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# Comparative Physico Chemical Analysis of Sankha and Shukti Bhasma

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## Abstract

Sankha and Shukti are important calcium riched materials used in the ayurvedic medicine in the form of Bhasmas. They are either used as single compound or as ingredients in ayurvedic medicines. It is mainly found near costal region. Standardization of ayurvedic drugs is an burning topic now days. Well proved scientific method of pharmaceutical processings i.e. shodhana and marana of sankha and shukti are elaborated in Ayurvedic texts. Their bhasma was prepared by following the method described in texts and was analysis was done on both ancient and modern parameters for comparative study.

Key-Words: Ayurvedic, Sankha, Shukti, Bhasma, Calcium, Shodhana, Maran

## Introduction

Calcium riched material used in Ayurveda as medicines were included in different Vargas by Ancient acharyas of Rasa Shastra like Shukla Varga [1], Shodhaniya Gana [2], Shweta Varga [3], Uprasa [4], Upratna [5], and Shuktidi vigyaniyam [6].

But the author of Rasa Tarangani later on in the 20th century A.D., included them under *Sudha Varga* due to the predominance of calcium or *Sudha*. Both Sankha and Shukti bhasmas have been used in Ayurvedic practice since many centuries for amlapitta, agnimandya, grahani etc.[7,8]. Generally the pharmaceutical processings of sankha and shukti bhasma involved two main steps namely shodhana and marana. Process of shodhana (Purification) is performed by using swedana (boiling) technique with the use of different herbal juices like lemon juice, jayanti swarasa, tanduliya swarasa [9,10] etc. and marana (calcination) is done by using puta (quantum of heat) system of heating like Gajaputa[11,12]. With the development of science now a day's different pharmaceutical companies are adopting electrical muffle furnaces for better procedural convenience.

Bhasmas of sankha and shukti may be used single or as an important ingredient in different compound formulations.

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Earlier medicines were prepared by Physicians themselves for their patient. They followed all the instructions laid in texts. But now this trend is decreased. Many companies prepared the same medicines by following different methods. Variations in pharmaceutical procedures leading in different physico-chemical properties of the same bhasma. Hence for minimization of variability, validation of the bhasma is essential in terms of its scientific findings for better facilitating the market policy in the right way and to provide better treatment to the customer.

Ayurvedic texts have described ancient quality control methods for bhasma by using different parameters like varitara, rekhapurna, unnama, etc. to get desired standard bhasma. This study was designed to characterize the raw sankha and shukti and their bhasmas with different modern tools and techniques. The fingerprints thus generated could be used as standards to ensure the quality and reproducibility of the same raw material and bhasma.

## Material and Methods

**Processing's of Shukti Bhasma** [13, 14, 15, 16]

In the current study both the bhasmas of sankha and shukti bhasma were prepared in two phases like shodhana and marana. For the pharmaceutical process same method of shodhana and marana were followed for the preparation of both the bhasmas.

**Shodhana Process**

Raw sankha and shukti were collected at sea shore, shop of Puri, Orissa, lemon was collected from local market and juice was prepared.

At first sankha and shukti were made into small pieces and kept inside a pottali (cotton pouch) separately. Then these separate pottali were subjected for swedana (fomentation) in Dola yantra containing lemon juice, for 8 hours lasting to 3 days. The product thus obtained was called shodhita sankha and shukti correspondingly and were subjected for marana process.

**Marana process**

For marana of sankha and shukti ,the shodhita products were kept in an different earthen casserole and another casserole was covered over it, the joint was sealed by rag and mud for 7 times. Then the samputas were dried in sun light. Properly dried and sealed samputas were subjected to puta system of heating in electrical muffle furnace at about a temperature of $600^0$c. Then after self cooling the material was collected and triturated with tap water, pellets were prepared, dried and subjected to firing in electrical muffle furnace as described earlier. The same process was repeated for 03 times.

**Analysis using Ancient quality control parameters:**

**Nischandra**: Little amount of bhasmas were taken in different petri dish and observed in day light with magnifying glass. No shinning were observed in the prepared bhasmas.

**Niswadu**: The prepared bhasmas were found tasteless when a small amount was kept on the tongue.

**Rekhapurna**: Small amount of bhasmas were taken in between the thumb and index followed by rubbing. It was observed that the bhasmsa particle enters into the cleavage of the lines and was not easily washed out.

**Varitara**: Small amount of prepared bhasmas were sprinkled over stagnant water in two different beakers and were found floated over the surface.

**Analysis using Modern parameters**

**Field Emission Scanning Electron Microscopy (SEM) study**[17]

Properly mounted sample was kept inside the vacuum chamber of scanning electron microscope and air was pumped out. Then a beam of electron was emitted by an electron gun from the top that travels downward through a series of magnetic lenses to focus the electrons to the very fine spot of the sample. At the bottom a set of scanning coils were arrange which made the focused beams to move to and fro across the mounted sample row by row. As the electron beam hits the sample, secondary electrons backscattered, detected by the detector and the signals were sent to the amplifier. The final image was formed from the number of electrons emitted from each spot of the sample.

**Energy Dispersive X-Ray analysis (EDAX)** [18]

An EDAX machine attached with FESEM and used for the elemental analysis. The properly mounted sample was analyzed with the principle that interactions between electromagnetic radiation and sample and then analyzing the X-rays emitted by the sample in response to being hit with charged particles. The number and the energy of the X-ray emitted from the sample are measured by Energy dispersive spectroscopy and elements present are quantified. The method of working is same as employed in FESEM described earlier.

