

Pharmaceutical Standardization of Chinchakshara Prepared From Stem Bark of Chinchā(Tamarindusindica Linn.)

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ABSTRACT

Ayurveda deals with minerals, metals and herbs in therapeutics as well as part of pharmaceutical process. It has been classified into several groups. Among them, ChinchāKshara (alkali preparation made with stem bark of Tamarindusindica Linn.) is a type of Kshara, which is useful in various diseases. It is an important ingredient of well-known Ayurvedic formulations i.e. Shankhavati, Mahashankhavati etc. But till date identification and authentication criteria of Chinchā Kshara has been not published. That makes altered, adulterated or substituted material in market. Present attempt to develop standard manufacturing process (SMP) of Chinchā Kshara prepared from stem bark of Chinchā (Tamarindusindica Linn.) and also to develop preliminary analytical profile of it. Chinchā stem bark was collected, dried and burned. Kshara was prepared as per the reference of Rasa Tarangini with three washes. Preliminary physicochemical parameters i.e. pH, loss on drying at 105°C, total ash (%w/w), acid insoluble ash (%w/w) and water soluble extractive (%w/w) were carried out. An average of 2.66% Chinchā Kshara was obtained in context to ash and 0.30% in context to dry stem bark. An average pH, loss on drying at 105°C, total ash, acid insoluble ash and water soluble extractive of ChinchāKshara were 12.77, 2.58%, 70.76%, 0.003%, 99.42% respectively. With the current standardization procedure, we get substantial information for proper identification of ChinchāKshara from stem bark.

KEYWORDS: Alkaline preparation, Chinchā Kshara, Standardization, Tamarindusindica Linn.

I. INTRODUCTION

Ayurveda has shown various paths to using metal, mineral, plant and animal materials in

medical treatment since long. Rasashastra and Bhaishajya Kalpana, the pharmaceutical branch of Ayurveda, has described use of these resources in a very planned and descriptive manner by formulating various medicines to treat diseases. Kshara (alkaline substances) is one among them. Kshara is a medicament obtained from ash of one or more plants, animal and mineral products. Kshara preparation process involves the extraction of 'alkali' from ash of dried plants. In classics, different parts of plant are advocated for preparation of Kshara i.e. whole plant, stem, stem bark etc. In Raj Nighantu, ChinchāKshara prepared from stem bark is indicated in Shoola and Agnimandya. Considering that, here stem bark was taken for the preparation of ChinchāKshara.

Variations in opinions regarding the methods of preparation including ratio of ash and water, soaking duration, folds of cloth, filtration pattern and specifications of vessel are found in different classics i.e. Sushruta Samhita, Ashtanga Samgraha, Ashtanga Hridaya, Chakradatta, Sharangadhara Samhita, Ayurveda Prakasha, Rasa Tarangini, Ayurveda Sara Samgraha etc. Chinchā Kshara is an important ingredient of well-known Ayurvedic formulations i.e. Shankhavati, Mahashankhavati etc. But in market, authenticity of Chinchā Kshara has big question mark because of demand-supply gap, lack of identification and authentication criteria. Also in API (Ayurvedic Pharmacopoeia of India), no any established standards given for ChinchāKshara. Previously research works were done on ChinchāKshara from fruit bark and stem. But till date no any research work has been carried out on ChinchāKshara from stem bark.

Considering this, an attempt has been made to develop standard manufacturing process of ChinchāKshara from stem bark of Chinchā.

II. MATERIALS AND METHODS

A. Collection of raw material:

Fresh stem bark of Chinchawas collected from the campus of Government Ayurved Pharmacy, Rajpipala, Gujarat, India in the month of May 2022 by adopting Good Collection Practices guidelines. The drug was identified and authenticated in the pharmacognostical laboratory of Upgraded Department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat for its authenticity.

B. Preparation of Chinchakshara:

To develop standard manufacturing

Ingredients:

Table No. 1: Ingredient for preparation of Chinchastem bark ash

| Sr. no. | Ingredients | Latin/English Name | Part used | Weight (kg) |
|---------|--------------|------------------------|-----------|-------------|
| 1 | Fresh Chinch | Tamarindusindica Linn. | Stem bark | 55 |

Procedure: Completely dried stem bark was ignited and allowed to burn completely in an open iron pan. After self-cooling, ash was collected. [Figure 1(a) - 1(c)].

