Review Article

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A CRITICAL REVIEW ON HISTORICAL ASPECTS OF KSHARA

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ABSTRACT

Various natural products are processed and used as medicine in Ayurveda system of medicine. These medicinal products are classified in different categories of dosage forms in Ayurvedic Pharmaceuticals. Kshara Kalpana (alkaline preparation) is one of them. Kshara are the substances obtained from the ashes of drugs of animals (conch shells, *Cypraea moneta*, coral etc.), minerals (borax, salt petre, mixture of potassium salts etc.) and plants (Mulaka; *Raphanus sativus* Linn., Snuhi; *Euphorbia nerifolia* Linn., Arka; *Calotropis gigantea* Linn. etc.) origin, where alkaline portion is extracted from the ashes of these substances. Kshara Kalpana is the dosage form of alkaline substance, which may be used as single, or compound, or mixture of many herbs, animal and mineral products. There is a wide range of description available about Kshara in many of authoritative texts of Ayurveda. However, Acharya Sushruta, father of Indian Surgery, is the pioneer of Kshara Kalpana, as he introduced Kshara Kalpana in one of the specific chapter. These alkaline preparations have many therapeutic usages and even proved to be effective in treating many disorders. Applications of these preparations have replaced many surgical procedures too. The internal use of Kshara is advised in Mutrashmari (viz. renal calculi), external application in Arshas (hemorrhoid piles) and in the form of Kshara Sutra (alkaline thread) in the treatment of Nadi Vrana (sinus), Bhagandhara (fistula in ano) etc.. Kshara is also aided in the different pharmaceutical procedure like Shodhana (purification), Jarana (roasting) and Maran (incineration of metals and minerals) in various preparations of Rasaasadhies (metal and minerals formulations). The importance of Kshara in therapeutics as well as in pharmaceutical procedure inspired us to explore the historical uses of Kshara and Kshara Sutra in view to establish its importance as well to get its clues for future scopes.

Key words: Kshara, Kshara Sutra, Jarana, Shodhan, Tankan

INTRODUCTION

Health has always been on topmost priority for human beings since the beginning of civilization. For the purpose of healthy life, nature has gifted various resources to human beings to spend their decisive / vital life. Herbs, metals, minerals and animal products are among those resources. Uses of these resources in medical treatment are not new for this world. Ayurveda has shown various paths to use these resources in medical treatment since longtime year back. Rasa Shastra, the pharmaceutical branch of Ayurveda, has described use of these resources in a very planned and descriptive manner by formulating various medicines to treat human diseases¹. Kshara (alkaline substances), is one among them. Kshara is medicament obtained from ash of one or more plants, animal and mineral products². The process of preparation of Kshara involves the extraction of 'alkalies' from ash of dried plants. It is said that the diseases which are difficult to treat can be cured by Kshara therapy (alkaline therapy)³. Kshara therapy not only minimizes complication but also reduces recurrence of diseases. Kshara can reduce the chances of post-surgical infections due to its alkalinity. Kshara has the top most place in all surgical and para-surgical measures⁴. It can be used externally and internally according to the ailments of the body. In different text of Rasa Shastra number of Kshara are mentioned in different pharmaceutical processes to prepare formulations of metals and minerals. Further, the inherent character of Kshara i.e. alkalinity,

not only responsible for the conversion of one metal / mineral into the medicine through the process of Shodhana⁵ (purification), Sattvapata⁵ (metal extracting), Marana⁶ (incineration of metals and minerals), and but also contradict the ill effects of poisonous drugs (schedule E-1) as antidote⁷.

In this article, an effort has been made to compile and present the utilization of Kshara in the pharmaceutical-therapeutics of Ayurveda from the historical perspective, by referring important texts of Ayurveda in all aspects of its preparation, types, qualities, indications and uses.

