



Review Article

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A REVIEW OF THE APPLICATIONS OF KSHARA KARMA IN AYURVEDA

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ABSTRACT

In Ayurveda, Kshara karma is an anushastra karma for para-surgical procedures. Kshara karma aids in unravelling the bottlenecks associated with Shalya tantra for treating specific diseases. Kshara therapy is the alkaline therapy specifically intended to treat diseases other modes cannot cure. Kshara can carry out excision, incision and scrapping simultaneously and hence can find application in different ailments. But still, Kshara therapy has been least explored, and the present review aims at shedding light on the therapeutic aspects of Kshara. This article also mentions various therapeutic applications where Kshara has been utilised.

Keywords: Kshara, Ksharakarma, Anushastra karma, Agni karma

INTRODUCTION

Ayurveda is a traditional Indian system of medicine, and Ayurvedic medicines have been time-tested over centuries. Ayurvedic medicines are gaining global importance as intensive research in pharmacology, and clinical aspects of herbal products have proven their efficacy ¹. Though India has been successful in promoting Ayurveda, it still demands the need for more extensive research and evidence base. Deleterious side effects, increased expense, microbial resistance, lack of restorative treatment for several chronic diseases, etc., attract the public towards complementary and alternative medicine². The Indian subcontinent is an immense repository of medicinal plants, and the use of medicinal plants in medicine is a traditional practice and is still followed. A significant share of the rural population in India depends on these conventional medicines ³. Ayurvedic science, originating in antiquity, exploits herbal sources for health and medicine. The revitalisation of herbal knowledge, which is being vanished from the larger sections of the population, will help evolve improved healthcare systems and human values ⁴. Researchers are concentrating on the authentication, validation, research and documentation for effectively utilising herbal drugs in the medical field apart from mere identification of folklore knowledge ⁵. However, harmful human activities such as deforestation, rapid industrialisation and urbanisation led to the deterioration of India's traditional culture of planting trees. There exists an urgent need to document and validate all the ethnobotanical knowledge available in various ethnic and folklore communities before the traditional culture is completely lost.

Ayurveda develops different branches depending upon the nature of the disease. The eight branches, collectively known as Ashtanga Ayurveda, are Kaya Chikitsa (Internal medicine), Baala Chikitsa (Paediatrics treatment), Graha Chikitsa (Psychiatry), Urdhyaanga Chikitsa (Surgery), Damstra Chikitsa (Toxicology), Shalya tantra (Surgery), Jara Chikitsa (Geriatrics) and Vrishya Chikitsa (Aphrodisiac therapy). Shalya tantra implicates different

tools and instruments for eradicating the complications associated with a disease. This branch has established the existing concepts in surgery and aims at faster relief from the disease ⁶. In the Vedic period, the chief sources of information about medicines were the Rigveda and the Atharvaveda. Rigveda explains the amputation of a leg and its replacements with iron substitutes and the plucking of injured eyes. In India, Bhisag Atharvan was considered the first surgeon who treated patients. Sushruta was the pioneer in the field of Shalya tantra and took surgery to excellent heights in the medieval period, and the era was later mentioned as 'The Golden Age of Surgery'. Sushruta Samhita confers the principles of surgery, viz., dissection, absorbable suture materials, tools for operations, and the art of handling tools and procedures for specific diseases ⁷. In Sushruta Samhita, Sushruta has classified the surgical procedures into eight groups such as Aharan (extraction of solid bodies), Bhedan (excising), Chhedan (incising), Eshan (probing), Lekhan (scarifying), Sivan (suturing), Vedhan (puncturing) and Visravan (evacuating fluids) ⁸. In Shalya tantra, the operating procedure is following three steps. Pre-operative, surgical and post-operative procedures. In pre-operative steps, everything needed for the operation procedure must be gathered, and it is also relevant in terms of patient readiness. The main operative procedure includes the Ashtavidha Shastra Karma, the eight surgical procedures proposed by Sushruta, as discussed earlier. Most of the surgical procedures accomplished nowadays follow these eight steps. The post-operative step should include the assurance of the patient, and the operative wound should be properly cleaned and dressed. The pus formation should be avoided with proper sterilisation procedures, and the patient should be admitted to a post-operative ward for ten days ⁹. Thus, Shalya tantra mainly deals with different methods or karma to facilitate surgical or para-surgical interventions, and one among them is anushastra karma. Anushastra karma is a surgical procedure achieved by non-surgical instruments ¹⁰. Various approaches involved in anushastra karma are Agnikarma, Ksharasutra, Jalukavacharana, Siravyadaha, etc. It also facilitates diagnosing pathological

