



Research Article

THE COMPARATIVE ANALYSIS OF *KARANJA KSHARA* SAMPLES -PREPARED ACCORDING TO DIFFERENT AYURVEDIC TEXTUAL REFERENCES

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ABSTRACT

*Karanja Kshara* is an alkali, extracted from water soluble ash of the plant - *Karanja* {*Pongamia pinnata* (L.)}. The *Kshara* preparation techniques differ according to various authors, with respect to the ratio of water added to ash, soaking time, folds of cloth and number of filtrations. In the current study, *Karanja Kshara* was prepared as per different classical methods and analysed for the differences. Three samples of *Karanja Kshara* were prepared, according to the textual references from *Sushruta Samhita* (Sample A), *Sharngadhara Samhita* (Sample B) and *Rasa Tarangini* (Sample C). Analysis of the methods of preparation along with organoleptic and Physico-chemical tests were conducted. There was a 14% yield of *Kshara* in Sample A, 7.45% of yield in Sample B and 7.54% in Sample C. In physicochemical analysis, there was 6.8%, 6.1% and 5.4% of loss on drying in Samples A, B and C, respectively. Total ash value was 84.7%, 85.78% and 87.89% in Samples A, B and C respectively. Acid insoluble ash value was 11.34%, 11.04% and 9.15%. pH value was 10.36, 10.30 and 10.37. Traces of Sodium, Potassium, Magnesium, Calcium, Sulphur, oxides of silica, Carbonate & Bicarbonate were found in all the 3 samples. There are very few notable differences found in the results, however, they are quite similar. In terms of yield, economy and alkalinity, sample A (*Sushruta Samhita*) can be considered as the better method while sample method C (*Rasatarangini*) is easier and faster.

INTRODUCTION

*Kshara Kalpana* is a unique dosage form in Ayurveda, where the alkali present in the ash of particular plants, like *Karnaja* {*Pongamia pinnata* (L.)} is extracted and is converted into a feasible formulation. The elaborate description of *Kshara* preparation is vividly available in the classics, whereby many differences in the opinions are also evident. *Sushruta Samhita* (SS) mentions that the ash must be soaked in 6 times of water,<sup>[1]</sup> while the *Rasa Tarangini* (RT) mentions that the ash can be soaked in 4 times water, just for 3 hours.<sup>[2]</sup> *Sharngadhara Samhita* (Sh.S) explains water must be 4 times the ash and should be soaked overnight.<sup>[3]</sup>

The difference or similarity in the *Kshara* prepared in all the three different methods should be analysed in order to understand the logic behind the methods of preparation and to judge, which method is feasible yet productive. *Ayurveda* describes various criteria to judge the quality of the product, based on the physical entities. With the Technological advent, many tests have evolved, which can help in the right judgement of the quality of the preparation. These tests make it easier for us, to understand the quality, purity and strength of the *Kshara*. Considering these factors, three samples of *Karanja Kshara* as per - SS (Sample A), Sh.S (Sample B) and RT (Sample C) were prepared and evaluated in terms of organoleptic characters, Physico-chemical parameters, as well as the chemical tests and the results thus obtained, were analysed.<sup>[4]</sup>

Materials and Methods

Raw drug i.e., *Panchanga* (leaves, flower, fruit, root and bark) of *Karanja* was procured from the local village of Bengaluru and authenticated before the *Kshara* preparation. It was dried well and burnt into

