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Research Article

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

**Anantkumar V. Shekokar[1]*, Vijay P.Ukhalkar[2]**

*[1]Ph.D Scholar, [2]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.

*Ksharaplota* (medicated gauze) is an innovative and newer concept used for management of Infected and chronic Wounds and ulcers. This *Ksharaplota* 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 *Ksharaplota* was prepared similarly with basic concept of *Ksharsutra* preparation**.** The Aim of this study was to formulate *Ksharaplota* dressing and to do the physico-chemical analysis of the *Ksharaplota*. The proved that pharmaceutical processing of the raw drugs imparts characteristic property to the formulation were evident by the physicochemical analysis of the *Ksharaplota*. The method of formulation of *Ksharaplota* holds good even for today's era and can be considered as standard protocol for *Vrana Shodhana* and *Ropana* in *Dushta Vrana Chikitsa*.

**KEYWORDS:** *Ksharaplota*, 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 *Vranastrava* (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], *Upayantra* (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 *Doshas.*[6] 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 *Kshapana* 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. *Ksharaplota* was formulated similarly with basic concept of *Ksharsutra* preparation. Preparation of *Ksharaplota,* was done with the coatings of *Snuhikshira, Apamargakshara* and *Haridra*. All these three drugs works as *Vrana Shodhana* and *Vrana Ropana.*[8] *Ksharaplota* was used for debridement or to remove unhealthy tissue and enhances formation of healthy granulation tissue so that normal epithelilization occurs earlier.

**AIMS AND OBJECTIVES**

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

**Preparation of *Ksharaplota***

Preparation of *Ksharaplota* was carried out at Government Ayurved College, Dept.of Shalya Tantra, Nanded, Maharastra. Material required for preparation of *Ksharaplota* 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.

**3. *Haridra* [11]**

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 *Ksharaplota.*

**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 *Sunhikshiria, Apamargakshara* and *Haridra* should be made very easy and effective.

**6. Cabinet [12]**

It was used for drying the *Ksharaplota* which was placed on wooden rings specially designed for this preparation. The prepared *Ksharaplota* 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 *Ksharaplota*. The size of bag is 12x8cm airtight packing of bag was done after insertion of *Ksharaplota* in it and that was labelled indicating the manufactures and precaution and quality of *Ksharaplota*.

**Method of *Ksharaplota* 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 *Ksharaplota* 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 *Ksharaplota* pieces, sealed in polythene packs. *Ksharaplota* 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, *Ksharaplota* 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 *Ksharaplota***

90.80 gm of the prepared *Ksharaplota* 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 1: Physico-Chemical Characteristic of *Ksharaplota***

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

**Table 2: Microbiological Analysis of *Ksharaplota* Dressing**

| Pathogens | Sample- 1 | Sample-2 | Sample-3 |
|---|---|---|---|
| **Bacterial count** | 2200CFU/gm | 2600CFU/gm | 2500CFU/gm |
| **Moulds and Yeast** | 10CFU/gm | 18CFU/gm | 22CFU/gm |
| **Total Enterobacteriacea** | Absent | Absent | Absent |
| **E.Coli** | Absent | Absent | Absent |
| **Salmonella spp.** | Absent | Absent | Absent |
| **Pseduomonas aeruginosa** | Absent | Absent | Absent |
| **Staphylococcus aureus** | Absent | Absent | Absent |

## Discussion

In preparation of *Ksharaplota* a skill hand is very important as it requires uniform and equal thickness of *Ksharaplota* 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 *Ksharaplota* was found to be 17.64%. The value suggests that *Ksharaplota* 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 *Ksharaplota*. The value obtained for acid insoluble ash for *Ksharaplota* is 0.73%. Acid insoluble ash indicates about 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 *Ksharaplota* is an utmost product. Water soluble extractive value for *Ksharaplota* was found to be 95.78 %. As per table no.2, Microbiological analysis of *Ksharaplota* dressing found that no or very low levels of bacterial contamination and demonstrated some very promising results in support of using *Ksharaplota* dressing in clinical practice. From this reading it is said that *Ksharaplota* is standard dressing material.

## CONCLUSION

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

The concept of *Ksharaplota* 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 *Ksharaplota* 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. *Ksharaplota* dressing is free from bacterial contamination. Thus it can be stated that this can be taken as the standard procedure of preparation of *Ksharaplota* used for the purpose of *Vrana Shodhana* and *Ropana* in *Dushta Vrana* as an utmost dressing material.

