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Pharmaceutico Analytical Study of Shankha Bhasma

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Abstract

Shankh Bhasma is an Ayurvedic formulation made from a conch shell. Ayurveda strongly recommends shank bhasma for treating the doshas or imbalances that are related to vata and pitta. It is widely used as a traditional medicine for treating various types of digestive disorders like gastritis, abdominal pain and malabsorption syndrome. But Shankha cannot be directly indicated for consumption.It undergoes various classical procedures like Shodhana and Marana to make it fit for the body when given internally.Shankha Bhasma is a very popular herbo-mineral preparation.Shankha Bhasma.

KEYWORDS: Shankha bhasma, Shodhana Marana, Dosha.

INTRODUCTION

Rasa Shastra is a branch of learning of Ayurveda pharmaceutics, specially dealing with the minerals, metals, precious stones, certain poisonous herbs and their processing. These are very potent in eliminating dreadful diseases and also for rejuvenation purposes. Due to their small dose, quick effectiveness, tastelessness, effectiveness on dreadful diseases and long self-life Rasoushadhis occupied superior status among the Ayurvedic medicine. To fulfill this our ancient seers might have tried a number of laudable measures and found that the drugs of different sources are the most suitable media to achieve them.

It is clear from the literature that in earlier time metals were used in form of fine powder or paste. After the development of Rasa Shastra metals like Iron, Gold, Copper, Silver were found extensively used therapeutically & development various pharmaceutical process. Such as, shodhana, marana, & amritikarana for the purification of the metals to reduce into Bhasmas which have greater therapeutic value.

As the Acharya Charka quote says the substances, which have the same affinity, will responsible for its increase and in the same manner opposite properties are responsible for their decay.[1]

There are several types of medicaments that are being used in Ayurvedic mode of treatment. The source of these drugs is diverse and belongs to different category. The category ranges from plants and animals to minerals, and enrich around different types of species of plants and animals with vivid habitats. In the course of last fifty years, Marine organisms have been proven to be a rich source of wide range of worth compounds for medicine.

Marine organisms have been used in traditional system of medicine. These drugs are used singly or in simple combinations or as compounds. Marine drugs are said to be a rich source of calcium carbonate $(CaCo_3)^2$, It comprises 95-98% of calcium carbonate ($CaCo_3$)

In Ayurveda there is a wide range of marine drugs rich in calcium carbonate like Shankha, Kapardika, Mukta, Mukta Shukti, Samudra Phen.[3]

The forms in which these are used are varied like powders, tablets, pills, medicated oil, bhasma (ash) and many more.[4]

The marine drugs are given in various calcium deficiency disease . Calcium is the fifth most abundant element in the human body. Calcium is the major contribute to the structural strength of bone. According to WHO most of the people around the world are suffering from calcium deficiency disease, in which pregnant women and children are affected the most.[5]

Marine drugs can be given as the calcium supplement in calcium deficiency disease, It is the concept of like substances having an affinity for each other and thereby causing an increase of these qualities in the individual.

the present study, the aim is to introduce a standard operating procedure for the preparation of Shankha Bhasma and analytical study

MATERIALS AND METHODS

Procurement of raw material

- AshudhShankha Nabhi – 952gm
- Hot water -QS for washing the Shankha pieces
- Fresh Nimbu swarasa – 6250ml
- **Equipments**: Dola yantra
- **Method:** Swedana

Observation

- Foam was found during first hour of boiling.
- While boiling, the citrus odor of Nimbu swarasa turned to sweetish sour odor.
- Initially, 4 liters of Nimbu swarasa was taken the pot, and its quantity decreased during boiling. So another 2250ml of fresh Nimbu swarasa was added to pot subsequently.
- After 3 hours, the Nimbu rasa in the pot was 2.5liters. Its color was light brown.
- When Pottali was taken out after 3 hours, white scum was observed over it.
- White small pieces of sediments were found at the bottom of Nimbu swarasa.
- Initial pH of Nimbu rasa was 2 and there was gradual increase of pH of Nimbu rasa during the process and at the end it was 3 with gross rise of 1 in its pH.

