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,conch etc.), minerals (borax, salt petre, mixture of potassium salts etc.) and plants (Mulaka; Raphenus sativus Linn., Snuli; Euphorbia nerfolia Linn., Arka; Calotropis gigantea Linn. etc.) origin, where alkaline portion is extracted from the ashes of these substances. Kshara Kalpans 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 Kalpans 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 Mutrashamri (urinary 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 used in the different pharmaceutical procedure like Shodhana (purification), Jarana (roasting) and Maran (incineration of metals and minerals) in various preparations of Rasasaadhies (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 KsharaSutra 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 decisional / 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 long time 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 diseases. Kshara (alkaline substances), is one among them. Kshara is medicament obtained from ash of one or more plants, animal and mineral products. 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). 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 measures. 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 Shodhana (purification), Satt vapatan (metal extracting), Marana (incineration of metals and minerals), but also contradict the ill effects of poisonous drugs (schedule E-1) as antidote.

In this article, an effort has been made to compile and present the utilization of Kshara in the pharmacutico-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) or the substance, which detoxify the Dosh (bodily humour), Dhatu (tissues) and Mala (excreta) 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 drugs.

Detailed View in Ayurvedic Classics

In Samhita period detail descriptions of Kshara Kalpans 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
Kasisadi is defined on Kshara (Pleehodara preparation of Kshara along with treatment of Mutraghta of Dalchini suaveolens Ksharodaka method of preparation of piles)).

Acharya Dalhana the commentator of Sushruta Samhita explained the use (penetrating action) types were explained according to methods of preparations i.e. prepared from burned drugs by Antahdhaum method. Jala Acharya Charak has mentioned two types of Kshara used for medicinal purpose and Kshara is one among them. Acharya Charak has mentioned 18 parts of plants which can be Kshara destroys the degenerated dhatus and remove the unhealthy tissues and doshas from their location.

In this formulary Kshara is dominated by K Lavana - alkaline water. Kshara also incorporated in the preparation of various methods and utensils are described for the various method of the important test for Shruti Pandey. In this formulary Kshara is dominated by K Lavana - alkaline water. Kshara also incorporated in the preparation of various methods and utensils are described for the various method of the important test for Shruti Pandey. In this formulary Kshara is dominated by K Lavana - alkaline water. Kshara also incorporated in the preparation of various methods and utensils are described for the various method of the important test for Shruti Pandey.

In Rasa Shastras (Ayurvedic Pharmaceutics) the Kshara plays its own role in different pharmaceutical procedures such as Shodhana, Jarana, Sodhana, Parimarjaniya (external use e.g. Kshara, Tila Kshara, Snuhi Kshara). In drugs & Cosmetic manufacturing premise required for the manufacturer of Kshara are described. 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 therapy. 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 wounds. Table 1 shows the use of Kshara in various diseases either in single medicine or in combination.

Pharmaceutical Potentials of Kshara

In Rasa Shastras (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 product. Kshara are known for their cleansing property. Hence, borax groups 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) media. Borax is also used in certain methods of purification of mercury explained in Rasana Tarangini. Some of the examples showing Kshara used in Shodhana process:

1. Silver is purified by melting it with borax in crucible subjecting to high temperature and immersed in Jyotismati Taila (extracted oil of Celastrolus paniculatus).
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 Shastras. In Rasendra Mangala, there is use of Kshara for Rodhana, Murchana, Dipana, Niyamana, Uthapana Samskara, which is intended to increase the potency of mercury.

Kshara as Reagent for Bhasma Testing 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) poison. 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 complications. 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 Agnivati vati, Ananda Bhaaratva Rasa. As per Ayurveda Prakasa, for subsiding the toxicity effects Kankausha (Mysore gamboge tree– Garcinia morella), decoction of root of Babul (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 preparations.

