Research Article

www.ijrap.net

(ISSN Online:2229–3566, ISSN Print:2277–4343)

SIGNIFICANCE OF COMBUSTION DURING THE PREPARATION OF KSHARA

Rakesh P [1]*, Kiran Sarma [2]

[1] PG Scholar, Department of Rasa sastra and Bhaishajya Kalpana, Government Ayurveda College, Thiruvananthapuram, Kerala, India

[2] Assistant Professor, Department of Rasa sastra and Bhaishajya Kalpana, Government Ayurveda College, Thiruvananthapuram, Kerala, India

Received on: 21/12/23 Accepted on: 22/1/24

***Corresponding author**
E-mail: rakeshpothirath@gmail.com

DOI: 10.7897/2277-4343.15235

ABSTRACT

Ksharas are water soluble-alkaline compounds that are prepared by the combustion of raw drugs. Various Ksharas are used in clinical practice, among them, Apamarga kshara is widely prescribed. The main process involved in the preparation of kshara is the combustion of raw drugs. The complete combustion of the raw drugs leads to higher yields and better analytical results. Hence, this study was initiated to increase the yield and minimise manual labour and time by maintaining constant combustion by implementing a new method. For this purpose, a new instrument was developed for the combustion of raw drugs and multiple experiments were conducted. In the classical method of preparation, after complete combustion, carbon particles or partially burned raw herbs accounted for 23.6%, whereas with the new instrument, this was reduced to 9.4%. The instrumental method produced an increase in the yield of kshara. The results showed that for the preparation of kshara, combustion is the major part. Complete combustion of raw drugs will produce a good yield.

Keywords: Apamarga, Kshara, Instrument

INTRODUCTION

Plant-derived products are becoming more popular in the modern day as pharmaceuticals, nutraceuticals, and cosmetics. The World Health Organization estimates that for their basic medical requirements, around 80% of the world's population still depends on herbs and other traditional medicines[1]. In accordance with the general trend of people reverting to natural therapy, the usage of herbal medications has dramatically expanded. Various herbal species are used therapeutically, modifying them into different dosage forms in Ayurveda. Kshara was one among such dosage forms.

Kshara, with its alkaline composition made from the enlisted therapeutic plants in classics, has an important role in today's clinical practice. Major Ayurvedic classical literature gives varied opinions and insights on different methods of kshara preparation.

Ksharas are alkaline compounds made from the ashes of herbal medicines that are water-soluble. Apamarga Kshara, one among such Ksharas extensively referred in classics, have a detailed description in the literature of Sushruta Samhita. Regarding the same context, varying opinions are available on different classics like Sharngadhara Samhita, Rasatarangini, Dravyaguna Vigyana, and Ayurveda Sara Samgraha.

Acharya Sushruta has described in detail regarding Kshara by dedicating a separate chapter Kshara Paka vidhi Adhyaya [2] which was a unique contribution in regard to Kshara Kalpanas. The prepared medicine substance was called Kshara because it causes Ksharana (Destruction of tissue) to Mamsa and other Dhatu [3]. Acharya Sushruta defines the Kshara as a substance possessing Ksharana and Kshanana (Destruction) properties [4]. Kshara was described as one among the Anushastras as well as one of the Upakrama for Vrana (Wound) [5]. It was the superior among the sharp and subsidiary instruments because of performing Chedana (excision), Bhedana (incision), Lekhana (scraping) and destroys the Tridoshaja disorders [6]. The classification of Kshara can be done in various ways based on administration i.e., Paneeya and Pratisaraneeya. concentration i.e., Mrudu, Madhyama and Teekshna [7].

Despite having great medicinal potency and efficacy, kshara is not properly used in Ayurvedic clinical practice. It is a result of the various steps involved during the preparation of kshara. It requires more manpower and time. Because of the difficulties faced during its preparation and availability is also minimal.

Various challenges experienced during the preparation of Kshara as per classical methods were the combustion of raw drugs, initiating ignition of raw drugs, ash flying from the pan and extinguishing of fire by surrounding air. Of these, the major challenge confronted in the preparation of kshara was maintaining the combustion of raw drugs, which might generate more carbon particles. As said before extinguishing of fire by surrounding air resulted in the generation of huge fumes which interrupted the procedure.