Table No 6 - Showing the Results of Shankha Shodhana

Shankha	**Pot 2**
Weight before Shodhana	952 gms
Weight after Shodhana	936gms
Loss of Weight	16gms

Table No -7 Characters of Shankha after Shodhana

Features	**Shankha**	
	Ashodhita	**Shodhita**
Color	Dull white	Yellowish white

Luster	Bright	Dull
Odour	Odorless	Acidic
Structure	Massive	Massive
Taste	Kshariya	slight Kshariya
Touch	Hard	Soft
Transparency	Opaque	Opaque
Weight	952gms	936gms

Practical: Preparation of Shankha Bhasma- 1st Gaja Puta.
Ingredients: Shodhita Shankha: 869gms **Instruments:** Pyrometer, Saravasamputa
Method: Puta Method
Subjecting for Gajaputa
Cowdungs - Lower 2/3rd Upper 1/3 of pit- 153 in no.of pit – 72 in no.

Observations:

- Total cowdungs used were 225 in no. and total weight was 25kg
- The total time duration required for burning of Gajaputa was 7 hours and total time required for complete burning and self-cooling was 24 hours.
- The maximum temperature recorded was 878 ^{0}c

Table No- 8: Showing Temperature record during Shankha Bhasma- 1st Gajaputa

S.N	Time	Temp (^{0}C)	Sl. n	Time	Temp (^{0}C)	Sl.n	Time	Temp (^{0}C)	Sl.n	Time	Temp (^{0}C)
1	09-40	26	19	11-20	780	37	12-50	333	55	02-25	50
2	09-45	32	20	11-25	823	38	12-55	160	56	02-30	49
3	09-50	37	21	11-30	844	39	01-00	154	57	02-35	48
4	09-55	41	22	11-35	870	40	01-05	141	58	02-40	48
5	10-00	50	23	11-40	**878**	41	01-10	130	59	02-45	42
6	10-05	86	24	11-45	850	42	01-15	118	60	02-50	40
7	10-15	171	25	11-50	823	43	01-20	107	61	02-55	38
8	10-20	361	26	11-55	815	44	01-25	99	62	03-00	37
9	10-25	460	27	12-00	774	45	01-30	90	63	03-05	35
10	10-30	511	28	12-05	787	46	01-35	88	64	03-10	35
11	10-35	540	29	12-10	737	47	01-40	86	65	03-15	34
12	10-40	575	30	12-15	715	48	01-45	76	66	03-20	34
13	10-45	615	31	12-20	680	49	01-50	70	67	03-25	33
14	10-50	647	32	12-25	605	50	01-55	69	68	03-30	31
15	10-55	683	33	12-30	565	51	02-00	65	69	03-35	30

16	11-00	715	34	12-35	479	52	02-10	61	70	03-40	
17	11-10	720	35	12-40	402	53	02-15	57	71	03-45	
18	11-15	754	36	12-45	378	54	02-20	52	72	03-50	

Practical: **Preparation of Shankha Bhasma- 2nd GajaPuta.**
Ingredients: Marita Shankha after 1st puta- 570gms
Kumari swarasa - 650ml

Observation:

- While adding Kumari swarasa to Marita Shankhai warmth was felt. After mixing, its color was Bliss (A.P.S.C.I), with mild alkaline odor.
- During trituration, initially mass was soft and trituration was done at the rate of 22-24 strokes/min. After two hours mass became thick, semisolid and heavy and trituration was done at the rate of 14-16 strokes/min.
- It took 3 hours for the appearance of subhavita dravya lakshana like non stickiness of the paste, easily rollable into pills etc. After bhavana and chakrika nirmana the weight of Shankha was increased from 570gms to 618gms.
- Peak temperature recorded was 828^0c.