DEFINITION OF KSHARA IN DIFFERENT AYURVEDIC CLASSICS

The substance that removes the vitiated debris of skin, flesh etc. (Dusta Tvagmasadi)⁸ or the substance, which detoxify the Dosha (bodily humour), Dhatu (tissues) and Mala (excreta)⁸ because of its Ksharan (corrosive) nature is known as Kshara. According to the Ayurvedic Formulary of India, Kshara are alkaline substance obtained from the ash of drugs⁹.

Detailed View in Ayurvedic Classics

In Samhita period detail descriptions of Kshara Kalpana regarding their methods of preparation, definition, varieties, properties and applications are found. Acharya Sushruta defines as the material which destroys or cleans the excessive/the

morbid Doshas are known as Kshara (Kshyaranat Kshyananat va Kshara). According to Acharya Charaka, Kshara Dravya has Ksharanatwa (corrosive) in nature. Acharya Dalhana the commentator of Sushruta Samhita explained the word Ksharana as one which mobilizes and removes the deformed flesh, skin etc. or which removes the vitiated Doshas from their location.

Acharya Charak has mentioned two types of Kshara preparation and has also mentioned the use of Kshara according to disease. Acharya Chakrapani has described the method of preparation of Kshara. Acharya Yadavji have described separate chapter of Kshara Kalpana. Kshara is dominated by Katu (pungent) and Lavana Rasas (salty taste). It is the object of many senses and it involves a special method of preparation¹⁰. Acharya Sushruta has narrated Kshara in scope of Shalya Tantra (surgical branch) due to actions like Chhedana (excision), Bhedana (incision), Lekhana (scrapping) etc. (Su. Su.11/5). According to him Kshara destroys the degenerated dhatus and remove the unhealthy tissues and doshas from their location (Su. Su.11/4). Acharya Charak has mentioned 18 parts of plants which can be used for medicinal purpose and Kshara is one among them¹¹. Acharya Charak has mentioned two types of Kshara preparations i.e. Bahya Parimarjaniya (external use e.g. Kshara Jala-alkaline water) and Antah- Parimarjaniya (which is prepared from burned drugs by Antahdhaum method)¹¹. Three types were explained according to methods of preparations i.e. Mridu (mild penetrating action), Madhyam (moderate penetrating action), and Tikсна (Sharp penetrating action) Kshara. However, Tikсна Kshara was prepared by addition of powders of drugs like Chitraka (*Plumbago zeylinica*), Danti (*Bliospermum montanum*), and Vacha (*Acorus calamus*) etc.¹². Dalhana the commentator of Sushruta Samhita explained the use of Kshara in Ashmari (calculi), Switra (leucoderma), Gulma (tumor), Mutraghat (dysuria), and Visha (poison) etc. In Astanga Hridya the Pratisaraniya Kshara is indicated to be used in, Switra (leucoderma), Kustha (skin disorders), Bhagandar (fistula), Granthi (carbuncles), etc. and Paniya Kshara in Arsha (piles), BhagandarAshmari, Gulma, Udarorga (abdominal disorders) etc. Kshara also incorporated in the preparation of Kasisadi Taila and medicated ghee for the treatment of Arsha¹³.

In the chapter of Arsha Chikitsa Chakradatta has also described method of preparation of Kshara Sutra¹⁴ and its application. Ksharodaka (alkaline water) containing 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*) are mentioned for the treatment of Mutraghta. Kshara are also indicated along with Vataghna (subsiding disorders of Vata) drugs in the treatment of Ashmari¹⁵.

In Sharangadhara Samhita quality measures of Kshara is mentioned various methods and utensils are described for the preparation of Kshara¹⁶. In Yoga Ratnakara various method of preparation of Kshara along with the powder of *Piper longum* (Pippali) mixed with Kshara is used in the preparation of Pleehodara (splenomegaly)¹⁷. In Rasa Tarangani detail description of Apamarga (*Achyranthus aspera*) Kshara, Arka (*Calotropis gigantea*) Kshara, Tila Kshara, Snuhi Kshara, Palash Kshara (*Butea monosperma*), Chinchā (*Tamarindus indica*) Kshara are mentioned¹⁸.

