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PHARMACEUTICO ANALYTICAL STUDY OF *NAGA* (LEAD) *BHASMA*

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ABSTRACT

Naga dhatu (Lead metal) came into therapeutic use after development of purification measures. *Shodhan* (purification) and *Maran* (incineration) procedures are necessary to convert raw *Naga* into *Naga bhasma* (incinerated lead). In the present study *Naga Bhasma* was prepared as per classical reference and its physiochemical properties were identified. *Parad* (Mercury) has been used for *maran* of *Naga* into specific compound. The chemical analysis confirms the decline in percentage of *Naga* due to combination with other materials. Various techniques like X-Ray diffraction were applied and it was found that *Naga Bhasma* is a phase of polymers of Lead Sulphide.

Keywords: *Naga dhatu, Naga Bhasma*, Pharmaceutical, Analytical Study

INTRODUCTION

Naga (lead) has been administered in various diseases since *vedic* period. It has been used in treating diabetes, diarrhoea, spleen and skin disorders.[1] *Naga bhasma* (incinerated Lead) has shown testis regenerative potential on partially degenerated testis.[2] Metals are treated vigorously through various consumable forms; one of such form is termed as *Bhasma*[3]. At the end of processing this micro fine medicinal product has easy digestive power and quick reaction with the bile juices.[4] But several other scientists hesitate to recommend liberal use of lead because of the associated toxic effect on human body. 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.[5] *Naga Bhasma* and other metallic *bhasma* are subject of constant research for *Ayurvedic* formulations in major scientific and educational research center in India. In *Ayurveda*, *Naga* has been used only after treatment under some pharmaceutical procedures like *Shodhan* and *maran*. The present study aims to study *Naga bhasma* by qualitative and quantitative analysis and by modern physicochemical techniques like metallography and X-ray diffraction.

MATERIAL AND METHODS

Raw *Naga* was procured from the market in the form of lead rods which were chemically 99.4% pure. *Naga Shodhan* (Purification) as prescribed in literature of *Naga* (Lead) was done as follows

1. *Samanya Shodhan* (General Purification): Lead was heated in an iron ladle and after melting, it was poured thrice sequentially in *Tila Taila* (sesame oil), *Takra* (butter milk), *Gomutra* (cow's urine), *Kanji* (sour rice

gruel) and *Kulatha Kwatha* (horse gram decoction).[6]

2. *Vishesh Shodhan:* For this purpose lead obtained from *samanya shodhan* was heated in an iron ladle and after melting, it was poured in *churnodak* (lime water) for seven times.[7]

The loss observed in the metal at the end of the process in each liquid can be attributed to the handling.

Table 1: Relation between Time, Temperature, Color, Brightness and Weight of *Naga* after *Samanya Shodhana*

SlNo	Media	Time to melt (Min)	Temp (^{o}C)	Color after *Dhalana*	Brightness	Weight (g)
1	*Taila*	15	350	Silver	+	490
2	*Takra*	15	350	Bright Silver	+	480
3	*Gomutra*	15	350	Bright Silver	+	470
4	*Kanji*	15	350	Silver grey	++	460
5	*KulathaKwatha*	15	350	Silver greyish	++	450

Maran of *Naga* (Lead): *Naga* was incinerated in association with mercury and sulphur by *puta* method.[8]

Table 2: Effect of *Naga Maran*

Sl No	Ingredients for the preparation of *bhasma*	Technique	Observation	Result	Remarks
1	*Shudha Naga*	Electric Furnace	Black coloured *Bhasma* obtained	Initial weight 300g Final weight 120g	Weight loss due to evaporation of *Parad* and *Gandhak*
2	*Shudha Parad*				
3	*Shudha Gandhak*				

The final product (*Naga Bhasma*) was analyzed on quality control measures describe in *Ayurvedic* texts as *Nishchandratva, Rekhapurnatvam, Varitaratvam* (floatability test), *Nirdhum Nirutha* (metal irreversibility test) and *Apunarbhava*.[9]

Analytical Study: Chemical analysis of the constituents of *Naga bhasma* has been done by Vogel's qualitative and quantitative analysis method.

