Research Article

FORMULATION AND PHYSICO-CHEMICAL CHARACTERISATION OF KSHARAPLOTA DRESSING FOR VRANA CHIKITSA

Anantkumar V. Shekoker1*, Vijay P. Ukhalkar2

*Ph.D Scholar, Guide and Professor, Dept. of Shalyatantra, Govt. Ayurved College, Nanded, Maharashtra, India.

ABSTRACT

Good quality of wound healing is a difficult task to the clinicians in ancient time and even in present time though. Wound healing is a defense mechanism of our body to prevent and fight against infection. In Health sciences, wound healing formulations are practiced with their own advantage and disadvantages. Ayurveda is a divine science of medicine where there are so many pieces of diamonds available for management of Vrana without any complication. Our Acharyas broadly described about treatment principles of wound management and classified the drugs related to Vranashodhana and Vranaropana.

As per text we are well known about the wider approach of Acharya Sushruta in relation to Vrana and its management. They have mentioned various dressing materials for wound care it comprises Pichu, Plota, Kawalika, etc. Among these Plota is much better because we can use it for both purposes i.e. to clean as well as to cover the wound.

Ksharaplotha (medicated gauze) is an innovative and newer concept used for management of Infected and chronic Wounds and ulcers. This Ksharaplotha is a herbo-chemical compound and prepared with the help of Snuhikshira (milk of Euphorbia neriifolia Linn.), Apamargakshara (ash of Achyranthes aspera L.) and Haridra (Curcuma longa L.). A single coating of the above drugs were given to the Plota (gauze). It can be used in number of open wounds and ulcers. This Ksharaplotha was prepared similarly with basic concept of Ksharsutra preparation. The Aim of this study was to formulate Ksharaplotha dressing and to do the physico-chemical analysis of the Ksharaplotha. The proved that pharmaceutical processing of the raw drugs imparts characteristic property to the formulation were evident by the physicochemical analysis of the Ksharaplotha. The method of formulation of Ksharaplotha holds good even for today’s era and can be considered as standard protocol for Vrana Shodhana and Ropana in Dushta Vrana Chikitsa.

KEYWORDS: Ksharaplotha, Physicochemical characteristics, Shodhana, Ropana, Dushta Vrana.

INTRODUCTION

Acharya Sushruta the father of surgery in 1000 BC has elaborated the concept of Vrana. Sushruta has explained 60 types of procedure for the management of wounds to achieve good approximation, early healing, without complication and acceptable or cosmetic scar.[1]

Sushruta has described multiple dressing materials, eg, Pichu, Plota, Kawalika and Vikeshika. Among these Pichu was used only to clean the Vrana and soak the Vranasthavara (oozing) while Kawalika is used as dressing pad or just to cover the wound.[2]

Plota can be used in toileting of the Vrana (ulcers) as well as to cover the Vrana. It can also be used as Varti in those wounds or ulcers which are very deep to clean easily. [3] In such wounds or ulcers Plotavarti (gauze wick) removes all the debris hidden inside the wounds or ulcers. Acharya Sushruta has mentioned Kshara (alkali) as in Anu-shastra (subsidiary instrument used in place of a regular surgical instrument)[4], Upayanta (a minor or secondary instrument), Agropaharaniya and one of the Upakram of Vrana. Acharya Sushruta emphasizes on the fact that, when the Kshara administered by an ignorant physician can harm[5] the body like Agni, Shastra and Vajra or death itself. While the same Kshara administered by an intelligent and well skilled physician it can prove potent enough and subside all serious and most troublesome disease speedily in which it is indicated. Thus Kshara karma has been considered as a wealth and weapon in Ayurvedic Pharmacopeia.

Acharya Sushruta defines the Kshara; the substance possessing Ksharana (melting away) and Kshanan (destroying the lesion) properties. Ksharana means one which mobilizes and removes the...
deformed skin, flesh etc. or which removes the vitiated Doshast. Although as Dalhana mentioned a few authorities considered the reference as Ksharana means Shodhan (cleansing). Probably these two groups of authorities intended to narrate the meanings of Ksharana and Kshapanama as about Pratisaraniya and Paniya Kshara respectively. Kshanan means which destructs the deformed Skin, Flesh etc. Acharya Charaka defines Kshara [7] as one which scraps the abnormal tissue from the locating viscera and drags it down after dissolving because of its corrosive nature.

