

PHARMACEUTICAL STUDY OF SHANKHA BHASMA BY TWO DIFFERENT  
METHODS

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## ABSTRACT

*Shankha* (Conch) is one of the member of *Sudha varga* (A class of calcium containing compound). It is used in various ailments from many centuries. *Shankha Bhasma* is chief ingredient of many formulations. *Shankha Bhasma* recognized as a sole medicines primarily in the treatment of gastrointestinal disorders like *Amlapitta*, *Grahani*, *Udarshula* and *Atisara*. 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* was prepared by two different methods given in *Ayurvedic* texts prescribed in the Drug and Cosmetic Act, *Rasa Tarangini* and *Ayurveda Prakash*.

**KEYWORDS:** Shankha bhasma, Shodhana Marana, Amlapitta.

## INTRODUCTION

*Ayurveda* an unequivocal traditional system of medicine uses the inherent principles of nature to maintain health in a person by keeping his body, mind and spirit in perfect equilibrium. *Ayurveda* is the first Indian medical science which mainly focus on the objectives like maintaining positive health and eradication of disease in a comprehensive way. Pharmacopoeia of "*Ayurveda*" comprises of drugs derived not only from herbs but also from minerals, metals and animals. But they can't be taken as it is, hence they are needed to be converted in to such form which will be therapeutically fit for use.

*Rasa Shastra* and *Bhaishajya Kalpana* provide complete knowledge of drugs including identification, procurement, processing, preparation and application. *Rasa Shastra* mainly deals with metals and minerals which are known as "*Rasa Dravyas*" whereas *Bhaishajya Kalpana* mainly deals with plant origin drugs.

*Rasa Shastra* is an important branch of Indian system of medicine, which deals with the pharmaceutical processes such as preparation of *Bhasmas*, *Pistis*, *Kharliya Rasayanas*, *Druti*, *Kupipakwa Rasayan*, *Parpati*, *Pottali* etc. It is a well-known fact in the *Ayurvedic* world that *Bhasmas* are highly efficacious. *Bhasma* is a unique dosage form, prepared after proper levigation with particular extract of medicinal herbs with particular metals and minerals and later they are subjected to particular quantum of heat and due to its fineness and nano particle size it turns in to most assimilatory, harmless & therapeutically effectual form.

*Shankha Bhasma* is a Calcium containing formulation. In the classics of *Rasa Shastra*, *Shankha Bhasma* recognized as a sole medicine primarily used in the treatment of gastro-intestinal disorders like *Amalpitta*, *Grahani*, *Udarshula* and *Atisaara*.

*Shankha Bhasma* is a good source of calcium as properly manufactured *Bhasma* contains calcium in the form of calcium carbonate. According to the classics of *Ayurveda*, *Shankha Bhasma* having properties like *Madhura Rasa*, *Laghu Guna*, *Sheetal Veerya* etc. had been widely used in the treatment of *Amlapitta*.

In pharmaceutical study, our main aim is to introduce an innovative Standard Operative Procedures (SOP). In the pharmaceutical practices homogeneity between different batches of the same drug is must. Considering these facts, an attempt is made to develop a Standard Operative Procedure (SOP) for the preparation of the *Shankha Bhasma*. To acquire this, we have tried our best to do the proper documentation at each & every stage of drug preparation which has been discussed in this chapter.

In the present study, the aim is to introduce a standard operating procedure for the preparation of *Shankha Bhasma* which was prepared in the P.G. Department of *Rasa Shastra & Bhaishajya Kalpana* of this institute.

## MATERIALS AND METHODS

### A. Procurement of raw material

- *AshudhShankha Nabhi* were procured from *Dhanvantri* herbals.
- *Nimbu* were procured from market.
- *Aloe Vera* was collected from local Gardens.

### B. Authentication of raw drugs

- The raw drugs were collected and identified by the committee having *Dravyaguna* and *Rasa Shastra* and *Bhaishajya Kalpana* experts as members.

### C. Shodhana of Shankha

- *Shankha Bhasma A* – *Shodhana* of 3 batches of *Shankha* done with *Nimbu Swarasa*.
- *Shankha Bhasma B* – *Shodhana* of 3 batches of *Shankha* done with *Kanji*.

### D. Marana of Shankha :

- *Shankha Bhasma A*– *Marana* done according to to the reference given in *Rasamitra*.
- *Shankha Bhasma B* –*Marana* done according to the reference given in *A.P.*

### Brief Description of Pharmaceutical Processings For *Shankha Bhasma* Preparation

#### *Shodhana of Shankha*

*Shankha* divided into two groups –

- Group A
- Group B

**Group A:** It is divided into three batches-

- Batch 1
- Batch 2
- Batch 3

**Group B:** It is divided into three batches-

- Batch 1
- Batch 2
- Batch 3

#### *Shodhana of Group A*

Group A is divided in to three batches. *Shodhana* of different batches of group A was done by the process of *Swedana* with *NimbuSwarasa* for 12 hours by *DolayantraVidhi*.

