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Pharmaceutico - Analytical Study of Mahagandhakam

Dr. Priyanka. B. Patil[1], Dr. Ravi R Chavan[2]

[1]PG Scholar, [2]Professor & HOD, PG Studies,
[1,2]Department of RS & BK, Taranath Government Ayurvedic Medical College, Bellary, Karnataka, India

ABSTRACT

Mahagandhakam is Sagandha &Saagni pottali putapaka kalpana involves parpati& also pottali rasayana mentioned in Bhaishajya ratnavali grahani chikitsa. It is one such formulation having unique method of preparation. i.e Muktashuktipoorana instead of Kaparda Poorana of Pottalipaka. Muktashukti Bhasma is main content of final product. Drug possess the Pitta Kaphahara property. Mainly acts on Apanavayu correction indicated in Atisara, Grahani, Sootikaroga & Vajikaraka. Aim of this article is to explain prepare mahagandhakam & physico – chemical analysis of formulation by XRD, FTIR, SEM EDAX, Zeta Particle analysis technique. Conclusion of article found as it's complex compound rich of Calcium i.e CaO, $CaCO_3$ & CaOH traces of mercury & sulphur with the presence of organic functional groups.

KEYWORDS: *Mahagandhakam*

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INTRODUCTION

"Rasashastra" the word itself indicating, the science chiefly dealing with Rasa and many other minerals, metals, herbal poisons and aquatic origin substances got its establishment in the medival period when people felt its requirement owing to their changing life style. The unique contribution of Rasashastra includes Bhasma, Sindura, Parpati, Pottali and Khalwi Rasayanas etc. Pottalikalpana comes under moorchana of parada .this means aim behind this invention of pottalikalpana is to enhance the properties of a drug there by decreasing the dosage and to facilitate easy administration.

Mahagandhakam[1] is Sagandha &Saagni pottali putapaka kalpana involves parpati& also pottalirasayana. It is one such formulation having unique method of preparation.i.e Muktashuktipoorana instead of Kaparda Poorana of Pottalipaka.

The present study is to explain the pharmaceutical procedure & evaluate analytical parameters of the yoga Mahagandhakam.

MATERIALS & METHODS

PHARMACEUTICAL STUDY: PREPARATION OF MEDICINE

Preparation of medicine involves
Pre procedure of preparation of Mahagandhakam
Preparation of Mahagandhakam

Pre Procedure of Preparation Of Mahagandhakam

Preparation of Kajjali[2]

280gm of Sodhita Parada (purified mercury) was taken in an iron mortar and 280gm Sodhita Gandhaka Choorna (purified Sulphur powder) added to that little by little. The grinding was continued until Kajjali attained Sidha Lakshnas i.e tests mentioned for Kajjali like Kajjalabhasa, Varitaratwa (floats on the surface of water), Rekhapoornatva (filling the lines over the skin of fingers), Nischandratwa (becomes lustreless).

Total number of hours taken for appearance kajjali siddhi laxana 170 hours. Weight of kajjali obtained was 270gms. Loss 10gm.

Table no 1. Showing kajjali siddi laxana with time taken.

Sl no	Kajjali siddhi laxana	Time taken
1	Slakshnatva	20hrs
2	Rekhapurnatva	40hrs
3	Kajjalabhasa	40hrs
4	Varitaratva	60hrs
5	Unnama	60hrs
6	Nischandrata	170hrs

Preparation of parpati[3]

Materials required Kajjali -20gm, Cow's Ghee, Lohadarvi, Cow dung, Plantain leaf, Mortar & pestle

Procedure: Fresh cow dung was collected and a Pottali was made with cow dung and Kadali Patra (plantain leaf). Ghee was taken inside the Loha Darvi (iron spoon) in the ratio of 3- 5 drops for 20 gm of Kajjali.

This Kajjali was melted in low flame and poured in to a ghee smeared Kadali Patra (plantain leaf) placed over the cow dung and immediately covered with the Pottali and held for 1- 2- minutes. Parpatakara Parpati was obtained, it was carefully collected from the Kadali Patra, weighed and stored well. 16 gm of Parpati was obtained which was blackish in colour and flaky in nature.

Sodhana of Mukta Sukti (Pearl oyster).[4]

The weight of each half of oyster shells ranged from 80 gm to 120 gm. 2100 gm of Mutka Suktis were taken in a vessel and washed well. It was then made in to two Pottalis (Cloth bundles). The kanjika was taken inside a mud pot and one of the Pottali was immersed in it and Dola Yantra Swedana was done for 3 hours (1 Yama). Sodhita Muktasuktis were collected from the Pottali and washed with warm water and kept for drying. The same procedure was done for the other set of Pottali.