Kshara (alkali) is a unique kind of Ayurvedic dosage form, known for its hot, piercing and scraping nature. Ksharalepa (application of alkalies) and ligature with Ksharasutra (thread smeared with alkali) in haemorrhoids, fistula in ano and sinuses are one of the most accredited therapeutic procedure in Ayurveda. Ksharaplotata was formulated similarly with basic concept of Ksharasutra preparation. Preparation of Ksharaplotata, was done with the coatings of Snuhikshira, Apamargakshara and Haridra. All these three drugs works as Vrana Shodhana and Vrana Ropana.[8] Ksharaplotata was used for debridement or to remove unhealthy tissue and enhances formation of healthy granulation tissue so that normal epithelization occurs earlier.

AIMS AND OBJECTIVES
1. To prepare the Ksharaplotata with Snuhikshira, Apamargakshara and Haridra powder.
2. To Sterilized and physiochemical analysis of the Ksharaplotata.
3. To established a new dressing material i.e. standard Ksharaplotata for infected wounds.

Preparation of Ksharaplotata
Preparation of Ksharaplotata was carried out at Government Ayurved College, Dept.of Shalya Tantra, Nanded, Maharashtra. Material required for preparation of Ksharaplotata is mentioned below.
1. Snuhikshira (Euphorbia nerifolia)
2. Apamarg Kshara (Achyranthus aspera)
3. Haridra powder (Curcuma longa)
4. Single layer Gauze piece
5. Wooden Ring
6. Cabinet
7. Polythene Bag (12 x 8 cm)

1. Snuhikshira [9]

It was collected by incising the stem of Snuhi plant. The secretary milk so obtained from incision should be stored in a pot. As the Snuhi Kshira has tendency to coagulate early, hence requires fresh Snuhi Kshira every time.

2. Apamarga Kshara [10]
Whole Apamarga plant was to be collected and cut in pieces, after drying the plant in shade. It should be burned in light fire. Ash was collected and dissolved in water, where by water quantity is 6 times to that of ash. The solution, so formed was filtered with the help of percolator. Residual ash was gained dissolved in 4 times of water and the same procedure was repeated at least twice in order to take away all the alkaline material from ash. Ultimately, the ash remains as a neutral residue, which should be thrown, the fluid was filtered several times (filtering once in a day) and finally, the Apamarga Kshara was obtained by evaporating the filtered solution.

Dry rhizomes of Haridra Plant were cut into pieces and powdered which was then sieved through a fine cloth. The fine powder thus obtained should be kept in jar for use.

4. Gauze Piece
According to Sushruta, gauze piece is similar to Plota. It was a piece of woven surgical wool. We have used the single layer gauze piece over a circular ring having diameter 23cm to achieve the preparation of Ksharaplotata.

5. Wooden ring
A structure of double ring was used to hold the gauze piece. With the help of this ring, gauze piece can be hold tightly so that coating of Snuhikshiria, Apamargakshara and Haridra should be made very easy and effective.

6. Cabinet [12]
It was used for drying the Ksharaplotata which was placed on wooden rings specially designed for this preparation. The prepared Ksharaplotata on wooden rings was kept in an air tight cabinet for drying, sterilization and storage purpose.

7. Polythene Bag
It was used for packing and preservation or to prevent the contamination during the handling of Ksharaplotata. The size of bag is 12x8cm airtight packing of bag was done after insertion of Ksharaplotata in it and that was labelled indicating the manufactures and precaution and quality of Ksharaplotata.

