



A PHARMACEUTICAL APPROACH OF MANIKYA BHASMA TOWARDS ITS STANDARDIZATION

Wavare Ramesh¹, Yadav Reena^{2*}, Sheth Suchita³, Sawant Ranjeet⁴

¹Associate Professor and Head, Department of Rasashastra, Kamaladevi Gauridutta Mittal Punarvasu Ayurved Mahavidyalaya, Mumbai, India

²P. G Scholar, Department of Rasashastra, Kamaladevi Gauridutta Mittal Punarvasu, Ayurved Mahavidyalaya, Mumbai, India

³Assistant Professor, Department of Rasashastra, Kamaladevi Gauridutta Mittal Punarvasu, Ayurved Mahavidyalaya, Mumbai, India

⁴Assisitant Professor, Department of Rasashastra, Kamaladevi Gauridutta Mittal Punarvasu Ayurved Mahavidyalaya, Mumbai, India

*Corresponding Author Email: reenasyadav007@gmail.com

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ABSTRACT

Manikya [Ruby] is one of the nine gems described in Ayurveda texts comprising of Aluminum oxide, chromium and Titanium. Manikya Bhasma [MB] is one of the exceptional preparations mentioned in Rasashastra texts. It is having innovate action on various hormonal, enzymatic, immunological pathways, as it comprises main stream trace elemental moieties. The Objective of the study was to prepare MB and standardize it with different physico-chemical parameters. Two types of Manikya bhasma were prepared i.e. Hartaladi Manikya Bhasma [MB1] and Vanaspati (gulab jal marit) Manikya Bhasma [MB2] as per textual reference with the help of 8 puta (ancient heating procedure). Prepared bhasma was subjected to ancient as well as modern physico-chemical analysis mainly XRD, DLS, Microscopic examination and results were compared. XRD Result of Raw Ruby showed Al_2O_3 as principal component. Mean Particle Size of Raw Ruby is 1071.58 nm. The particle sizes of MB1 and MB2 were respectively 43 nm and 63 nm. So it can be concluded that both MB1 and MB2 are nano-medicine, hence both will have better assimilation in human body.

Keywords: Manikya Bhasma, Bhavana, Gajaputa, Corundum, particle size, XRD.

INTRODUCTION

Ayurveda being ancient Indian science its theme is to maintain the proper health and to cure diseases. Previously gems were used in Mercury binding procedures.¹ The priority of Rasashastra is to attain a Body that is for elixir alchemy. Hence Rasashastra had used almost all the gems for purpose of inducing longevity of life in human body.² Also internal use of the gems can cure the several diseases present on the earth.³ In Ayurveda Manikya categorized under ratna varga. As per Ayurved texts Manikya possesses properties such as appetizer, aphrodisiacs, kapha vatahara, bhutaghna, papaghna and eradicates evil souls.⁴ Also balances vitiated vata, pitta and kapha. Manikya is samashitoshna that is neither too hot nor too cold. It is cardio tonic as well as brain tonic.⁵ Rasashastra had used almost all the gems for purpose of inducing the longevity of life in human body. Although ruby contains the above mentioned properties, its therapeutic use is restricted due to its hardness and lack of standardization parameters of its bhasma. So an attempt was made to prepare and standardize MB to facilitate its use in Ayurvedic therapeutics.

MATERIALS AND METHODS

Materials

Ruby and other processing drugs like Sulphur, Orpiment, Realgar, Lime, Bhrungraj (*Eclipta alba*), Kushmand (*Benincasa hispida*), Ginger (*Zingiber officinale*), Kulattha (*Dolichos biforus*) and rose water were procured from the local market of Mumbai, India. Raw ruby was authenticated via microscopic examination at gems testing lab, Mumbai, India. Raw herbal drugs were authenticated at pharmacognosy lab at Nicholas Piramal Lab, Ltd Mumbai, India.

Methods

Manikya was processed using standard procedures and included steps namely Manikya Shodhana (purification) and Manikya Marana (Calcination).

Preparation

Purification of accessory drugs like Sulphur, Orpiment, Realgar was carried out as per the Rasashastra text.

1) Purification of Manikya

- swedan in lime juice⁶,
- processed in Kulattha⁷
- quenching of ruby in rose water.⁸

2) Preparation of Manikya Bhasma by to methods viz.

- Hartaladi marit [MB1]⁹
- Vanaspati marit [MB2]⁸.

Instruments - Iron mortar and pestle, charcoal, iron pan, pyrometer etc.

Purification of Manikya

Materials

Crude Manikya and lime juice

Method

This sample was wrapped in a cloth and tied to the iron rod in a suspended manner, which was kept horizontally over the steel vessel. Lime juice was taken in the steel vessel. Manikya was allowed to immerse in the juice in such a way that, it neither touches the sides nor the bottom of the container. The pot was placed over the, gas stove and heated for 3 h. Similarly the purification in the Kulattha was carried out. Quenching of Manikya in Rose water was carried out for 101 times to make the Ruby more brittle and in powdered form.