This study was initiated to decrease the difficulty faced during the preparation of kshara as in classical methods and the present study mainly focuses on comparing the time consumption, manpower, yield, and analytical parameters of the two methods - Open combustion and specially designed earthen pot methods.

For this study, Apamarga (Achyranthes aspera) was selected, because of its easy availability and the majority of the physicians prefer Apamarga kshara for their clinical practice. It

was collected from a Thiruvananthapuram-based Ayurvedic medicine vendor. In classical texts, it was mentioned that disorders that are difficult to treat can be cured by Kshara therapy. Numerous studies are available regarding the uses of kshara in Bhagandhara (Fistula in ano), Arsas (piles), Shvitra (vitiligo), charmakeela (warts), and kadara (corns), Cervical Erosion (Karnini Yonivyapada), Trichomonas vaginalis, Carbamate Kinase, Non-healing venous ulcer, Diabetic foot ulcer etc [7-8].

MATERIALS AND METHODS

Plan of work in brief - Briefing of both methods

The first method - Traditional method

3 Consecutive batches of each of 1 kg of Apamarga panchanga (A1, A2, A3) was taken. Dry Apamarga panchanga was taken in 3 large iron pans and burnt into ash form. It was left for self-cooling (swangasheeta) and collected in 3 separate iron vessels. Water was added to these vessels in a ratio of 6 parts with 1 part of ash and stirred well and the mixture was left undisturbed overnight for a specified period of time (12 hours). The following morning, supernatant from all the three pans was collected separately by filtration, and the dark color sediment was discarded. Then each of the supernatants was filtered 21 times till a clear liquid was obtained known as Ksharodaka (alkaline liquid), which had Gomutra varna (color like cow's urine). After that, each liquid was placed in a different iron vessel and heated over a moderate fire while being stirred periodically until all of the water had evaporated. Thus, Mridu kshara was obtained [9].

Method of preparation - Classical (as per Sushruta Samhita)

Collection of Apamarga: Three consecutive batch of Apamarga (A1, A2, A3) plant, each weighing 1.5 kg was taken, and external impurities (foreign matters) were removed. It was dried under sunlight until it was completely dried to a constant weight. Thus 1.25 kg,1.30 kg, and 1.25 kg Apamarga were obtained from each batch respectively. 1 kg of Apamarga panchanga from each batch was taken for the preparation of kshara.

Vessel for combustion: 3 Iron pan with 35 cm, 30 cm, and 33 cm diameters was taken. A small quantity of dried Apamarga was placed within it, and it was concurrently set on flame. The remaining plant parts were added in small quantities to the igniting iron pan. After full combustion, it was allowed to cool down.

Figure 1: Combustion of raw drugs in classical method

Figure 2: After complete combustion of raw drugs in classical method

Vessel for ksharajala: The obtained ash was transferred into three separate steel vessels, each with a diameter 10 cm,15 cm height and mixed with 6 times of water and stirred well which was kept undisturbed overnight.

Filtration of ksharajala: The next day, supernatant clear liquid was decanted into a separate vessel and it was filtered through a double-layered cotton cloth for 21 times. The procedure was repeated for the following two batches. Finally, three batches of slimy ksharajala were collected and stored separately in steel vessels.

Figure 3: Filtration of ksharajala in classical method

Boiling of ksharajala: The obtained ksharajala was boiled on mild fire in an iron vessel till it was reduced to 1/10th part. In

this stage, a small quantity of ksharajala was collected and kept aside for preservation of kshara. The remaining ksharajala was boiled further till the water content got completely evaporated. It was scrapped from the vessel and kept in a borosil glass tube, and then the previously collected ksharajala was added to it, to maintain its potency.