Ingredients:

Table No. 2: Ingredients for preparation of Ksharajala

| Sr. no. | Ingredients | Ratio (v/v) | Quantity (ml) | | | |
|--------------|---------------|--------------------------|--------------------|-------------|-------------|------|
| | | | Batch 1 | Batch 2 | Batch 3 | |
| 1 | Ash of Chinch | 1 | 500 | 500 | 500 | |
| 2 | DM water | For 1 st wash | 4 | 2000 | 2000 | 2000 |
| | | For 2 nd wash | 4 (compare to Ash) | 1200 | 1210 | 1220 |
| | | For 3 rd wash | 4 (compare to Ash) | 1220 | 1280 | 1250 |
| Total | | | 4420 | 4490 | 4470 | |

Procedure:

500 ml ash was taken in a stainless steel vessel and four times of demineralized (DM) water was added. Contents were mashed thoroughly with hand and left undisturbed for three hours. After three hours, the supernatant layers were decanted by rubber tube into another vessel. This was labelled as Ksharajala-1. Residual ash was again added with DM water as same quantity of previously decanted filtrate and kept undisturbed for three hours. Clear liquid was drained and labelled as Ksharajala-2. Further, the residue obtained at the end of second

process (SMP), 3 batches of Chinchakshara (CK) were prepared as per the reference of Rasa Tarangini with slight modification.

The whole process is divided into 3 steps:

1. Preparation of ash
2. Preparation of Ksharajala
3. Evaporation of Ksharajala

1. Preparation of ash

Equipment:

Electric weighing balance, big iron pan, s.s. tray, infrared thermometer and spatula.

2. Preparation of Ksharajala

To develop SMP, 3 batches of Ksharajala were conducted containing 500 ml of ash in each batch from obtained total ash.

Equipment:

Electric weighing balance, measuring cylinder, s.s. vessels, rubber tube, cotton cloth.

wash was again added with DM water and repeat process to obtain Ksharajala-3. All three Ksharajala were mixed and filtered 7 times through three folded cotton cloth and labelled as Ksharajala. [Figure 1(d) - 1(i)].

3. Evaporation of Ksharajala

Equipment:

Electric weighing balance, measuring cylinder, s.s. vessels, spatula, gas stove, infrared thermometer, pincer, porcelain mortar & pestle, glass container.

Ingredients:

Table No. 3: Ingredients for evaporation of Ksharajala

| Sr. no. | Ingredients | Latin/ English Name | Part used | Quantity (ml) | | |
|---------|-------------------|------------------------|-----------|---------------|---------|---------|
| | | | | Batch 1 | Batch 2 | Batch 3 |
| 1 | ChinchaKsharajala | Tamarindusindica Linn. | Stem Bark | 3690 | 3780 | 3740 |

Procedure:

Ksharajala was taken in steel vessel and heated over the gas stove till the entire water portion gets evaporated completely. Kshara was stored in an air tight glasscontainer [Figure 1(j) - 1(m)].

C. Preliminary analysis

Organoleptic characteristics as like colour, odour, taste, texture and appearance were carried out. Preliminary physicochemical parameters including pH, loss on drying, total ash¹⁷,

acidinsolubleash¹⁷ and water soluble extractive were carried out at quality control laboratory, upgraded department of Rasashastra & BhaishajyaKalpana, Government Ayurved College, Vadodara.

III. OBSERVATIONS AND RESULTS

Chincha stem bark was dried completely in 13 days. As material was completely dried, it burnt quickly. After self-cooling, greyish white coloured ash was obtained with a characteristic odour.

Table No. 4: Results obtained during preparation of Chincha stem bark ash

| Sr. No. | Parameters | Results |
|---------|---|---|
| 1 | Total quantity of Fresh Chincha stem bark(kg) | 55 |
| 2 | Total quantity of Dry Chincha stem bark (kg) | 45.83 |
| 3 | Total time taken for drying (Days) | 13 |
| 4 | Total time taken for preparation of ash(Hr:min) | 27:50 |
| 5 | Final weight of ash (kg) | 5.12 |
| 6 | Final weight of ash (l) | 6.02 |
| 7 | Final weight of ash (%) | 11.17 |
| 8 | Loss from dry Chincha stem bark (kg) | 40.71 |
| 9 | Loss from dry Chincha stem bark (%) | 88.83 |
| 10 | Loss from fresh Chincha stem bark (kg) | 49.88 |
| 11 | Loss from fresh Chincha stem bark (%) | 90.70 |
| 12 | Reason of loss | Due to burning organic part of the material |

An average 1210 ml Ksharajala was obtained in first wash followed by 1250 ml and 1277 ml in second and third wash respectively. During preparation of Ksharajala, at the time of addition of water into ash effervescent was observed. After some times, ash was settled down

at the bottom of the vessel and few ash particles were floating on the upper surface of the vessel. After each wash colour and taste of Ksharajala was decreased.