Manikya marana [MB1]

Raw materials used - Purified Manikya, Sulphur, Orpiment, Realgar and lime juice for bhavana. Shodhita Manikya was made into fine powder. Fine powders of purified Sulphur, Orpiment & Realgar was mixed with fine powder of Manikya and triturated with freshly prepared lime juice for 4 hours. After 7th Bhavana the pellets were prepared and placed in a shallow earthen disc and sealed properly and was subjected to gaja puta using 20 kg charcoal. Total 8 gajaputa were given.⁹ Marita Manikya was collected from discs and weighed, powdered and subjected to confirmatory tests mentioned in texts for Bhasma.

Manikya marana [MB2]

Drugs used – Purified Manikya, Rose water for bhavana; apart from this no other processing drugs were used and bhavana of Rose water was given else whole process was like MB1.⁸

RESULTS**Analysis using parameters described in Ayurveda texts****Raw Ruby**

Raw Ruby was subjected to Grahyaalakshana of Manikya¹⁰ and prepared Bhasma was subjected to tests¹¹ mentioned in Rasashastra texts.

Prepared bhasma**Rekhapurnatva**

A pinch of Bhasma was taken in between the thumb and index finger and rubbed. It was observed that the bhasma entered into the lines of the finger and was not easily washed out from the cleavage of the lines.

Nishandratva

The bhasma was taken in a petri dish and observed for any lustre in daylight through magnifying glass. No lustre was observed in the bhasma.

Varitaratva

A small amount of prepared bhasma was sprinkled over the still water in a beaker. It was found that the bhasma particles floated over the surface of water.

Analysis using modern parameters**Testing in gems lab for its genuinely**

Raw Ruby sample showing certified natural ruby qualities. [Table 1]

Table 1: Certified natural ruby qualities

Shape	Rough
Cut	Uncut
Isotropic/Anisotropic	Anisotropic
Weight	4.78 cts
Dimensions	5.00 length approx.
Mounted/ un-mounted	Un-mounted
Color	Milky pinkish brownish Red
Fluorescence	Inert

Sample of Manikya passed all the ancient criteria of genuine Manikya (Ruby). Raw Ruby and MB was also analyzed using the technique like DLS, NTA, XRD.

Dynamic light scattering (DLS)**Instrument**

Malvern Mastersizer Ver. 2000 5.31

Place

IIT, Powai, Mumbai, India

A rolling table with a partly adjustable incline piece was constructed from hardboard and mounted on a steel frame. It was varnished with ordinary wood varnish to present a smooth surface along which movement could take place. Glass jars of various sizes were filled with different masses of the various materials and rolled from a fixed position with inclined part down the rolling Table. The positions where the jars came to a stand. Still on the flat part of the table readings were recorded and noted. Each measurement was performed 3 times and the values obtained were arranged as shown in [Table 2] [Figure 1]

Table 2: Particle size of Raw Ruby by DLS

Sample	Test below	Observation
Raw Sample of Ruby	10 % particles	134.717
	50 % particles	706.819
	90 % particles	1445.421
	100 % particles	1999.400

The average particle size of Raw Ruby was 1071.58nm

Nano-particle tracking analysis (NTA)**Instrument**

Nano particle tracking analyzer

Place

Institute of Science, Churchgate, Mumbai, India

The bhasmas were placed in a container and dispersed in liquid media. The light scattered by the particles is captured using a CCD or EMCCD camera over multiple frames. Computer software is then used to track the motion of each particle from frame to frame. The rate of particle movement is related to a sphere equivalent hydrodynamic radius as calculated through the Stokes–Einstein equation. [Table 3] [Figure 2 and 3]

Table 3: Particle Size of Manikya Bhasma BY NTA

S. No.	Sample	Particle size (nm)
1	Hartaladi marit Manikya Bhasma (MB1)	43
2	Vanaspadi marit Manikya bhasma (MB2)	63

Particle size of both the samples was in nano scale. Hence Both Manikya bhasma were proved as a Nano-medicine

X - ray diffraction study (XRD)**Instrument**

Philips Holland XRD system

Place

IIT Institute, Powai, Mumbai, India

The powdered sample was spread on to a double side tape with spatula, which was then placed on an aluminium sample holder. All the peaks were recorded on the chart, and the corresponding 2 theta values were calculated. The strongest peak identified in the samples was corundum which is compiled in [Table 4 & 5] [Figure 4, 5 and 6]

Table 4: X- ray diffraction of raw ruby

2-Theta value	d-spacing	Intensity
25.580	3.479	100
26.621	3.346	10.7
27.480	3.243	6.1
35.140	2.552	84.3
37.780	2.379	35.5
43.360	2.085	97.5
52.580	1.739	64.2