In Ayurvedic Formulary of India a separate chapter/ monograph on Lavana- Kshara has been included. In this formulary Kshara is defined as an alkaline substance⁹. In Drugs & Cosmetic Rule1945, the list of machinery, equipment and minimum

manufacturing premise required for the manufacturer of Kshara are described¹⁹.

IMPORTANCE OF KSHARA

Therapeutic Importance of Kshara

It is mentioned in the classics, that the diseases which are difficult to treat can be cured by Kshara therapy⁴. Various types of skin diseases can be cured easily by Kshara due to Lekhana property. Vrana Shodhana (purification of wound) and Ropana (healing) properties of Kshara are helpful in the healing of discharge wounds²⁰. Table 1 shows the use of Kshara in various diseases either in single medicine or in combination¹².

Pharmaceutical Potentials of Kshara

In Rasa Shastra (Ayurvedic Pharmaceutics) the Kshara plays its own role in different pharmaceutical procedures such as Shodhana, Jarana, Marana etc. Because of its alkalinity in nature, these substance help in the corrosion of unwanted material from the desired product⁷. Kshara are known for their cleansing property. Hence, borax grouped under Sodhaniya Gana (drugs grouped under purifiers) and is useful in preparation of metal extracts (Sattva), etc. In 8th century, Rasendra Mangal has described a general method for the purification of all Rasa drugs as to triturate the drugs with Kshara (alkali), Sneha (fatty), Amla (acidic) media⁵. Borax is also used in certain methods of purification of mercury explained in Rasa Tarangani. Some of the examples showing Kshara used in Shodhana process²¹:

- 1) Silver is purified by melting it with borax in crucible subjecting to high temperature and immersed in Jyotismati Taila (extracted oil of *Celastrous paniculata*).
- 2) In the preparation of Abhrak Sattwa (metallic extract if biotite mica), borax is used as one of the ingredient.
- 3) Borax is used in method of purification of Tuttha (copper sulphate- blue vitriol).
- 4) Gauri Pashana (arsenic trioxide; As₂O₃) is purified by Svedana process in Dola Yantra (an equipment where drugs tied in cloth piece, which hangs with an iron rod and in dipped in liquid media prepared by borax dissolved water. This is aid with the continuous supply of moderate heat till specific duration of time).

Table 2 shows the uses of Kshara in different Pharmaceutical procedure of herbomineral formation. However, mercury is the supreme metal of Ayurvedic Pharmaceutics. To make it therapeutically more potent and to make ready for further processing, there are 18 Samskara (series of purification process) mentioned in foremost texts of Rasa Shastra. In Rasendra Mangala, there is use of Kshara for Rodhana, Murchana, Dipana, Niyamana, Uthapana Samskara, which is intended to increase the potency of mercury²¹.

Kshara as Reagent for Bhasma Testing²² Apunarbhava is one of the important test for Bhasma of metallic origin in which prepared Bhasma is tested by incinerating with Mitrapanchaka (five drugs-accumulators helpful to check the free metals, if present in prepared Bhasma) and ensure that Bhasma does not come back to its original state (metallic form).Tankan, is one of the important ingredient in Mitrapanchaka.

Potential of Kshara as Antidote

Particularly, borax is known as an antidote for aconite (Vatsanabha) poison⁷. Due to this antidotal effect, Ayurveda Prakasa advocated triturating aconite with equal quantity of borax and it can be used in all conditions without any risk of aconite complications²³. Yoga Ratnakara advised to mix equal quantity of borax and double quantity of *Piper nigrum* to nullify

any untoward effects of aconite. It is also interesting to note that majority of aconite containing formulations contains borax also as an ingredient in it like Agnitundi vati, Ananda Bhairava Rasa. As per Ayurveda Prakasa, for subsiding the toxicity effects Kankustha (*Mysore gambose tree– Garcinia morella*), decoction of root of Babbula (*Acacia nilotica*), Jiraka (*Cuminum cyminum*) and purified borax are advised to be taken internally as suggested by the same text. Rasa Tarangini suggested various antidotes for untoward effects caused by administration of Improperly prepared mercurial preparations²⁴.

