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PREPARATION AND STANDARDIZATION OF PALASHA KSHARASUTRA

Dr Ganapathi Rao.I[1], Dr Chandrakanth.M.Halli[2], Dr Subhod Kamthikar[3]
[1]Scholar, [2]Guide, Professor & HOD, Department of Shalyatantra, NKJ Ayurvedic Medical College & P G Centre, Bidar [3]Co-Guide, Associate Professor, Department of Anaesthesiology, BRIMS

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ABSTRACT

Ksharasutrais a medicated thread prepared by using plant-based ingredients. The activeingredients are coated repeatedly on Barbour thread no 2-0 so that a required amount of drug gets adhered on the thread to achieve therapeutic value. Charaka mentioned Ksharasutra in the chapter of SothaChikitsa. Susruta mentioned its reference in NadivranaChikitsa. Vagvat had clearly mentioned along with Shastrakarma, Agnikarma and Ksharakarma. Chakradutta in Arshodikar clearly mentioned the idea of preparation of Ksharasutra with SnuhiKsheera and HaridraChurna. As the name Ksharasutra itself suggest Kshara should also be one of the ingredients which was missing in the description of Chakradutta. Therefore, Kshara was added subsequently in the preparation of Ksharasutra at the department of Shalya Tantra BHU. Among the various types of Kshara,ApamargaKsharawas selected because of its better clinical efficacy, wider availability ofraw material and higher yield of Kshara from the plant. Ksharasutra is a well-established procedure in the management of Fistula in Ano with a high success rate. Although the standard ApamargaKsharasutrais used successfully in the management of Fistula in Ano. Along with theadvantages the standard ApamargaKsharasutra creates many problems during preparation and application of thread. To overcome these problems various types of Ksharasutra research, preparation along with their standardization have been carried out. The research is based on searching for the drugs having better actions and acceptability made attempt withArkaKsheera and PalashaKshara in this study.

KEYWORDS: Ksharasutra, Sushruta Samhita, Fistula in Ano.

INTRODUCTION

Etymological derivation of the word Kshara: As pershabdakalpadruma, the word Kshara is derived from the root Kshara means to melt away or to perish.

Kshara Sutra means thread made up of caustic material which destroys or cleans the devitalized tissue and to disintegrate the skin or other tissues[1].

Origin of Kshara sutra: Pioneer of Ayurvedic surgery AcharyaSushruta first mentioned Ksharasutra in the treatment of NadiVrana (sinus), Bhagandara (fistula in ano), arbuda[2] (Benign tumor) etc.but does not emphasis upon its preparation. Chakrapani Dutta was the first person to mention the method of preparation with its indication in Bhagandara(fistula in ano) and arsha[3] (hemorrhoid). He described method of preparation as smearing a thread repeatedly in latex of Snuhi(Euphorbianeriifolia) and Haridra (turmeric) powder[4]. After ChakrapaniDutta almost all the later author described same method of preparation of kshara sutra. But because of complexity of preparation and inadequate method of procedure of application, it lost its popularity among Ayurvedic surgeons. Rasatarangini which was published later to Chakradutta a better kshara sutra preparation was introduced. The credit of standardization and development for practical use mainly goes to Prof. P.J. Deshpande[5], Dr. S.R. Gupta in the present era.

Properties of kshara: Kshara is considered superior to allsurgical and Para surgical measures[6], because they perform the work of incision, puncture, and scarification to relieve derangements of the Tridosha[7] and uniformly affect the diseased part to which they are applied. As per Sushruta, kshara possess the following qualities, Tridoshaghna – because of different types of drugs it can pacify all the humours, Saumyata – owing to their white color, Dahana – owing to its burning nature, Pachana- because of its digestive capability, Darana- since many drugs of agneya nature enters into their composition, Katuka – because of its pungent taste, Ushna – because of its heat producing nature,

Tikshna – because of its irritant nature, Vilayana – because of its liquefaction property, Shodhana – because of its cleansing property, Ropana – improves granulation (healing), Shoshana – absorption, Stambhana – arresting or stopping nature, Lekhana – scraping property, Krimighna – because of its antimicrobial action, Sterility[8] – if used in excess, It normalizes Aama, Kapha, visha, medodhatu and also cures kushtha when given in proper doses. In addition to that Acharya Charak attributed two more properties – Laghu&Bhedana[9]. Vagbhatta said that kshara acts by extracting all the toxins from the site and cures the disease totally[10].