Second method by instrument: A specially designed instrument was made for the combustion of raw drugs. 3 consecutive batches of 1 kg of Apamarga panchanga (B1, B2, B3) were taken for the study. From the first set of Apamarga (B1), a small amount of dry drug was added to the instrument and ignited. A blower was used for maintaining the fire. The remaining Apamarga was gradually added to the fire and continued to burn until total combustion was achieved. After complete combustion, it was left for self-cooling and was collected in steel vessel.6 times of water was added to the steel vessel and mixed well. It was kept undisturbed overnight (for a specified period:12 hours). Next morning, the supernatant was collected by filtration through double-layered cotton, and the dark-coloured sediment was discarded. Then the supernatant was filtered 21 times till a clear liquid was obtained known as Kshara jala (alkaline liquid), which had Gomutra varna (color like cow's urine). Then the liquid was put in an iron vessel and heated with moderate fire with alternating stirring till complete evaporation of water. Thus, Mridu kshara was obtained. The process was repeated for B2 and B3 batches subsequently.

Figure 4: Kshara obtained after complete boiling of ksharajala

Figure 5: Ksharajala collected for preservation

Method of preparation-second (instrumental method)

Collection of Apamarga: Three sets of 1.5 kg of the Apamarga (B1, B2, and B3) plant were taken, cleaned of external pollutants and thoroughly rinsed with water. It was sun-dried until it achieved a stable weight. The outcome was 1.30 kg, 1.25 kg, and 1.25 kg of Apamarga.

Vessel for combustion: Two mud vessels were taken and the largest mud vessel of 24 cm depth, 24 cm upper diameter open at both ends was placed upright. The second mud vessel of 20 cm depth, 24 cm upper diameter open at both ends was placed inverted over the first mud vessel. The mouth of both vessels was properly sealed with 7 layers of cloth smeared with Multani mitti. A mud sieve was placed inside the first mud vessel 10 cm above the base. A blower was connected to the hole which was made just above the base of the lower vessel.

The dried Apamarga plant was placed in the mud vessel and ignited. The remaining plant parts were added in small quantities to the igniting mud pot and after full combustion, it was allowed to cool down.

Vessel for ksharajala: The resulting ash was placed in a steel container with a diameter of 10 cm and height of 15 cm mixed with 6 times of water, and well agitated before being left undisturbed overnight.

Figure 6: Combustion of raw drugs in instrumental method

The next day, the supernatant clear liquid was decanted into a separate vessel, and it was filtered through a double-layer cotton cloth 21 times. Thus, a slimy ksharajala was obtained.

Boiling of ksharajala: The obtained ksharajala was boiled in a mild fire in an iron vessel till it was reduced to $1/10^{th}$ part. In this stage, a small quantity of ksharajala was collected and kept aside for preservation of kshara. The remaining ksharajala was boiled further till the water content was completely evaporated. It was scrapped from the vessel and kept in a borosil glass tube. Then the collected ksharajala was added to it to maintain its potency.

Figure 7: Filtration of ksharajala in instrumental method

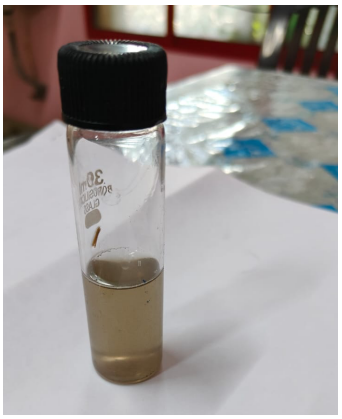

Figure 8: Ksharajala collected for preservation of ksharajala

Figure 9: Kshara obtained after complete boiling of ksharajala

RESULTS

Table 1: Results of Classical method

Sl no	Quantity	Time taken for combustion	Ash obtained	Amount of water added to ash	Ksharajala before filtration	Ksharajala after filtration	Kshara obtained	Amount of Carbon	pH	Colour of kshara
A 1	1 Kg	30 min	83 gm	498 ml	230 ml	170 ml	11 gm	10 gm	10.53	Light brown
A 2	1 Kg	40 min	80 gm	480 ml	250 ml	180 ml	9.5 gm	16.5 gm	10.62	White
A 3	1 Kg	50 min	80.5 gm	483 ml	300 ml	375 ml	8 gm	30 gm	10.54	Light brown
Average		**40 minutes**	**81.16**	**487 ml**	**260 ml**	**241.6 ml**	**9.5 gm**	**18.8 gm**	**10.5**	

