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PHARMACEUTICAL AND COMPARATIVE EVALUATION OF THREE *SUDHAVARGIYA* DRUGS NAMED *KUKKUTAND TWAKA BHASM, MUKTA SHUKTI BHASM* AND *GODANTI BHASM*

Dr. Rajni Bala[1], *Dr. Vikas Chandra Gupta[2] and Dr. Nitin Pandey[3]

[1]Associate Professor, Rasa Shastra and Bhaishjya Kalpana, Himalayiye Ayurvedic Medical College, Dehradun.

[2]Lecturer, Lalit Hari State Ayurvedic Medical College, Pilibhit.

[3]Associate Professor, Kayachikita, Himalayiye Ayurvedic Medical College, Dehradun.

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***Correspondence for Author**
Dr. Vikas Chandra Gupta
Lecturer, Lalit Hari State Ayurvedic College, Pilibhit.

ABSTRACT

Ayurvedic Rasashastra is one of the unique branches of *Ayurveda* dealing with metals, minerals and combination of herbs. The sub-specialties of *Ayurvedic* pharmaceuticals have specified therapeutics uses of metals and minerals in the form of *Bhasmas*. Theses preparations are considered potent in action and a part from this**,** these are considered catalytic (*Yogvahi*) and acts on molecular level (Sukshma srotogantva). All the three drugs *Kukkutanda twaka*, *Mukta-shukti* and *Godanti* are rich source of calcium and enumerated under *Sudhavarg* by *Vaidhya Yadav Ji Tikram Ji*. *Kukkutanda twaka* and *Mukta-shukti* are of animal origin drugs while *Godanti* is an inorganic mineral. There is lot of discussion about chemical and physical characters of *Sudha vargiya* drugs. The present study is concerned about physical and chemical analysis of *Kukkutanda twaka bhasma*, *Mukta-shukti bhasma* and *Godanti bhasma.*

KEYWORD: *Sudhavargiye dravya*, *Kukkutanda twak Bhasma*, *Mukta-Shukti Bhasm*, *Godanti Bhasma*, Nambure Phased Spot Test.

INTRODUCTION

Sudhavargia Dravyas is group of drugs *Shankha, Shukti, Varatika, Praval, Mukta, Godanti, kukkutand twaka, Mrigshring, Shambuka, Khatika, Samudraphala* and *Sudha* as explained by *Vaidhya Yadav Ji Tikram Ji.* Although these drugs are more or less similar and containing huge amount of calcium, the utility of each drug is different in Indian system of medicine.

Kukkutanda twaka (Egg shells)

It is egg shell or Ovi testa of hen (Gallus domesticus), white, hard, fragile, calcareous substance composed of carbonate and phosphate of lime with some traces of Sulpher, iron, some organic matter, and salts as the chlorides, iodides, sulphate and phosphate of potassium, calcium and magnesium.

Mukta-Shukti (Indian pearl oysters)

Main source of Mukta Shukti is Indian Ocean coasts. The land forms are usually found on and under plants, in the sea, the shallow water of the littoral zone with abundant seaweeds. Oysters are bivalve (two shelled) soft bodied mollusks. Oyster shell consists mainly of calcium carbonate and total weight of live oyster contain 52-55% of calcium oxide by weight.

Godanti (Gypsum deposits)

It has been formed either by the evaporation of enclosed or partly enclosed basin of sea water or by the chemical action of sulphuric acid, produced by the weathering of pyrites on limestone, present in clays. Till 20th centaury, description of *Godanti* (named due to resemblance from cow teeth) was not available in *Ayurvedic* classics, *Sri Sadananda Sharma* was first who described its acceptable qualities, *Shodhana* and *Marana* in *Rasa- tarangini*.

METHOD OF SHODHAN (Purification)

KUKKUTANDA-TWAKA

Procedure: (Reference- *Siddha bhaishajya mani mala/ bhasm vigyan*) *Kukkutanda twak* was boiled in water containing salt and *Nausadar* for two hour. Later we removed the adherent membranous part from the *twak* and wash it with luke warm water and dried. This was named as sample 1st.

Next day fresh Kukkutanda twak of 400 gram has taken for its Shodhan and same procedure has has been done. This sample was named as sample 2nd.

Another sample (sample 3rd) of 400 gram was also taken for its shodhan on 3rd day.

OBSERVATION

	Sample 1st	Sample 2nd	Sample 3rd	Total (gram)
Initial weight	400	400	400	1200
Wt. after purification	372	375	373	1120
Loss in Wt.	28	25	27	80
% of loss	7%	6.25%	6.75%	6.67%

MUKTA-SHUKTI

Procedure: (Reference- *Ayurveda Prakash 2/330*)

Initially *Mukta-Shukti* was scrabbled with the help of grinder. Small pieces are kept in clean cloth *Pottali* and with the help of glass road it was hanged into a container containing *Kanji*(fermented solution of cooked rice, salt and *Rajika*). It is boiled for three hours and then put off for cooling. After cooling, pieces were separated, washed from luke warm water and then allowed to dry. This is named as sample 1st.Same procedure was repeated for sample 2nd and 3rd.