Kshara preparation as per Sushruta Samhita[11]:

Intheprocess of kshara preparation; the following precautions are inevitable-

a)Kaala-Sharad kala (in between Oct-Nov)

b) Place-nearby hilly area

After performing devotional preparation (mangalacharana) with healthy mushkaka plant along with its root in made into small parts and subjected for boiling till it is converted into total ash.

After the separation of burnt lime-stones, the ash is collected in a utensil and care is taken that moisture is not contaminated with the ash. This is the praathamikakshara (basic kshara).

Table 1: List of source plants for kshara preparation as per Sushruta Samhita[12]

Name	Botanical Name	Family
Mushkaka	ElaeodendronglaucumPers.	Celastraceae
Kutaja	HolarrhenaantidysentricaLinn.	Apocyanaceae
Palash	Butea monospermaLinn.	Fabaceae
Ashwakarna	DipterocarpusturbinatusGaertn F.	Dipterocarpaceae
Paaribhadrak	Erythrina variegate Linn.	Fabaceae
Bibhitaka	Terminalia bellericaRoxb.	Combretaceae
Aaragwadha	Cassia fistula Linn.	Caesalpinoidae
Tilwaka	SymplocosracemosaRoxb.	Symplocaceae
Arka	Calotropisprocera(Ait) R.Br.	Asclepiadacea
Snuhi	Euphorbia neriifoliaLinn.	Euphorbiaceae
Apamarga	AchyranthesasperaLinn.	Amaranthaceae

Paatla	StereospermumsuaveolensDC.	Bignoniaceae
Naktamaala	PongamiapinnataPierre.	Fabaceae
Vrusha	AdhatodavasicaNees.	Acanthacae
Kadali	Musa sapientumLinn.	Musacaea
Chitraka	PlumbagozeylanicaLinn.	Plumbaginaceae
Putika	HolopteliaintegrifoliaPlanch.	Ulmaceae
Asphota	HemidesmusindicusR.Br.	Asclepiadaceae
Karaveera	Nerium indicumMill.	Apocyanaceae
Saptachhada	AlstoniascholarisR.Br.	Apocyanaceae
Agnimantha	PremnaintergrifoliaLinn.	Verbenaceae
Gunja	AbrusprecatoriusLinn.	Fabaceae

Kshara sutra preparation: Present technique of manufacturingofkshara sutra is basically an outcome of repeated experimentations based on clinical experiences.

Material used

Thread: Ideal thread for the preparation of kshara sutra should possess a sufficient strength to hold the 21 coatings of all the ingredients throughout the therapy. different studies were carried out in this regard by subjecting the different kinds of threads to gradually increasing tension on a tensiometer till a point reached when the thread just broke. It was noted after these experimentations that surgical linen no.20 retains its strength throughout the processing and had maximum tensile strength, i.e.5.0 kg[13]. Therefore, non-absorbable natural linen thread no. 20 is chosen as an ideal thread for kshara sutra preparation.

Kshara (Alkali or caustic agent): kshara used for kshara sutra preparation should be fine, dry & white powder, which can't be obtained from the Madhya and Tikshna varieties of kshara. Chemically, maximum hygroscopic & caustic action is seen in Mridu variety of pratisarniyakshara (mentioned by Sushruta in KsharaPakavidhi). Addition of different substances to increase its potency i.e. shankhanabhi, danti etc. really increases its irritability & reduces its alkalinity (pH >9.0)[14]. So, mridu variety of kshara is considered suitable for making of kshara sutra. Further studies have been carried out using different types of kshara and Palashakshara and Apamargakshara is found to be most effective.

Ksheera (Latex): kshara itself does not have a sticking property. Ksheera, which is used mainly for adhesive purpose, are acidic in nature (pH=9.7) and produces debridement by proteolytic enzymes. Kshara being alkaline in nature overshadows the debridement action of Ksheera, but its sticking property is sustained. Ksheera also potentiates the debridement action of Kshara due to absorption of high concentration of it. Latex of Arka, snuhi, papaya, udumbara, guggulu etc. can be used as binding material for preparation of different types of kshara sutra.

