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Short Communication

Comparative Study of Calcium Based Micro Fined Egg Shell Powder And Its *Ayurvedic* Formulation Egg Shell *Bhasma*

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ABSTRACT

The modern medicines now a day's shows an increased interest in the use of animal products. Since animal kingdom is so vast that enough and constant supply of raw material is possible for wider utilization and pharmaceutical preparations derived from animal source will be safer and can substitute corresponding synthetic products. Calcium is essential for all living organisms. Supplementary Calcium is used to prevent and treat Calcium deficiencies in food. The amount of Ca and other elements in the hen's egg shell and its acceptable limit is yet not reported. Hens egg shell bhasma is one of the organic form of Calcium carbonate used to treat osteoporosis that is in calcium deficiency. Hen's egg shell bhasma prepared in acidic medium is easily absorbed in the body. The acidic medias used are lemon juice and buttermilk at pH 2.4 and 3 respectively. Total five calcinations cycles are given to convert egg shell powder into the Bhasma state. The study showed that the egg shell is composed of an organic medium containing calcium carbonate in calcite form. The egg shell Bhasma formed in this way is characterized by instrumental techniques such as InfraRed spectrophotometry, Ultra Violet spectroscopy E- DAX and XRD. Here attempts are made to characterize hen's egg shell bhasma structurally and chemically.

Keywords: bhasmas.

INTRODUCTION

Ayurveda does not exclude any kind of animal from medicinal purpose, right from the tiny insects like bee to huge animal like elephant. This class of *Ayurvedic* medicines therefore includes innumerable resources for numerous pharmaceutical preparations.

Tons of egg shells are disposed in landfills which contains lot of Calcium and magnesium. Research shows that this hens egg shells can be used for adsorption of reactive dye, it is also used as catalyst for biodiesel production. Apart from this ayurvedic formulations prepared from egg shell are used as rich source of Calcium. Calcium obtained from egg shell *bhasma* is easily absorbable and assimilable in the body. The natural calcium present in this *bhasma*s is more effective than synthetic calcium. Determination of chemical composition of this byproduct is necessary to investigate biological role of hen's egg shell [6]. When this bio calcium from hen's egg shell was tested on pigs then it showed improved results than that of

purified calcium carbonate [3]. Chemical analysis of hen's egg shell shows that it is composed about 97% Calcium Carbonate. [1] Egg shell powder may be an essential source of Ca for human diet. [5].
Hen's egg shell bhasma in literature it is also known as *Kukutandatwak bhasma*. [7] It is a traditional *Ayurvedic* therapeutic formulation. Various *ayurvedic* calcium compounds have wide range of therapeutic applications. Acid neutralizing capacity is higher in kukutandtwak *bhasma* [4]. Hen's egg shell bhasma is prepared through heating of eggshell powder as described in classical *Ayurvedic* text. Work on this egg shell powder showed that the egg shell is composed of a organic medium containing calcium carbonate in calcite form. [2] Here attempt has been done to give some scientific base to ayurvedic medicine egg shell *bhasma* from modern scientific techniques such as electronic spectroscopy, Infra-red spectroscopy, X ray diffraction and energy dispersive X ray spectroscopy.

MATERIALS AND METHODS

Collection of egg shell sample and its purification: Hens egg shells were collected. These shells are washed thoroughly with water and dried under shade for 12 h. These egg shells are then soaked for three days in the (1:1) mixture of ammonium chloride and Sodium chloride at pH 7.5. After three days the mixture is filtered through ordinary filter paper and washed with water. Then these shells are dried and grinded into fine powder. Preparation of egg shell *Bhasma*: Transformation of purified micro fine egg shell powder into egg shell *bhasma* (*Kukutandtwaka Bhasma*) was done through the ayurvedic process of *bhasmikarana*. Natural acidic media which include lemon juice and buttermilk were employed for this purpose. Purified egg shell powder was soaked in sufficient quantities of lemon juice. The mixture was triturated in an agate mortar for three hours. The processed paste of egg shell powder was filtered through Whatman number 40 under suction to remove solvent part. The dried paste was then subjected to heating in silica crucible in muffle furnace by gradually increasing the heat with an interval of 100 ^{0}C till the end product becomes white. In this way first put was completed. About 5 g from this sample was stored for further studies.
The remaining part was again soaked in acidic juice and triturated in agate mortar again for three hours. Subsequently this was filtered, dried and subjected to heat and the process was repeated as mentioned above. In this way second put was completed. From this second put sample again 5 g of sample was stored for further studies. This entire process was repeated three more times to get the sample for put number 3, put number 4 and put number 5.