## Results and Discussion

In FESEM testing it was found that grains in the both raw material are not uniformly arranged (Fig 1 and 2) while uniform arrangements of grains are observed in the prepared bhasma (Fig 3and 4). The grain size of the raw material was found approximately 50- 100 micron while for the bhasma it was approximately 100nm.

In the elemental analysis from EDAX study (Table 1) it was found that calcium is the main element present in both raw material and bhasma form. Other elements like Mg, Al, Si, K, , Fe and Pb are found changed quantitatively in bhasmas but are seemed insignificant. Lead was present in trace amount in raw material which was found nill in bhasma after pharmaceutical processings.

**Table 1: Showing the elemental percentage of raw materials and bhasmas as analyzed by EEDAX method**

| Compound | Carbon | Oxygen | Magnesium | Aluminium | Silicon | Potassium | Calcium | Iron | Lead |
|---|---|---|---|---|---|---|---|---|---|
| **Raw Sankha** | 25.91 | 40.21 | 00.37 | 00.41 | 00.65 | 00.44 | 28.71 | 1.85 | 01.45 |
| **Raw Shukti** | 27.41 | 37.2 | 00.47 | 00.41 | 00.72 | 00.67 | 29.92 | 02.10 | 01.11 |
| **Sankha Bhasma** | 07.40 | 43.63 | 00.24 | 00.00 | 00.00 | 00.20 | 44.96 | 00.72 | 00.00 |
| **Shukti Bhasma** | 09.90 | 41.2 | 00.38 | 0.11 | 00.00 | 00.13 | 46.23 | .12 | 00 |

Sankha and Shukti are important calcium riched compounds used in the form of bhasma in Ayurveda. Many methods of processing for different calcium preparations are described in ayurvedic pharmaceutics. It is the demand of time to characterize the bhasma by using sophisticated scientific tools to determine the effect of the process. Both the bhasma were prepared and studied with this objective. Field emission scanning electron microscopy study reveals that the size of the raw materials are reduced from 50 – 100 micron to aprroximately 100nano micron in bhasma.This causes varitara (Floating on water) in the bhasma. The reduction in particle size facilitates the absorption and assimilation of the bhasma in the system. The clusters of grains are regularly arranged in bhasmas in comparison to raw materials. EDAX study reveals the increasing of calcium percentage in bhasmsa in comparison to raw sankha and shukti which suggests the proficient use of these bhasmas for therapeutic purposes as calcium supplementations.

## Conclusion

In bhasmas grains are found to be in more cluster form than raw materials. The grain size of the bhasmas are reduced significantly. This facilitates better absorption and assimilation of the bhasma in to the human physiological system to provide better effect. Also due to process effect the percentage of calcium in the bhasmas is significantly increased in comparison to raw materials that facilitates the logical clinical practice of calcium riched bhasmas in calcium deficiency diseases. Percentage of oxygen increases in bhasmas reveals regarding the process of oxidation. The scientific datas generated in this study can be the fingerprints for bhasmas of sankha and shukti prepared following same pharmaceutical procedures.

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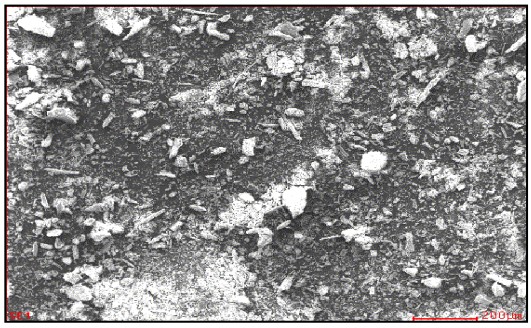

**Fig. 1: Raw Sankha**

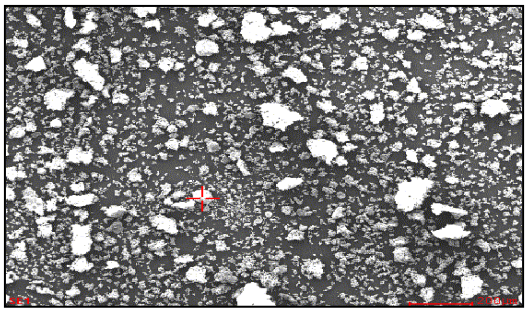

**Fig. 2: Raw Shukti**

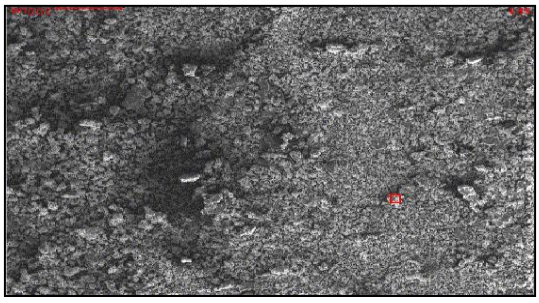

**Fig. 3: Sankha Bhasma**

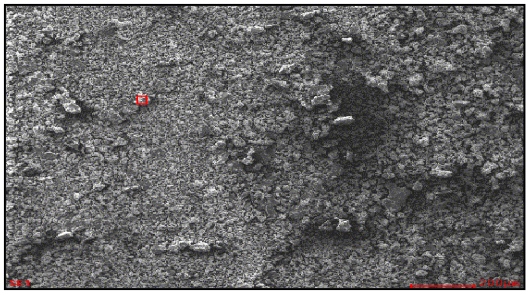

**Fig. 4: Shukti Bhasma**

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