Table No 9: Showing Temperature record during Shankha Bhasma- 2nd Gajaputa

S.N	Time	Temp	Sl. no	Time	Temp	Sl. no	Time	Temp	Sl. no	Time	Tem
1	09-40	24	19	11-20	640	37	12-50	698	55	02-25	70
2	09-45	33	20	11-25	690	38	12-55	652	56	02-30	58
3	09-50	36	21	11-30	785	39	01-00	589	57	02-35	42
4	09-55	44	22	11-35	800	40	01-05	491	58	02-40	40
5	10-00	49	23	11-40	**828**	41	01-10	390	59	02-45	40
6	10-05	82	24	11-45	820	42	01-15	301	60	02-50	38
7	10-15	168	25	11-50	810	43	01-20	257	61	02-55	38
8	10-20	195	26	11-55	807	44	01-25	197	62	03-00	36
9	10-25	215	27	12-00	780	45	01-30	112	63	03-05	32
10	10-30	236	28	12-05	769	46	01-35	98	64	03-10	32
11	10-35	290	29	12-10	737	47	01-40	86	65	03-15	34
12	10-40	350	30	12-15	715	48	01-45	76	66	03-20	34
13	10-45	380	31	12-20	680	49	01-50	70	67	03-25	33
14	10-50	425	32	12-25	605	50	01-55	69	68	03-30	31
15	10-55	493	33	12-30	565	51	02-00	65	69	03-35	30
16	11-00	530	34	12-35	479	52	02-10	61	70	03-40	
17	11-10	590	35	12-40	402	53	02-15	57	71	03-45	

18	11-15	610	36	12-45	378	54	02-20	52	72	03-50	

Practical: Preparation of Shankha Bhasma- 3rd Gaja Puta.

Ingredients: Marita Shankha after 2nd puta- 500gm
Kumari swarasa – 450ml

Apparatus: As used in second puta.

Procedure: As done in second puta.

Observation:

- While adding Kumari Swarasa to Marita Shankha, warmth was felt. After mixing, its color was light Beacon (A.P.S.C.I), with mild alkaline odor.
- During trituration, initially mass was soft and trituration was done at the rate of 22-24 strokes/min. After two hours mass became thick, semisolid and heavy and trituration was done at the rate of 14-16 strokes/min.
- It took 3 hours for the appearance of subhavita dravya lakshana like non stickiness of the paste, easily rollable into pills etc. After bhavana and chakrika nirmana the weight of Shankha was increased from 500 to 521gms.
- Peak temperature recorded was 808^0c.

Table No 10: Showing Temperature record during Shankha Bhasma- 3rd Gajaputa

S.N	Time	Temp (^{0}C)	Sl. n	Time	Temp (^{0}C)	Sl.n	Time	Temp (^{0}C)	Sl.n	Time	Temp (^{0}C)
1	09-40	22	19	11-20	745	37	12-50	400	55	02-25	38
2	09-45	30	20	11-25	765	38	12-55	375	56	02-30	32
3	09-50	34	21	11-30	798	39	01-00	328	57	02-35	29
4	09-55	39	22	11-35	800	40	01-05	141	58	02-40	25
5	10-00	46	23	11-40	**808**	41	01-10	130	59	02-45	22
6	10-05	52	24	11-45	806	42	01-15	112	60	02-50	20
7	10-15	90	25	11-50	800	43	01-20	103			
8	10-20	150	26	11-55	798	44	01-25	96			
9	10-25	267	27	12-00	765	45	01-30	90			
10	10-30	398	28	12-05	722	46	01-35	82			
11	10-35	425	29	12-10	700	47	01-40	78			
12	10-40	452	30	12-15	689	48	01-45	72			
13	10-45	487	31	12-20	672	49	01-50	68			
14	10-50	521	32	12-25	605	50	01-55	62			
15	10-55	598	33	12-30	578	51	02-00	58			
16	11-00	624	34	12-35	502	52	02-10	52			
17	11-10	692	35	12-40	478	53	02-15	47			
18	11-15	715	36	12-45	468	54	02-20	41			