Table 5: X- ray diffraction of Manikya Bhasma

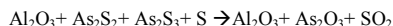
MB 1			MB 2		
2-Theta value	d-spacing	intensity	2-Theta value	d-spacing	Intensity
43.560	2.0760	642	25.660	3.4688	321
44.540	2.0326	649	25.760	3.4556	1029
52.040	1.7559	299	25.800	3.4503	1396
52.160	1.7521	304	25.860	3.4424	1492
52.320	1.7471	266	25.920	3.4346	1117
52.680	1.736	782	25.980	3.4268	550
52.820	1.7318	527	35.300	2.5405	908

Table 6: Results of elemental analysis of raw ruby, Manikya Bhasma [MB 1] and [MB 2]

Elements	Raw Ruby	MB 1	MB 2
Al	51.2	43.8	43.2
Cu	21.6	115.2	81.6
Fe	1600	34996	33316
Cr	2884	3884	3748
K	274	2644	2684
Na	52	4048	4460
Ca	174.4	15820	15316
Mn	ND	506	503
Mg	1004	8828	8660
As	ND	ND	ND
S	ND	ND	ND

DISCUSSION

As a result of different stages of processing techniques like shodhana (which involves roasting, with addition of herbal juices and continuous stirring) and marana [which involves bhavana (wet trituration) and puta system of heating], the particle size reduces significantly, which may facilitate absorption and assimilation of the drug into the body system. Calcination is a process in which the metal or mineral is heated strongly in the absence of air. Even in case of Marana, the materials are heated in closed earthen discs to avoid air entry. In modern metallurgy this calcination is used to get the pure metal which is devoid of unwanted materials. Manikya is in Aluminum oxide form, when heated it may be in same form.



Marana is an endothermic reaction in which energy supplied is in the form of heat so that temperature will remove the instability or distortion and then cooling at a slow rate, so that the room temperature is stable. Its purposes are inducing a completely stable refining and homogenizing the structure, reducing hardness, attaining desire quality of Bhasma. According to this law, the rate of heat flow through a uniform material is proportional to the area and the temperature drop

Elemental Analysis by (ICP-AES)

Inductively coupled plasma (ICP) can be generated by directing the energy of a radio frequency generator into ICP argon gas. Coupling is achieved by generating a magnetic field by passing a high frequency electric current through a cooled induction coil. This inductor generates a rapidly oscillating magnetic field oriented in the vertical plane of the coil. Ionization of the flowing argon is initiated by a spark from a Tesla coil. The resulting ions and their associated electrons from the Tesla coil then interact with the fluctuating magnetic field. This generates enough energy to ionize more argon atoms by collision excitation. The electrons generated in the magnetic field are accelerated perpendicularly to the torch. At high speeds, cat-ions and electrons, known as eddy current, will collide with argon atoms to produce further ionization which causes a significant temperature raise. Within 2 ms, a steady state is created with a high electron density. Plasma is created in the top of the torch. A long, well-defined tail emerges from the top of the high temperature plasma on the top of the torch. This torch is the spectroscopic source. It contains all the analyte atoms and ions that have been excited by the heat of the plasma. The results obtained are given in [Table 6]

and inversely proportional to the length of the path of flow. Heat always conducts from warmer objects to cooler objects. The composition of a material affects its conduction rate. By this law we can explain the heat flow to the pellets through discs in gajaputa. If the pellets are flat then length decreases and uniform heat flow can be maintained throughout the sample. Particle size reduced from 1071.58 nm to 53 nm after bhasma process. It is thus significant reduction of size and that allows the phenomenon of rekhapurnata and varitara to develop which could be specified as the criteria for the final product confirming to all the traditional parameters under the bhasma pariksha (examination of properly prepared bhasma). Reduction in particle size facilitates absorption and assimilation of the bhasma in the system. Again the clusters of particles are regular and uniform in the final bhasma in comparison to raw material. The particle size recorded can be characterised as the desired specification of the final bhasma.

CONCLUSION

Thus, modern techniques can assist proper characterization of Ayurvedic dosage forms and standardization of Ayurvedic medicines.