Table 3: Percentage of lead in sample of *Naga Bhasma*

Sl No	Initial Materials	Final Product	Adopted Method	Aprox. Temp	% of Pb
1	Pb, Hg, S	*Naga Bhasma*	*Puta* by Electric Furnace	350^{o}C	74.7

Infrared spectra: Changes taking place during the process. Infrared spectral studies are generally done for organic molecular where the absorption bonds are specific for group vibrations. IR studies have also been used for minerals and silicates. Since the *Naga bhasma*, prepared at high temperatures (350°C) in this study are mainly the sulphide phases,the I.R. spectra are very broad signifying polymer sulphide phases present in this system.

Metallography: It is a specialized technique, adopted for the study of microstructure of *bhasma* particles. It has been observed that metallographic study of the samples of the material provides information regarding the changes taking place during processing as well as helps in characterization and standardization of the final product. The samples were carefully mounted and polished for their metallographic examination and interpretation of the physic chemical Magnification lOOX, 200X and 500X under a microscope shows that there is no free lead, mercury, sulphur in the sample of *Naga Bhasma*.

X-ray Diffraction: It is a powerful technique for detecting the presence of various phases in a given sample. The basic principle of the phase Analysis using powder XRD tech-

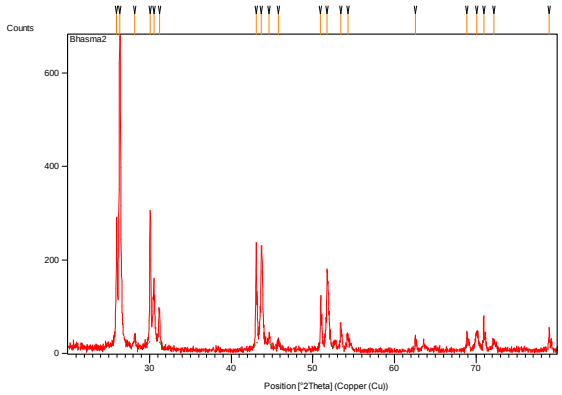
nique is the presence of diffraction peaks corresponding to various interplanar (dhkl) spacings which are Characteristics of a given material. The relative intensities of various peaks occurring at different'd' spacing is also different phases. The Handbook of American Society for Testing of Materials (ASTM) provides the relative intensities and corresponding'd' spacing of various broad reflections of very large number of compounds.

RESULTS

Naga Bhasma- was prepared by puta method. XRD pattern of it is given in fig.1 and'd' spacing of various prominent reflections are listed in table.

It showed PbS and other phases which could not be identified. The findings of XRD analysis of sample of *Naga Bhasma* is summarized below.

Fig I- X Ray Diffraction of *Naga Bhasma*



DISCUSSION AND CONCLUSION

It is the expertises that make good quality medicines. So, for preparation of medicines in prescribed *Ayurvedic* standards require control of temperature and standards for operation process. Unless S.O.P. (Standard operational procedures) of *Ayurvedic* medicines is taken care of no quality control and quality assurance of these medicines can be ascertained. *Naga* is an important metal with high therapeutic value. Its *bhasma* has been recognized as potential therapeutic agent, inspite of its toxic effects. Through *shodhan* and *Maran* the toxic effects of *Naga bhasma* are nullified. It is important to understand the structure and composition of various constituents present in the *bhasma* which suppresses its toxic effects and inserting therapeutic effects to the metal. It has been hypothesized that repeated incineration of metal with suitable raw material change the inherent quality of the metal, which render them non-toxic and suitable for the treatment of chronic ailments. The conventional tests like *Varitara*, *Rekhapurna*, *Niruttha* etc., performed to check the quality of *bhasma* are not quite reliable. Characterization of *naga bhasma* using modern analytical tools became inevitable.[10]All the physico – chemical parameters applied to get the values can serve as mean for standardization of *Bhasma*. The findings in this paper suggest that *Naga bhasma* are polymeric lead-sulphide phases.

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