conditions like Nadi vrana, Unmargi vrana and Utsangi vrana. Ksharasutra is mainly adopted to treat ailments like fistula, fissure and pilonidal sinus. Jalukavacharana is primarily implemented for bloodletting or purification needs.

Agnikarma

Agnikarma is mainly a cauterisation technique involving the use of Agni in direct or indirect ways to cure different ailments. The Agni provides a sterilisation effect, preventing the attack of microbes and killing the pathogens more effectively. The disease recurrence rate is shallow in the case of Agnikarma as its action is by destroying its root cause. Agnikarma employs an instrument called shalaka to impart heat to affected body parts. A properly cauterised burn wound (samyak dagdha) would not be deep-seated and of optimal depth. The colour will be like that of Tala phala (Palm fruit, blackish at the borders and whitish at the centre). During the treatment procedures, the patients should be strictly monitored for any unfavourable complications and under the direct supervision of an expert physician. Objectionable diet and excessive physical activities should be avoided. The surgical tools should be of the prescribed standard and should be sterile. Prolonged thermal applications should be avoided⁸. As per dhatus, different signs and symptoms will be produced after Agnikarma.

In Twakgata vyadhi, when twaka is cauterised, burning will be accompanied by a crackling sound, foul odour, and skin contraction. But while the cauterisation of mamsa, a pigeon-like discolouration will occur at the part. The lesion will dry and wrinkle, followed by inflammation and mild pain. The cauterisation of snayu and siras will result in black discolouration, swelling of the lesion and cessation of discharge. Dryness, redness, hardness and persistence of the lesion will occur after the cauterisation of sandhi and asthigata vyadhis¹¹. Improper heating of the shalaka can lead to plustha dagdha, a condition characterised by redness and burning sensation in the applied area. It is the case of first-degree burns causing only superficial burns. But suppose an unskilled surgeon carries out the procedure or there is unusual mobility of the area due to the fear of patients. In that case, it can cause durdagdha, a second-degree burn leading to the eruption of blisters. The wound will take a long time to heal. Thus, the patients should be given proper warm and cold therapies. Excess heating can also transfer heat from shalaka yantra to the affected part and cause ati dagdha. This is a third-degree burn characterised by the presence of excessive necrosed tissues. The patient's body will become stiff and suffer fever, severe pain, and extreme thirst. This mode of treatment is mainly suited for asthi and sandhi. It is proven effective in curing Arsha, Arbuda, Gridhrasi, Bhagandar, etc. In the Agnikarma for skin diseases (twakgata vyadhi), Ajashakrita, Godanta, Pippali, Shalaakand Shara, etc., are used. The treatment of muscular diseases can be realised using panchadhaatu shalaka, and for diseases affecting sir and marma, madhu, sneha, and guda, it can be used¹².

Ayurvedic pharmaceuticals is a well-developed discipline in the field of drug formulation. The manufacturing of medicaments involved various techniques such as heating, evaporation, pounding, churning and extraction. The active pharmaceutical ingredient (API) is a part of any drugs/formulations that produce its therapeutic effect. Various extraction techniques can obtain these APIs. Kshara kalpana is one among them to extract the alkalis from the ashes of the plant. Kshara is indicated in diseases that are difficult to treat. It also minimises complications and reduces the recurrence of infections. The texts of yore, like Charaka Samhita (1200 BC) and Sushruta Samhita (1000 BC), have mentioned the importance of Kshara^{8, 13}. The collective

property of the drug will be fine-tuned and sharply targeted to suit the clinical needs of the body when its Kshara is administered in tailored doses. Kshara has been proven very effective in abating unhealthy or undesirable growth of body tissues and is being practised widely¹⁴. In context to this description, different opinions exist regarding the ratio of ash and water, duration of soaking and filtration pattern.

