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Research Article

STUDY OF JARANA PROCEDURE OF PUTI LOHAS WITH SPECIAL REFERENCE TO NAAG DHATU

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ABSTRACT

The science of Rasashastra includes preparation of herbo-mineral compounds e.g. bhasmas, pishties, various rasakalpas, etc. Among the minerals, dhatu(metals) have been given more importance. For the Putiloha category of dhatu, Jarana is an important intermediate step during their marana procedure (incineration) . In present study,Jarana of Naag (Lead) dhatu has been studied pharmaceutically and analytically. New steps like washing of the jaritNaag, repeating the cycles of Jarana are introduced. The elemental Assay using ICP-AES technique shows presence of 80% of Lead in JaritNaag.

KEY WORDS: Bhasma, Dhatu, Jarana, Marana,Naagdhatu.

INTRODUCTION

In Rasashastra, term Jarana is generally used in concern with Parada.It is one of the most important sanskaras (procedures) of Parada. However, this term is also used for the intermediate step performed during the marana of Putilohas i.e. Naag (Lead), Vanga (Tin), and Yashad (Zinc).

The first step to be performed during Marana of putiloha is Shodhan (Purification) and the second one is jarana. During Jarana procedure, shodhit dhatu which is in solid form gets converted into fine powder form which is necessary for the further marana procedure. Putiloha have very low melting point, so these cannot be directly subjected to heat after their shodhan. During jarana procedure, the shodhit dhatu is continuously triturated with the mentioned herbs till the metal is converted into fine powder.

Though jarana is an important step during the maran of putiloha, the procedure is found included in maran of these dhatu i.e. it is not found termed separately in Rasagranthas. Only in the classical text Rasamitra, clear use of the term 'Jarana' is found in the context of Vangamarana. In this reference it is described that shudhhavanga is molten in an iron pan and Apamargchurna is gradually added in small quantity to the molten Vanga and whole mixture is kept stirring with a ladle. This process of adding the powder, stirring the mixture along with heating is continued till molten Vanga gets converted into amorphous powder. Then the powder is collected in the centre of the pan. A sharav(an earthen pot) is placed upside down covering thepowder and strong heat is given for a day. After self-cooling this powder can be termed as JaritVanga and the process is termed as 'Jarana'.[1]

In present study, jarana of Naagdhatu has been studied. Naagbhasma is an important ingredient in various Rasakalpas. Formulations of Naagbhasma are frequently used due to their efficient therapeutic effectiveness. On the other hand, Naag i.e. Lead is considered to be a highly toxic metal for the human body by the scientist today. Toxicity of Naag is also described by Rasagranthas, but they have also recognized its usefulnessin alleviation of several diseases. Hence they have developed systemic procedures for removing its toxicity and potentizing its therapeutic effect.

Poorly processed NaagBhasma causes Kushtha, Gulma, Pandu, Prameha, Agnisaad, Shoth, Bhagandara, etc.[2], but bhasma prepared by following the classicalmethod is never harmful. Therefore, it is imperative to prepare the bhasma as per the classical methods. It clears the importance of every step of marana. So in present study, Jarana procedure of Naag is concentrated. Practical difficulties and their solutions have been described here.

MATERIALS AND METHODS

Shodhan of Naagdhatu was carried out as per the reference from Rasatarangini (15/4-6) [3].
Following Raw materials were taken-

1. Raw Naag (Lead)……500mg
2. Kanji (Fermented rice water)……...4.5 lit.
3. Takra (Butter milk)……..4.5lit.
4. Kulitthakwath (Decoction of Horse gram) …….4.5lit.
5. Gomutra (cow urine)…… ……4.5lit.
6. TilTaila (Sesame Oil)……4.5lit.

Procedure

Naag was taken in a ladle and heated to melt. 1.5lit. of Kanji was taken in a Borosil beaker and the beaker was covered with the lid having a hole in its centre. As soon as Naag got liquefied, it was poured into the Kanji through the hole of the lid. After

self-cooling, the pieces of Naag were taken out and they were again subjected to heating. Similar procedure was repeated for two more times, each time fresh Kanji in same quantity i.e. 1.5 liter was used.
After completing three dhalanas in Kanji, similarly dhalanas were performed in Takra, Kulitthakwath, Gomutra, and TilaTaila sequentially for three times in each.
After shodhan process, Naag obtained was weighing 498gm.
Obtained shodhitNaag was further subjected to Jarana Procedure.
Jarana was performed following the reference from Rasatarangini (19/34) [4].