CLASSIFICATION OF KSHARA

Ayurvedic texts described classification of Kshara on various bases. In Brihtraya (three foremost texts of Ayurveda viz. Charak Samhita, Shrutya Samhita and Ashtanga Hridaya Samhita), Kshara are classified on the basis of their mode of application. These are Pratisaraniya (external use) and Paneeya (internal use) Kshara. The Pratisaraniya Kshara has been further sub classified according to its potential in to Mridu (mild), Madhya (moderate), and Tikshna (intense)¹⁵. This classification is entirely based on the strength or concentration of Kshara and applicable in the external use. Some other classifications of Kshara on different basis are also given in different texts:

On the basis of Origin

- 1) Vanaspatijanya: Obtained from the plant sources e.g. Apamarga Kshara Yava Kshara
- 2) Pranjaya: Obtained from the Animal sources e.g. Shankha, Kapardika, Pravala etc.
- 3) Khanijanya: Obtained from the mineral origin e.g. Tankan (Borax), Sarji Kshara, Surya Kshara etc.

On the basis of Season of preparation:

- 1) Uttam (best) – Prepared in Greeshma (summer season)
- 2) Madhyam (better) – Prepared in Sharad (autumn season)
- 3) Adhama (bad) – Prepared in Varsha (rainy season)

Further Kshara has been classified on the basis of the number present in the group. Table 3 shows the classification on the basis of number of Kshara present in a group.

Concept Regarding Methods of Preparation of Kshara by Different Ayurvedic Scholars

In Sushruta Samhita for increasing or decreasing the strength of Kshara, some methods other than the general method were described through Sanskara- Vishesha and Gunantaradhan (modification of properties). Acharya Sushruta in Sutra Sthana described the special procedure for the preparation of Kshara which is not “Ek-aushadh Kshara” but a Kshara- Kalpa in which by the Samyoga of Ksharas (combination of alkali), Agni (fire intensity), Kala (time), Yukti (procedure), and Samskara, changes can be brought¹⁵.

According to Sharangdhara Samhita (Sh.Sm.M. 11/102-103), dried parts of plants which exude milky sap are burnt into ash form in fire. The ash thus obtained is dissolved in four times of water in mud pot and kept overnight. Next day morning the clear supernatant water is decanted out into a clean vessel and boiled till all the water evaporates, leaving of a fine white powder at the bottom. This is known as Kshara.²⁰

According to Rasa Tarangini (R.T. 14/59-61), the plants containing Kshara are dried and burnt into ash form. The ash thus obtained is dissolved in four times of water and rubbed with hands properly and contents are kept without any disturbance for 3 hours. Then contents are filtered with three folded cloth. This filtered liquid is boiled till total water content gets evaporated. Finally, Kshara is obtained in greyish white powder form²⁵.

According to Acharya Yadavji (Dravya Guna Vigyana), Panchanga (five parts of plant) of the plants containing Kshara are collected and dried, and then they are burnt to get ash form. The burning should be done till matter get burnt. The ash is dissolved in six times of water in an earthen pot and kept for one night. Next day morning contents should be filtered for 2 times and obtained liquid is heated, till total water content is get evaporated, then Kshara is obtained which is similar to the colour of greyish white²⁶.