Table 2: Results of Instrumental method

Sl no	Quantity	Time taken for combustion	Ash obtained	Amount of water added to ash	Ksharajala before filtration	Ksharajala after filtration	Kshara obtained	Amount of Carbon	pH	Colour of kshara
B 1	1 Kg	20 minutes	60 gm	360 ml	255 ml	230 ml	12 gm	4 gm	10.83	White
B 2	1 Kg	25 minutes	65 gm	390 ml	220 ml	190 ml	10.5 gm	6 gm	10.75	Light brown
B 3	1 Kg	20 minutes	50 gm	300 ml	230 ml	200 ml	10 gm	6.5 gm	10.84	White
Average		**21.6 minutes**	**58.3 gm**	**350 ml**	**235 ml**	**206.6 ml**	**10.83 gm**	**5.5 gm**	**10.8**	

Table 3: Comparison of results of both methods

Steps	Classical method	Instrumental method
% of raw drug and ash obtained after combustion	8.16%	5.83%
% of amount of carbon obtained in	23.16%	9.4%
Average Kshara obtained	9.5 gm	10.83 gm
Average pH of kshara	10.5	10.8
Average time for combustion	40 minutes	21.6 minutes

DISCUSSION

Out of the 3 batches of Apamarga panchanga taken, weighing 1 kg each, it was observed that the time of combustion was more in the first method compared to the second method. This might be due to the usage of a blower in the second method which maintained a constant supply of air for uniform maintenance of the fire and complete combustion of the raw drugs.

Owing to the design of the instrument, combustion was not affected by the external air or wind, which facilitated complete combustion of the raw materials in a short period when compared to the first method. The formation of carbon particles was comparatively less in the second method as the constant fire was maintained by the usage of a blower.

In the classical open method, surrounding air/wind might alter the fire but in the second method, surrounding air/wind can't alter the fire because of the structure of the instrument, as only its upper portion was open to space.

In the second method, the peculiar design of the equipment helped in preventing the flying of ash during combustion. Whereas the flying of ash from the iron pan in the first method was relatively higher than in the second method.

In the first method, more carbon particles were produced due to the influence of surrounding air which altered the constant maintenance of fire. Sustained fire enables the complete burning of raw drugs and produces lesser carbon particles, which ultimately determines the yield of kshara.

The production of Aparmarga Kshara for the current study was done using the guidelines from Susrutha Samhitha [10] and Ashtanga Hridaya[11] . For optimum drying, Panchanga should be cut into small pieces. Panchanga should be properly dried for complete combustion. For optimal burning it must be added gradually to the fire in both methods

In the second method, the employment of a blower aided in forming ash quickly. The amount of ash produced after full combustion was determined by the constant fire; an inappropriate supply of fire may result in the production of more carbon particles. The raw drug should be dried properly to enhance the ignition and decrease the time for combustion. The raw drug was dried in sunlight until a constant weight was

attained. To avoid potential chemical reactions, stainless steel or a suitable nonreactive vessel was used. Ash has to be mixed well with water before being allowed to settle down. Ksharajala must be retrieved from the outlet with extreme caution and without damaging the vessel. The colour of the final kshara formed varied due to the presence of residue in ksharajala. Sediment ingress was prevented using appropriate measures. For this, a fresh cotton cloth was used. In order to prevent sedimentation in the contents, Acharyas also advised filtering them through multiple-folded cloth.

In the second approach, a constant supply of fire was maintained with the aid of a blower and a newly designed instrument, that enhanced the complete combustion of raw drugs. Compared to the first approach, this process produced less ash and carbon.

The advantage of the new instrument during the combustion of raw drugs is this instrument can reduce the time consumed for the combustion of raw drugs. The average time required for combustion was 21 minutes but in the classical method the time required was double i.e., 40 minutes.