Table No. 5: Results obtained during preparation of ChinchaKsharajala

| Sr. No. | Parameters | Results | | | |
|---------|--|---------|---------|---------|----------------|
| | | Batch 1 | Batch 2 | Batch 3 | Average |
| 1 | Volume of ash taken (ml) | 500 | 500 | 500 | 500 |
| 2 | Weight of ash taken (g) | 431 | 422 | 424 | 425.67 |
| 3 | Volume of water taken (ml) | 4420 | 4490 | 4470 | 4460 |
| 4 | Volume of totalKsharajala obtained after 3 washes (ml) | 3690 | 3780 | 3740 | 3736.67 |
| 5 | Ksharajala (%) | 83.48 | 84.19 | 83.67 | 83.78 |
| 6 | Ksharajala loss (%) | 16.52 | 15.81 | 16.33 | 16.22 |

| | | | | | |
|---|--|-----------------------------------|-------|-------|-------|
| 7 | Times taken for preparation of Chinchaksharajala(Hr:Min) | 09:20 | 09:25 | 09:30 | 09:25 |
| 8 | Reason of loss | Due to decantation and filtration | | | |

The obtained Ksharajalahadsalty taste, characteristic our,yellowish colour and slimy touch. During the phase of evaporation,temperature of liquid media and flame were recorded atregularintervals.

Table No. 6: Temperature of flame and liquid media at different interval during evaporation ofKsharajala

| Time (Min.) | Temperature (°C) | | | | | |
|-------------|------------------|--------------|---------|--------------|---------|--------------|
| | Batch 1 | | Batch 2 | | Batch 3 | |
| | Flame | Liquid media | Flame | Liquid media | Flame | Liquid media |
| 00 | 96.8 | 31.4 | 94.3 | 30.2 | 93.8 | 29.6 |
| 15 | 184.3 | 62.5 | 174.4 | 60.4 | 181.2 | 61.7 |
| 30 | 251.6 | 83.9 | 255.7 | 84.4 | 249.6 | 83.1 |
| 45 | 259.5 | 88.3 | 262.4 | 89.7 | 258.4 | 87.6 |
| 60 | 267.3 | 94.9 | 269.5 | 95.2 | 264.2 | 93.7 |
| 75 | 272.2 | 96.6 | 277.1 | 96.9 | 269.3 | 95.5 |
| 90 | 288.4 | 97.4 | 286.6 | 97.2 | 286.1 | 97.2 |
| 105 | 295.7 | 98.6 | 298.3 | 98.8 | 292.5 | 98.3 |
| 120 | 287.2 | 97.3 | 298.2 | 98.3 | 281.1 | 97.1 |
| 135 | 261.2 | 79.2 | 259.1 | 78.1 | 252.7 | 77.4 |
| 150 | 232.1 | 77.6 | 236.3 | 76.5 | 217.4 | 75.4 |
| 165 | 227.3 | 76.4 | 221.4 | 75.6 | 211.4 | 74.7 |
| 168 | 213.4 | 74.8 | - | - | - | - |
| 174 | - | - | - | - | 207.5 | 73.3 |
| 178 | - | - | 208.5 | 73.9 | - | - |

At the time of evaporation, the yellowish Ksharajalawasgraduallyturnedto light brownish semisolid masswith aggregationandcreaking sounds.Finally a white colouredKsharawasobtained.

Table No. 7: Results obtained during evaporation ofKsharajala

| Sr. No. | Parameters | Results | | | |
|---------|--|-----------------------------|---------|---------|----------------|
| | | Batch1 | Batch 2 | Batch 3 | Average |
| 1 | Volume of Ksharajala (ml) | 3690 | 3780 | 3740 | 3736.67 |
| 2 | Time taken for evaporation of Ksharajala(Hr:Min) | 2:48 | 2:58 | 2:54 | 2:53 |
| 3 | Final weight of Kshara (g) | 12 | 11 | 11 | 11.33 |
| 4 | Final weight of Kshara (%) | 2.78 | 2.60 | 2.59 | 2.66 |
| 5 | Reason of loss | Due to evaporation of water | | | |

Organoleptic characteristics

Table No. 8: Organoleptic characteristics of powder, ash and Kshara of Chinchastem bark

| Sr No. | Characters | Stem bark powder | Stem bark ash | Stem bark Kshara |
|--------|------------|------------------|----------------|------------------|
| 1 | Colour | Light brown | Grey | White |
| 2 | Odour | Odourless | Characteristic | Odourless |
| 3 | Taste | Astringent | Slight salty | Caustic |
| 4 | Texture | Rough | Smooth | Smooth |
| 5 | Appearance | Powder | Powder | Powder |