Properties of Kshara: Different Ayurvedic texts described properties of Kshara and these properties are tabulated in Table 4¹⁵

Kshara are prepared from herbal drugs and it includes the basic properties of the original herbal drugs. Kshara is predominant with Agnibhuta (fire elements) hence having Teekshna property. It consists of Sparsh Guna (consistency property) due to its predominance of Vayubhuta (wind elements) and hence gives quick action. So, above factors clearly state that Kshara is having predominance of Agni and Vayubhuta. Kshara is having Tejohbhuta (agni element) property predominantly hence it is having the property of corrosiveness. According to Sushruta Kshara is the most superior procedure among Shastra and Anushastra (sharp instrument and substitute for sharp instrument respectively) because it is having superior qualities like Chhedana, Bhedana, Lekhana etc. So, Kshara having Lavana (salty), Tikta (bitter) Rasa; Ruksha (dry), Teekshna Guna (properties); Ushna (hot) Virya (potency); and Katu (pungent) Vipaka (attributes of drug assimilation)²⁷.

Dose of Kshara¹⁵: Doses of Kshara is applicable according to mode of application, i.e. Paneeya Kshara: Uttama Matra (best quantity): 1 Pala (48 ml), Madhyama Matra (better quantity): 3 Karsha (36 ml), Heena Matra (bad quantity): ½ Pala (24 ml) and Pratisaareeya Kshara: as per requirement. For internal use²⁸: 250mg to 1gm

Indications of Kshara

Pratisaraniya Kshara¹⁵: Pratisaraniya Kshara is indicated in Kustha (skin disorders), Arsha (piles), Visha (poison), Kitibha, Dushtavarna (non-healing ulcers), Dadru (fungal infection), Nadvirana (sinus), Mukharoga (mouth disorders), Arbuda (tumor), Bhagandar (fistula), and Krimi (worms) Roga¹⁵ (Su. Su.11/7)

Paniya Kshara: Paniya Kshara is indicated in Gara Visha (artificial poison), arochak (tastelessness), Krimi, Gulma (tumors), Anaha (constipation), Visha, Udararoga (GIT disorders), Arsha, Agnimandya (loss of appetite), Ashmari (renal calculi), Ajirna (indigestion),¹⁵ Arsha, Bhagandar, Ashmari, Gulma, and Udararoga².

Contradiction of Kshara¹⁵: In case of Raktapitta (bleeding disorders), Timira (eye disease), Ruksha (dryness), Moorchha (unconscious), and the diseases occurs at the sites of Marma (vital points), Sira (head), Snayu (ligaments), Sandhi (joints), Tarunasthi (cartilaginous bones), Dhamani (arteries), the use of Kshara is not indicated. The conditions like whole body oedema, bone pain, heart pain, joint pain, thirst, pregnancy.

Actions of Various Kshara¹²: Kshara has possessed the Chhedana (excision), Bhedana (incision) properties along with various other therapeutic actions. Thus, they are used in different diseases as shown in Table 1.

Description of Kshara Sutra (medicated alkaline thread) by Different Ayurvedic Scholars

Kshara or caustic substances are considered as one of the most important means of parasurgical means because Kshara can produce excision, incision, scrapping and can pacify all the three doshas²⁹. In the recent era modified Kshara application in the form of Ksharasutra in ano-rectal disease has become a common practice in Ayurvedic surgical parlance. Vagbhatta has described to use thread smeared with Kshara in the treatment of Nadi (nerves). Chakradutta has referred to a medicated thread coated with Snuhi Ksheera (exudate of *Euphorbia nerifolia*) and Haridra churna (*Curcuma longa* powder) in treatment of arsha. Later on Bhavprakash has also mentioned similar description regarding Kshara-sutra. They use only Snuhi Ksheera and Haridra churna as the ingredients. Chakradutta has given the

clear idea about the thread which is to be used. According to him it should be strong one. It means that even after all procedures with coatings thread should be remained in good strength as playing prominent role. In Rasa Tarangini sufficient descriptions regarding the way of coatings, the numbers of coatings are described in this book. According to the description, fine Haridra Churna should be mixed with Snuhi Ksheera and a thin strong thread should be dipped in this mixture and followed by keeping dry in shadow area. This procedure should be repeated for seven times. The thread is named as Kshara Sutra though it does not contain any Kshara, because Kshara Sutra possesses the properties of Kshara like excision, incision, scrapping etc.