Table.No11-: Showing Result of Shankha Bhasma after 1st, 2nd and 3rd Puta:

Weight of Shankha	1st puta	2nd puta	3rd puta
Weight before Marana	869gms	570gms	500gms
Weight after Marana	600gms	520gms	500gms
Weight Loss	269gms	50gms	00gms

Table No-12: Showing Lakshana of Shankha Bhasma after 1st, 2nd and 3rd Gajaputa

Parameters	Observations after 1st puta	Observations after 2nd puta	Observations after 3rd puta
Color	Grey	Grayish white	Bright White
Taste	Alkaline (tongue irritant)	Slight alkaline	Very mild alkaline
Odor	Slight alkaline	Very mild alkaline	Odorless
Touch	Rough	Not much rough	Soft, smooth
Appearance	Powder	Fine powder	Very fine powder
Rekhapoornata	Not observed	Positive	Positive
Varitara	Negative	Negative	Negative

RESULTS

The results are produced mainly under three headings,
Observational
Analytical
DNA study with refer to Calcium estimation

OBSERVATIONAL RESULTS

Pharmaceutical process – Preparation of Shankh Bhasma

Table no. 13: Showing Organoleptic features of Shankh before and after Bhavana.

SI No	Features.	Before	After
1	Color	Shiny white	Dull white
2	Touch	Smooth	Rough
3	Odour	Not specific	Nimbuvat

Table no. 14: Showing Organoleptic features of Shudh Shankha.

SI No	Features	Shudh Shankha
1	Color	Dull white
2	Touch	Rough
3	Odour	Nimbuvat

Table no. 15: Showing Organoleptic features of Shudh Shankha Bhavana with Ghritakumari swarasa.

SI No.	Features	Before	After
1	Color	White	White
2	Touch	Smooth	Fine, soft powder
3	Odour	Not Specific	Not Specific

Table No-16 : Showing Lakshana of Shankha Bhasma after 1st, 2nd and 3rd Gajaputa

Parameters	Observations after 1st puta	Observations after 2nd puta	Observations after 3rd puta
Color	Grey	Grayish white	Bright White
Taste	Alkaline (tongue irritant)	Slight alkaline	Very mild alkaline
Odour	Slight alkaline	Very mild alkaline	Odourless
Touch	Rough	Not much rough	Soft, smooth
Appearance	Powder	Fine powder	Very fine powder
Rekhapoornata	Not observed	Positive	Positive
Varitara	Negative	Negative	Negative

ANALYTICAL RESULTS

Quantitative analytical results.

Table No 17 - Showing quantitative analysis of Shankha Bhasma by AAS (Instrumental) method & by Gravimetric method.

SI No	Parameters tested	Raw Shankh
1	Assay of Calcium	44.49% w/w

Table No 18. - Showing quantitative analysis of Shankha Bhasma by AAS (Instrumental) method & by Gravimetric method.

SI No	Parameters tested	Shankha Bhasma
1	Assay of Calcium	48.38% w/w

Qualitative analytical results

Table No 19 - Showing Qualitative analysis of prepared Shankha Bhasma.

SI No.	Parameters tested	Shankha Bhasma
1	pH	12.10
2	Ash Value (450^0c)	95.628
3	Acid sol matter % w/w	99.274

1. Pharmaceutical study:

It was done at different steps as follows:

1. Shankha shodhana.
2. Shankha Marana.

Drug identification:

We identified and finalized the individual raw drugs based on the literature support, opinion of different pharmacies, raw drug traders, traditional vaidya's and the experienced teachers of Rasa shastra and Bhaishajya Kalpana and by the AYUSH certified lab KLE Belgaum. Basic analytical tests were performed at Research lab of Desh Bhagat University PG school of Ayurveda and Research .Quantitative analysis were carried out from Herbal Health Research Cluster.