#### Equipments

Weighing machine, Stainless steel vessel, Ladle, Muslin cloth, Tray, Beaker, plastic container, induction heater.

#### Procedure of *ShankhaShodhana* of Group A

1. *Ashudha ShankhaNabhi* was taken and weighed properly.
2. It was then taken in a muslin cloth and made a *Pottali*.
3. The *Pottali* was then hanged in a vessel with the help of the ladle to made a *Dolayantra*.
4. Then *Nimbu Swarasa* was added in to it till the *Pottali* immersed in it properly.
5. The vessel was subjected to heat on induction heater for 12 hours on constant temperature. By this the

*Pottali* having *Shankha Nabhi* subjected to *Swedana* for 12 hours.

6. Then record the changes during the whole process.
7. The process was continued for 12hours, frequently some amount of *NimbuSwarasa* were added to the vessel and whenever required so that the *Pottali* remain dipped entirely in it.
8. After 12 hours turn off the induction heater and leave it for some time to cool down.
9. After some time, *Pottali* was taken out and *Shankha* pieces were washed with warm water.
10. Then left for drying in sun rays.
11. Then after drying kept it in air tight container for next process.
12. Same procedure of *Shankha Shodhana* followed for making three different batches of *Group A*.

### GROUP A

#### *Shankha Shodhana*

##### Batch 1:

- ❖ **Reference** - *Ras Tarangini12/6-7*
- ❖ **Principle** - *Swedana*
- ❖ **Duration** - 12 hours

#### Material

1. *AshudhaShankhanabhi* - 250gm
2. *Fresh Nimbu fruit* - 12kg
3. *NimbuSwarasa* extracted - 6.1litres

##### Batch 2

- ❖ **Reference** - *RasaTarangini12/6-7*
- ❖ **Principle** - *Swedana*
- ❖ **Duration** - 12 hours

#### Material

1. *AshudhaShankhaNabhi*- 250gm
2. *Fresh Nimbu fruit* - 12kg
3. *NimbuSwarasa* extracted - 6litres

##### Batch 3

- ❖ **Reference** - *Rasa Tarangini12/6-7*
- ❖ **Principle** - *Swedana*
- ❖ **Duration** - 12 hours

#### Material

1. *AshudhaShankhaNabhi* - 250gm
2. *Fresh Nimbu fruit* - 12kg
- NimbuSwarasa* extracted- 6litres

#### Observations

1. After *Shodhana* reduction of lusture and roughness of surface of *ShankhaNabhi* was observed.
2. Total 17.7 litres of *NimbuSwarasa* was used in this process.
3. The temperature of the liquid used for *Swedana* was maintained in the range of 200°C
4. Deposition of material at the rim of the vessel.
5. The colour of *NimbuSwarasa* changed from greenish yellow to reddish brown at the end of the process.

**Precautions**

1. *Pottali* should not touch the bottom or the inner sides of the vessel.
2. *Pottali* must be placed in centre of the vessel.
3. The equipments must be neat and clean before use.
4. Heat must be moderate.
5. The purified *Shankhanabhi* must be kept in closed air tight container.
6. Remaining liquid should be disposed off.

**Table 3.1: ShankhaShodhana Group A.**

Batch	Name of media	Quantity of media	Duration of Swedana	Weight of Shankha (before shodhana)	Weight of Shankha (After shodhana)	% loss
1	<i>Nimbuswarasa</i>	5.9litres	12 hours	250gm	248gm	0.8
2	<i>Nimbuswarasa</i>	5.9litres	12 hours	250gm	250gm	0
3	<i>Nimbuswarasa</i>	5.9litres	12hours	250gm	248gm	0.8

**Shodhana of Group B**

Group B is divided in to three batches. *Shodhana* of different batches of group B was done by the process of *Swedana* with *Kanji* for 3hours by *dolayantravidhi*.

**Equipments**

Weighing machine, Stainless steel vessel, Ladle, Muslin cloth, Tray, Beaker, plastic container, induction heater.

**Procedure of ShankhaShodhana of Group B**

1. *AshudhaShankhaNabhi* was taken and weighed properly.
2. It was then taken in a muslin cloth and made a *Pottali*.
3. The *Pottali* was then hanged in a vessel with the help of the ladle to made a *Dolayantra*.
4. Then *Kanji* was added in to it till the *Pottali* immersed in it properly.
5. The vessel was subjected to heat on induction heater for 3 hours on constant temperature. By this the *pottali* having *Shankhanabhi* subjected to *Swedana* for 3 hours.
6. Then record the changes during the whole process.
7. The process was continued for 3hours, frequently some amount of *kanji* was added to the vessel and whenever required so that the *Pottali* remain dipped entirely in it.
8. After 3 hours turn off the induction heater and leave it for some time to cool down.
9. After some time, *Pottali* was taken out and *Shankha* pieces were washed with warm water.
10. Then left for drying in sun rays.
11. Then after drying kept it in air tight container for next process.
12. Same procedure of *Shankha Shodhana* followed for making three different batches of *Group B*.