Table 1: Therapeutic importance of Kshara of different plant origin

S.no.	Kshara from different plants	Therapeutic actions
1	Arka (<i>Calotropis gigantea</i>)	Disorders of G.I. (colic pain), respiratory (asthma, cough) systems, splenomegaly etc
2	Apamarga (<i>Achyranthus aspera</i>)	Disorders of gastro- intestinal (G.I.) system (Agnideepaka, Pachaka- improves digestive power)
3	Gokshura (<i>Tribulus terrestris</i>)	Disorders of urinary system (urinary tract infection, dysuria, renal calculi, Prameha viz. polyuria)
4	Chincha (<i>Tamarindus indica</i>)	Disorders of G.I. system (Aruchi – tastelessness, Udarshoola viz. colic pain, Grahni viz. malabsorption syndrome), nausea, vomiting (Vamana)
5	Kadali (<i>Musa paradisiaca</i>)	Disorders of urinary system (urinary tract infection, dysuria, renal calculi), Gulma (tumor), Pradara (leucorrhea)
6	Kantkari (<i>Solanum surattense</i>)	Disorders of G.I., respiratory (asthma, cold, cough, rhinitis) systems, and acts as cardiac tonic
7	Mulaka (<i>Raphanus sativus</i>)	Disorders of gastro- intestinal (G.I.) system, Gulma (tumor)
8	Palash (<i>Butea monosperma</i>)	Disorders of respiratory (asthma, cough)
9	Sarpunkha (<i>Tephrosia purpurea</i>)	Disorders of respiratory (asthma, cough), Pleeha-Yakrit Vriddhi (splenomegaly and hepatomegaly respectively), Gulma (tumor), fever
10	Kshara Gutika (Alkaline tablet)	Aruchi (Tastelessness)
11	Kshara Taila (Alkaline oil)	Disorders of urinary system (urinary tract infection, dysuria, renal calculi, Prameha viz. polyuria), Gulma (tumor), Karna Roga (ear disorders)
12	Kshara Ghrita (Alkaline ghee) + Hingvadi Churna	Gulma (Tumour)
13	Ksharaof Aswagandha (<i>W. somnifera</i>), Yava (Mixture of potassium salts)	Swasa (Asthma), Kasa (Cough), Hikka (Hiccup)
14	Kshara Taila, Yava Kshara (Mixture of potassium salts), Swarji Kshara (Mixture of potassium salts)	Karna Roga (Ear disorders)
15	Kshara of Bhallataka (<i>Semecarpus anacardium</i>), Bhunimbadi (<i>Andrographis paniculata</i>), Haridra (<i>Curcuma longa</i>), Kshara Gutika, Pancham Kshara	Jalodara (Ascites), Grahni (Malaabsorption Syndrome)
16	Kshara of Tila (Alkali of <i>Sesamum indicum</i>), Apamarga, Kadali, Palasa, and Yava	Mutraghat (Graveland Stone)

Table 2: Use of Kshara Dravya in different pharmaceutical procedures of Rasa Shastra

Sr. No.	Kshara Dravya used	Uses in pharmaceutical processing of various minerals and metals	Reference
1	Kshara	Shodhan (purification) of Shilajatu (mineral pinch)	R.R.S. 2/116
2	Yava Kshara (alkaline of barley; Salts of potassium)	Shodhan of Rajavarta (Lapis lazuli)	R.R.S. 4/7-8
3	Churnodaka (Lime water), and Tankana (Borax)	Shodhana of Hartala (orpiment; As ₂ S ₃)	R.R.S. 3/70-73
4	Tankana	Shodhan of Tamra, Kantalooha	A.P.
		Marana (incineration) of Vajra (diamond)	R.N.V. 6/85-86
		Marana of Tuttha (blue vitriol)	R. Cu. 10/76
		Marana of Abhraka (biotite mica)	R.R.S. 2/19
		Sattvapatana (extraction of metallic essence) of Makshika (Copper pyrite)	R.M. 2/28
		Sattvapatana of Manahshila (As ₂ S ₂)	R. Cu. 11/68
		Sattvapatana of Gairik (red ochre; Fe ₂ O ₃)	R.R.S. 4/12