RESULTS AND DISCUSSION

The infra red spectrums:

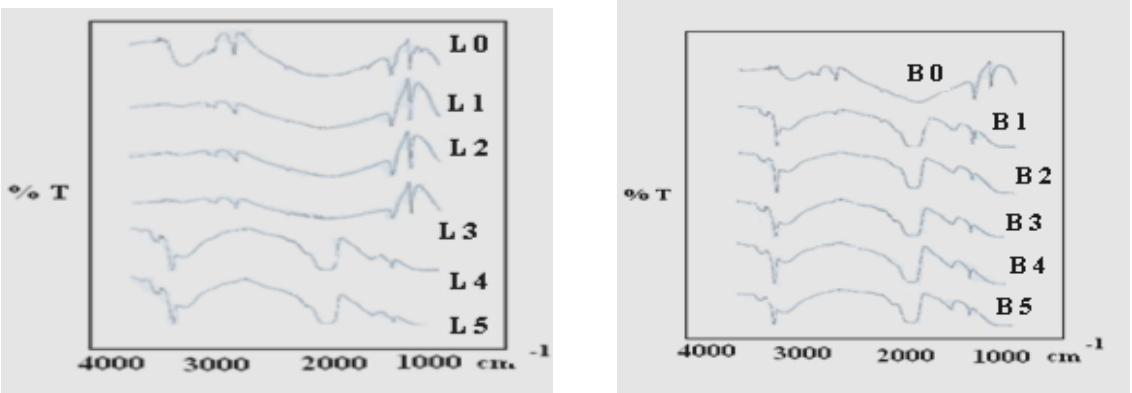

Fig I. Comparison of infra red spectrum of E.S *Bhasma* prepared using lemon juice and in buttermilk

All I.R spectra are mid infra red spectra. Infra red spectrum of egg shell powder shows sharp and intense bands. And hence this biomaterial shows presence of organic component. IR spectrum of the egg shell *bhasma* shows broadening of spectrum gradually after each heating i. e. putas. Hence organic component of biomaterial is lost after heating.

SEM images:

