INTERNATIONAL
AYURVEDIC MEDICAL
JOURNAL

IAMJ

International Ayurvedic Medical Journal, (*ISSN: 2320 5091)* (July, 2017) 5(7)

EFFECT OF NUMBER OF PUTA ON PARTICLE SIZE OF VANG BHASMA

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ABSTRACT

Vang Bhasma is an important one amongst the metallic *Bhasma*. It is widely used by clinicians in *Prameha, Medoroga, Shukra Vikara* and many other ailments. Mainly *Gaja Puta, Ardhagaja Puta* and *Laghu Puta* have been described for *Marana* of *Vang* using a variety of levigation media. The number of *Puta* to be given also varies in relation to type of *Puta* and levigation media to be used. In this study, three samples S_1, S_2 and S_3 of *Vang Bhasma* were prepared by using *Aloevera* pulp as levigation media at 600-800^{0}C temperature using Electric Muffle Furnace. They were given 10, 15 and 20 *Puta* respectively. All the three samples were analyzed at a Govt. approved laboratory by HELOS Particle Size Analyzer. The Volumetric Mean Diameter of the three samples S1, S2 and S3 was found to be 7.63 µm, 6.07 µm and 4.86 µm respectively. It was found that number of *Puta* given to *Vang Bhasma* directly affects on its particle size. More number of *Puta* results in finer *Bhasma*. So, 20 *Puta* is more convenient for *Marana* in reference to particle size of *Vang Bhasma*.

Keywords: *Bhasma*, *Puta, Marana*, Particle size, Volumetric Mean Diameter

INTRODUCTION

Ayurveda is the science made up of *Ayush* (life) and *Veda* (knowledge) i.e. knowledge of life[1]. It is believed that *Ayurveda* had its origin in *Atharvaveda* which consists of many hymns, narrating information on various subjects including human health, engineering and astrology[2]. An *Ayurvedic* system adopts a holistic approach towards health care by balancing the physical, mental and spiritual functions of the human body. *Rasa Shastra* (Vedic alchemy) is a branch of *Ayurveda*, which deals with herbo-mineral/metalic/non-metalic preparations called *Bhasma*[3]. *Rasayana* (Immunomodulation and Anti-aging quality) and *Yogavahi* (ability to target drugs to the site) are characteristics of a properly made herbo-

mineral/metalic/non-metalic preparation, which is also non-toxic, gently absorbable, adaptable and digestible in the body[4]. Concept of reduction of particle size of metals is prevailing since *Charak Samhita* (1500 BC) for a metallic preparation i.e. *Lauhadi Rasayan*. For purification, a mineral/metal is heated upto when it becomes red hot and quenched in some liquid media immediately until flakes of metal become fine powder[5]. It is then treated with herbal juices or decoction and exposed for certain quantum of heat as per *Puta* to make its *Bhasma*.

Aims and Objectives

To observe the effect of number of *Puta* on the particle size of *Vang Bhasma*

Materials

The raw material *Vang* (Tin) was procured from Govt. approved laboratory. Other herbs like *Aloevera, Apamarga* and materials used during *Shodhana* (Purification) were procured from Govt. Herbal Garden. The samples of these materials were authenticated and identified from accredited institutes.

Methods

Preparation of *Vang Bhasma*

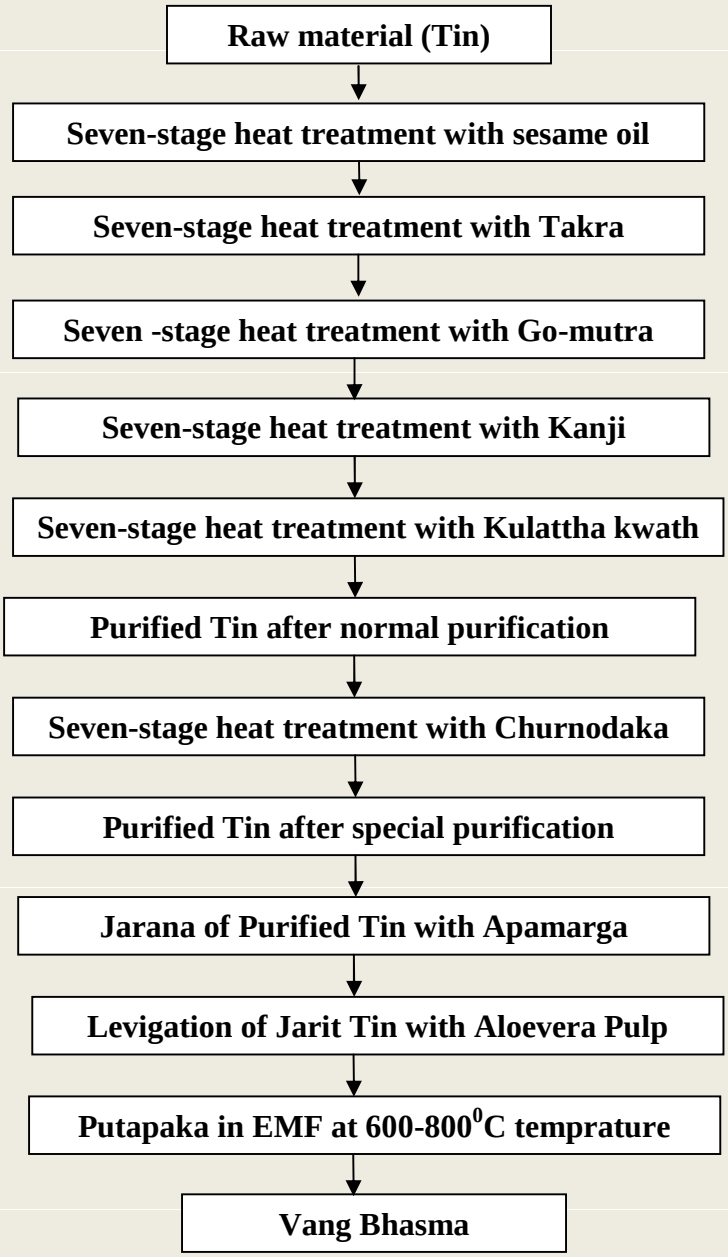
Preparation of *Vang Bhasma* involves three stages:

1. ***Samanya Shodhana*[6]:** For *Samanya Shodhana*, the raw material was subjected to heat treatment in different treating liquids. This procedure is called *Dhalana* (Quenching). In this, the raw material was heated upto its melting point and poured in sufficient quantity of treating liquid. The solid particles formed were recovered by filtration while the spent liquid was rejected. This procedure was repeated seven times by using fresh treating liquids each time. The treating liquids used were *Til* (*Sesamum indicum* L.) oil, *Takra* (butter milk), *Go-mutra* (cow urine), *Kanji* (rice gruel) and decoction of *Kulattha* (*Dolichos biflorus* L.).
2. ***Vishesha Shodhana*[7]:** The solid material obtained after *Samanya Shodhana* was subjected to Special purification by similar heat treatment in *Churnodaka* (lime water) for seven times.
3. ***Jarana*[8]:** The solid material obtained after *Vishesha Shodhana* was subjected to *Jarana* process, in which it was heated in an iron pan along with the addition of *Apamarga* (*Achyranthes aspera* Linn). Continuous stirring of this mixture was done using iron spatula for about three hours. After that, it was heated upto 400^0 C for about 4-6 hours followed by cooling, which facilitates solidification.
4. ***Marana*[9]:** The material obtained after *Jarana* stage is expected to be soft enabling mixing by levigation with *Aloevera* juice. A paste was obtained after levigation with *Aloevera*, which was then made into thin flat discs called *Chakrikas*. These were dried under sunlight and taken in an earthen bowl, covered with another earthen bowl with interface between them sealed with a clay-smeared cloth. This arrangement is referred to as *Sarava samputa* in *Ayurveda*. *Putapaka* (calcination) was carried out in Electric Muffle Furnace by placing *Sarava samputa* into it. It was heated at temperature ranging from 600^0 C to 800^0 C for 1

hour[10]. Then it was allowed to self cooling. The material was recovered by breaking *Sarava samputa*. The temperature profile during *Puta* was monitored using a K-type thermocouple connected to a digital temperature indicator.

In this way, 3 different samples of *Vang Bhasma* were prepared by using 10, 15 and 20 Puta respectively.

Flow Chart of Preparation of *Vang Bhasma*



Characterization of *Bhasma*[11]

Description, Colour, Odour, Identification (chemical), Particle size or mesh size, Loss on drying at 105^0C, Total ash, Acid insoluble ash, Water soluble ash, Assay of element, *Ayurvedic* specifications, Lustreless (*Nishchandrica*), Fine enough to enter the crevices of finger (*Rekha purnatva*), Floats on water (*Varitara*), Smokeless (*Nirdhoom*), Tasteless (*Niswadu*) and Irreversible (*Apunarbhav*).

Particle Size Analysis of *Vang Bhasma*

The particle size analysis of *Vang Bhasma* was done at a Govt. approved laboratory using HELOS (H1004) & SUCELL Particle Size Analyzer (Sympatec Gmbh, Germany).

Observations and Results

The observations and results of *Vang Shodhana* (Table- 1), *Jarana* of *Shuddha Vang* and *Marana* of *Jarit Vang* (Table- 2) for all the three samples were documented. Maximum temperature given to all the three samples of *Vang Bhasma* was also recorded and is shown in Tables- 3. Result of particle size analysis for all the three samples is shown in Tables- 4.