* R.R.S.= Rasa Ratna Samuchaya; A.P.= Ayurveda prakash; R.N.V.= Rasarnava; R.M.= Rasendra Mangal; R.Cu.= Rasendra Chudamani

Table 3: Classification of Kshara on the basis of their number

Sr. No.	Classification of Kshara on the basis of number	Number of Kshara	Name of Kshara	Reference
1	Ksharadwya	02	Kshara of Swarji and Yava	R.T. 2/6
2	Kshara traya	03	Kshara of Swarji, Yava, and Tankana	R.T. 2/6
3	Kshara Panchaka	05	Kshara of Musaka, Yava, Palash, Swarji, and Tila	R.T. 2/7
4	Kshara Shastaka	06	Kshara of Tila, Palash, <i>Vacha (Acorus calamus)</i> , Apamarga, Kutaja (<i>Halarrhena antidysenterica</i>), and Mustaka (<i>Cyperus royundus</i>)	D.N.
5	Kshara Saptaka	07	Kshara of Swarji, Yava, Tankana, Suvarchika, Palash, Gaurya, Mutsaka	A.P. 3/15
6	Ksharashtaka	08	Kshara of Snuhi (<i>Euphorbia nerifolia</i>), Palash, Apamarga, Chinca, Arka (<i>Calotropis gigantea</i>), Tila, Swarji and Yava	R.T. 2/8
			Kshara of Apamarga, Palash, Arka, Tila, Mulaka, Yava, Swarji and Tankana	D.N.
7	Ksharadasaka	10	Kshara of Shigru (<i>Moringa oleifera</i>), Mulaka, Palash, Chukrika (<i>Tamarind fruit</i>), Chitraka (<i>Plumbago zeylanica</i>), Adraka (<i>Zinziber officinalia</i>), Nimba (<i>Azardicha indica</i>), Ikshu (<i>Saccharum officinarum</i>), Apamarga and Mochak (<i>Musa sapientum</i>)	R.N.
			Kshara of Tila, Apamarga, Kadali, Palash, Shigru, Mochaka, Mulaka, Adraka, Chincha and Aswattha (<i>Ficus religiosa</i>)	R.H.T.

* A.P.= Arka Prakash; B.P.= Bhava Prakash; DN= Dhanvantari Nighantu; R.T.= Rasa Tarangini; R.N.= Raj Nighantu; R.H.T.= Rasa Hridya Tantra

Table 4: Properties of Kshara as mentioned in different texts of Ayurveda

Sr. No.	Charak Samhita (Sutra Sthana 27/366)	Sushruta Samhita (Sutra Sthana 11/16)	Astanga Hridya (Sutra Sthana 24)	Rasa Tarangani (14/62-63)
1	Tikshna (sharp penetrating action)	Nati-tiksna (not excessively sharp)	Natitiksna	Tikshna
2	Ushna (Hot temperature)	Natimridu (not excessively soft)	Natimridu	Atyanta Usna (Very hot temperature)
3	Laghu (Light)	Sighrakari (having rapid action)	Sita (cold temperature)	
4	Ruksha (Dry)	Slaksna (smooth texture)	Natiruksha (less dry)	Krimighna (wormicidal)
5	Kledi (oozing)	Picchila (sticky adhesion)	Picchila	Pachaka (digestive)
6	Dahana (cauterization of bleeders)	Abhishyandi (obstructive)	Avisyandi (immobile)	Dahaka (corrosive)
7	Darana (bursting)	Sita	Sukhanirvapyapya (quenching)	Shodhana (purification)
8	Lekhana (scratching)	Shikhari (do not move when placed in piles)	Sighragani (having rapid digestive fire)	Dahaka
9	Dipana (Digestive)	-	Slaksna (slimy)	Mutrala (Diuretic)
10	Chhedana (cutting or excision)	-		Ropana (Healing)