Following Raw materials were required-
1. ShodhitNaag…….498gm.
2. Ashwattha (*Ficus religiosa* Linn.) Twakchurna (powder of Bark)…….166gm
3. Vasa (*Adhatoda vasica* Linn.) patra (leaves)…….. 166gm
4. Apamarg (*Achyranthus aspera* Linn.) panchang (whole plant)….166gm
5. Tap water……..q.s.

The powders in total were taken in equal quantity of ShudhhaNaag for Jarana procedure.

Procedure

JaranaDravyas i.e. AshwatthaTwakchurna, Vasa patrachurna, and Apamargpanchangchurna (**Figure 1**) were mixed together in equal quantity. ShodhitNaag was taken in an iron pan and it was heated on a high pressure gas burner. When Naag got melted, the powder of jaranadravyas was gradually added in small quantity to it and whole mixture was kept stirring with a stump of Ashwathha. The powder of jaranadravyas burnt out and turned into ash and some part of the molten Naag slowly got converted into fine powder form. The process of addition of jaranadravya, continuous stirring the mixture along with heating was continued till whole molten Naag got converted into fine powder. Care was taken that no amount of Naag was remained either in molten form or in solid or crystalline form. This fine powder was termed as JaritNaag. This JaritNaag was then collected in the centre of the iron pan and a sharav i e. an earthen pot was placed upside down on this powder and strong heat was given till the powder became red hot (**Figure 2**). It took about half an hour.

After self-cooling, the powder of jaritNaag was taken out. Whole this procedure took about three hours. Weight of JaritNaag was found 466gm.

This JaritNaag was containing both fine powder as well as incompletely processed coarse powder of Naag. This mixture was sifted using a mesh to separate the fine powder. When the coarse Naag and even the sifted Naag heated intensely on pressure gas stove, they got melted indicating that some fine particles of of unconverted Naag were also got sifted along with the fine powder. So, for separating the fine powder, following method was developed specially. In this method the JaritNaag was repeatedly washed with tap water. The procedure is described below.

Washing of JaritNaag (Figure 3)

JaritNaag was taken in a S.S. container and washed with tap water repeatedly to remove the kshar matter i. e. water soluble content. The washings were collected in another S.S. container and allowed to settle overnight.

Next day, the water was removed by siphon method and the fine powder, which was settled at the bottom of the container, was allowed to dry and after drying it was termed as 'fine powder of JaritNaag'. The coarse powder of Naag remained after washing was termed as 'coarse powder of Naag'. Thus two types of powders were obtained-

Fine powder - 110gm
Coarse powder - 356gm

The coarse powder of Naag was again subjected for Jarana with equal amount of jaranadravyas and similar procedure was repeated. The fine powder obtained after every Jaranawas collected and lastly mixed together (**Figure 4**). In present study, Jarana had to be conducted in seven cycles to obtain the fine powder of whole Naag.
Weight of total JaritNaag was found 430gm.

RESULT

Jarana procedure had to be done in seven cycles.
The observations in seven cycles have been shown in **Table 1.**
Elemental Assay of JaritNaag using Acid digestion and alkali fusion method was done using ICP-AES Technique.It has been shown in **Table 2.**

Table 1: Details of Jarana in seven cycles

Sr. No.	Weight of Naag taken for Jarana in gm	Weight of Jaranadravyas in gm	Time required for Jarana process in min.	Weight of JaritNaag before washing in gm	Weight of fine powder obtained in gm	Weight of coarse powder in gm	Colour of the fine powder i.e. JaritNaag
1.	498	498	120	466	110	356	Pale Yellow
2.	356	356	180	348	71	277	Pale Yellow
3.	277	277	175	268	58	210	Pale Yellow
4.	210	210	160	201	56	145	Pale Yellow
5.	145	145	152	142	49	93	Brick Red
6.	93	93	90	89	62	27	Brick Red
7.	27	27	45	25	21	04	Brick Red

Table 2: Elemental Assay of JaritNaag

Sr. No.	Element	Unit	JaritNaag
1.	Lead(Pb)	%	80.0
2.	Calcium(Ca)	%	1.70
3.	Silica(Si)	%	0.33
4.	Iron(Fe)	%	1.40
5.	Aluminium(Al)	%	0.05
6.	Potassium(K)	%	0.1
7.	Arsenic(As)	%	0.38
8.	Magnesium(Mg)	%	0.28
9.	Nickel(Ni)	µg/g	<10
10.	Magnese(Mn)	µg/g	80.0
11.	Cadmium(Cd)	µg/g	<10
12.	Zinc(Zn)	µg/g	118

AshwatthaTwak (Bark)

AshwatthaTwakChurna (Powder of Bark)