OBSERVATION

	Sample 1st	Sample 2nd	Sample 3rd	Total (gram)
Initial Wt.	400	400	400	1200
Wt. for purification	380	383	370	1133
Loss in Wt.	20	17	30	67
% of loss	5%	4.25%	7.50%	5.60%

GODANTI: (Reference- *Rasa Tarangini 11/238*)

Small pieces of Godanti were prepared and hanged into a container containing *Nimbu-Swarasa* (lemon juice) with the help of glass road. It was boiled for one and half hour and after that put off from heating device for cooling. Pieces were separated from cloth, washed and allowed to dry and this is named as sample 1st. Same procedure was repeated for sample 2nd and 3rd.

	Sample 1st	Sample 2nd	Sample 3rd	Total (gram)
Initial wt.	400	400	400	1200
Wt. after purification	390	392	390	1172
Loss in Wt.	10	8	10	28
% of loss	2.5%	2%	2.5%	2.4%

METHOD OF *MARANA*(Incineration)

KUKKUTANDA TWAK

All three samples of *Kukkutand twak* were triturated with lemon juice (300 ml) for two days (eight hours in a day). After trituration, pellets were prepared, dried and kept in between two *Shoraws*(earthen saucer) and sealed with seven layers of clay dipped clothes and again kept for drying. Each *Shoraw* was kept in *Gajaputa* for heat of 40 kilo Uplas (cow dung cake). After cooling the *Shoraws*, *Kukkutanda twak* was again separated and triturated with lemon juice for two days. Pellets were formed again and again kept in *Gajaputa* for heating. After repeating same procedure for 5 times, *Kukkutanda Twak Bhasma* was prepared.

OBSERVATION

	Sample 1st	**Sample 2nd**	**Sample 3rd**	**Total (gram)**
Initial wt.	372	375	373	1120
Wt. after 1st *puta*	344	345	345	1034
Wt. after 2nd *puta*	312	310	312	934
Wt. after 3rd *puta*	290	280	289	859
Wt. after 4th *puta*	270	265	272	807
Wt. after 5th *puta*	256	245	255	756

Total loss in weight: 32.5%

MUKTA SHUKTI

All purified pieces of *Mukta-Shukti* from three samples were taken and putted on single layer of cow dung cakes and covered again by another cow dung cake. Heat was given through this and after cooling the cakes**,** pieces were removed from ash.. These pieces were triturated with Aloe Vera juice for 2 days (8 hour each day). After trituration pellets are formed and put in between two *Shoraws* which was sealed with clay dipped clothes. The *Shoraws* were kept in *Gazaputa* furnace for *Marana* and this procedure is repeated for three times to obtain *Mukta-shukti bhasma*

OBSERVATION

	Sample 1st	**Sample 2nd**	**Sample 3rd**	**Total (grm)**
Initial Wt.	380	383	370	1133
Wt. after 1st *puta*	360	365	356	1081
Wt. after 2nd	330	342	340	1012

puta				
Wt. after 3rd *puta*	310	320	315	945

Total percentage of loss – 16.6%

GODANTI

Purified *Godanti* is triturated with Aloe vera juice and placed in between two *Shoraws* and subjected to *Gajaputa* for *Bhasmikarana* as in *Mukta-shukti*. This procedure was repeated three times.

OBSERVATION

	Sample 1st	**Sample 2nd**	**Sample 3rd**	**Total**
Initial Wt.	390	392	390	1172
Wt. after 1st *puta*	365	380	372	1122
Wt. after 2nd *puta*	325	324	318	967
Wt. after 3rd *puta*	290	290	276	856

PHYSICO-CHEMICAL STUDY

1. Showing the Organoleptic characters of *Kukkutanda twak bhasma*, *Mukta-shukti bhasma* and *Godanti bhasma*

S. No.	**Parameters**	**Kukkutand twak bhasm**	**Mukta shukti bhasm**	**Godanti bhasm**
1.	Color	White	White	White
2.	Odor/ smell	Odorless	Odorless	Odorless
3.	Touch	Smooth	Smooth	Smooth
4.	Taste	Tasteless	Tasteless	Tasteless
5.	Appearance	Lusterless White powder	Lusterless White powder	Lusterless White powder

2. Showing total Ash /Ash value of *Kukkutand Twak Bhasma*, *Mukta-Shukti Bhasma* and *Godanti Bhasma*

S. no.	**Parameter**	**Kukkutand Twak bhasma**	**Mukta shukti bhasma**	**Godanti bhasma**
1.	Ash value/ Total ash (A.V.) % w/w	97.426	97.184	99.872
2.	Water soluble ash (%w/w)	27.208	26.156	31. 082
3.	Acid insoluble Ash (%w/w)	09.247	0.131	0.420