The quantity of Ash obtained after combustion was less in the second method ie,58.3 gm but in the first method, it was 81.6 gm because this novel instrument can combust almost all the raw drugs well, so the amount of carbon was less. This complete combustion of raw drugs has resulted in the production of more Kshara. In the classical method, 9.5 gm of kshara was obtained but in the second method, it was 10.83 gm. In a large production, this change may produce huge differences.

In the classical method, self-cooling required more than 3 ½ hours because the combustion was done in an iron pan, which caused the temperature to drop slowly. However, the instrumental method required less than half an hour to cool down on its own. This is because the instrument has been designed in such a way that the ash collection tray is positioned below the combustion chamber, away from direct heat. Therefore, it can be claimed that compared to the instrument approach, the classical method required more time for self-cooling.

CONCLUSION

This novel instrument can maintain the fire constantly by the use of a blower, which will aid in complete burning of raw drugs and efficient formation of ash. The complete combustion of raw drugs will produce good yield and analytical results. This device can sustain a steady flame throughout the combustion of raw drugs, producing ash with little to no carbon particles or partially burned particles.

REFERENCES

1. World. WHO establishes the Global Centre for Traditional Medicine in India [Internet]. Who. int. World Health Organization: WHO; 2022 [cited 2022 Nov 19]. Available from: https://www.who.int/news/item/25-03-2022-who-establwashes-the-global-centre-for-traditional-medicine-in-india
2. Sushruta, Sushruta Samhita, English Commentary by Sharma P.V., Varanasi, Chaukhamba Bharati Academy, Reprint 2010, Sutra Sthana 11/11, p 113
3. Sushruta, Sushruta Samhita, English Commentary by Sharma P.V., Varanasi, Chaukhamba Bharati Academy, Reprint 2010, Sutra Sthana 11/4, p 113
4. Acharya Sushruta, Sushruta Samhita, Dalhana. Nibandha Samgraha commentary, Edited by English Commentary by Prof. K.R. Srikantha Murthy, Chaukhamba Orientalia, Varanasi, Reprint, Sutrasthana 2012; 11/4, p 63
5. Acharya Sushruta, Sushruta Samhita, Dalhana. Nibandha Samgraha commentary, Edited by Kaviraj kunjalal bhishagratna, Chaukhamba Sanskrit Series, Varanasi, Third edition, Sutrasthana 2005; 11/2, p 63
6. Acharya Sushruta, Sushruta Samhita, Dalhana. Nibandha Samgraha commentary, Edited by English Commentary by Prof. K.R. Srikantha Murthy, Chaukhamba Orientalia, Varanasi, Reprint, Sutrasthana 2013; 11/3, p 63
7. Sushruta, Sushruta Samhita, English Commentary by Sharma P.V., Varanasi, Chaukhamba Bharati Academy, Reprint 2010, Sutra Sthana 11/7, p 115
8. Vagbhata. Ashtanga Hridaya (Sarvangsundara of Arundatta and Ayurveda Rasayan of Hemadri). Hari Sadashiva Shastri Paradakara, editor. 1st ed. Varanasi: Chaukhamba Surbharati Prakashan; 2011;30, p 344
9. Vagbhata. Ashtanga Hridaya (Sarvangsundara of Arundatta and Ayurveda Rasayan of Hemadri). Hari Sadashiva Shastri Paradakara, editor. 1st ed. Varanasi: Chaukhamba Surbharati Prakashan; 2011;30/8-14, p 344
10. Sushruta, Sushruta Samhita, English Commentary by Sharma P.V., Varanasi, Chaukhamba Bharati Academy, Reprint 2010, Sutra Sthana 11, p 113
11. Vagbhata. Ashtanga Samgraha (Shashilekha Sanskrit commentary by Indu), Vol. 3. Shivprasad Sharma, editor. 3rd ed. Varanasi: Chaukhamba Sanskrit Series; 2012;30, p 343

Cite this article as:

Rakesh P and Kiran Sarma. Significance of combustion during the preparation of Kshara. Int. J. Res. Ayurveda Pharm. 2024;15(2):38-42 DOI: http://dx.doi.org/10.7897/2277-4343.15235

Source of support: Nil, Conflict of interest: None Declared