pg 363.
6. Sharma S. Rasatarangini, 11th ed, Chapter-19, Verse 19/10, Varanasi, Motilal Banarasidas publications 2004 pg 458.
7. Sharma S. Rasatarangini, 11th ed, Chapter-19, Verse 19/7-9, Varanasi, Motilal Banarasidas publications 2004 pg 458.

Source of support: Nil, Conflict of interest: None Declared