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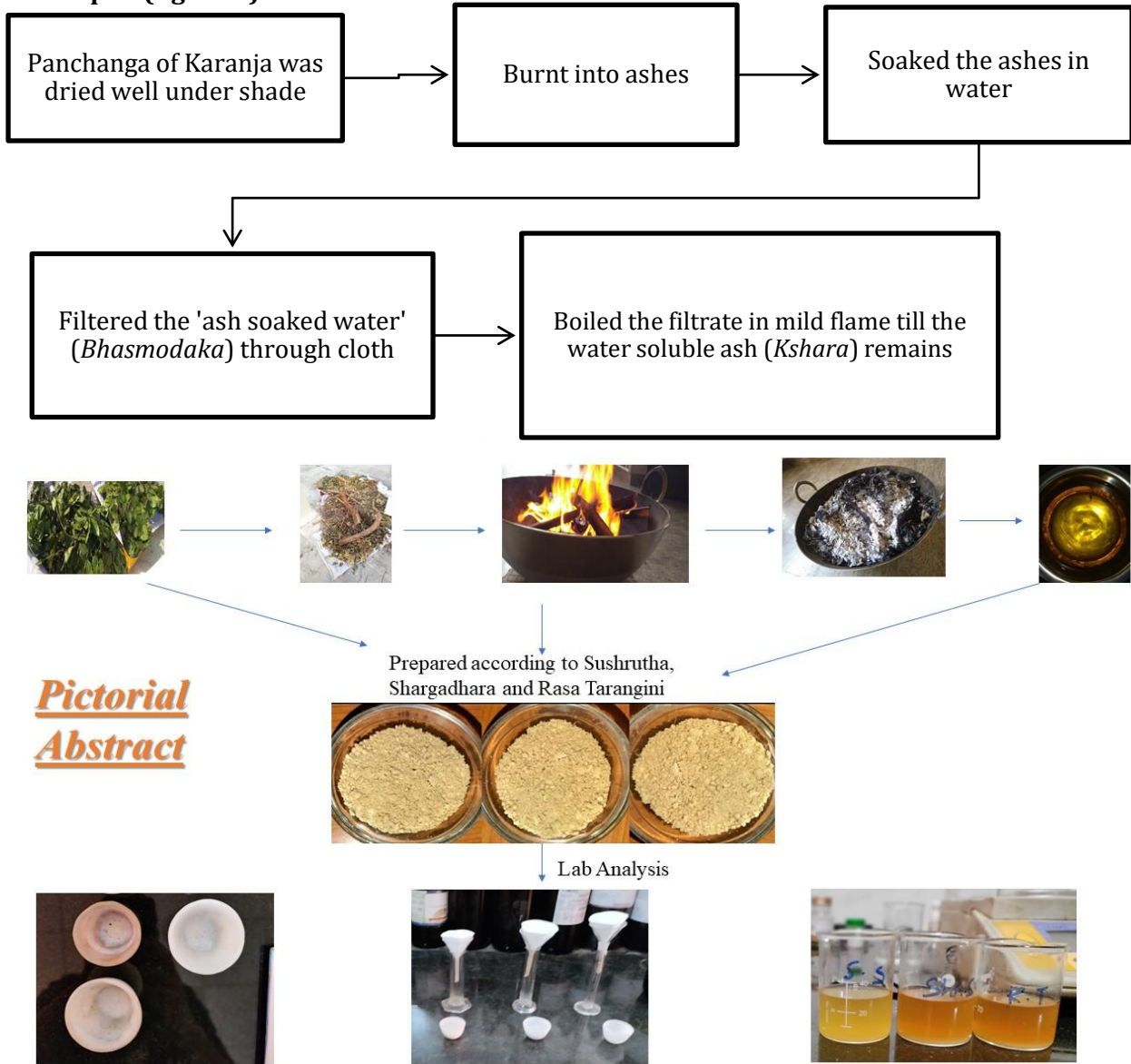
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ashes. After preparing the ash it was processed as per three different methods mentioned in SS (Sample A), Sh.S (Sample B) and RT (Sample C). (Shown in Figure 2 and Table 1)

The analysis of samples (A, B & C) was carried out by using different organoleptic, Physico-chemical and chemical tests.

Organoleptic Characters of the end product like Colour, Taste, Odour and Appearance were noted. Physico-chemical parameters like - Loss on drying, pH analysis, Total Ash, Acid Insoluble ash, Water-soluble ash, Specific gravity and Chemical tests were conducted in Central Drug Testing Laboratory, Bengaluru and in Bangalore Analytical Research Centre, Bengaluru. (Table 2)

**Common steps - (figure 2)**



Sample	Reference	Proportion of Ash and Water	Soaking Time	Number of Filtrations	Folds of Cloth
A	Sushruta Samhita	1:6	--	21	1
B	Shargadhara Samhita	1:4	12 hours (overnight)	Decanted Liquid	1
C	Rasa Tarangini	1:4	3 hours	3 (Till Clear Liquid is obtained)	3

<b>Table 2: Parameters</b>	
Organoleptic Characters	Colour, Taste, Odour, Appearance
Physicochemical parameters	a) Loss on drying b) pH analysis c) Total Ash d) Acid Insoluble ash e) Water soluble ash f) Refractive index g) Specific gravity
Chemical tests	Qualitative analysis & Quantitative analysis- Percentage of Sodium, Potassium, Magnesium, Calcium, Sulphur, oxides of silica, Carbonate & Bicarbonate and Alkalinity, Phenolphthaleine Alkalinity.