Table 1: Observations during *Shodhana* of *Vang*

Media for *Shodhana*	Sample – S_1		Sample – S_2		Sample – S_3	
	Weight before *Shodhana*	Weight after *Shodhana*	Weight before *Shodhana*	Weight after *Shodhana*	Weight before *Shodhana*	Weight after *Shodhana*
Til oil	588 g	583 g	400 g	395 g	380 g	374 g
Takra	583 g	576 g	395 g	389 g	374 g	366 g
Go-mutra	576 g	570 g	389 g	384 g	366 g	351 g
Kanji	570 g	564 g	384 g	379 g	351 g	345 g
Kulattha kwatha	564 g	548 g	379 g	370 g	345 g	336 g
Churnodaka	548 g	534 g	370 g	364 g	336 g	328 g

Table 2: Observations during *Jarana* and *Marana* of *Vang*

Name of process	Sample – S_1		Sample – S_2		Sample – S_3	
	Weight before process	Weight after process	Weight before process	Weight after process	Weight before process	Weight after process
Jarana	534 g	575 g	364 g	404 g	328 g	360 g
Marana	575 g	538 g	404g	371 g	360 g	326 g

Table 3: Maximum temperature given to *Vang Bhasma* during *Puta*

No. of *Puta*	Maximum temperature given during *Puta*		
	Sample- S_1	Sample- S_2	Sample- S_3
1st	600 ^{0}C	600 ^{0}C	600 ^{0}C
2nd	600 ^{0}C	600 ^{0}C	600 ^{0}C
3rd	600 ^{0}C	600 ^{0}C	600 ^{0}C
4th	700 ^{0}C	600 ^{0}C	600 ^{0}C
5th	700 ^{0}C	600 ^{0}C	600 ^{0}C

6th	700 ^{0}C	700 ^{0}C	600 ^{0}C
7th	800 ^{0}C	700 ^{0}C	600 ^{0}C
8th	800 ^{0}C	700 ^{0}C	700 ^{0}C
9th	800 ^{0}C	700 ^{0}C	700 ^{0}C
10th	800 ^{0}C	700 ^{0}C	700 ^{0}C
11th	-	800 ^{0}C	700 ^{0}C
12th	-	800 ^{0}C	800 ^{0}C
13th	-	800 ^{0}C	800 ^{0}C
14th	-	800 ^{0}C	800 ^{0}C
15th	-	800 ^{0}C	800 ^{0}C
16th	-	-	800 ^{0}C
17th	-	-	800 ^{0}C
18th	-	-	800 ^{0}C
19th	-	-	800 ^{0}C
20th	-	-	800 ^{0}C

Table 4: Particle Size of *Vang Bhasma*

Parameter	Particle Size		
	Sample – S_1	Sample – S_2	Sample – S_3
X_{10}	1.45 µm	0.75 µm	1.21 µm
X_{16}	2.02 µm	0.90 µm	1.64 µm
X_{50}	5.46 µm	2.60 µm	4.07 µm
X_{84}	12.94 µm	11.03 µm	8.18 µm
X_{90}	16.39 µm	16.41 µm	9.71 µm
X_{99}	35.12 µm	41.18 µm	15.41 µm
SMD	4.26 µm	1.85 µm	3.94 µm
VMD	7.63 µm	6.07 µm	4.86 µm

DISCUSSION

The purified *Vang* (Tin) obtained after *Samanya* and *Vishesh shodhana* was subjected to *Jarana* process using *Apamarga*. Then it was levigated with fresh *Aloevera* pulp for about 8 hours. *Aloevera* contains useful compounds like polymannans, anthraquinones and lectins. Anthraquinones are well-known metal-chelators capable of coordinating with nickel, cobalt, tin etc. The tirturation of *Jarit Vang* in *Aloevera* juice results in the reduction in its particle size, accompanied by an increase in surface area. Since most of the solid-fluid interactions take place at the external surface of the solid, these interactions are promoted through increase in surface area by the presence of particles of smaller sizes. Increased number of *Puta* also leads to increase in the property and potency of *Bhasma*. It reaches to higher molecular level and shows quicker action on the body[12].

CONCLUSION

The temperature pattern observed over different '*Puta*' cycles indicate a consistent pattern, of certain degree of heating and cooling, essential for the formation of particles of well-defined morphology and crystallinity, which

were confirmed through scanning electron microscopy and X-ray diffractometry. Significant increase in surface area as a result of *Puta* confirmed the essentiality of *Puta* step for administering metallic supplements in biocompatible form. The particle size of *Vanga Bhasma* was found to be decreasing while increasing the number of *Puta*. It denotes that more the number of *Puta* results in finer *Bhasma*. Thus, 20 *Puta* is more convenient to form superior *Bhasma* of *Vang* in reference to Particle Size.

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Source of Support: Nil
Conflict Of Interest: None Declared

How to cite this URL: Amit Bhatt Et Al: Effect Of Number Of Puta On Particle Size Of Vang Bhasma. International Ayurvedic Medical Journal {online} 2017 {cited July, 2017} Available from: http://www.iamj.in/posts/images/upload/2372_2377.pdf