Powdering of herbal drugs:

Dried samples of Elabeeja (Elettaria cardamom Linn), Lavanga (Syzygium aromaticum Linn), Jati patra (Aril of Myristica fragrance), Jatikosha (Seed of Myristica fragrance), were powdered well. It was then sieved and stored in separate containers. Fresh leaves of Nimbapatra (Azadirachta indica), and Sinduvara (Vitex negundo Linn) was collected, dried, powdered, sieved and stored in air tight containers.

Preparation of Mahagandhakam[5]

Drugs taken: 1. Parpati - 170gm
2. Powdered Jatipatra- 85gm
3. Powdered Jatikosam-85gm
4. Powdered Lavangam- 85gm
5. Powdered Nimbapatra-85gm
6. Powdered Nirgundipatra-85 gm
7. Powdered Elabeejam-85 gm
8. Muktasukti- 9 pair in number
10. water –QS

Procedure 170 gm of Parpati was taken inside a mortar and powdered well. 85 gm each powdered Jatipatri, Jatikosha, Lavanga, Nirgundipatra, Nimbapatra and Elabeeja were added and mixed thoroughly and ground well for 1 Praharam (3 hours). Bhavana Dravya used was Jala (plain water). After grinding for 1 hour the whole drugs changed in to black colour. The grinding was continued for 2 more hours till the drugs were completely dried. (Fig.no.) shodhita Muktasuktis were taken and each half was filled with medicine (about 60-100 gm in each pair).

Preparation using classical Puta method

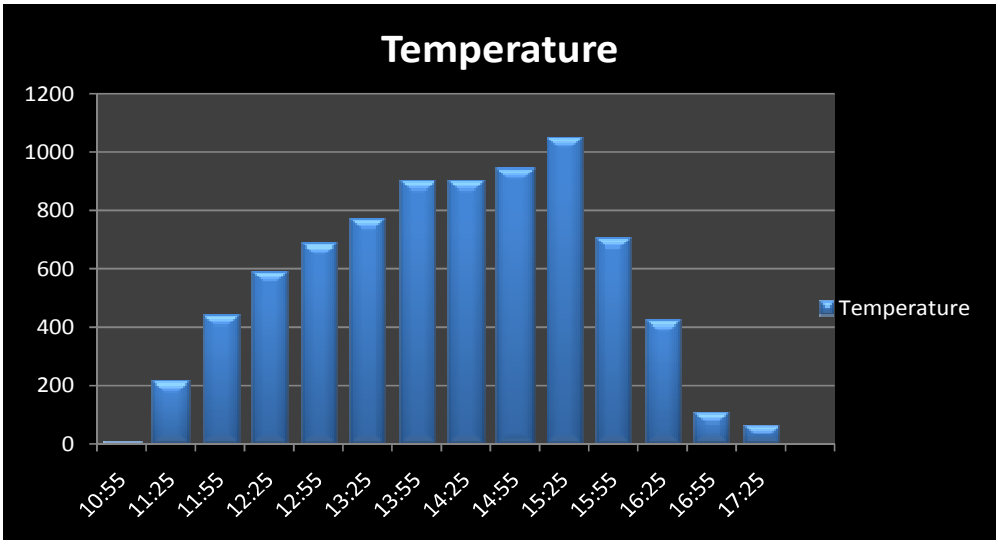
Materials needed: cloth, multani mitti, banana leaf & thread. Cow dung cakes- 270 number (total weight of 31kg), Pyrometer,

Procedure

Step 1: 9 pairs of Muktasuktis pair containing medicine wrap with the banana leaf above thread is tied. Above the wraped leaf, cloth dipped in mulanimitti is wrapped in 7 layers completely. Above this applied with thick mud. Total thickness was 5cm.Kept it for drying.

Step 2: in Gaja Puta pit measuring First it was filled with 180 cow dung cakes below and the Samputikrita shukti Sarava with medicines to be incinerated was kept on them. Again 90 cow dung cakes were arranged on top of it. Simultaneously fire was lit on the cowdung with the help of a karpoora. The temperature at regular intervals was recorded with the help of a pyrometer. Next day, after Swangaseeta (self-cooling), the Sarava was taken out from the pit and the mud covering is separated. The Muktasuktis remained closed, each pair was individually weighed and powdered. They were greyish – white colour. After powdering the drug became grey in colour.

Graph 1.Showing gajaputa temperature with time



ANALYTICAL STUDY

Organoleptic Characters of Mahagandhakamm

The organoleptic characters like colour, odour, taste and smell of Mahagandhakam was determined.

Color	Grayish white
Odour	Characterstic
Taste	Alkaline
Touch	Fine powder

Determination of pH Value

To prepare 5% solution, 5g Mahagandhakam was mixed in 500ml of distilled water. pH of solution was measured with the help of pH meter.

pH 12.04+ 0.10

Determination of Total Ash Value, Acid Insoluble Ash, Moisture Content (Loss on Drying), Alcohol Soluble Extractive, Water Soluble Extractive were done as per the standard protocol of measurements.