Method of Ksharaplotata preparation
Round gauze piece, 23cm in diameter is fixed in the doubled layered circular wooden ring. This gauze piece is made so tight that the coating can be done uniformly. Initially on 1st day Sunhikshira 50ml was applied with the help of small cotton swab over the gauze on its whole circumference. The hands should be gloved before smearing. The wet coated
gauze with rings should be placed inside cabinet. It is then dried for a day. On the 2nd day dried gauze is again smeared with Snuhikshira 50ml and followed by Apamargakshara 20gm with cotton swab; Let this be dried in a cabinet for a day. On the 3rd day dried gauze was smeared with Snuhikshira 50ml followed by Haridra powder 20gm which is then allowed to dry in the cabinet for a day. One coating of Snuhikshira required 50ml quantity, so total quantity of Snuhikshira in Ksharaplots is 150ml, Apamarag kshara is 20gm, Haridra powder is 20gm.

In this way a single coating of each Snuhikshira, Apamargakshara and Haridra powder were applied to the gauze and cut into 6cm x 6 cm Ksharaplots pieces, sealed in polythene packs. Ksharaplot should be placed in a cabinet under ultra-violet light for safety storage as well as sterilization.

### Precautions
1. Kshara coating done during minimal humidity atmosphere.
2. Kshara is highly hygroscopic so coating is avoided during cloudy weather.
3. During packing, Ksharaplot should be absolutely dry.
4. Sealing of polythene bags should be complete to check the entry of humidity, which will destroy the Kshara properties.

### Physico-Chemical Characteristic of Ksharaplot
90.80 gm of the prepared Ksharaplot was sent for analysis to Dept. of Botany, University of Pune, organoleptic characteristics like colour, odour, taste, loss on drying, pH, total ash value were assessed with standard procedure\(^{[13,14]}\) and the obtained results were as follows.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the test</th>
<th>Ksharaplot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Initial weight of Plain Gauze</td>
<td>4.50 gm</td>
</tr>
<tr>
<td>2.</td>
<td>Total Weight of coated Gauze</td>
<td>90.80 gm</td>
</tr>
<tr>
<td>3.</td>
<td>Weight of coated material</td>
<td>86.30 gm</td>
</tr>
<tr>
<td>4.</td>
<td>Colour</td>
<td>Yellowish –Brownish</td>
</tr>
<tr>
<td>5.</td>
<td>Odour</td>
<td>Fairly Aromatic</td>
</tr>
<tr>
<td>6.</td>
<td>Taste</td>
<td>Characteristic</td>
</tr>
<tr>
<td>7.</td>
<td>Thickness of coated Gauze</td>
<td>3 mm.</td>
</tr>
<tr>
<td>8.</td>
<td>Shape</td>
<td>Circular</td>
</tr>
<tr>
<td>9.</td>
<td>Size</td>
<td>23 cm x 23 cm</td>
</tr>
<tr>
<td>10.</td>
<td>Ph</td>
<td>9.68</td>
</tr>
<tr>
<td>11.</td>
<td>Moisture Content</td>
<td>48.21 %</td>
</tr>
<tr>
<td>12.</td>
<td>Total Ash Value (%w/w)</td>
<td>91.64</td>
</tr>
<tr>
<td>13.</td>
<td>Acid insoluble ash (%w/w)</td>
<td>0.73</td>
</tr>
<tr>
<td>14.</td>
<td>Water soluble ash (%w/w)</td>
<td>95.78</td>
</tr>
<tr>
<td>15.</td>
<td>Hydrocarbons</td>
<td>+</td>
</tr>
<tr>
<td>16.</td>
<td>Steroids</td>
<td>+</td>
</tr>
<tr>
<td>17.</td>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>18.</td>
<td>Glycosides</td>
<td>+</td>
</tr>
<tr>
<td>19.</td>
<td>Saponins</td>
<td>+</td>
</tr>
<tr>
<td>20.</td>
<td>Flavanoids</td>
<td>+</td>
</tr>
<tr>
<td>21.</td>
<td>Carbohydrates</td>
<td>+</td>
</tr>
<tr>
<td>22.</td>
<td>Proteins</td>
<td>+</td>
</tr>
<tr>
<td>23.</td>
<td>Phenols</td>
<td>+</td>
</tr>
<tr>
<td>24.</td>
<td>Essential oils</td>
<td>-</td>
</tr>
<tr>
<td>25.</td>
<td>Foreign matter</td>
<td>0.21 %</td>
</tr>
<tr>
<td>26.</td>
<td>Loss on drying</td>
<td>17.64 %</td>
</tr>
</tbody>
</table>
Table 2: Microbiological Analysis of Ksharaplotra Dressing

