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PREPARATION AND CHARACTERISATION OF NANO SWARNA BHASMA

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Abstract

Ayurvedic sastric preparation used widely as immunomodulatory agent – Swarna bhasma is prepared by a novel method to obtain nano swarna bhasma in liquid form. The bhasma prepared traditionally and according to novel method, are compared by applying physiochemical evaluation and modern method of analysis namely Atomic Absorption Spectroscopy (AAS). The marketed swarna bhasma samples were also purchased and subjected to same evaluation procedure. The conclusion is that the nano swarna bhasma and the marketed preparation are qualitatively the same and contains gold as proved by AAS.

Keywords: Swarna bhasma, nano swarna bhasma , Atomic Absorption Spectroscopy.

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INTRODUCTION

Ayurvedic sastric preparations have been manufactured according to the procedure detailed in the scriptures and are followed for generations. As technology evolves, there are new discoveries and novel method of preparations have been investigated by scientists and practitioners all over the world. General public have been led to believe that Ayurvedic preparations contains heavy metals and are poisonous due to negative publicity. With an aim to benefit humanity, to reach real Ayurveda to deserving patients, to bridge the gap between novel technology and ancient truth, this work was envisaged to prepare swarna bhasma by a radically different approach than mentioned in the Ayurvedic textbooks. Bhasmas (ash) are the fine powdered ayurvedic compounds which are prepared from pure metals, minerals, herbs and animal products by treating them with herbal juices or decoction and exposed high quantum of heat (puta). Swarna Bhasma (Gold ash) is one of an ancient popular ayurvedic formulation. Swarna Bhasma (SB) has many therapeutic applications in both ancient and modern medicine. As they are biocompatible, non-antigenic in nature, non-toxic, they will be readily absorbed and assimilated in the body [1]. In ayurvedic medicine, swarna has been used to boost the immunity, enhance strength and promote longevity. Depending on the diagnosis, the dose of swarna bhasma was determined by the practitioner [2]. SB has been used to treat dysentery, acidity, hiccup, jaundice, consumption, memory loss, fever, heart diseases, rheumatism, gout, morbid voice change, leprosy, diabetes mellitus, nervous diseases, aging, effect of poison and respiratory diseases like bronchial asthma [3, 4]. It was also reported as an immunostimulant. In addition to its therapeutic application, the gold nanoparticles (AuNPs) are also known for its significant drug delivery ability. They provide fast and selective drug delivery to targeted site in the body even across the blood brain barrier.

METHOD OF PREPARATION OF NANO SWARNA BHASMA (NSB):

The traditional preparation method which includes shodana, marana and puta is time consuming, involves use of heavy metals and depends on the expertise of the manufacturer to ensure reproducibility. To overcome the limitations experienced in the traditional method of preparing the bhasma, a novel method of preparation of nano swarna bhasma (NSB) without making use of mercury was developed. The procedure of preparation of NSB is as follows: Gold leaves were tested for purity and triturated to form small particles (1 part). To this, extracts of tila (0.5 part), mango leaves aqueous extract (1 part), fresh lime juice (2 parts), bay leaves (aqueous extract) (0.5 parts), papaya fruit extract (freshly made) (3 parts) were allowed to mix on a magnetic stirrer for 3

to 4 hours. Then the mixture was sonicated for 24 hours at room temperature and filtered. The final product is a purplish red colored solution. This is the final form of Swarna Bhasma.

The product SB is in the form of liquid and active ingredient is swarna with reduced particle size in the nanometer range. The product is subjected to physiochemical analysis and qualitative assessment is executed by advanced technique for metal testing, namely Atomic Absorption spectroscopy. These analyses are required for the standardization and global acceptance of NSB. These are needed for the characterization of nano swarna bhasma.

PHYSIOCHEMICAL EVALUATION

Analysis using parameters described in Ayurveda texts

The final bhasma was analyzed for quality control as described in Ayurvedic texts as follows and found suitable:

1. Nischandratva: The bhasma was taken in a Petri dish and observed for any luster in daylight through magnifying glass. No luster was observed in the bhasma.
2. Rekhapurnatvam: 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.
3. Varitaratavam: A small amount of the prepared bhasma was sprinkled over the still water in a beaker. It was found that the bhasma particles floated over the surface of the water.
4. Nisvadutvam: The prepared bhasma was found to be tasteless when a small amount was kept on the tongue.
5. Amla pariksha: A pinch of prepared bhasma was mixed with a little amount of dadhi (curds) in a clean and dry Petri dish and observed for any color change. No color change of dadhi was observed. The same procedure was followed with lemon juice taken in a test tube, and the same result was observed.
6. Avami: Ingestion of 5-10 mg of the bhasma did not produce any nausea/ vomiting.

Description (Rupa, varna, sparsha, gandha, rasa): The NSB is visually evaluated for physical state, colour, feel when touched, smell and taste. Clarity by filtration process (Rekhapurnata): 25 ml of NSB prepared was passed through 0.45 micron Whatman filter paper. The filter paper was visually observed for the presence of any solid particle.

Identification of Swarna (Gold) by Atomic Absorption Spectroscopy (AAS)

This test was executed in Asthagiri herbal research foundation, Perungudi, Chennai.

The prepared NSB and marketed preparation were subjected to identification test by AAS and the result identified the presence of gold (swarna) in both the samples—marketed and sample prepared by the novel method.

COMPARISON WITH MARKETED SWARNA BHASMA:

To test whether the swarna bhasma prepared is qualitatively similar to currently available marketed preparation, comparison was also executed. Both NSB and marketed sample was subjected to all the tests and results obtained are tabulated. Swarna bhasma was purchased from Ayurvedic pharmacy.

Manufacturer: Shree Dhootapapeshwar Ltd. Batch number: P170300279.

RESULTS

Nischandratva: No luster was observed in the marketed preparation and in nano swarna bhasma.

Rekhapurnatvam: It was observed that the marketed bhasma entered into the lines of the finger, and was not easily washed out from the cleavage of the lines. Nano swarna bhasma did not stick to any surface.

Varitaratavam: The marketed bhasma particles floated over the surface of the water, whereas nano swarna bhasma was miscible in water.

Nisvadutvam: The marketed and prepared bhasma was found to be tasteless when a small amount was kept on the tongue.

Amla pariksha: Both marketed and prepared swarna bhasma did not show any color change from baseline.

Avami: Ingestion of marketed bhasma and nano swarna bhasma did not produce any nausea/vomiting.

Other observed results are tabulated.

Table 1: Physiochemical evaluation

Parameter	MSB	NSB
Appearance (Rupa)	Solid	Liquid
Color (Varna)	Yellow powder	Purplish red solution
Taste (Rasa)	Bland	Bland
Touch (Sparsha)	Fine	Liquid, No gritty particles
Smell (Gandha)	NIL	NIL
Metallic sound (Shabda)	NIL	NIL
Fineness (Rekhapurnata)	Super fine	No solid particles

Abbreviation: MSB – Marketed Swarna Bhasma, NSB- Nano Swarna Bhasma

DISCUSSION AND CONCLUSION

NSB is a liquid with no characteristic odor, taste and smell but is in purplish color. Marketed swarna bhasma is yellow colored superfine powder with no characteristic odor, taste and smell.

AAS analysis reports the presence of swarna in both NSB and marketed preparation.

From the analysis of the results, it is evident that the method of preparation is simple, economical and fast method of preparing swarna bhasma with nanoparticle size distribution in liquid form.

Qualitatively the NSB contains swarna as proved by AAS identification method.

To conclude, the marketed swarna bhasma and the nano swarna bhasma are qualitatively the same.

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