

**Role of *kshara* (an alkali preparation) in wound healing with special reference to cervical erosion**

Pragati Saxena<sup>1\*</sup>, Anuradha Roy<sup>1</sup> and Binay Sen<sup>2</sup>

<sup>1</sup>Department of Prasuti Tantra, Faculty of Ayurveda, IMS, BHU, Varanasi

<sup>2</sup>Department of Dravyaguna, Faculty of Ayurveda, IMS, BHU, Varanasi

**Abstract**

Cervical erosion is caused by the replacement of the stratified squamous epithelium of the ectocervix with the endocervical columnar epithelium. In Ayurvedic classics, it can be co-related to *garbhashayagrivagatavrana*. Its management mainly includes destruction of overgrown epithelium by different techniques has its own limitations and side effects. Further observing its prevalence there is a requirement for a treatment modality which is more efficient and cost-effective. *Kshara* which possesses *lekhana* (scrapping), *vrana-shodhana* (wound cleansing), and *ropana* (wound healing) properties as described in Ayurveda, provides a scientific background of the therapeutic application in the management. Different review works revealed the potential use of *kshara* on wound healing due to its alkalinity which maintain the body pH within the normal range and thus maintains different cellular and extracellular function. Therefore, *kshara* is found to be an important preparation that has been investigated for its gynecological uses by different scholars.

**Keywords-** *Kshara*, Alkali, Wound healing, Cervical erosion

\*Corresponding author Email: [pragatisaxena111@gmail.com](mailto:pragatisaxena111@gmail.com)

## Introduction

Cervical erosion is the most common clinical finding of female patients found in gynecological OPD. The worldwide prevalence of cervical erosion ranges between 17-50% worldwide.[1] In Ayurvedic literature, there is no direct description of cervical erosion, but the reference of *yonivra* [2] (ulcers of the vagina) and *prajananavrana* [3] are available. On the basis of sign and symptoms these references could be correlated to cervical erosion to some extent. The term *vrana* (wound) is derived from the verb-root '*vrana* *travichurnane*', which means a phenomenon of complex causing destruction, discontinuation, and rupture of tissue of a particular area of the body leading to discoloration.[4] Cervical erosion is a condition in which cells which are present on the inside of the cervical canal (glandular cells or columnar epithelium) are extend to outside of the vaginal portion of the cervix. These overgrown cells are redder and more sensitive than the cells typically on the outside. That is why they may cause symptoms like inter-menstrual bleeding, lower abdominal pain, lowbackache, discharges [5]. Though the conventional system of medicine has a therapeutic role in cervical erosion but its management remains challenging in terms of cure, non-recurrence and sequelae of the interventions. The management is mainly based on thermal cauterization or cryosurgery which has some limitations and side effects such as cervical stenosis, accidental burns, excessive copious discharge per vagina or they are too expensive such as laser therapy [6]. Therefore, there is a basic need of an easily available therapeutic intervention which is cost-effective, safe and free from complications [7]. *Kshara* (alkali) is a caustic, alkaline in nature obtained from ashes of medicinal plants. *Kshara* therapy which is applied locally is known as *pratisarniya kshara*. It is considered as a milder procedure as compared to surgery and thermal cautery. It is the superior most among the sharp and subsidiary instruments because of its excision, incision, and scrapping properties. *Vranashodhana* and *vrana* *ropana* properties of *kshara* are mentioned in classical ayurvedic texts and advocated in *vrana* [8] but it is not widely practiced and hence there is a lack of scientific evidence of its safety and efficacy.

## Wound healing (*Vranaropana*)

Based on different stages and characteristics features, wound healing process is described in Ayurveda (Table no.1) as well as in modern medicine (Table no.2) [9]

**Table no. 1: Different stages of *vrana* *ropana***

Characteristic features	<i>Dushtavrana</i> (hemostasis)	<i>Shuddhavrana</i> (inflammatory response)	<i>Roohymanavrana</i> / healing wound (remodelling phase)	<i>Roodhavrana</i> (healed phase)-
<b><i>Vedana</i> (pain)</b>	Painful	Painless	-	Painless
<b><i>Shopha</i> (swelling)</b>	-	-	-	No swelling due to inflammatory process
<b><i>Srava</i> (discharges)</b>	Different types of discharges	No discharges	No discharges	-
<b><i>Gandha</i> (smell)</b>	Bad	-	-	-
<b><i>Akrti</i> (granulation tissue)</b>	-	Surface is filled with small eruptions (granulation tissue)	Surface filled with healthy eruptions (healthy granulation tissue)	No eruptions, the level of scar is even
<b><i>Varna</i> (colour)</b>	Various colours	Bluish edges	Greyish blue margins ( <i>kapota varna</i> )	Colour is that of skin