Kshara therapy

Kshara therapy, or alkaline therapy, treats diseases that other modes cannot cure. Kshara preparation involves the extraction of alkali from the ash of dried medicinal plants. The term Kshara originates in the two roots, chhana and chhar, which means satan or destroyer, as it can destroy unwanted tissues in the body¹⁵. Acharya Sushruta has described Kshara as having ksharana and kshana properties; it can melt away or destroy lesions. While Sushruta mentions Kshara (caustics) as pradhana (excellent), Dalhanacharya, the commentator of Sushruta Samhita, mentions explicitly that Jalauka is pradhana, Agni is pradhantara (better), and Kshara (caustics) is pradhanatama (best). He explained that the Kshara pradhanatama is because Agni and Jalauka cannot act as chedana (excision) while Kshara acts as chedana. Due to its properties, Ksharakarma cannot be used in Pittaja disease, but Dalhanacharya mentioned its use in Pittaja Arsha. He also gave the logical interpretation for accepting Kshara pradhanata by differentiating ksharana and kshana. "Ksharanata", "dushtatwakmansadi chalanat shatanata", which means cutting, and "kshananata twakmanasadi hinasana", i.e., kshana means to dissolve. Thus, Dalhanacharya described the perfect mode of action of Ksharakarma^{16, 17}. Modern Ayurvedic literature also considers Kshara as an alkali having hot, piercing and scraping properties. Kshara is deemed a critical anushashtra (minimal surgical access) as it can simultaneously carry out excision, incision and scraping.

Kshara Preparation Mentioned in Different Ayurvedic Classics

Acharya Charaka has mentioned three types of Kshara based on the mode of preparations and the drug's potency: mrudu, madhyama and tikshna. Mrudu possesses mild penetrating action, madhyama has moderate penetrating action, and tikshna has sharp, penetrating action. However, tikshna Kshara was prepared by the addition of drug powders like Chitraka (*Plumbago zeylanica*), Danti (*Baliospermum montanum*), and Vacha (*Acorus calamus*) etc. Further, two types of Kshara have been mentioned based on the mode of applications. Bahya parimarjaniya (for external use, e.g. Kshara jala or alkaline water) and antah parimarjaniya (for internal use)¹⁸.

As stated by Sushruta Samhita, plants containing Kshara were collected, dried and burnt to collect the ash. The collected dried samples should be burned until all the matter gets charred. Thus, obtained ash must be dissolved in six times the volume of water in an earthen pot and kept overnight to settle down. All the contents should then be filtered 21 times the following day, and the liquid thus obtained to be heated for evaporating the water content, and Kshara will be obtained¹⁹. As per Sharangdhara Samhita, Kshara is obtained by burning parts of plants exuding milky sap in fire. Thus, formed ash needs to be dissolved in four times the volume of water in a mud pot and will be kept overnight. The following day, the clear supernatant will be decanted into a clean vessel from the suspension and boiled to remove all the water content. Finally, a fine white powder will be left at the bottom, known as Kshara²⁰.

According to Rasa Tarangini, the ash obtained by burning dried plants will be dissolved four times in water and kept undisturbed for 3 hours. Then, it will be filtered through a three-layered cloth, and the filtered liquid should be boiled to evaporate the water content. Finally, the Kshara in white powder form will be obtained²¹. As explained by Acharya Yadavji in Rasamritam, panchanga or five parts of the plants are collected, dried, and burnt to get ash. The dried samples should be burned completely, and the obtained ash should be dissolved in six times water in an earthen pot and kept for one night. The contents need to be filtered 21 times the following day, and the obtained liquid will be heated to evaporate the total water content. Then greyish white coloured Kshara will be obtained²².