**➤ GROUP B****ShankhaShodhana****Batch 1**

- ❖ **Reference** - *Rasa Tarangini 12/10*
- ❖ **Principle** - *Swedana*
- ❖ **Duration** - 3 hours

**Material**

1. *Ashudha Shankhanabhi*- 250gm
2. *Kanji* - 2.3litre

**Batch 2**

- ❖ **Reference** - *Rasa Tarangini 12/10*
- ❖ **Principle** - *Swedana*
- ❖ **Duration** - 3 hours

**Material**

1. *Ashudha Shankhanabhi*- 250gm
2. *Kanji* - 2.3litre

**Batch 3**

- ❖ **Reference** - *RasTarangini 12/10*
- ❖ **Principle** - *Swedana*
- ❖ **Duration** - 3 hours

**Material**

1. *AshudhaShankhanabhi* - 250gm
2. *Kanji* - 2.3litre

**Observations**

1. After *Shodhana* reduction of lusture and smoothness was observed.
2. Total 6.9 litres of *Kanji* was used in the process.
3. The temperature of the liquid used for *Swedana* was maintained in the range of 200°C
4. The colour of *Kanji* changed to orange at the end of the process.

**Precautions**

1. *Kanji* should be made properly and properly filtered before using it for *Shodhana*.
2. pH of *kanji* must be acidic.
3. *Pottali* should not touch the bottom or the inner sides of the vessel.
4. *Pottali* must be placed in centre of the vessel.
5. Remaining liquid must be disposed off.

Table 3.2: Summary of Shodhana of Group B.

Batch	Material used	Name of media	Quantity of media	Duration of Swedana	Weight of Shankha(before Shodhana)	Weight of Shankha(after Shodhana)	% loss
1.	AshudhShankha	Kanji	2.3litres	3hours	250gm	244gm	2.4
2.	AshudhShankha	Kanji	2.3litres	3hours	250gm	248gm	0.8
3.	AshudhShankha	Kanji	2.3litres	3hours	250gm	246gm	1.6

### Marana of Group A Of Shankha

**Group A:** Marana of different batches of group A was done and Bhavana of GhritaKumariSwarasawas given.

### Aloe Vera Leaf Pulp Extraction

- ❖ Reference - *SharangdharaSamhitaMadhyamaKhanda*
- ❖ Ingredients - Fresh *Aloe vera* leaves
- ❖ Apparatus - Stainless steel container and knife

### Procedure

Before each *Bhavana* being given to *ShankhaBhasma* (under process), the *Aloe vera* leaves were washed with water, the margins cut off and leaves cut longitudinally in such a way that the dorsal part of the leaf was separated from the ventral part exposing the mucilage. The mucilage was separated by cutting and scrapping. The mucilage was then churned to make a pulp of uniform consistency.

### Precautions

- Pulp used should be in a non-contaminated state.
- For every *Bhavana* fresh *aloe vera pulp* should be used.

### MARANA

- ❖ Reference - *Rasamitra*
- ❖ Type of procedure - *Putapaka* (incineration)
- ❖ Drug for incineration - *ShudhaShankhaNabhi*
- ❖ Media for Levigation - *Aloevera pulp*

### Equipments

Weighing machine, *Khalvayantra*, Electric muffle furnace, Knife, Spatula, Stainless steel plate, muslin cloth, *Earthen plates*, Measuring cylinder.

### Sub-Processes

- *Bhavana* (levigation)
- *Chakrika* preparation.
- Calcination and Reprocessing the calcined material for subsequent *Putapaka*.

### Procedure

1. The weighed amount of the *Shodhita Shankha* to be calcined was taken inside the *Shrava* (earthen plate) and another *Shrava* (earthen plate) was kept inverted over it.
2. The joint between the two earthen plates was sealed with the mud smeared cloth so as to seal away any visible opening or gap between the two earthen plates and left for drying in sunlight.