### Observations and Results

The detail of the process of preparation, organoleptic studies, physicochemical study and Chemical tests of *kshara* has been depicted in the Table 3 to Table 5.

	A	B	C
Weight of <i>Karanja</i> Wet Drug	35 Kg		
Weight of <i>Karanja</i> Dry Drug	21 Kg		
Loss of weight after Drying	14 Kg		
% Of loss of weight after Drying	40%		
Weight of <i>Karanja</i> Ash	2 Kg		
% Of Weight of Ash w.r.t wet drug	5.7%		
% Of Weight of Ash w.r.t dry drug	9.5%		
Weight of Ash Distributed	1000g	470g	530g
Volume of <i>Karanja</i> ash	2.2 litre	1 litre	1.17 litre
Ratio of water to be added	1:6	1:4	1:4
Volume of Water added	13 litres	4 litres	4.68 litres
No. of filtrations	21	Till Supernatant Liquid is obtained (5)	In 3 fold cloth
Total time taken for heating on Mild flame	39 hours	12 hours	12.5 hours
Weight of <i>Kshara</i> Obtained	140g	35g	40g
% Of yield w.r.t Ash	14 %	7.44%	7.54%
Approximate time required to obtain <i>Kshara</i> from 1 Kg <i>Bhasma</i>	39 hours	26.4 hours	19.4 hours

### Evaluation of *Karanja Bhasma* (Ash):

<b>Table 4: Organoleptic Characters</b>	
1. Colour	Greyish white
2. Odour	Characteristic
3. Taste	Salty
<b>Physico - Chemical Characteristics</b>	
1. Total Ash	76.48%
2. Water Soluble Ash	26.74%
3. Specific Gravity at 27 <sup>o</sup> C	0.5706
4. pH	10.26

	A	B	C
<b>Organoleptic Characters</b>			
1.Colour	Off white	Creamish White	Creamish Yellow
2.Odour	Characteristic	Characteristic	Characteristic
3.Taste	Acrid	Acrid	Acrid
4.Appearance	Amorphous	Amorphous	Amorphous
<b>Physico – Chemical Characteristics</b>			
1.Loss on drying	6.8%	6.1%	5.4%
2. Total Ash	84.7%	85.78%	87.89%
3. Acid insoluble Ash	11.34%	11.04%	9.15%
4. Water Soluble Ash	85.75%	85.41%	87.26%
5. Specific Gravity at 27 <sup>o</sup> C	1.6597	1.6329	1.63898
6. pH	10.3	10.4	10.6
7. Refractive Index	1.3458	1.3646	1.3454

**Table 6: Qualitative and Quantitative Analysis**

	Sample A	Sample B	Sample C
1. Total Alkalinity	25.03%	22.18%	21.14%
2. Alkalinity	15.22%	13.44%	12.8%
3. Phenolphthalein Alkalinity	9.81%	8.74%	8.34%
4. Carbonates	19.62%	17.46%	16.68%
5. Bicarbonates	5.41%	4.72%	4.468%
6. Oxides of Silica	0.907%	1.46%	0.35%
7. Sulphur	7.31%	6.12%	13.66%
8. Magnesium	0.18%	0.71%	0.75%
9. Sodium	0.50%	0.64%	0.60%
10. Potassium	30.81%	29.22%	31.05%
11. Calcium	0.09%	0.24%	0.11%

## DISCUSSION

### Preparation

*Karanja panchanga* burnt quickly and easily as it was completely dried. Time required for the complete preparation of *Kshara* in Sample C < Sample B < Sample A, yet the percentage of yield obtained was more in Sample A in comparison with Sample B and C. Water proportion added is more in the case of Sample A, which might be one of the reasons for the good percentage of yield, as *Kshara* is an extracted water-soluble alkali. More the water, more the dissolution. *Sh.S* and *RT* have mentioned the same proportion of water, but the time of soaking is different. Hence soaking time does not seem to affect yield as the final product of the two are almost similar.

### Organoleptic characters

Colour of Sample A, Sample B and Sample C was found to be Off white, Creamish white and creamish yellow, maybe due to the reduction in carbon particles during filtration as Sample A is filtered a greater number of times. The taste was pungent and Acrid, maybe because of the presence of inorganic salts. The odour was characteristic and pungent. On touch, *Kshara* was Amorphous powder form and slightly Slimy due to the presence of salts.