Shankha shodhana:

Swedana covers the maximum area of preference. Dolayantra is said to be most convenient and repeatedly used instrument for swedana. And the time mentioned was 3 hours in most of the contexts. Most of the time media used for shodhana procedure is kshara, amla or other herbal juices. During the procedure we observed the reaction between shankha naabhi (alkaline) and nimbu swarasa (acidic media) in the form of froth and air bubbles. This resulted in the deterioration of the outer layer of shankha, leading to decrease in its weight and decline of hardness after shodhana.

Chakrika Nirmana:

By making chakrikas it can be easily accommodated a large quantity of drug in a small place of sharava and can also gain the advantage of proper drying. This process increases the surface area, which allows maximum as well as uniform heat transmission during marana.

Sharava Samputa Nirmana:

Encircled sustained temperature can be obtained. And also can prevent the contamination of materials kept inside. We can also expect the oxidation of materials. It may be altering the preparation time of bhasma by reducing the diffusion of released gases, thus building up the pressure inside the apparatus. The obvious reason for forming this provision is to avoid direct loss of material in the completely burnt fuel.

Marana:

Marana is a procedure adopted to convert the heterogeneous material in to homogenous substance and converting it into nano particles. The puta adopted in the present study are Gajaputa for Shankha which exerts up about 900^0C.

During incineration (Putapaka), final change in the physical form of the material takes place. Heating during incineration causes linear expansion of the compound. The linear expansion leads to separation of the compound causing exposure of the part, facilitates further change. Repetition of this process leads to reduction in particle size and fineness of the particles.

2. Analytical Study:

The analytical procedures adopted are also reviewed in view of proper interpretation of the procedures and to establish a hypothesis regarding the probable changes and net resultant.

- **Determination of Loss on drying:** It determines the amount of volatile matter. The moisture content of a drug should be minimized in order to prevent decomposition either due to chemical change or due to microbial contamination.
- **Determination of Total ash:** Total ash value represents the inorganic salts naturally occurring

in drug or adhering to it or deliberately added to it as a form of adulteration. Therefore it is a criterion to judge the identity or purity of sample. Total ash usually consists of carbohydrates, phosphates, silicates and silica.

- **Determination of Acid Insoluble ash:** Used to determine adhering dirt, silica material and sand.
- **Determination of pH value:** The pH value of a given sample expresses the degree of acidity or alkalinity of a sample solution.
- **Particle Size Determination**: Particle size of the drug affects its absorption and the rate of absorption can be assessed by determining the particle size of the drug. Determining particle size of the material helps to draw the conclusion regarding the significance of that particular pharmaceutical procedure.
- **FTIR**: It can identify chemical bonding, molecular structures of the product, organic functional groups and often specific organic compounds can be obtained. By this the action of the drug can be analysed. FTIR analysis of Shankh Bhasma shown, that particles were in Cubic and Orthorhombic in shape.

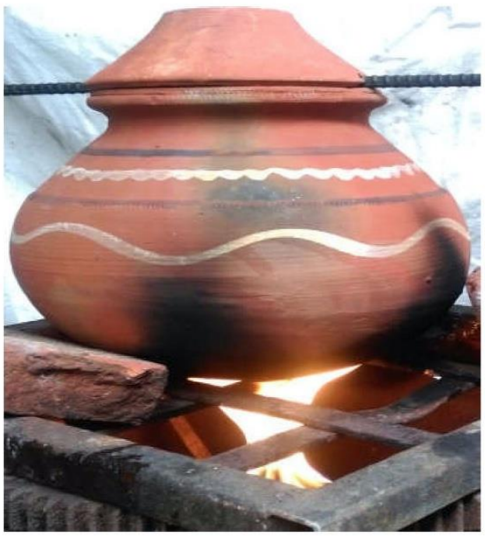
Quantitative analysis:

Shankh raw contain about 44.49% of Calcium as well as Shnakha Bhasma contains 48.38% of calcium. pH value of 10% w/v in water was 12.10 of Shankha Bhasma. Ash value of Shankha Bhasma at 450^0c was calculated 95.628.Acid soluble matter %age was calculated as 99.274.