3. After drying, the *Shrava Samputa* was placed in an Electric Muffle Furnace and *Gajputa* given. Specific temperature of 900°C was maintained for 1 hour.
4. After this the EMF was switched off and allowed to self cool for about 12 hours.
5. After the *Putapaka* became *Swanga Sheeta*, the earthen plates were taken out and *Kapadmitti* was removed & opened cautiously.
6. The material kept between them was weighed.
7. The weighed amount of the material after first *putapaka* to be calcined was taken in a clean mortar.
8. A weighed and measured amount of *Aloe vera* leaf pulp was added to this material slowly, simultaneously mixing it with the pestle to form a homogenous paste.
9. The mixture was *levigated* with constant pressure and frequency.
10. The mixture was *levigated* until smooth dough of tough consistency is formed.
11. This paste was made in to small pellets (*Chakrika*) of uniform size and thickness.
12. After complete drying, these *Chakrika* were kept inside a *Shrava* and another *Shrava* was kept inverted over it, then mud smearing was done.
13. Then these *Shrava Samputa* were dried in sunlight.
14. After drying, 2<sup>nd</sup> *Gajputa* was given in an EMF and maintained for 1 hour.
15. After the *Putapaka* became *Swanga Sheeta*, the earthen plates were taken out and *Kapadmitti* was removed & opened cautiously.
16. The material kept between them was weighed and other observations like color, taste, odour etc. were recorded.
17. The whole process of the 2<sup>nd</sup> *Putapaka* was repeated one more time using the end product of the previous *Putapaka*.
18. As explained above, same procedure of *Shankha Marana* followed for making three different batches of Group A.

### Precautions

1. Each time *fresh Aloe Vera Pulp* should be used for *levigation*.
2. Sufficient amount of *Aloe Vera Pulp* should be taken for *Bhavana*
3. *Chakrika* should be completely dried in sunlight before *Shrava Samputa*.
4. *Shrava Samputa* dried properly before giving *Putapaka*.
5. *Putapaka* should be removed when temperature in EMF reaches room temperature. Room temperature

should be considered as temperature of *Swangasheeta*.

6. *Pellets* collection after *Putra* done carefully.

## MARAN OF GROUP A

### Batch 1

- ❖ Reference - *Rasamitra 5*

### Observations during consecutive *Putra*

#### During 1<sup>st</sup>*Putra*

1. Initial weight – Before *Putra* Wt. of *Shudha Shankha* - 200g
2. Final weight - After *Putra* Wt. of *Shankha* - 112gm
3. Odour of end product - odourless
4. Touch - Brittle (break with hand)
5. *Rekhapurnta* - negative
6. Colour - white

#### During 2<sup>nd</sup>*Putra*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 112gm
  2. *Kumari Swarasa* used - 140ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 156 gm
    - b. Weight gain after *Bhavana* - 44gm
    - c. Weight after *Putra* - 104gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - negative
  8. Colour - off-white

#### During 3<sup>rd</sup>*Putra*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 104gm
  2. *Kumari Swarasa* used - 100ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 138gm
    - b. Weight gain after *Bhavana* - 34gm
    - c. Weight after *Putra* - 108gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - positive
  8. Colour - white

### Result (Batch 1)

- End product gained - *Shankha bhasma*
- Colour of the *Bhasma* - White
- Odour - odourless
- Taste of *bhasma* - Pungent
- Weight of the end product - 108gm
- Total *putra* applied - 3
- *Rekhapurantvam* - positive

## BATCH 2

- ❖ Reference - *Rasamitra5*

### Observations during consecutive *putra*

#### During 1<sup>st</sup>*Putra*

1. Initial weight – Before *Putra* Wt. of *ShudhaShankha* - 200g
2. Final weight - After *Putra* Wt. of *Shankha* - 116gm
3. Odour of end product - odourless
4. Touch - Brittle (break with hand)
5. *Rekhapurnta* - negative
6. Colour - white

#### During 2<sup>nd</sup>*Putra*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 116gm
  2. *Kumari Swarasa* used - 140ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 144 gm
    - b. Weight gain after *Bhavana* - 28gm
    - c. Weight after *Putra* - 102gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - slightly positive
  8. Colour - white

#### During 3<sup>rd</sup>*Putra*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 102gm
  2. *Kumari Swarasa* used - 100ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 138 gm
    - b. Weight gain after *Bhavana* - 36gm
    - c. Weight after *Putra* - 100gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - positive
  8. Colour - white

### Result (Batch 2)

- End product gained - *Shankha Bhasma*
- Colour of the *Bhasma* - White
- Odour - odourless
- Taste of *Bhasma* - Pungent
- Weight of the end product - 100gm
- Total *Putra* applied - 3
- *Rekhapurantvam* - positive

## Batch 3

- ❖ Reference - *Rasamitra 5*

#### During 1<sup>st</sup>*Putra*

1. Initial weight – Before *Putra* Wt. of *ShudhaShankha* - 200g
2. Final weight - After *Putra* Wt. of *Shankha* - 106gm
3. Odour of end product - odourless
4. Touch - Brittle
5. *Rekhapurnta* - negative
6. Colour - white

**During 2<sup>nd</sup> Puta**

1. Initial weight
  - a) Wt.of *Shankha Bhasma* - 106gm
2. *Kumari Swarasa* used - 140ml
3. Colour of dried *Chakrika*- white
4. Weight of *Chakrika*
  - a. Before *Puta* - 144 gm
  - b. Weight gain after *Bhavana* - 38gm
  - c. Weight after *Puta* - 104gm
5. Odour of end product - odourless
6. Touch - soft
7. *Rekhapurnta* - slightly positive
8. Colour – white