## Physico chemical parameters

### Loss on drying

Loss on drying determines the amount of volatile matter (i.e., the water drying off from the drug).<sup>[5]</sup> The more the moisture content, the lesser will be the shelf life. Here, Sample C has the minimum Moisture content while Sample A with maximum moisture, though the difference was very minimal.

### Total ash

The total ash value is important as this indicates the amount of ash content present in the sample.<sup>[6]</sup> More the content of ash in the sample more will be the presence of alkaline matter in the sample. Sample A < Sample B < Sample C.

### Acid insoluble ash

Acid insoluble ash test is carried out to evaluate the percentage of insoluble inorganic content of the sample in dilute acid.<sup>[7]</sup> This evaluates the Bio-availability of the drug. Here Sample A > Sample B > Sample C.

### Water soluble ash

Water soluble ash indicates the percentage of solubility of contents of the sample soluble in water.<sup>[8]</sup> Also, the solubility of ash finds out the impurities. Sample C > sample A > sample B. All the samples were almost soluble in water.

### Specific gravity

Specific gravity is the weight for a given volume of substance when compared with same amount of water at given temperature.<sup>[9]</sup> It indicates the presence of solutes in a solvent. All the three samples have similar specific gravity. Here the solutes refer to the extracted active principles of *Karanja*.

### Refractive index

RI is a fundamental property of a substance which helps to identify substance confirms its purity and measures its concentration.<sup>[10]</sup> It is directly proportional to density. RI in all the samples were almost similar.

### pH

The pH Value of an aqueous liquid may be defined as the common logarithm of the reciprocal of the hydrogen ion concentration expressed in gram per litre.<sup>[11]</sup> pH is similar in almost all the samples indicating that they are all equally basic.

### Alkalinity

Alkalinity is a standardized measure of the buffering capacity of an aqueous solution or the quantitative capacity of bases in the solution to neutralize acids. The Alkalinity of a solution is a measure of how strong the bases are in the solution, more the alkalinity, stronger the solution.<sup>[12]</sup> The alkalinity found in *Karanja kshara* samples had

minimal variations in the order Sample A > Sample B > Sample C.

Alkalinity in Phenolphthalein was also found to be Sample A > Sample B > Sample C.

### Quantitative Analysis

Percentage of Sodium, Potassium, Magnesium, Calcium, Sulphur, oxides of silica, Carbonate & Bicarbonate was noted. There were minute differences noted in all the values. Sodium traces were found in the order Sample B > Sample C > Sample A. Magnesium traces were found in the order Sample C > Sample B > Sample A. Calcium traces were found in the order Sample B > Sample C > Sample A. Potassium was seen in all the samples and in the order Sample C > Sample A > Sample B. Sulphur was found to be more in Sample C when compared to the other 2 samples. The order in the other 2 was Sample A > Sample B. Oxides of silica were found in the order Sample B > Sample A > Sample C. Carbonates and Bicarbonates were found in the order Sample A > Sample B > Sample C.

### CONCLUSION

Though the values of organoleptic, physicochemical, qualitative, and quantitative analysis are with slight variation in all the three samples, there are no significant and outstanding differences noted. Procedures followed in Samples B and C produce similar yields, however, Sample C takes less time. Considering yield, economy and alkalinity sample A could be considered a better method among the three methods of *Kshara* preparation. When the raw drug availability is scarce, one can go with the 1<sup>st</sup> method (Sample A – *Sushruta Samhita*) of *Kshara* preparation. Whereas ease of preparation and quick process is seen in sample C. So, when there is time scarcity one can choose the 3<sup>rd</sup> method (sample C - *Rasa Tarangini*) of preparation.

### Limitations

As the yield of *Kshara* with respect to the raw drug is very low, and the amount of *Kshara* sample necessary for lab analysis is large, these studies are a bit difficult to carry out.

### Scope for further study

The current study is based on the physicochemical evaluation, and it can be further evaluated clinically.

Different other methods of *Kshara* preparation mentioned in various Ayurvedic texts might be studied, such as in - Yogaratnakara, Ayurveda Sara Sangraha, Ayurveda Prakasha, Rasatantra sara and Siddha prayoga sangraha.

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