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Standardization of anti-arthritic herbo-mineral preparation

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ABSTRACT

Rasa Bhasma is a multi-ingredient herbo-mineral or herbo-metallic formulation used in the treatment of rheumatoid arthritis. The quality of prepared *Rasa Bhasma* depends on the quality of raw material and standard manufacturing practice. Standardization techniques help in ensuring the safety and efficacy of the product. Hence the prepared *Rasa Bhasma* was subjected to both the traditional and modern standardization techniques. Result of the present study suggest that the prepared *Rasa bhasma* satisfied the required criteria of traditional standardization techniques and the modern standardization techniques confirmed the presence of metals such as Iron, Copper, Manganese, Zinc, Nickel, Cobalt, Arsenic, Cadmium, Lead and Mercury in the prescribed pharmacopeial limit. Infrared spectra analysis confirmed the absence of organic compounds. Hence the quality of the prepared *Rasa Bhasma* was established using traditional and modern standardization techniques.

Keywords: Rasa Bhasma, Herbo-mineral, Rheumatoid Arthritis, Standardization,

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INTRODUCTION

Bhasma (calcified powder or ash) are herbo-mineral or herbo-metallic formulation. The section of ayurveda which deals with Bhasma is referred as 'Rasa Sastra'. Buddhist Philosopher Nagarjuna who was considered as father of metallic medicine in India used metals and minerals in the form of Bhasma as therapeutic agent in ayurvedic system of medicine from prior 8th century A.D. Metals in Bhasma are believed to provide an enhanced bioavailability to the herb, also act as carrier and catalyst for many process [1-3]. The quality of raw material and practice of standard manufacturing practice determines the quality of final product. Use of inferior grade of raw material, adulteration and deviations in standard manufacturing practice either intentionally or unintentionally, leads to the production of inferior quality products, which not only rise the concern over the efficacy but also the safety. Standardization techniques help in ensuring the safety and efficacy of the product. Ayurvedic textbooks have described the quality control procedures for the finished products through different parameters like nischasndratva, varitara, nirutha, apunarbhava, etc., to achieve a specific acceptable standard bhasma [4].

Rasa Bhasma was taken up for the study based on its usage in the treatment of rheumatoid arthritis by the ayurvedic physician around Thanjavur district of Tamil Nadu, India. The present study utilizes traditional and modern standardization techniques to characterize the prepared *Rasa Bhasma*.

MATERIAL AND METHODS

Ayurvedic physician utilize the following material and method for the preparation of *Rasa Bhasma*.

Material

Rasam [Mercury] (1 Kg), Lime salt (1 Kg), Annapathi (1 Kg), Karium (750 gm), Appalakaram (500 gm), Hot water, Apparatus used are Mortar, Pestle, Cloth and Bowl.

Preparation of *Rasa Bhasma*

Equal quantity (1 kg) of melted rasam and lime salt was triturated for 24 hrs (eight hours in a day for 3 days). Followed by addition of 750 gm of karium, 1 kg of Annapathi and 500 gm of Appalakaram and triturated for sufficient duration. Resultant was heated, washed with hot water and filtered using a double folded cloth to obtain the rasam.

Standardization described in ayurveda textbooks [4]

The prepared *Rasa bhasma* was analysed for quality control as described in ayurvedic textbooks as follows and found suitable:

Nischandratva

The *Rasa bhasma* was taken in a Petri dish and observed for any luster in day light through magnifying glass.

Rekhapurnatvam

A pinch of bhasma was taken in between the thumb and index finger and rubbed.

Varitaratavam

A small amount of the prepared bhasma was sprinkled over the still water in a beaker.

Amla pariksha

A pinch of prepared bhasma was mixed with a little amount of curds in a clean and dry petri dish and with a little amount of lemon in a clean and dry test tube for any colour change.

Avami

Ingestion of 5-10 mg of the bhasma to observe nausea/ vomiting.

Modern standardization techniques

Physicochemical characterization of *Rasa Bhasma* [5-10]

Physicochemical characterizations such solubility, loss on drying, total ash value, water soluble extractive value, alcohol soluble extractive value, pH determination, bulk density, particle size analysis and estimation of heavy metals were performed using stranded procedures mentioned elsewhere. Infrared spectra of prepared *Rasa bhasma* were obtained by scanning the product in the range of 400-4000 cm^{-1} .

RESULT AND DISCUSSION



Figure 1: Prepared Rasa Bhasma

Rasa Bhasma was prepared as per the procedure mentioned in literatures (Figure 1). To ensure the quality of prepared *Rasa Bhasma*, it was standardized by traditional methods mentioned in textbooks and also standardized by modern techniques and the results of the standardization were summarized below.

Standardization described in ayurveda textbooks

Table 1: Summary of traditional standardization

| Techniques | Observations |
|-----------------------|---|
| Nischandratva | No lusters were observed in <i>Rasa bhasma</i> . |
| Rekhapurnatvam | It was observed that the <i>Rasa bhasma</i> entered into the lines of the finger, and was not easily washed out from the cleavage of the lines. |
| Varitaratavam | It was found that the <i>Rasa bhasma</i> particles floated over the surface of the water. |
| Amla pariksha | No colour change of curd and lemon was observed. |
| Avami | Ingestion of 5-10 mg of the <i>Rasa bhasma</i> did not produce any nausea/ vomiting. |

Results of traditional standardization are summarized in Table 1. The result suggests that prepared *Rasa bhasma* satisfied the required criteria.