CLASSIFICATION OF KSHARA

Ayurvedic texts described classification of Kshara on various bases. In Brihatraya (three foremost texts of Ayurveda viz. Charak Samhita, Shuruta Samhita and Ashtanga Hridya 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)37. 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) Vanuspatijanya: Obtained from the plant sources e.g. Aparmarga Kshara Yava Kshara
2) Pranajaya: Obtained from the Animal sources e.g. Shankha, Kapardika, Praval etc.
3) Khanijajanya: 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 Greetings (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- Visheshas and Gunantaradhan (modification of properties). Acharya Sushruta in Sutra Sthana described the special procedure for the preparation of Kshara which is not “Ek-aushadhi Kshara” but a Kshara- Kalpa in which by the Samyoga of Ksharas (combination of alkalai), Agni (fire intensity), Kala (time), Yukti (procedure), and Sanskara, changes can be brought3.

According to Sharangdhar 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 form24.

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 4.

Kshara are prepared from herbal drugs and it includes the basic properties of the original herbal drugs.Kshara is predominant with Agniibhuta (fire elements) hence having Teeksha property. It consists of Sparsh Guna (consistency property) due to its predominance of Vayabhuta (wind elements) and hence gives quick action. So, above factors clearly state that Kshara is having predominance of Agni and Vayubhuta. Kshara is having Tejobhuta (agni element) property predominantly hence it is having the property of corrosiveness. According to Sushruta Kshara is the most superior procedure among Shashtra and Anushastra (sharp instrument and substitute for sharp instrument respectively) because it is having superior qualities like Chhedana, Bhedana, Lekhana etc. So, Kshara having Lavara (salty), Tikt (bitter) Rasa; Ruksha (dry), Teeksha Guna (properties); Usha (hot) Virya (potency); and Katu (pungent) Vipaka (attributes of drug assimilation)37.

Dose of Kshara: 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 Pratisaraneeya Kshara: as per requirement.

Indications of Kshara

Pratisaraniya Kshara: Pratisaraniya Kshara is indicated in Kusha (skin disorders), Arsha (piles), Visha (poison), Kshitibha, Dushthavarna (non-healing ulcers), Madhu (fungal infection), Nadiivrana (sinus), Muka (mouth disorders), Arbuda (tumor), Bhagandar (fistula), and Krimi (worms) Roga3 (Su. Su.11/7)

Panjya Kshara: Paniya Kshara is indicated in Gara Visha (artificial poison), arochak (tastelessness), Krimi, Gulma (tumors), Anaha (constipation), Visha, Udaragora (GIT disorders), Arsha, Agnimandya (loss of appetite), Ashmari (renal calculi), Ajirna (indigestion), Arsha, Bhagandar, Ashmari, Gulma, and Udaragora3.

Contradction of Kshara: In case of Raktipita (bleeding disorders), Timir (eye disease), Ruksha (dryness), Morecha (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 Kshara: Kshara has possessed the Chedana (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 doshas in the recent era modified Kshara application in the form of Kharasutra in ano-rectal disease has become a common practice in Ayurvedic surgical parlance. Vaghbhatta 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 or Kshara (exudate of Euphorbia neriifolia) 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

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

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

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Kshara Dravya used</th>
<th>Uses in pharmaceutical processing of various minerals and metals</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kshara</td>
<td>Shodhan (purification) of Shilajatu (mineral pinch)</td>
<td>R.R.S. 2/116</td>
</tr>
<tr>
<td>2</td>
<td>Yava Kshara (alkaline of barley; Salts of potassium)</td>
<td>Shodhan of Rajavarta (Lapis lazuli)</td>
<td>R.R.S. 4/7-8</td>
</tr>
<tr>
<td>3</td>
<td>Churnodaka (Lime water), and Tankana (Borax)</td>
<td>Shodhana of Hartala (orpiment; As₂S₃)</td>
<td>R.R.S. 3/70-73</td>
</tr>
<tr>
<td>4</td>
<td>Tankana</td>
<td>Shodhan of Tamar, Kantaloha</td>
<td>A.P.</td>
</tr>
</tbody>
</table>

* R.R.S= Rasa Ratna Samuchaya; A.P= Ayurveda praksh; R.N.V= Rasarnava; R.M= Rasendra Mangal; R.Cu= Rasendra Chudarnani
utilized in the treatment of abnormal growth of the tissues like.

Carbon dioxide (CO$_2$) 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 extents.