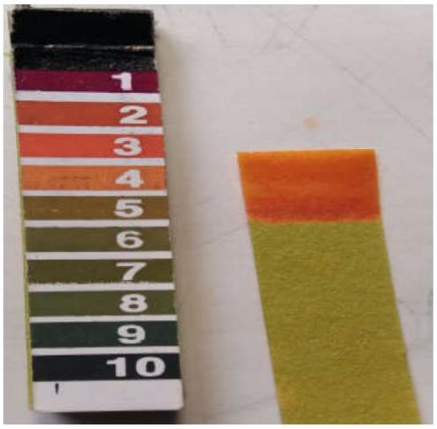
ASHUDHA SHANKHA

SHUDHA SHANKHA

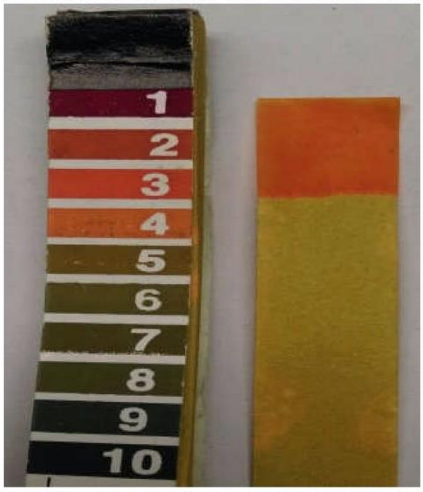
SHANKHA NABHI SHODHANA PROCESS



pH OF NIMBU SWARASA



pH OF NIMBU SWARASA BEFORE SHODHANA OF SHANKHA



pH OF NIMBU SWARASA AFTER SHODHANA OF SHANKHA

SHARAVA WITH SHANKHA NABHI

PUTTA PROCESS

SHANKH NABHI AFTER 1ST PUTTA




SHANKHA NABHI AFTER FIRST PUTTA

MARDANA AFTER FIRST PUTTA

SHANKHA BHASMA PAREEKSH

REKHAPURNATVA

NIRDHUMA PAREEKSHA

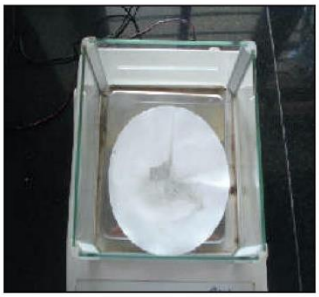
ANALYTICAL PROCEDURES

pH OF NIMBUSWARASA

SPECIFIC GRAVITY BY PYCNOMETER

LOSS ON DRYING

LOSS ON IGNITION



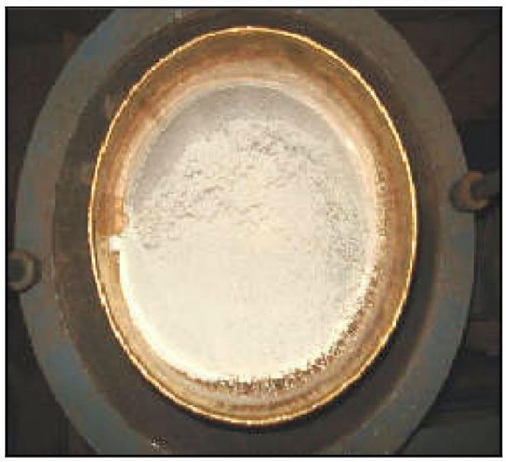
SOLUBILITY IN PERCENTAGE

SOLUBILITY IN DIFFERENT CHEMICALS

ACID INSOLUBLE ASH

PARTICLE SIZE BY SIEVE METHOD

Ca% BY TITRIMETRIC METHOD



SHANKHA BHASMA
IN MESH NO. 230

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