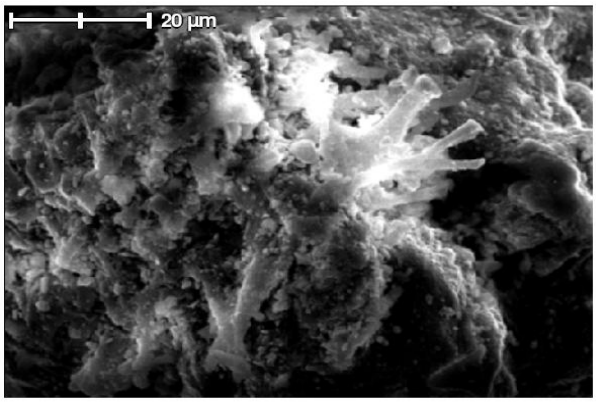

Fig 2. SEM photographs of E. S. powder

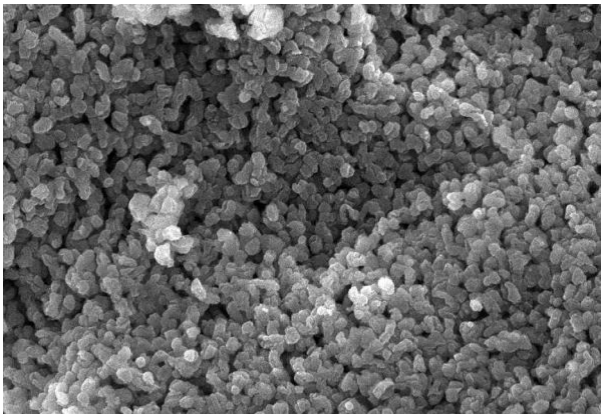

Fig 3. SEM photographs of E. S. *Bhasma* L 5

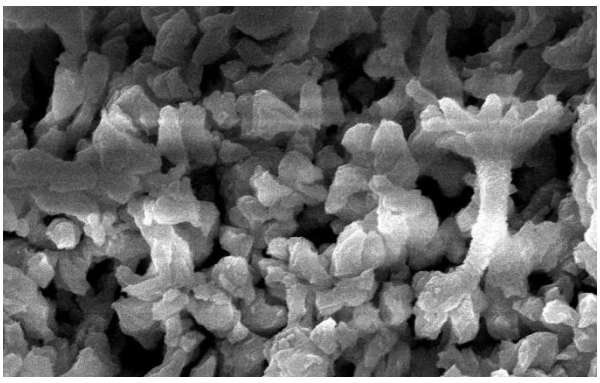

Fig. 4 . SEM photographs of E. S. *Bhasma* B 5

X ray diffraction investigations:

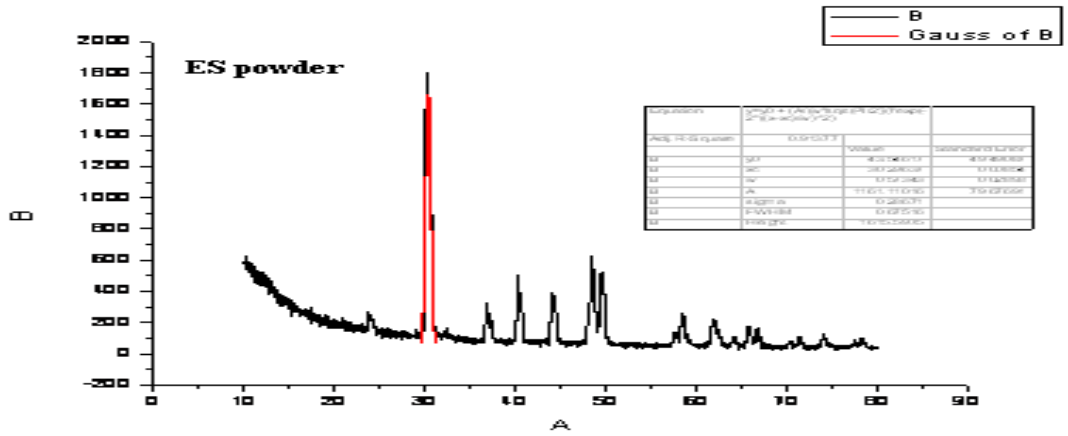

Fig. 5. XRD Patterns of E. S. powder

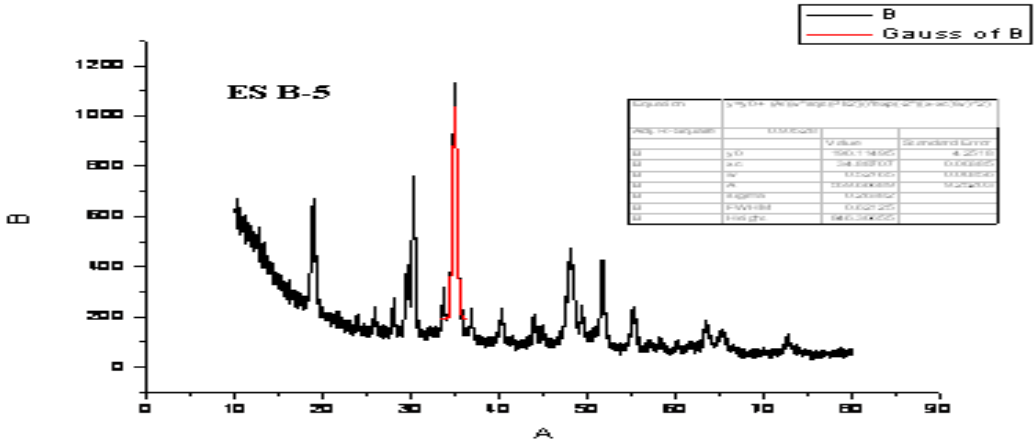

Fig.6 . XRD Patterns of ES *bhama* B 5

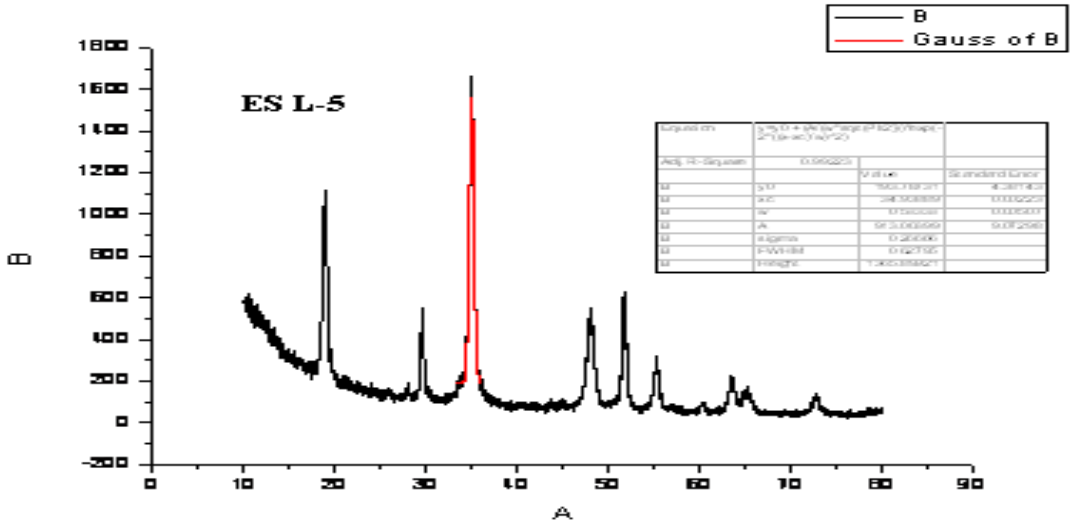

Fig.7. XRD Patterns of ES *bhama* L 5

Table I. Particle size of egg shell Bhasma samples.

Sr. No.	Name of the compound	FWHM	Angle 2θ	Particle size (nm)
1	E. S. Powder	0.33141	26.90766	24.65794
2	E. S. B-5	0.62125	34.88707	13.40985
3	E. S. L-5	0.62795	34.93889	13.26866

APPLICATIONS

The prepared bhasmas have better surface properties and are more useful.

CONCLUSIONS

The hen's egg shell *bhasma (Kukutandatwak bhasma)* prepared in present study passes all originality test of genunine *bhasma*. Egg shell *bhasma* floats on the water, it is able to enter in furrows of finger and it loses its luster. The most important property is, it is converted to micro fined structure and very soft in touch. The particles of egg shell powder appear to be spongy with large size of the agglomerates having heterogeneous nature. This macroscopic size and shape is converted into small/tiny particles having homogeneous size and identical shapes. This is the effect of *bhasmikarana* due to which relatively microscopic state of egg shell powder is transformed into nanometric *bhasma* state. This is an important finding which is likely to result enhancement of medicinal potency of the egg shell *bhasma*. The size and morphology of the egg shell *bhasma* particles is found to be dependent on nature of acidic media used for the synthesis. This is clearly reflected in the SEM photographs of the egg shell *bhasma* prepared using lemon juice and that prepared by using buttermilk. Egg shell *bhasma* synthesized by using lemon juice is more homogeneous possess relatively much smaller size and mostly identical size and shapes. As compared to this *bhasma* prepared by using buttermilk is composed of large size agglomerates, heterogeneous in nature and consists of different morphologies. Therefore nature of acidic has predominant effect on the size, shape and morphologies of the *bhasma* particles.

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