Properties of Kshara

Kshara is dominated by katu (pungent) and lavana rasas (salty taste). Kshara are caustic substances having either natural or artificial occurrence. Natural Kshara consists of differing percentages of minerals, especially calcium, potassium and sodium. Artificial are those obtained by burning specific herbal plants into ash. The Kshara of both sources possess alkaline properties and can destroy the tissues by penetrating deep into them. This property can be exploited to manage abnormal tissue growth like piles, wound mass, tumour, etc. Herbal ashes mainly comprise sodium, potassium carbonates, calcium oxide, magnesium and silica. In the Kshara preparation procedure, the insoluble substances like silica will be separated by filtration, and the remaining solution will contain soluble substances like potassium and sodium. The kshara strength of the Kshara is dependent on the amount of hydroxides in it. Kshara has more hydroxides than carbonates, is more alkaline or tikshna and will be used for external applications. Kshaodak (alkaline water) containing trace amounts of sodium or potassium hydroxides, called Paneeyakshara, can be administered internally²³. According to Charaka, Kshara destroys the degenerated dhatus and removes the unhealthy tissues and doshas from their location¹³. Being prepared from herbal drugs, it possesses the basic properties of the herbal source. Agnihuta (fire elements) are chief components in Kshara, thus imparting teekshna property.

Additionally, the prevalence of Vayu bhuta contributes to sparsh guna (consistency property). The Agni element gives the corrosiveness property to Kshara. Kshara possesses qualities like chhedana (excision), bhedana (incision), lekshana (scraping), etc. Sushruta explains kshara as a superior procedure among shastra (sharp instrument) and anushastra (subsidiary instruments)²⁴.

Based on the source of origin, Kshara is classified into three categories: vanaspatijanya, pranijanya and khanijajanya. Vanaspatijanya kshara refers to that obtained from plant sources. Examples are Apamarga Kshara and Yava Kshara. Pranijanya Kshara is obtained from animal sources. Shankha bhasma, Kapardika bhasma, and Pravala bhasma are examples. Tanka bhasma, Sarji Kshara and Surya Kshara are Khanijajanya Kshara obtained from the mineral source¹⁵. The Kshara prepared in different seasons is also categorised as uttam (prepared in greeshma), madhyam (prepared in sharad) and varsha (prepared in rainy season).

Therapeutic Properties of Kshara

Kshara owes its medicinal value to its shodhana, ushna and tikshna properties. Dalhana, the commentator of Sushruta Samhita, explained the use of Kshara in Ashmari (calculi), Switra (leucoderma), Gulma (tumour), Mutraghat (dysuria), and Visha (poison) etc¹⁶. Ksharakarma is mainly used to manage Arsha, Guda bhramsha and wounds. Depending upon the usage of Kshara, Kshara is classified as Paneeya Kshara and Pratisaraneeya Kshara. Pratisaraneeya Kshara are used for external applications, and Paneeya Kshara are used for internal applications. Arshas, Bhagandara, Switra (leucoderma), Dusta vrana, Nadi vrana and Baahya vidradi are some conditions where Pratisaraneeya Kshara are recommended, while Gulma, Udara, Ashmari and Abyantara vidradhi, etc. can be treated using Paneeya Kshara²⁵. Kshara has also been incorporated in preparing Kasisadi taila and medicated ghee to treat Arsha.