Loss on Drying	0.25%
Total ash	98.68%
Acid Insoluble Ash	21.57%
Water Soluble Ash	1.94%
Alcohol soluble extractive value	1.31%
Water soluble extractive value	5.35%

Chemical tests of mahagandhakam.

Test for estimation of mercury & sulphur

Total Mercury	10.01
Mercurous mercury	1.52
Mercuric mercury	9.49
Free Mercury	0.00
Total Sulphur	9.10
Free Sulphur	0.00
Sulphide	8.81
Sulphate	0.19

SEM – EDAX[6]

The SEM/ EDX (Energy disperse X-ray) instrument is a powerful and flexible tool for solving a wide range of product and processing problems for a diverse range of metals and materials. It can produce extremely high magnification image (up to 2 lakh x) at high resolution up to 2nm combined with the ability to generate localised chemical information.

Table no.2 showing elemental presence of mahagandhakam

Mahagandhakam	
Element	Mass %
C	7.86
O	43.02
Ca	49.12

FTIR[7]

Fourier Transform Infrared (FTIR) spectroscopy is an analytical methodology used in industry to understand the structure of individual molecules and the composition of molecular mixtures. FTIR spectroscopy uses modulated, mid-infrared energy to interrogate a sample.

FTIR analysis of Mahagandhakam shows it contains organic functional group like Amine, Amide, Alkene, Aromatics, Acid, Alcohol, Alkane, Carbonyl, Alkyl halide, Ester, Nitro, and Ether.Alcohol, Acid, Amide, Alkane, Carbonyl, Aldehyde, Ester, Ketone, Aromatic, Nitro, Amine, Alkyl halide, Alkene.

X-Ray Power Diffraction (XRD)[8]

X-ray powder diffraction (XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions.

XRD result of Mahagandhakam

Table No.3 showing XRD result of mahagandhakam

Sample	Compound Name	Chemical Formula	Crystal Structure
Mahagandhakam	Oxocalcium	CaO	Cubic
	Calcite	$CaCO_3$	Trigonal
	Portlandite	$Ca(OH)_2$	Trigonal

Particle Size Analysis:[9]

The Zeta Pals is an automatic instrument designed for use with suspensions of particles or solutions of macromolecules. Particles with diameters from 10nm to 30µm (depending on particle density) can be measured. The technique employed - electrophoretic light scattering (ELS) - is based on reference beam (modulated) optics and a dip-in (Uzgiris type) electrode system. It is also known as Laser Doppler Velocimetry (LDV).

Mean particle size of MG is 1021nm. Suitable for internal administration.

DISCUSSION

Grinding of Kajjali was continued for about 170 hours until the product became completely lustreless and blackish in nature which indicates complete bonding of Mercury and Sulphur. It was difficult to get same size pair of muktashukti. In Puta procedure, peak temperature attained 1050 ^{0}C in 4 hours 30 minutes and remained in that state for nearly 10minutes. Then the temperature declined. The final product was collected next day after Swangaseeta (self-cooling). The final product obtained from classical method was whitish grey in colour. The pH of 5% solution of Mahagandhakam was 12. The product was found to be alkaline in nature which indicates that it can be easily absorbed in stomach and small intestine. Mahagandakam was evaluated for ash value and it was found to be 98.68% which indicates the presence of high amount of Calcium & inorganic salts in it & naturally occurring drugs adhering to it.

Acid insoluble ash was found to be 21.57 %. Low value of acid insoluble ash signifies dissolution of drug in the acid media of GIT, which in turn increase the absorption of drug. It also indicates the presence of less quantity of silica materials present in it. From these analytical data it can be assessed that the product contain more of calcium compounds rather than mercury and sulphur. As Muktasukti is basically CaCO3, on incineration, the CO2 portion may have escaped and the CaO part remained. MG is product which contains more of calcium compounds rather than mercury & sulphur. It's a special pharmaceutical procedure adopted for the preparation of this medicine have contributed to the reduction of mercurial percentage to make it safer for internal administration

The SEM analysis & zeta particle of the study drug indicates the reduction of particle size up to 1025nm which may help in easy assimilation and absorption of drug in the body. Particle size reduction will result in precise drug delivery and thereby increasing the bioavailability of the drug.

CONCLUSION

Mahagandhakam can be prepared in single gajaputa. pH of product is 12 hence it can be indicated in Gastric Related disorders. Reduced Particle size helps in easy absorption. It's a special pharmaceutical procedure adopted for the preparation of this medicine have contributed to the reduction of mercurial percentage to make it safer for internal administration

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