Preliminary physicochemical parameters

Table No. 9: Preliminary physicochemical parameters of Chincha stem bark powder and ash

| Sr. No. | Parameters | Results | |
|---------|------------------------------------|------------------|---------------|
| | | stem bark powder | stem bark ash |
| 1 | pH (1% aqueous solution) | 6.73 | 12.51 |
| 2 | Loss on drying at 105 °C (% w/w) | 5.20 | 1.97 |
| 3 | Total ash (% w/w) | 11.78 | 91.42 |
| 4 | Acid insoluble ash (% w/w) | 2.13 | 2.95 |
| 5 | Water soluble extractive (% w/w) | 6.78 | 6.12 |
| 6 | Alcohol soluble extractive (% w/w) | 8.13 | 1.6 |

Table No. 10: Preliminary physicochemical parameters of ChinchaKshara

| Sr. No. | Parameters | Results | | | |
|---------|----------------------------------|---------|---------|---------|--------------|
| | | Batch 1 | Batch 2 | Batch 3 | Average |
| 1 | pH (1% aqueous solution) | 12.71 | 12.84 | 12.76 | 12.77 |
| 2 | Loss on drying at 105 °C (% w/w) | 2.16 | 2.43 | 3.16 | 2.58 |
| 3 | Total ash (% w/w) | 70.38 | 71.12 | 70.79 | 70.76 |
| 4 | Acid insoluble ash (% w/w) | 0.00 | 0.01 | 0.00 | 0.003 |
| 5 | Water soluble extractive (% w/w) | 99.92 | 98.58 | 99.76 | 99.42 |