**During 3<sup>rd</sup> Puta**

1. Initial weight
  - a) Wt.of *Shankha Bhasma* - 104gm
2. *Kumari Swarasa* used - 100ml

3. Colour of dried *Chakrika* - white
4. Weight of *Chakrika*
  - a. Before *Puta* - 144 gm
  - b. Weight gain after *Bhavana* - 40gm
  - c. Weight after *Puta* - 102gm
5. Odour of end product - odourless
6. Touch - soft
7. *Rekhapurnta* - positive
8. Colour - white

**Result (Batch 3)**

- End product gained - *Shankha bhasma*
- Colour of the *Bhasma* - White
- Odour - odourless
- Taste of *Bhasma* - Pungent
- Weight of the end product - 102gm
- Total *Puta* applied - 3
- *Rekhapurntvam* - positive

**Table 3.3: Summary of Marana of Group A.**

Batch	Material used	Bhavanadravya	Amount of Bhavana Dravya used (2 <sup>nd</sup> puta + 3 <sup>rd</sup> Puta) in ml	Wt.of Shankha (before Marana in gms)	Wt. after Ist Puta in gms	Wt. after 2 <sup>nd</sup> Puta in gms	Wt. after 3 <sup>rd</sup> Puta in gms	% loss
1	<i>Shudha Shankha</i>	Aloe vera pulp	140+100	200	112	104	108	46
2	<i>Shudha Shankha</i>	Aloe vera pulp	140+100	200	116	102	100	50
3	<i>Shudha Shankha</i>	Aloe vera pulp	140+100	200	106	104	102	49

**Observations**

1. After 1<sup>st</sup> Puta, pieces of *Shankha* were found white, lighter in weight and brittle in consistency. After 1<sup>st</sup> Puta maximum loss was observed in comparison to next Putas.
2. After levigation with *Aloe Vera* colour of *Bhasma* changes to grey from white.
3. An estimate of 12 hours was needed for complete drying and *Sandhibandhan* of *Shrava*.

**Marana of Group B of Shankha**

**Group B:** *Marana* of different batches of group B was done and *Bhavana* of *Nimbu Swarasa* was given.

**Extraction of Nimbu Swarasa**

**Principle** - *Nishpidana* (squeezing)

**Equipments**

Knife, lemon juice extractor, cotton cloth, S.S.vessel, weighing machine.

**Materials:** *Nimbu Fruits*.

**Procedure**

*Nimbu fruits* were washed with water properly. Then they were cut in to two halves. These pieces were placed in lemon juice extractor and compressed to collect lemon juice in to a stainless steel vessel. Then it was filtered through clean cotton cloth, measured and stored in glass bottle.

**Precautions**

1. Clean cotton cloth should be used.

2. Proper hygiene should be maintained throughout the procedure.
3. Seeds should be removed.

**Equipments**

Weighing machine, *Khalva Yantra*, Gas stove, Electric muffle furnace, Knife, Spatula, Stainless steel plate, muslin cloth, Earthen plates, Measuring cylinder.

**Sub-Processes**

- *Bhavana* (levigation)
- *Chakrika* preparation.
- Calcination and Reprocessing the calcined material for subsequent *puta*.

**MARANA**

- ❖ **Reference** - *Ayurveda Prakasha*
- ❖ **Type of procedure** - *Putapaka* (incineration)
- ❖ **Drug for incineration** - *Shudha Shankha Nabhi*
- ❖ **Media for Levigation** - *Nimbu Swarasa*

**Procedure**

1. The weighed amount of the *Shodhita Shankha* to be calcined was taken over the iron net and *open Marana* was done by giving heat through LPG stove till it becomes red hot.
2. After that gas stove turns off and iron net left over it and allowed to self cool.
3. After the iron net became *swangasheeta*, the iron net removed cautiously.
4. The material kept over it was weighed properly.

5. The weighed amount of the material after first open *Putra* to be calcined was taken in a clean mortar.
6. A weighed and measured amount of *Nimbu Swarasa* was added to this material slowly, simultaneously mixing it with the pestle to form a homogenous paste.
7. The mixture was *levigated* with constant pressure and frequency.
8. The mixture was *levigated* until smooth dough of tough consistency is formed.
9. This paste was made in to small pellets (*Chakrika*) of uniform size and thickness.
10. After complete drying, these *Chakrika* were kept inside a *Shrava* and another *Shrava* was kept inverted over it, then mud smearing was done.
11. Then these *ShravaSamputa* were dried in sunlight.
12. After drying, *1<sup>st</sup>laghuputa* was given in an EMF and maintained for 1hour.
13. After the *Putra* became *Swanga Sheeta*, the earthen plates were removed and opened.
14. The material kept between them was weighed and other observations like colour, taste, odour etc. were recorded.
15. The whole process of the first *Laghuputa* repeated one more time using the end product of the previous *puta*.
16. As explained above, same procedure of *Shankha Marana* followed for making three different batches of Group B.