Haridra (Turmeric): kshara has been found to be excessively hygroscopic which catches moisture and becomes useless if left exposed to the atmosphere. Haridra prevent direct contact of Kshara with the atmosphere, so it can be preserved & used for longer period. It also possesses antiseptic & antihistaminic properties too.

Collection of ArkaKsheera	
Botanical Name	Calotropisgigantean Linn.
Family	Asclepiadeceae
Size of the Plant	2-3 years. Old
Best time for collection:	Throughout the year.

Linear cuts are made on the stem and latex is collected in clean bowl. After sufficient amount is collected it is transferred to a glass bottle. Care to be taken so that the pieces of bark and dust will come along with latex. The Latex to be used immediately, avoid clotting.

Preparation of Kshara

Ash is prepared by burning the whole plant along with tilanala. The ash is mixed with 4 times water or Gomutra and filtered thoroughly. Boil the filtrate, evaporate the water and dry powder is obtained. Powder should be stored in air tight container.

Equipment Needed

1. Kshara Sutra cabinet with ultraviolet light
2. Autoclaved Petridish**(**for storage of raw material during application**)**
3. Glass tubes **(**for packing of the prepared kshara sutra**)**

Kshara Sutra cabinet with ultraviolet light: This is speciallydesigned for preparation of

Kshara Sutra. It is available in two designs; horizontal and vertical. The processor can design his own Kshara Sutra cabinet according to his requirement and resources. It has two chambers; the bigger one for the Kshara sutra hangers and smaller one for the hot air blower, fan etc. A thermometer is also fixed which will indicate the temperature inside the cabinet.Ksharasutra hangers are the rectangular shaped structures, made up of thick Aluminum/wooden strips of about 2 cm width and 3 -4 mm in thickness. Each hanger has small cuts (notches) on both sides which are placed at a distance of 2 to 2.5 cm from each other. These notches are meant for hooking the thread throughout the width and length of the hangers. Each hanger has 15 to 20 notches on either side. There may be variation in the size of the hanger depending on the size of the cabinet. The width of the hanger is about 30 cm. In this way one hanger can accommodate as many as 30 to 40 threads at a time and one Kshara Sutra cabinet can accommodate as many as 30 to 50 hangers. Thus, the capacity of a cabinet to manufacture kshara sutra in one batch is 900 to 1600 threads. Cabinet is also used for preventing the contamination because of atmospheric dust particles from sticking over the wet threads. It dries the coated thread rapidly and maintains sterilization through ultraviolet light; it acts as a bactericidal through constant temperature at 40°C by providing dryness and constant heat. It also prevents the hydrophilic activity of the coated medicated kshara sutra.

Quantity required: For 1000 ksharasutraSurgical linen no. 20 = 300 meter

Arka latex (Calotropisgigantean Linn., Asclepiadeceae) – 3.5 liter,PalashaKshara (ButeamonospermaLinn., Fabaceae) – 1 kg, Haridra powder (Curcuma Longa, Zingebaraceae) – 500 gm for the preparation of kshara sutra, linen thread is tied throughout the length and breadth of the hangers which is then mounted over hanger stand. Each thread on the hanger is then smeared with latex with the help of the clean gauze piece all the four side of the thread viz. front, back, above and below should be uniformly smeared.

The hanger then is replaced into to the cabinet. When all the hangers are processed, the cabinet should be closed properly and the hot air is blown in order to dry the threads. 11 such coatings with ArkaKsheera should be done. The twelfth coating is done by first smearing the thread with the latex and then passing the wet thread through a heap of finely powdered kshara. When all the threads are smeared with kshara, the hanger should be gently shaken so that all the excess particles of kshara fall down. In the final phase, 3 coatings of Haridra powder and Ksheera were given. Thus, the twenty-one coatings over the thread are complete. Allow it to dry.

Sterilization and packing of kshara sutra[15]

Prepared ksharasutra is sterilized by ultraviolet radiation by placing them in ksharasutra cabinet for 20-30 min. at 40^0C. Sterilized Ksharasutra measuring approx. 10-12 inches is cut away at two ends and packed in polythene bag or sterilized glass tubes. Care should be taken that only one-fold at the center will be given while putting the sutra in a glass tube otherwise folding at many points will allow the coating to be stripped off. Sealed glass tubes should again be put inside the cabinet and exposed to ultra-violet radiation. Each tube should finally be labeled giving details of date of manufacture, date of sealing, batch number etc.