3. Showing the physico-chemical characters of *Kukkutand twak Bhasma*, *Mukta-Shukti Bhasma* and *Godanti Bhasma*

S. No.	Parameter	Kukkutand twak	Mukta shukti	Godanti
1.	pH	7.5	9.5	6
2.	Fineness of particles	3.570% w/w	1.482%w/w	4.828 %w/w
3.	Ash value/ total ash value (A.V.) %w/w	97.426	97.184	99.872
4.	Acid insoluble ash (A.I.A) %w/w	0.247	0.131	0.420
5.	Water soluble ash (W.S.A) %w/w	27.208	26.156	31. 082
6.	Loss on drying (LOD) %w/w	0. 044	0. 055	0.14

4. Showing the result of qualitative analysis of *Kukkutanda twak Bhama*, *Mukta-shukti Bhasma* and *Godanti bhasma*

S.No.	Name Of Bhasma	$CO3^{-}$	Cl^{-}	$SO4^{-}$	$PO4^{-}$
1.	Kukkutand Twak Bhasma	+	+	+	-
2.	Mukta shukti bhasma	+	+	+	-
3.	Godanti bhasma	+	+	+	-

5. Showing calcium content of *Kukkutanda Twak Bhasma*, *Mukta shukti Bhasma* and *Godanti bhasma*

S. No.	Name of bhasma	Total Calcium content
1.	Kukkutand Twak Bhasma	60.830% w/w
2.	Mukta-Shukti Bhasma	40. 047% w/w
3.	Godanti Bhasma	28.690% w/w

6. Showing results of *Atomic Absorption Spectrophotometry* (AAS)

S. No.	AAS content	Kukkutand Twak Bhasma	Mukta shukti Bhasma	Godanti Bhasma
1.	Iron (ppm)	8.50	2. 0	5.1

7. Showing observation during *NAMBURE PHASED SPOT TEST* (N.P.S.T.)

In the present study, *Nambure phased spot test* was done. It is simple test, which helps to distinguish different calcium *bhasmas* without use of any sophisticated technological equipment. In this test 50% alcoholic solution of *Haridra* (Turmeric), was absorbed on with supernatant fluid of different *bhasmas*, develop different colored spots and the spot also differ in their fading time. It may be explained on the basis of chemical constituent presents in *Haridra* itself and affinity of these constituents towards the supernatant fluid of calcium

bhasmas. A search of literature has revealed that *Haridra* solution contains some *Phenolic* constituents and several *Sesquiterpenes* with *Enone* and *Dienone*. Such compounds undergo variable changes in their color when fluid of different pH is applied to them. When the supernatant fluids of different calcium *Bhasmas* were applied on the *Haridra* test paper, it was noticed a change of color of *Haridra* test paper in respect to pH of the *Bhasma* solution.

Name of bhasma	Phase-I	Phase- II	Phase-III
Kukkutanda twak bhasma	A deep pink solid spot appeared with immediate formation of more deep pink margin and wet periphery. By the end of this phase the central space become light pink	By the end of this phase the margin merged with the space and wet periphery turned into light pink	At starting of the 3rd phase the wet periphery faded away and after 24 hours 50% of the color fades away
Mukta Shukti Bhasma	A deep pink solid spot appeared with immediate foundation of more deep pink margin and wet periphery. By the end of 1st phase the central space become light	By the end of 2nd phase the margin merged with the central space and wet periphery turned into light pink	By the end of beginning of 3rd phase wet faded away and after 24 hours 50% of the color fades away
Godanti Bhasma	A think pink circle formed on a wide wet spot	Starts fading ways rapidly	The entire circle faded away within 24 hours

CONCLUSION

Analytic study is the present research work was chiefly carried out basing on the standard laid in Government official test i.e. Pharmacopial Standards for Ayurvedic Formulations (P.S.A.F), second edition.

Following tests were done for standardization of drugs

1. Organoleptic character
2. pH
3. Fineness of particle
4. Ash value/total ash
5. Acid insoluble Ash
6. Water soluble Ash
7. Loss on drying
8. Qualitative analysis
9. Quantitative analysis of calcium
10. A.A.S.
11. N.P.S.T

Organoleptic evaluation of all *Bhasma* showed those to be white smooth tasteless without any odor. The pH of *Kukkutanda Twak Bhasm* was 7.5, *Mukta-Shukti Bhasma* 9.5 and *Godanti Bhasma* 6.0. It showed that *Mukta-Shukti Bhasma* is more alkaline than other.

The Ash values of *Kukkutanda Twak Bhasma*, *Mukta-Shukti Bhasma* and *Godanti Bhasma* remain within range of N.U.M and P.S.A.F.

The qualitative analysis shows carbonate, chloride, sulphate were present in all these *Bhasma* but phosphate is absent. In AAS test it has been proved that *Kukkutanda Twak bhasma* has maximum Iron in ppm (60.830%w/w) in comparison to *Mukta-Shukti Bhasma* (40.047%w/w) and *Godanti bhasma* (28.690%w/w). Quantitative analysis shows *Kukkutanda Twaka Bhasma* has highest calcium than other two *Bhasmas*.

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