Modern standardization techniques

Physicochemical characterization of *Rasa Bhasma*

The prepared *Rasa Bhasma* was white in colour, odourless, metallic taste, alkaline in nature and in the size range of 0.5-10 μ . *Rasa Bhasma* was soluble in con HCL and con HNO₃. Other physiochemical properties of prepared *Rasa Bhasma* such as Loss on drying, bulk density, water soluble extract, alcohol soluble extract, total ash were found to be in acceptable range.

Heavy metal analysis

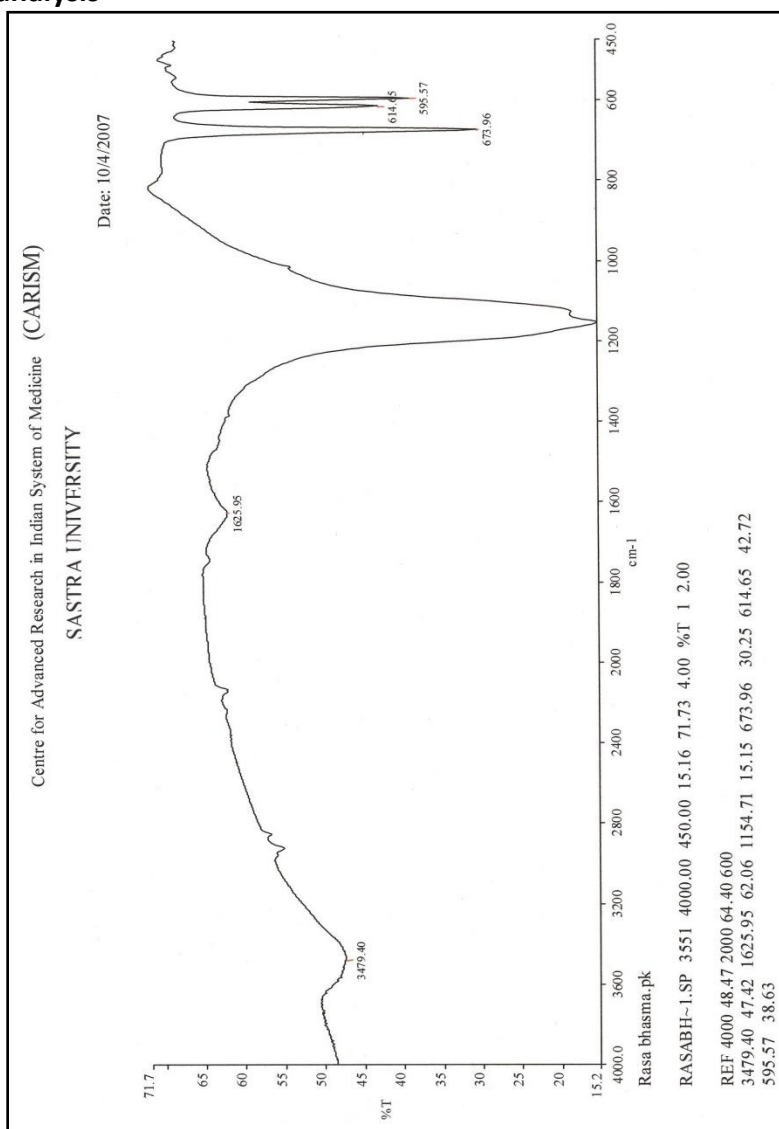
Table 2: Summary of modern standardization

| Parameter | Observations |
|-----------------------------|--------------------------------|
| Solubility | Con HCL & Con HNO ₃ |
| Colour | White |
| Odour | Odourless |
| Taste | Metallic |
| Loss on drying at 105 °C | 1.4981 w/w |
| Total ash (Acid insoluble) | 92.5896 % |
| Water soluble extractives | 4.1014 w/w |
| Alcohol soluble extractives | 6.5630 w/w |
| pH | 8.74 |
| Particle size | 0.5-10 μ |
| Bulk density | 1.799 gm/ml |
| Heavy metals | |

| | |
|----|-------------|
| Fe | 35.1200 ppm |
| Cu | 1.30667 ppm |
| Mn | 0.45333 ppm |
| Zn | 8.00000 ppm |
| Ni | 3.00666 ppm |
| Co | 0.88000 ppm |
| As | 1.76133 ppm |
| Cd | 0.13333 ppm |
| Pb | 5.76666 ppm |
| Hg | 56.233 ppm |

Estimation of heavy metals in *Rasa Bhasma* revealed that not only mercury, but also other metals like zinc, silver, arsenic, copper, tin were present in the prepared *Rasa Bhasma* and found to be acceptable with pharmacopeia. The results are summarized in Table 2.

Infrared spectra analysis



Infrared spectra (Figure 2) of prepared *Rasa Bhasma* when scanned in the range of 400-4000 cm^{-1} confirmed the absence of organic compounds in prepared *Rasa Bhasma*.

CONCLUSION

Prepared *Rasa bhasma* satisfied the required criteria of traditional standardization techniques and the modern standardization techniques confirmed the presence of heavy metals such as Fe, Cu, Mn, Zn, Ni, Co, As, Cd, Pb and Hg in the prescribed pharmacopeial limit. IR analysis confirmed the absence of organic compounds. Hence the quality of the prepared *Rasa Bhasma* was established using traditional and modern standardization techniques.

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