**Table no. 2: Different stages of wound healing**

Characteristics	Inflammatory phase (stage 1)	Proliferative Phase (stage 2)	Maturation phase (stage 3)
<b>Time taken</b>	2-5 days	5days to 3 weeks	3 weeks to 2 years
<b>Haemostasis</b>	Haemostasis occurs platelet start to clot leading to formation of a scab	-	-
<b>Inflammation</b>	occur by opening of the blood supply and hence the cleansing of wound	-	-
<b>Granulation tissue</b>	-	Forms to fill in the defect	-
<b>Wound edges</b>	-	Starts to contract	-
<b>Epithelialisation</b>	-	Occurs	-
<b>Formation of scar</b>	-	-	Occurs by formation of collagen which increases the tensile strength of wound

**Objective**

To evaluate the efficacy of *palashaksharain* wound healing w.s.r to cervical erosion.

**Material and Methods**

Total 10 patients with cervical erosion, have been selected randomly from Prasuti Tantra OPD, S.S. Hospital, BHU, Varanasi. After detailed history, complete examination and investigations. Patients were treated with *Palash kshara* application in a single sitting. Study was assessed after completion of follow-up period.

**Inclusion Criteria**

(i) Married women, (ii) Reproductive Age between 18-45 years, (iii) Detection of cervical erosion (per speculum examination), (iv) Associated with any of the following symptoms- abnormal vaginal discharge, low backache, pelvic pain, inter-menstrual bleeding, post coital bleeding, dyspareunia.

**Exclusion Criteria-**

(i) Positive history of venereal diseases (HIV, HPV, Syphilis, genital herpes etc.), (ii) Cervical polyps, (iii) Pregnant women, (iv) Patient having organic pathology of uterus & adenexa like cervical carcinoma or any malignant growth, (v) Patients not giving consent to participation in the study.

**Consent**

An informed written consent to be taken from the patient.

**The assessment will be done under the following parameters based on a special scoring pattern****Subjective criteria**

(i) *Yonisrava* (abnormal vaginal discharges), (ii) *Maithuna paschatraktsrava* (post-coital bleeding), (iii) *Katishula* (low backache), (iv) *Udarashula* (pelvic pain), (v) *Antara-rituraktsrava* (intermenstrual bleeding), (vi) *Maithuna asahiushnuta* (dyspareunia)

**Objective Criteria**

- Area of erosion:** extent of erosion will be measured by a modified compass. Cervix will be measured in 6-8 different angles and measurements will be marked on a graph paper having 100 divisions in one square inch and shape and size of cervix will be drawn. % area will be calculated as no. of squares covered by erosion divided by no. of squares covered by cervix multiplied by 100.
- Appearance of erosion:** on the basis of colour, tissue and discharge present on cervix.
- Cervical motion tenderness**

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4. **Based on improvement in wound healing parameters:** *vedana*(pain), *daha*(burning sensation), *kandu* (itching), *srava*(discharge), *gandha*(smell), *akruti*(floor and granulation tissue).
5. **Status of investigative parameters:** Changes in cervical and vaginal pH, HVS-culture and sensitivity, PAP smear test.
6. A special scoring pattern was applied in symptoms and associated
7. Complaints

### Management

*Kshara karmawithpalashakshara* once in early morning in post menstrual period.

**Table no. 3- Plan of study**

Drug	Dose	Route	Time of administration	Total duration of study including follow ups	Follow ups		
					Without medication		
					1 <sup>st</sup> follow up (14 <sup>th</sup> day)	2 <sup>nd</sup> follow up (21 <sup>st</sup> day)	3 <sup>rd</sup> follow up (28 <sup>th</sup> day)
<b>Palashakshara application</b>	As per requirement (depending on the area of erosion)	Per vaginal	<b>Post menstruation-</b> Early morning once a day on Day 7 <sup>th</sup>	28 days			

**Table no. 4- Timeline of study**

Date	Application of the drug and follow ups
Registration	Day 0
Drug application	Day 7 <sup>th</sup>
FU1	Day 14 <sup>th</sup>
FU2	Day 21 <sup>st</sup>
FU3	Day 28 <sup>th</sup>