Reason behind the definite sequence of 21 coatings: After 21coatings, linen no.20 assumes the size of 14-15 gauge which is an appropriate size to be introduced into lumen of an average fistula It is also an auspicious number according to Hindu mythology. The purpose of definite sequence of 21 coatings is as follows:

First 11 coatings of latex: Upper few coatings are likely to beneutralized by the application of Kshara; but innermost coatings will still remain protected and will preserve their proteolytic action which helps in the debridement of the tissues.

7 coatings of latex &Kshara: Latex only acts as bindingmaterial for tiny Kshara particles which helps in maintaining the adequate concentration of Kshara for an effective caustic action.

3 coatings of latex &Haridra: It helps in prevention of directexposure of Kshara to atmosphere & prolongation of preservation of ksharasutra. The sequence and number of coatings was finalized after sufficient discussion, experimentations & a long experience of trial and error, thus it should be ensured that Ksharasutra to be made in definite sequential manner.

Mode of action of Ksharasutra: To establish the probablemode of action of Kshara Sutra, various clinical trials and studies have been carried out in India as well as other countries e.g. Sri lanka, Japan etc. From the outcome of these various analytical studies, it can be postulated that in kshara sutra, linen thread supports the strength of ligation and weight of 21 coatings, while snuhi latex acts as binding material for preserving all the properties of kshara.Kshara sutra works by pressure effect made by ligation which creates mechanical strangulation of blood vessels and tissues which causes the pressure necrosis of the body of any swelling.Kshara invades into the cells of lesion till engorged tissue destruction occurs by its Ksharanaguna(corrosive properties).Arka latex is being proteolytic in nature, dissolves the tissue at its base. The action of turmeric powder provides the effect of bactericidal action with healing properties. All these three drugs do not contradict each other but rather support their actions by equal and desirable effect.Kshara sutra has the ability to perform incision with excision slowly by virtue of its controlled chemical cauterization. During cutting effect, there may be oozing of blood which is ceased by sclerosing effect of kshara by its protein coagulation property. Hence, there was no chance of bleeding during the cutting of the mass. The chances of infection are least due to sustained action of anti-infective virtue of kshara. In case of Bhagandara(fistula in ano), kshara sutra also acts as a Seton to allow the proper drainage of pus and debridement of unhealthy tissue, thus, providing a cleaner base for wound healing with minimal scarring and without complications.

Standardization of Ksharasutra:

In standard KsharasutraArkaKsheera, PalashaKsharaandHaridrachurnaare used.Standardization of Ksharasutra requires standardization of its raw materials on the basis of analysis of various physical as well as chemical parameters to ensure the quality control with cost effectiveness at clinical level and also requires standardization in preparation process and quality standards in packaging, storage, labelling and developing scientific parameters for maintaining its uniform coating, pH, microbial check etc. Various characteristics of an ideal Ksharasutra based upon following features. This analysis was done at lab attached to Sri Siddarameshwara Ayurveda Medical College and Research Centre, Bidar.

- pH: 10.5
- Length: 30±1 cm
- Diameter: 1.9mm
- Min. breaking load: 5.83 kg
- Weight of coating: 0.83 gm
- Thickness of thread after coating: 2.10+0.11mm

pH of individual ingredients

1. ArkaKsheera: 9.7
2. Haridra: 6.2
3. PalashaKshara: 10.56

Figure 1: Thread tying

Figure 2: Arkaksheera coating

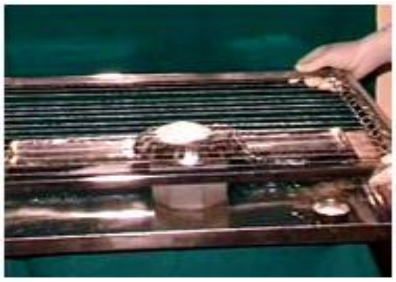

Figure 3: Palasha Ksharacoating

Figure 4: Haridra coating

Figure 5: Kshara Sutra Drying oven Figure

6: Kshara Sutra Storage Rack with hangers and stand hangers

Figure 7: PreparedKshara Sutras preserved in test tubes

Corresponding author:
Dr Ganapathi Rao.I Ph.D Scholar,
Department of Shalyatantra, NKJ Ayurvedic Medical College & P G Centre, Bidar
Email: i.ganpathi@gmail.com

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