Vasa Patra (Leaves)

Vasa Patrachurna (Powder of leaves)

ApamargPanchang (Whole plant)

ApamargPanchangchurna (Powder of whole plant)

Figure 1: Jaranadravyas

ShodhitNaag Being molten

Addition of JaranaDravya to Naag

Stirring of the mixture

Jarana in- process

Powder covered with a sharava (an earthen pot)

JaritNaag (Before washing)

Figure 2: Procedure of Jarana

Washing of JaritNaag with water

Decantation process (Water is being removed using siphon)

Sediment fine powder of jaritNaag

Figure 3:Washing of Jarit Naag

JaritNaag (After drying)

Figure 4: JaritNaag

DISCUSSION

Present study involves two main steps i. e. Shodhan and maran of Naagdhatu. Shodhan of Naag was basically aimed at making it free from the impurities as well as to make it ready for the further process of marana.Previous study also shows that there is a considerable increase in the percentage of Lead, obviously along with the decrease in the percentage of impurities after its shodhan process[5]. In present study, method of Samanyashodhan for dhatus was selected.It was performed to eliminate all the possible impurities in Naag and alsoto make it more brittle, which could ease the further tedious process of marana. Naag, being aputiloha, jarana was the next important step after its shodhan.

In the reference selected for the Jarana procedure in present study, Jaranadravyas are mentioned as 'Mayuradi' i. e. Mayuradi plants. Mayur means Apamarg and 'Aadi' mean some other plants.On studying the previous references of Naagmarana in the same text i.e. RasaTarangini, Jaranadravyas used were Vasa, Ashwathha and Apamarg.So these plants were selected as Jaranadravyas under the term 'Mayuradi'.
Selection of these dravyas was supported by the description of the same reference in the text book 'AyurvediyaAushadhikaran' (Part II page 201), where it has been mentioned to use the powders of and Apamarg Vasa and Ashwathha for Jarana process.

After Jarana process, the fine powder collected did not undergo any change when subjected to intense heat i.e.no change of form was observed even when if it turned red hot.

JaritNaag was analysed chemically using ICP-AES technique. Purpose was to find out the percentage of free Lead in the JaritNaag, but the sample was not soluble in Acetic acid it could not be analyzed. However, the elements found in the JaritNaag along with their percent concentration could be found out.

Probable actions, which might have been happened during the process of Jarana, are as follows –

i) When Shodhit Naagwas melted, the remnants, which were persisted in the Naag from the Shodhana medium, may have burnt out.
ii) Compounding the parent metal i.e. Lead which has low melting point, to asubstance which can stand relatively more amount of heat i.e. increasing theheat tolerating capacity of the Naag .
iii) The Shodhana process, though very exhaustive in itself may have left behind some volatile undesirous substances, which find an occasion for volatizingaway.
iv) Stirring of the molten Naag was done using stump of Ashwattha, which can be equated to poling (oxidation of impurities). Stirring of the hot crude moltenmetal with green logs of wood is called as 'Poling'. This may be helping to achieve following two objectives.
a) The wood gases like hydrocarbons produced during the burning of thewood reduce the metal oxide formed during the Shodhan process and convert much of it to metallic form, but in a finely powdered state.
b) During stirring of the molten Naag, large quantity of air is consumed by the molten Naag and such absorbed air oxidizes the easily oxidizable content. These oxidized matter escapes either as vapour or form 'scum' which appears on the molten metal.

When Naag was converted to powder form, which was almost fine, so as tobe called as ash or Bhasma, it was heated in the open container till it became redhot. At this stage it did not undergo melting. Here it can be equated with roasting, which brings about oxidation of that part of the fine metallic powder, which lies on thesurface of whole powder mass.

In the penultimate stage, where the powder formed after Jarana process was piled up and covered with an earthen plate i.e.

Sharava , in short when it was madebarred from the air contact and then heated to red hot for prolonged time, indicates the process of calcination where again Naag was not melted but may have undergonedecomposition.In the end, when the whole system was getting self-cooled, the slight loweringof temperature may have facilitated sulphatization where the lead sulphides may have converted into Lead sulphates.

In hand matter after Jarana –
i) Very finely powdered metallic form of Naag with a melting point much higherthan the original metal i.e. Naag was obtained.
ii) Some Lead in oxide form, if other favourable reactants were present in the added Jarana Dravyas or which were accompanied Naag through the Shodhana process, some othercompounds like Lead chlorides, Lead sulphates etc. might be formed.

Thus after Jarana process, very fine powder of Naag is obtained which could be then used for the maran procedure.

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