MODERN CONCEPTS

After reviewing the properties of the Kshara which are utilized in the Ayurvedic treatment, here accounting of the same in the light of modern sciences. Kshara are alkaline substances, which are of two kinds viz. natural and artificial. Natural are minerals and includes calcium, potassium, and sodium in different combinations. Artificial are those prepared by the ashes of certain plants like Yava, Apamarga etc. Both these kinds are caustic, alkalis possessing the property of destroying the tissues by penetrating deep into them. The advantage of this property is utilized in the treatment of abnormal growth of the tissues like tumor, pile, masses of wounds. It destroys extra growth. Generally calcium or limestone or organic materials having calcium is utilized for the preparation of Kshara. A. R. Vasudev Murthy describes the chemical composition of Kshara in his Indian Tradition of Chemistry and Chemical Technology, as follows: the wood ashes contain potassium and sodium carbonates (K_2CO_3 and Na_2CO_3). Limestone and sea shells contain calcium carbonate ($CaCO_3$). On heating strongly carbonate decomposes into calcium oxide (CaO), quick lime and Carbon dioxide (CO_2), which escapes into the air. Calcium oxide reacts with water vigorously and gives calcium hydroxide

($CaOH$), which is lime water indeed. Calcium hydroxide reacts with Potassium/Sodium carbonate and gives rise to Calcium carbonate which comes down as precipitate. Potassium hydroxide (KOH) remains in solution which may be concentrated by boiling to different extents²⁷.

Herbal ashes generally contain sodium, potassium, carbonate, calcium oxide, magnesium and silica. Kshara is prepared by dissolving this ash in water and after filtering dried by the heat, in this process, an insoluble substance like silica is being separated by the filtration and soluble substances like potassium and sodium remain in the solution. In this process when so many substances come in contact of each other, some of them get decomposed and some new substances are being formed. For example the Ksharana strength is more dependent on the preparation of hydroxides than that of the carbonates. It means Kshara having more hydroxides are having more Ksharana Shakti, hence it is comparatively more 'Tikshna' so used externally only. Kshaodak (alkaline water) contains Sodium and Potassium hydroxides in traces hence prescribed internally and can be said as 'Paniya Kshara'. Proportion of hydroxides can be increased in the Ksharas by the addition of lime stone, conch shell, etc., which are known to be having Calcium. These are

added by heating and dissolving in the water, by which chemical reaction is set up in the Kshara, the outcome of which is the transformation of some of them into carbonates.

In the pharmaceutical process of metallic Bhasma formation (especially for Puti Louha- group of metals having low melting point viz. Vanga- Tin, Naag- Lead, Yashad- Zinc), Jarana (roasting) is one of the intermediate process where Shodhit Dhatu (purified metal) roasted with alkaline herbs in which herbal drug get completely burned and Kshara of that herb help in the process of Jarana. Jarana may be compared with “polling” process in which refining of crude metal is done from its own oxide as impurity. It is a redox reaction with reduction being the dominant one³⁰.

CONCLUSION

Kshara is one of the important dosage forms as mentioned in Ayurveda to cure various diseases like Kustha, Gulma Mutraghata and Kshara Sutra is one of the important surgical procedures for the treatment of fistula. Kshara and Kshara Sutra are known from the time of extreme antiquity and are still alive nowadays. This fact testifies its efficiency in healing various kinds of illness and fistula respectively. Thus, Kshara have therapeutic as well as pharmaceutical importance, as both are the prime aspects of Ayurvedic therapy.

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