Another approach of Ksharakarma in practice is Ksharasutra. In the chapter of Arsha Chikitsa, Chakradatta has also described the method of preparation of Ksharasutra and its application²⁶. Ksharasutra has been widely practised in Bhagandara and Nadivrana worldwide in Ayurvedic and modern surgical eras at a reasonable successive rate. Ksharasutra is also effective in dushtavrana (infected wound), but sutra form is challenging for local application as the potency of ingredients is weak. In the same way, Ksharodaka (alkaline water) comprising of Patala (*Stereospermum suaveolens*), Yava Kshara (Salts of potassium), Paribhadra (*Erythrina indica*), Tila (*Sesamum indicum*) along with powder of Dalchini (*Cinnamomum zeylanicum*), Ela (*Elettaria cardamomum*), Kalimircha (*Piper nigrum*) have been mentioned for the treatment of Mutraghata (Retention of urine). Kshara is also used with Vataghna (subsiding disorders of Vata) drugs in treating Ashmari (Renal calculi). The lekshana property of Kshara enables it to be a potential candidate for numerous skin diseases. Furthermore, the Kshara application is helpful in wound healing due to its vrana shodhana (wound purification) and ropana (healing) properties²³. Kshara plotas (alkaline medicated gauze) absorb discharges from the infected wound and prevent recurrence²⁷.

Acharya Sushruta has mentioned that Kshara can be prepared from 22 plants such as Apamarga (*Achyranthes aspera*), Snuhi (*Euphorbia nerifolia*), Amaltas (*Cassia fistula*), Kutaj (*Holarrhena antidysenterica*), Vasa (*Adhatoda vasica*), Arka (*Calotropis gigantea*), Tila (*Sesamum indicum*), etc. Apamarga Kshara, the alkaline preparation prepared from Apamarga (*Achyranthes aspera*), has been in clinical practice for many years²⁸. It has been used in different formulations for different ailments. It is used in the form of Ksharasutra and as Pratismiya Kshara. The standard Kshara Sutra was prepared with 11 coatings of Snuhi latex (*E. nerifolia*), 7 coatings of Snuhi latex and Apamarga Kshara (*A. aspera*) and last 3 coatings of Snuhi latex and Haridra churna (*C. longa*). Apamargakshara taila is a medicated oil prepared from *Achyranthes aspera*, and sesame oil exhibited wound healing properties. Table 1 shows the clinical studies done using Apamarga Kshara for different illnesses.

Various other herbal plants have been exploited for Kshara preparation. They have been used alone or with other drugs for various illnesses. Kshara prepared from some other medicinal plants are listed in Table 2.

Table 1: Clinical studies of Apamarga Kshara for different illnesses

Sl. No.	Formulation	Disease	Study Details	Ref.
1	Apamarga Pratisaraneeeya Kshara	Abhayantra Arsha (internal haemorrhoids)	A 48-year-old male patient complained of some mass coming out during defecation and bleeding while passing stool to the anorectal unit and was treated successfully with the Kshara karma application. The pile mass and per rectal haemorrhage were gone in 8 days, and the patient was free of all symptoms within 18-20 days.	²⁹
2	Apamarga Kshara	Jalarbuda (Mucocele), Nasarsha (nasal polyp), Aural keloid, and Gingival hyperplasia	Case 1- Aural keloid was removed surgically, and Apamarga Kshara was applied over the lesion. It was repeated two times. Tab Nimbadi Guggulu 1 tid was given orally for seven days, and no reoccurrence was noted after four months of follow-up. Case 2- Gingival hyperplasia was cured with three sittings of Apamarga Kshara and Tab Nimbadi Guggulu 1 tid was given orally for seven days. Case 3- Ethmoidal polyp was treated with four sittings of Apamarga Kshara with intervals of three days along with the internal oral medicines tab Nimbadi Guggulu 1 tid. Case 4- Three sittings of Apamarga Kshara were applied on the mucocele at intervals of three days, and Tab Nimbadi Guggulu 1 tid given orally for seven days after three sittings of Kshara application complete regression of the mucocele was noted.	³⁰
3	Apamarga Ksharasutra	Nasal synechiae	Apamarga ksharatailam (1 week) and Ghondaphaladi nasavathi (2 weeks) were also done as post-procedure after Ksharasutra. The endoscopic examinations in the follow-up showed that the patient was symptom-free.	³¹
4	Apamarga Ksharasutra	Pilonidal Sinus	The number of days required varies from patient to patient, depending on the length of the track, flabbiness of the muscles, chronicity of the condition, drugs used in the preparation and their concentration, the pressure exerted by the Ksharasutra on the track and sensitivity of the patient. The follow-ups reported no recurrence.	³²
5	Apamarga Ksharasutra	Bhagandara (fistula in ano)	A case series of six patients has shown the remarkable effect of Ksharasutra application in Bhagandara/fistula-in ano with complete healing of the fistulous tract without any obvious complication.	³³
6	Apamarga Kshara	Umbilical granuloma	Successfully treated in an 8-year-old male child.	³⁴
7	Apamarga Kshara taila	Diabetic foot ulcer	Complete wound healing was achieved in 76 days with Unit healing time (UHT) of 5.88 days/cm ² . Local cleaning by Triphala kwatha has shown an antimicrobial effect that augmented the healing process, while Apamarga Kshara Taila application enhanced tissue debridement.	³⁵
8	Apamarga Kshara Yoga	Shvitra (vitiligo)	Significant improvement was found in the symptoms of Shvitra with treatment using Apamarga Kshara Yoga Lepa and Apamarga Kshara Yoga ointment for 2 months.	³⁶