## Photographs

### Preparation of *Ksharaplota*

**Figure 1. *Snuhikshira***

**Figure 2. *Apamargakshara***

**Figure 3. *Haridra***

**Figure 4. Circular Ring**

**Figure 5. Open Circular Ring Figure**

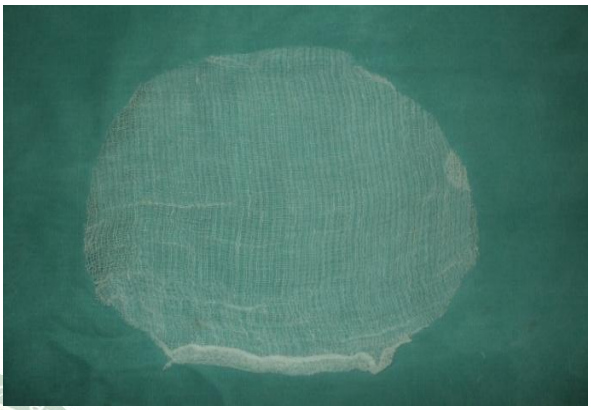

**Figure 6. Plota ( Gauze)**

**Figure 7. Cabinet**

**Figure 8. Coating of Snuhikishira**

**Figure 9. 1st Complete Coating of**

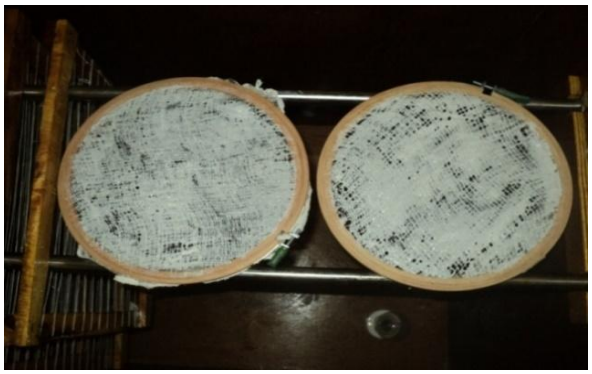

**Figure 10. Drying of Plota in Cabinet Snuhikishira**

**Figure 11. Coating of *Apamargakshara***

**Figure 12. 1st Complete Coating of *Apamargakshara***

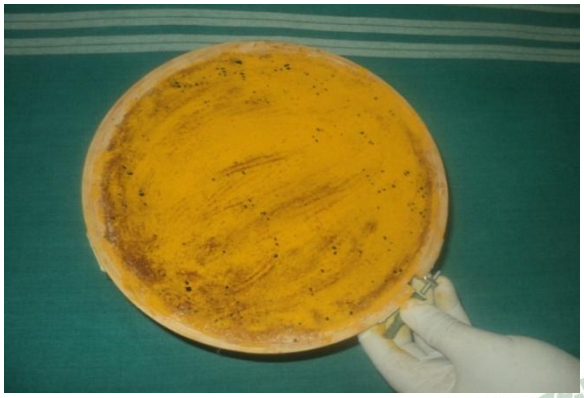

**Figure 13. 1st Complete Coating of *Haridra***

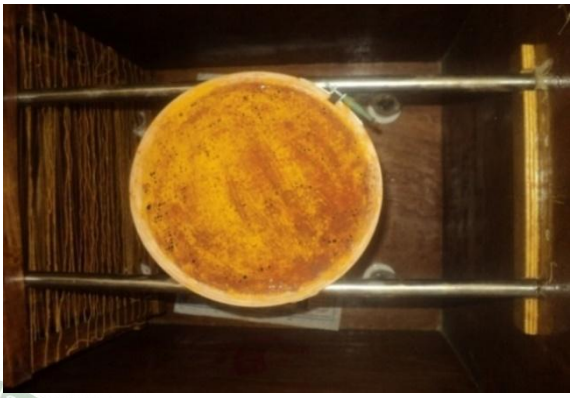

**Figure 14. Storage of Prepared Ksharaplota In Cabinet**

**Figure 15. Sterilization of Prepared Ksharaplota in Cabinet Figure**


**16. Packed Ksharaplota**

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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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