#### Precautions

1. Each time *fresh NimbuSwarasa* was used for *levigation*.
2. Sufficient amount of *Nimbu Swarasa* should be taken for *Bhavana*.

#### MARANA OF GROUP B

##### Batch 1

- ❖ Reference - *Ayurveda Prakasha*

##### Observations during consecutive *Putra*

##### During OPEN *PUTA*

1. Initial weight – Before *puta*  
Wt. of *ShudhaShankha*- 200g
2. Final weight - After *Putra*  
Wt. of *Shankha* - 168gm
3. Odour of end product - odourless
4. Touch - Brittle
5. *Rekhapurnta* - negative
6. Colour - off –white

##### During 1<sup>nd</sup>*Putra*

1. Initial weight
  - a) Wt. of *ShankhaBhasma* - 168gm
  2. *Nimbu swarasa* used - 130ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 188 gm
    - b. Weight gain after *Bhavana* - 20gm
    - c. Weight after *Putra* - 162gm
  5. Odour of end product - odourless

6. Touch - soft
7. *Rekhapurnta* - slightly positive
8. Colour - greyish

##### During 2<sup>nd</sup>*puta*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 162gm
  2. *NimbuSwarasa* used - 80ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 190 gm
    - b. Weight gain after *Bhavana* - 28gm
    - c. Weight after *Putra* - 160gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - positive
  8. Colour - greyish white

##### Result (Batch 1)

- End product gained - *Shankha Bhasma*
- Colour of the *Bhasma* - greyish White
- Odour - odourless
- Taste of *Bhasma* - Pungent
- Weight of the end product - 160gm
- Total *Putra* applied - 3
- *Rekhapurntvam* - positive

##### Batch 2

- ❖ Reference - *Ayurveda Prakasha*
- ❖ Date of starting - 13 February 2021
- ❖ Date of completion - 3 March 2021

##### During OPEN *PUTA*

1. Initial weight – Before *Putra*  
Wt. of *Shudha Shankha* - 200g
2. Final weight - After *Putra*  
Wt. of *Shankha* - 166gm
3. Odour of end product - odourless
4. Touch - Brittle
5. *Rekhapurnta* - negative
6. Colour - off –white

##### During 1<sup>st</sup>*Putra*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 166gm
  2. *Nimbu Swarasa* used - 130ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 194 gm
    - b. Weight gain after *Bhavana* - 28gm
    - c. Weight after *Putra* - 160gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - slightly positive
  8. Colour - greyish

##### During 2<sup>nd</sup>*Putra*

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 160gm
  2. *Nimbu Swarasa* used - 80ml

3. Colour of dried *Chakrika* - white
4. Weight of *Chakrika*
  - a. Before *Putra* - 190 gm
  - b. Weight gain after *Bhavana* - 30gm
  - c. Weight after *Putra* - 156gm
5. Odour of end product - odourless
6. Touch - soft
7. *Rekhapurnta* - positive
8. Colour - greyish white

**Result (Batch 2)**

- End product gained - *ShankhaBhasma*
- Colour of the *Bhasma* - greyish White
- Odour - odourless
- Taste of *Bhasma* - Tasteless
- Weight of the end product - 156gm
- Total *Putra* applied - 3
- *Rekhapurntvam* - positive

**Batch 3**

- ❖ Reference - *Ayurveda Prakasha*

**During OPEN PUTA**

1. Initial weight – Before *Putra*  
Wt. of *ShudhaShankha* - 200g
2. Final weight - After *Putra*  
Wt. of *Shankha* - 164gm
3. Odour of end product - odourless
4. Touch - Brittle
5. *Rekhapurnta* - negative
6. Colour - off -white

**During 1<sup>st</sup>Putra**

1. Initial weight

- a) Wt. of *Shankha Bhasma* - 164gm
2. *Nimbu Swarasa* used - 130ml
3. Colour of dried *Chakrika* - white
4. Weight of *Chakrika*
  - a. Before *Putra* - 192 gm
  - b. Weight gain after *Bhavana* - 28gm
  - c. Weight after *Putra* - 162gm
5. Odour of end product - odourless
6. Touch - soft
7. *Rekhapurnta* - slightly positive
8. Colour - greyish

**During 2<sup>nd</sup>puta**

1. Initial weight
  - a) Wt. of *Shankha Bhasma* - 162gm
  2. *Nimbu Swarasa* used - 80ml
  3. Colour of dried *Chakrika* - white
  4. Weight of *Chakrika*
    - a. Before *Putra* - 186 gm
    - b. Weight gain after *Bhavana* - 24gm
    - c. Weight after *Putra* - 160gm
  5. Odour of end product - odourless
  6. Touch - soft
  7. *Rekhapurnta* - positive
  8. Colour - greyish white