Table 2. Kshara is prepared from different herbal plants

SN	Kshara prepared from different plants	Therapeutic uses	Significance	Ref.
1	Chincha Kshara prepared from the plant <i>Tamarindus indica</i> Linn.,	Subside conditions like Agnimandhya, Gulma, Shula, Mutrakrucchra and Ashmari	Used in formulations like Shankha Vati, Mahashankha Vati, Agnisandeepano Rasa, Gudapippali, Bhruhat Gudapippali	³⁷
2	Kadali Kshara (prepared from the leaves of plantain)	Amlapitta	When amla is predominant, Kshara is said to be like agni and is caustic. It enhances the digestive power by subsiding indigestion, heartburn, acid eructation, nausea and vomiting-like symptoms.	³⁸
3	Mahayavanal Roma Kshara (Prepared from <i>Zea mays</i>)	Vatastheela (benign prostatic hyperplasia)	Kshara made from roma of mahayavanala contains properties like tridoshghna, pachana, vilayana, and lekha and causes a decrease in prostate size and an increase in urine flow rate. Kshara also changes the pH of urine to alkaline and reduces the symptoms due to irritation of the lower urinary tract (e.g., dysuria, frequency).	³⁹
4	Mulaka Kshara (alkaline preparation of the drug <i>Mulaka-Raphanus sativus</i> Linn.)	Mutrashmari (Urolithiasis)	This alkaline preparation has many therapeutic usages and can even replace many surgical procedures.	⁴⁰
5	Palasha Kshara (Prepared from palashastem - <i>Butea monosperma</i> Lam.)	Agnimandhya, Gulma, Plihayakritvridhi, Mutrakruccha, Anah, Grahani, Visuchika, Sarkara	Potassium found in Palasha Kshara is essential in breaking the etiopathogenesis of CAD and will help recanalise coronary arteries and prevent further myocardial infarction.	^{41 42}
6	Yava Kshara (prepared from barley [Yava], which comprises potassium carbonate)	Management of tubal blockage	Yavakshara taila was effective in intra-uterine uttar basti for treating tubal blockage.	⁴³

CONCLUSION

Although Kshara therapy is reported to be one of the possible measures in treating Arbuda in Ayurvedic science, limited individual practitioners are practising it. This mode of treatment has been proven to terminate the invasion of fast-growing tumour cells and has been clinically shown to render significant symptomatic relief. But still, the Kshara applications are rarely tested internally. The Kshara variety meant for internal application, termed Paneeyakshara, is prepared by dissolving Kshara in water. Sushruta has described the fact that Paneeyakshara has a greater affinity for the destruction of new tissues. Based on this finding, it has been proposed to be helpful for the destruction of unwanted tissues. Furthermore, exploring new plants for preparing Kshara as better alternatives for existing medicines is very much needed.

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