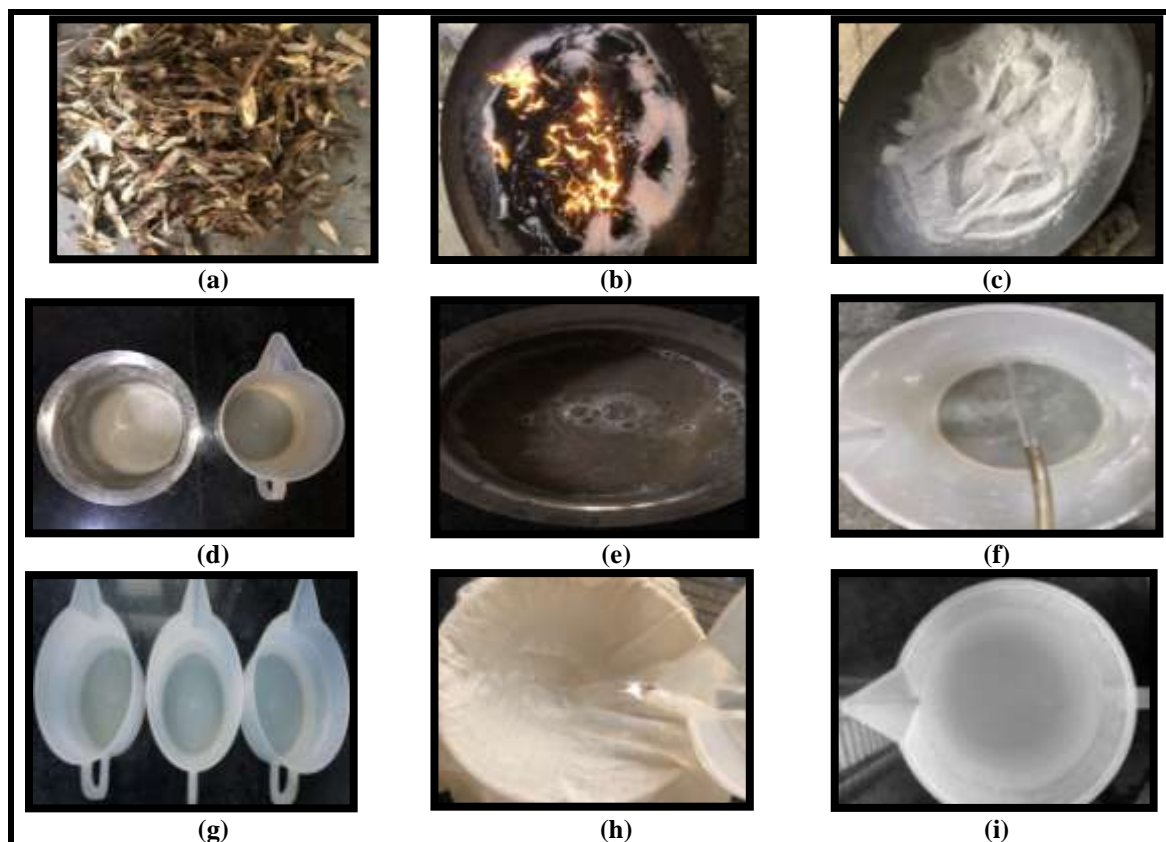




Figure 1: Unit operative procedure for Chincha Kshara prepared from stem bark

(a) Dried stem bark of Chincha. (b) Burning of stem bark in big iron pan. (c) Chincha ash from stem bark. (d) Ash and water. (e) Effervescent during addition of water in ash. (f) Decantation of Ksharajala. (g) Ksharajala 1, Ksharajala 2 and Ksharajala 3. (h) Filtration of Ksharajala. (i) Ksharajala after 3 washes. (j) Heating of Ksharajala. (k) Semisolid form of Kshara. (l) Last stage of Kshara preparation. (m) Prepared Kshara stored in airtight glass container.

IV. DISCUSSION

Kshara are important therapeutic agents as well as a part of different pharmaceutical process, being used in Ayurveda since ages. For example, 30 varieties of Kshara, have been mentioned in Charaka Samhita that signifies the importance of its use in therapeutics. It is used in more than 20 different pharmaceutical processes. However, a uniform method of its preparation is not found in the classical literature. Variations are found in the ash and water proportion, soaking time, filtration pattern in different classics. For example, Acharya Sushruta advised six times water and 21 times of filtrations,⁴ whereas Acharya Sharangadhara suggested four times water and soaking overnight,⁸ while author of Rasa Tarangini advised addition of four times of water, maceration for 3 hours and filtration through three-folded cloth.¹⁰ Few classics advised keeping the content undisturbed for overnight,⁸⁻⁹ while few suggested for 3 hours¹⁰ or 2-3 days.¹¹ However, none of the classical texts has mention about the repetition of washings. But many research works has been carried out by repetition of washings. After reviewing the different research works of Chincha Kshara, it was found that the majority of scholars adopted the method of Rasa Tarangini. In one research work on Chincha Kshara from fruit bark, author concluded that increasing number of washings increases the yield of Kshara. Author repeated the process five times for the preparation of Chincha Kshara. But in that study, yield

percentages of the fourth and fifth washes were 2.12% and 0.68% respectively. That was minimal compared to the first wash (11.15%), second wash (9.33%) and third wash (5.52%). So for the present study, it was decided to adopt the method of Rasa Tarangini with three washes.

For preparation of ash, collected fresh material should be cleaned properly. Foreign particles, soil, mud, and other sticky materials should be removed meticulously and dried in sunlight. To avoid contaminated with soil, the dried materials were burnt in an open pan. This also facilitates frequent shifting of the burning material within the container. Instead of burning entire batch at a time, it is always advisable to burn the dried material in increments. After catching fire, the material should be added little by little into the fire and sufficient amount of time is to be given for complete burning. Intermittent stirring should be done for complete burning. Ash should be collected after self-cooling.

Fresh water (preferably DM) should be used for each wash to avoid addition of inorganic salts present in tap water. Ash should be macerated well in water for proper mixing and maximum dissolution of the contents that further facilitates maximum yield. Then the contents should be left undisturbed allowing the insoluble contents to settle down for three hours. After each wash colour and taste of Ksharajala was decreased, it was due to dilution of ash in each wash by water. Non-reactive stainless steel vessel should be used during evaporation of Ksharajala to prevent possible chemical reactions. Continuous mild to moderate heat should be given. During final stages of heating, continuous stirring should be done to prevent burning and sticking. As Kshara is hygroscopic in nature, it should be stored in airtight glass containers to prevent atmospheric reactions.

The degree of acidity or alkalinity of a sample solution is expressed by the sample's pH

value.pH of stem bark powder was 6.73 while pH of stem bark ash, CK1, CK2 and CK3 were 12.51, 12.71,12.84 and 12.76 respectively. Higher pH value indicates alkaline nature of material.The acid-insoluble ash (AIA) is used to estimate the amount of silica present, which is the indication of contamination with earthy material. In present study, AIA value was nearer to 0.01% in all batches of Kshara. It indicates that, these samples are free from contamination of earthy material.

V. CONCLUSION

The residues after a first wash should never be discarded. It should be processed further to obtain more Kshara.This method is adoptable for future research work with larger batch size. The current observations and results can be considered as a lead for future studies.Till date API not published any standard on Chinchakshara, so current findings of preliminary physicochemical parameter can be used as a reference. With the current standardization procedure, we get substantial information for proper identification of Chinchakshara from stem bark.

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