**Result (Batch 3)**

- End product gained - *Shankha bhasma*
- Colour of the *Bhasma* - greyish White
- Odour - odourless
- Taste of *Bhasma* - Pungent
- Weight of the end product - 160gm
- Total *Putra* applied - 3
- *Rekhapurntvam* - positive

**Table 3.4: Summary of Marana of Group B**

Batch	Material used	Bhavanadravya	Amount of BhavanaDravya used(2 <sup>nd</sup> Putra+ 3 <sup>rd</sup> Putra)in ml	Wt. of Shankha(before Maran) in gms	Wt. after open Puta in gms	Wt. after IstPutra in gms	Wt. after 2ndPutra in gms	% loss
1	<i>ShudhaShankha</i>	<i>Nimbuswarasa</i>	130+80	200	168	162	160	20
2	<i>ShudhaShankha</i>	<i>Nimbuswarasa</i>	130+80	200	166	160	156	22
3	<i>Shudhashankha</i>	<i>Nimbuswarasa</i>	130+80	200	164	162	160	20

**Observations**

1. During *open Marana* of *Shankha* After 15 minutes of *Marana* colour changes to black from white.
2. After 45minutes it changes to grey from black and then to off white after 2hours of *Marana*.
3. When *Nimbu Swarasa* added than colour changes to green but after *levigation* it changes to grey.
4. After *levigation* when soft dough is formed than *Chakrika* was made which is grey in colour but after drying colour changes to white.

**RAW DRUGS**



**SHODHANA GROUP A – BATCH I**



**AshudhaShankha**



**NimbuSwarasa**



PottaliNirmana



Swedana by Dolayantra



pH during Swedana



After Shodhana

**SHODHANA GROUP A – BATCH II**



Before Shodhana



AfterShodhana

**SHODHANA GROUP A – BATCH III**



**Before Shodhana**



**After Shodhana**

**SHODHANA GROUP B – BATCH I**



**Ashudha Shankha**



**Kanji**



**Pottali Nirmana**



**Dola Yantra**



Swedana by Dola Yantra



After Shodhana

**SHODHANA GROUP B – BATCH II**



Before Shodhana



After Shodhana

**SHODHANA GROUP B – BATCH III**



Before Shodhana



After Shodhana

MARANA GROUP A – BATCH I



Before IstPutra



After IstPutra



Breaking after IstPutra



Aloevera



Bhavana



Chakrika Nirmana



ShravaSamputa



AfterPutra



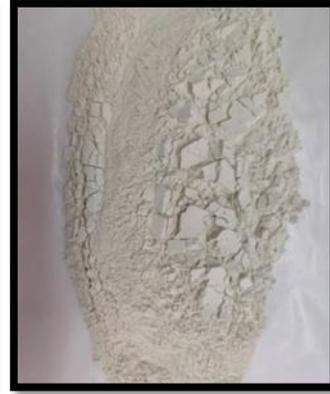
After IIndPutra



After IIIrdPuta



RekhaPurna



Passed from Sieve No. 120

**MARANA GROUP A – BATCH II**



Before IstPuta



After IIIrdPuta

**MARANA GROUP A – BATCH III**



Before IstPuta



After IIIrdPuta

**MARANA GROUP B – BATCH I**



**Shudha Shankha**



**Open Marana**



**After Marana**



**NimbuSwarasa**



**Bhavana**



**ChakrikaNirmana**



**After IstPutra**



**After IIndPutra**

**MARANA GROUP B – BATCH II****Before Puta****After Puta****MARANA GROUP B – BATCH III****Before Puta****After Puta****DISCUSSION SHODHANA OF SHANKHA**

*Shankha* divided into two groups –

- Group A
- Group B

**Group A:** It is divided into three batches-

- Batch 1
- Batch 2

- Batch 3

**Group B:** It is divided into three batches-

- Batch 1
- Batch 2
- Batch 3

**Shodhana of Group A**

Group A is divided in to three batches. *Shodhana* of different batches of group A was done by the process of *Swedanawith NimbuSwarasa* for 12 hours by *DolayantraVidhi* reference given in *RasTarangini*.

For *Shodhana* of *Shankha Dolayantra* was made and it was immersed in *Nimbu Swarasa* for twelve hours.400ml of *Swarasa* was added after every one hour and colour of *Swarasa* changed from greenish yellow to reddish brown at the end of the process.Weight of *Shankha* in three batches before *Shodhana* 250gm and after *Shodhana* 248 gm in Batch I,250gm in Batch II, 248gm in Batch III.i.e. 0.8% loss in Batch I and Batch III and zero % loss in Batch II.

After *Shodhana* colour of *Shankha* changed, reduction of lusture and surface became rough.The reaction between an alkaline substance (*Shankha*) and acidic media (*NimbuSwarasa*) resulted in the corrosion of the outer layer of *Shankha*, leading to reduction in its weight and reduction of hardness after *Shodhana*.It helps in removal of impurities.