Natural herbs 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 Ksharas by the addition of lime stone, conch shell, etc., which are known to be having Calcium. These are

<table>
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<tr>
<th>Sr. No.</th>
<th>Classification of Kshara on the basis of number</th>
<th>Number of Kshara</th>
<th>Name of Kshara</th>
<th>Reference</th>
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<tbody>
<tr>
<td>1</td>
<td>Kshara Sharga</td>
<td>02</td>
<td>Kshara of Swarji and Yava</td>
<td>R.T. 2/6</td>
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<tr>
<td>2</td>
<td>Kshara traya</td>
<td>03</td>
<td>Kshara of Swarji, Yava, and Tankana</td>
<td>R.T. 2/6</td>
</tr>
<tr>
<td>3</td>
<td>Kshara Pancaka</td>
<td>05</td>
<td>Kshara of Musaka, Yava, Palash, Swarji, and Tila</td>
<td>R.T. 2/7</td>
</tr>
<tr>
<td>4</td>
<td>Kshara Shastaka</td>
<td>06</td>
<td>Kshara of Tila, Palash, Vacha (Acorus calamus), Apamarga, Kataja (Halarrhena antidysentrica), and Mustaka (Cyperus royandusi)</td>
<td>D.N.</td>
</tr>
<tr>
<td>5</td>
<td>Kshara Saptaka</td>
<td>07</td>
<td>Kshara of Swarji, Yava, Tankana, Suvarchika, Palash, Gaurya, Mutsaka</td>
<td>A.P. 3/15</td>
</tr>
<tr>
<td>6</td>
<td>Ksharashtaka</td>
<td>08</td>
<td>Kshara of Snuhi (Euphorbia neriifolia), Palash, Apamarga, Chinca, Arka (Calotropis gigantea), Tila, Swarji and Yava</td>
<td>R.T. 2/8</td>
</tr>
<tr>
<td>7</td>
<td>Ksharasasaka</td>
<td>10</td>
<td>Kshara of Shigru (Moringa oleifera), Mulaka, Palash, Chukrika (Tamarind fruit), Chitraka (Plumbago zeylanica), Adraka (Zinziber officinalis), Nimba (Azardica indica), Ikdu (Saccharum officinarum), Apamarga and Mochak (Musa sapientum)</td>
<td>R.N.</td>
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<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Charak Samhita (Sutra Sthana 27/366)</th>
<th>Sushruta Samhita (Sutra Sthana 11/16)</th>
<th>Astanga Hridya (Sutra Sthana 24)</th>
<th>Rasa Tarangani (14/62-63)</th>
<th>Reference</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Tikshna (sharp penetrating action)</td>
<td>Nati-tikshna (not excessively sharp)</td>
<td>Nattikshna</td>
<td>Tikshna</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ushna (Hot temperature)</td>
<td>Natimridu (not excessively soft)</td>
<td>Natimridu</td>
<td>Atyanta Usna (Very hot temperature)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Laghu (Light)</td>
<td>Sighrakari (having rapid action)</td>
<td>Sita (cold temperature)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Raksha (Dry)</td>
<td>Slaksha (smooth texture)</td>
<td>Natiruksha (less dry)</td>
<td>Krimighna (wormicidal)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Kledi (soaring)</td>
<td>Pichilia (sticky adhesion)</td>
<td>Pichilia</td>
<td>Pachaka (digestive)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dahana (cauterization of bleeders)</td>
<td>Abhishyandi (obstructive)</td>
<td>Avisyandi (immobile)</td>
<td>Dalaka (corrosive)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Durana (bursting)</td>
<td>Sita</td>
<td>Sukhanirvapya (quenching)</td>
<td>Shodhana (purification)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Lekhana (scratching)</td>
<td>Shikhari (do not move when placed in pile)</td>
<td>Sighragani (having rapid digestive fire)</td>
<td>Dalaka</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Drpana (Digestive)</td>
<td>-</td>
<td>Siaksha (slimy)</td>
<td>Mutrana (Diuretic)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Chhedana (cutting or excision)</td>
<td>-</td>
<td>-</td>
<td>Ropana (Healing)</td>
<td></td>
</tr>
</tbody>
</table>

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$_2$CO$_3$ and Na$_2$CO$_3$). 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 extents.

Herbal herbs 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 Kshara 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 Puli 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 one[9].

CONCLUSION

Kshara is one of the important dosage forms as mentioned in Ayurveda to cure various diseases like Kushta, 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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