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Sample-1</th>
<th>Sample-2</th>
<th>Sample-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial count</td>
<td>2200CFU/gm</td>
<td>2600CFU/gm</td>
<td>2500CFU/gm</td>
</tr>
<tr>
<td>Moulds and Yeast</td>
<td>10CFU/gm</td>
<td>18CFU/gm</td>
<td>22CFU/gm</td>
</tr>
<tr>
<td>Total Enterobacteriacea</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>E.Coli</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Salmonella spp.</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Pseduomonas aeruginosa</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
</tbody>
</table>

Discussion

In preparation of Ksharaplotra a skill hand is very important as it requires uniform and equal thickness of Ksharaplotra for clinical application.\[15\]

As per table no.1, pH depicts the relative acidity or alkalinity of any sample. The pH of the sample was found to be 9.68 which clearly intimates about the alkaline nature of the Kshara.

Loss on drying is an important parameter to be assessed for the Kshara because it is a hygroscopic and hence loss on drying values denotes the limit to which the sample has absorbed moister. Lesser the value of loss on drying the stable the Kshara is considered. The value of loss on drying of Ksharaplotra was found to be 17.64%. The value suggests that Ksharaplotra sample is less hygroscopic and maximum stable.

The ash value denotes the amount of inorganic material present in the given sample. Ash value should be higher indicates. The lower value denotes some amount of organic matter was present in the sample but 91.64% of present sample ash value denotes good quality of Ksharaplotra. The value obtained for acid insoluble ash for Ksharaplotra is 0.73%. Acid insoluble ash indicates the ash obtained from the matter which is not soluble in water for e.g. silica. This value should be less for a standard product and hence it can be said that Ksharaplotra is an utmost product. Water soluble extractive value for Ksharaplotra was found to be 95.78 %. As per table no.2, Microbiological analysis of Ksharaplotra dressing found that no or very low levels of bacterial contamination and demonstrated some very promising results in support of using Ksharaplotra dressing in clinical practice. From this reading it is said that Ksharaplotra is standard dressing material.

CONCLUSION

From this study it was proved that the method of preparation of Ksharaplotra explained for present study holds good even for today's era.

The concept of Ksharaplotra preparation and its applied application will open new research path to promote wound healing with herbomineral remedies in a modern surgical practice.

It could be concluded that pharmaceutical processing imparts specific qualities to a formulation which helps in the fortification of the clinical efficacy. The pH of the Ksharaplotra was obtained 9.68 which is alkaline and it was clear that it retained the basic properties of Kshara which works as Chedana, Bhedana, Lekhana, Patana, Krimighna, Ropana, Tridoshaghna and other properties. Ksharaplotra dressing is free from bacterial contamination. Thus it can be stated that this can be taken as the standard procedure of preparation of Ksharaplotra used for the purpose of Vrana Shodhana and Ropana in Dushta Vrana as an utmost dressing material.

Photographs

Preparation of Ksharaplotra

Figure 1. Snuhikshira

Figure 2. Apamargakshara
Figure 3. Haridra

Figure 4. Circular Ring

Figure 5. Open Circular Ring

Figure 6. Plota (Gauze)

Figure 7. Cabinet

Figure 8. Coating of Snuhikishira

Figure 9. 1st Complete Coating of

Figure 10. Drying of Plota in Cabinet Snuhikishira
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*Address for correspondence
Dr Anantkumar V. Shekokar
Ph.D scholar,
Dept. of Shalyatantra
Govt. Ayurved College, Nanded
Ph No. 9860376534
Email: dranantkumarshekokar@gmail.com

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