**Shodhana of Group B**

Group B is divided in to three batches. *Shodhana* of different batches of group B was done by the process of *Swedanawith Kanji* for 3hours by *Dolayantra Vidhi* reference given in *RasTarangini*.

For *Shodhana* of *Shankha Dolayantra* was made and it was immersed in *Kanji* for three hours.400ml of *Kanji* was added after every one hour and colour of *Kanji* changes to orange at the end of the process.Weight of *Shankha* in three batches before *Shodhana* 250gm and after *Shodhana* 244 gm in Batch I,248gm in Batch II, 246gm in Batch III. i.e. 2.4%% loss in Batch I,0.8%loss in batch II and 1.6%loss in Batch III.

pH of *Kanji* is 3 which is acidic reaction between acidic and alkali media results in corrosion of the outer layer of the *Shankha* and helps in removal of impurities.

**Marana of Shankha**

*Marana* of any mineral is achieved by continuous levigation with liquid media and subjecting it to a particular quantum of heat. Due to levigation with a specific herbal material,organic matter is added to the mineral. Further repeated levigation helps in reducing the particle size due to the action of comminution forces.When the same material is subjected to *Putra* processing,the presence of heat facilitates the formation of compound.

**Sub-Processes**

- *Bhavana*
- *Chakrika preparation*
- *Calcination and reprocessing the calcined material for subsequent Putra.*

**First phase: Phase of Bhavana (levigation)**

**Group A:** Group A *Bhavana* of *Ghritha Kumari Swarasa* given.

**Group B:** Group B *Bhavana* of *Nimbu Swarasa* given.

Before each *Bhavana* being given to *Shankha Bhasma* (under process),the *aloe Vera* mucilage pulp was extracted from the *Aloe Vera* leaves and *NimbuSwarasa* extracted from the fresh *Nimbu*.Then levigation of *Shankha* was done with *Aloe Vera* juice and *Nimbu Swarasa* continuously for 7-8 hours and was done till the material became a dough mass.

**Second phase: Phase of Chakrika (pelletization)**

In this phase, the levigated doughly mass was converted into small pellets.Then pellets were kept in earthen saucer and another earthen saucer was covered and junction was sealed by mud smeared clothes.

**Third phase: Phase of heating (Putra)**

*Putra* is a measure of quantum of heat applied to the mineral to convert it into calcined form. Amount of heat required for *Marana* of particular substance depends upon its internal energy and original bonding of the molecules of that substance.If the bonding of molecules is strong,then heat should be applied for a longer duration and a higher temperature range is required.

In this phase after drying,the *Sarava Samputa* was placed in an Electric Muffle Furnace at the specified temperature which was maintained for 1 hour. In Group A, three *Putas* were given to all the three batches at temperature 900°C.When the EMF was switched off it was allowed to self-cool.After the *Putra* became *Swanga Sheeta*,the earthen plates were removed and opened cautiously.

In Group B, three *Putas* were given to all the three batches at 600°C.First *Putra* was open *Putra* and other two *Putra* were closed *Putra* at 600°C.When the EMF was switched off it was allowed to self-cool.After the *Putra* became *Swanga Sheeta*,the earthen plates were removed and opened cautiously.

Percentage loss after *Marana* in different batches of Group A: Batch1-46%, Batch2-50%, Batch3-49% and in Group B: Batch1-20%, Batch2-22%, Batch3-20%.

**CONCLUSION**

In present research work on the basis of facts, observations and results of pharmaceutical studies, it could be concluded that

- Here in this study three batches of *ShankhaBhasma* in Group A and three batches of *ShankhaBhasma* in Group B were prepared. Total six batches of *Shankha Bhasma* were prepared.
- In Group A *Marana* of *Shankha Bhasma* done by *Gajaputa* at specific temperature of 900°C. In Group B Firstly open *Maran* of *Shankha Bhasma* was done

after that two *Laghuputa* was given at specific temperature of 600°C.

- *Shankha Bhasma* required minimum 3 *Putra* to be transformed in to *Rekhapurna*, *Nirdhuma*, *Avami Bhasma* using *Aloe Vera* leaf pulp as media (*Bhavana Dravya*) for Group A and *Nimbu Swarasa* as media for Group B.
- Cutting of tongue *Pareeksha* of *Shankha Bhasma*. This *Guna* of *Shankha Bhasma* is due to the *Kshariya Guna* of *Shankha*.
- Yield of final product in all batches of Group A was 45-50% and yield of final product in all batches of Group B was 78-80%.
- Colour of *ShankhaBhasma* prepared :
- Group A-White and Group B –off white.
- The elements present in *ShankhaBhasma* are Ca, C, O and Si shown by EDAX.
- Although the method of preparation of *Shankha Bhasma* Group A and Group B was different but the analysis of both the *Bhasmas* showed almost same results.

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