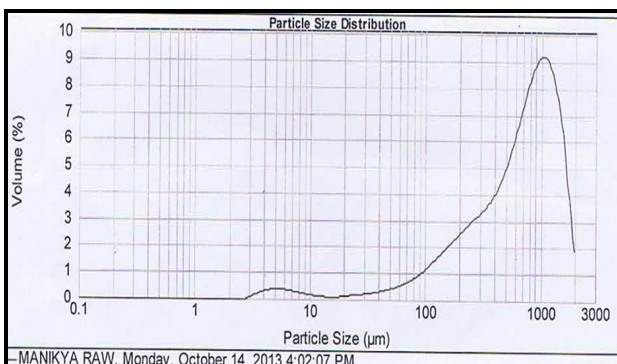


Figure 1: Particle size of Raw Ruby by DLS

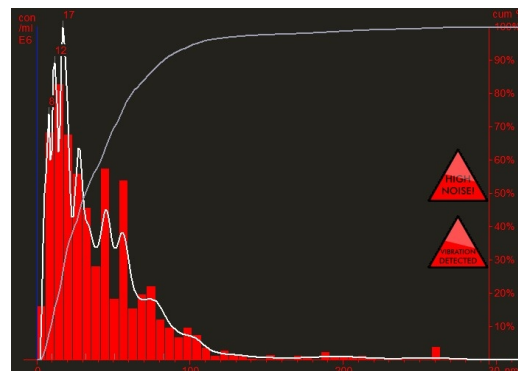


Figure 2: Particle Size of Manikya Bhasma [MB1] BY NTA

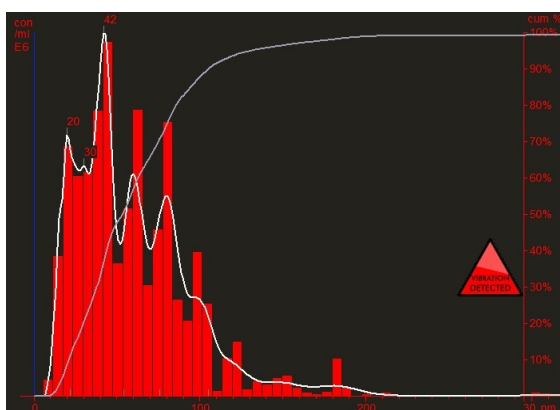


Figure 3: Particle Size of Manikya Bhasma [MB2] BY NTA

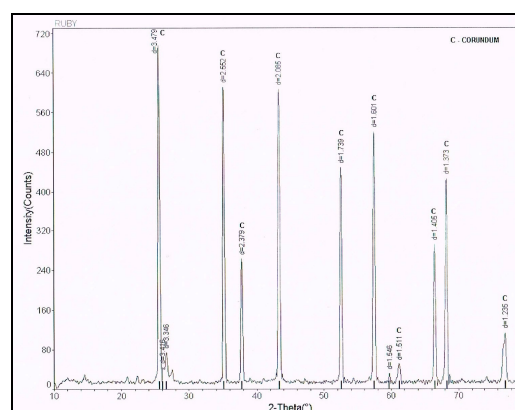


Figure 4: X-ray diffraction of raw Ruby

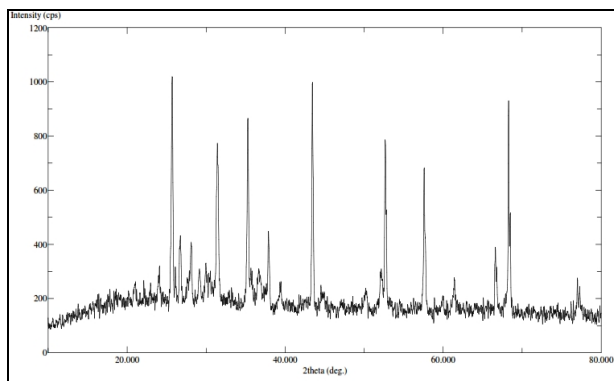


Figure 5: X-ray diffraction of Manikya Bhasma [MB1]

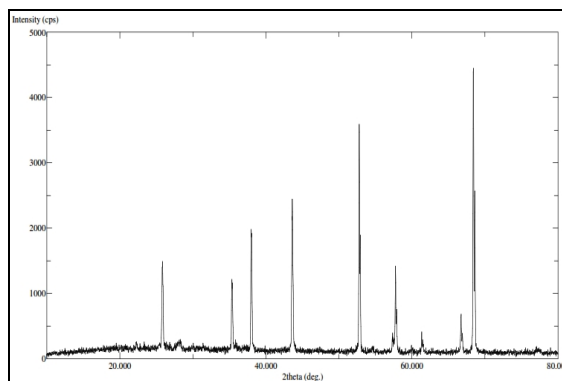


Figure 6: X-ray diffraction of Manikya Bhasma [MB2]

Glossary of important terms used in this article

Varitara

The bhasma that floats on water is termed as varitara.

Nischandra

The sparkling particles (Chandrika) in a bhasma indicate a semi –finished product.

Putra

In continuation with the etymological meaning, putra is the measure of the amount of heat required to convert or transform any metal or mineral. This amount is substance specific and measured in terms of number or weight of fuel.

Bhavana

Trituration of the drug with liquid medium, e.g. manahshila with juice of fresh *Zinzibar officinalis*

Sharav

Earthen petri dish having specific measurements

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