### Clinical assessment

#### Subjective criteria

1. **Yonisrava (abnormal vaginal discharges):** it was significantly reduced because *kshara* has *vata* and *kaphanashakguna*.
2. **Maithuna paschatraktsrava (post-coital bleeding):** due to healing of the erosion by *palashakshara*, present around the os.
3. **Katishula (low backache):** relief in *katishula* was found probably due to the *ushnatikshnaguna* of *kshara* and analgesic property of *palasha*.
4. **Udarashula (pelvic pain):** significant relief in *udarashula* was there due to the *ushnatikshnaguna* of *kshara* and analgesic property of *palasha* or due to the *sothahara* effect of *kshara* by which the congestion in the nearby organs is released.
5. **Antara-rituraktsrava (intermenstrual bleeding):** *palasha* is having *yonidosha* properties helps in regulating menstrual cycle.
6. **Maithuna asahiushnuta (dyspareunia):** in most of cases there was relief in dyspareunia due to anti-inflammatory and analgesic property of *palasha*.

#### Objective Criteria

1. **Area of erosion:** It was found there is significant decrease in area of erosion or even complete healing of erosion after the application of *kshara* in most of cases.
2. **Cervical motion tenderness:** Marked relieve in cervical motion tenderness was seen.

3. **Wound healing property:** all the parameters were found to be fulfilled and healthy granulation tissue was there.
4. **Status of investigative parameters:** assessment was done before and after the treatment. Changes in cervical and vaginal pH- the optimum pH of vagina was reached in most of cases and it was found to have a significant improvement in reports.

Total effect of treatment

Total effect of treatment	% relieve in parameters	No. of patients
Completely cured	50-100%	7
Mild to moderate improvement	1-50%	2
No relief	0-1%	1

## Result

Out the 10 patients, 07 patients are completely cured and 02 patients got mild to moderate improvement and in 01 patient there was no change in the condition of cervical erosion and symptoms.

## Mode of action

The principle of wound management is based on the drugs that possess *vrana-shodhana*, *vrana-ropana*, *lekhana*, *krimighna* properties. *Kshara* therapy is said to be superior to any other surgical or para-surgical measures and has the properties and action which are therapeutically useful for the management of *vrana* like *tridoshaghna*, *pachana* (digestive), *lekhana* (scrapping), *ksharana* (cauterizing), *shodhana* (cleansing), *ropana* (healing), *shoshana* (absorption), *stambhana* (styptic), *krimighna* (antimicrobial), *kaphaghna* (alleviates unctuousness), and *mamsadhatuksharana* (elimination of dead tissue) [10].

Further, it is observed that acidic pH results in diminished random migration and chemotaxis of neutrophils, reduction in phagocytosis and bactericidal capacity of polymorphonuclear leukocytes, and inhibition of lymphocyte activity. Acidic pH predominates at inflammatory loci and other sites of immune activity. It is also evident from different studies that the enzymatic, healing and repairing, immunological functions are best in an alkaline environment [11]. It is seen that changes in pH affect wound healing [12]. The bioactivity of *kshara* may be attributed to its high alkalinity, which is mainly due to its alkali elements such as potassium, sodium, calcium, carbonate, and chloride [13].

*Kshara* (alkali) have a high pH. The ash of certain *kshara* was found to be rich in potassium ( $K^+$ ), sodium ( $Na^+$ ), calcium, iron, chloride, and many alkaline minerals. These bio-antacids have been found to inhibit the growth of microorganisms which help in wound healing as well as cleansing the body channels. The bioactivity of *kshara* may be attributed to its high alkalinity, which is mainly due to its alkali elements such as potassium, sodium, calcium, carbonate, and chloride. *Kshara* is widely used by many ethnic groups of Northeast India in traditional cuisine, in case of artificial poisoning, abdominal lump, anorexia, common cold etc as an internal use. It is also locally used on wounds, cuts and piles for healing and haemostasis. The internal and external use of *kshara* is directly influencing the pH of internal and external environment. [4]

## Discussion

Wound or *vrana* is a complex process characterized by a break in the structural integrity of the skin or tissues often associated with destruction, discontinuation, and rupture of tissue structure along with disruption in the function. Cervical erosion is said to occur when a zone of columnar epithelium exists on the outer portion of the cervix replacing the normal stratified squamous epithelium present on the external os. The cardinal symptoms of the disease are excessive vaginal discharge associated with contact bleeding or post-coital bleeding, dyspareunia, low backache, pelvic pain, burning micturition, etc., which bothers the patient and affects their daily lifestyle. On per speculum examination, there is a bright red area seen in the ecto-cervix which is surrounding and extending beyond the external-os. The outer edge of the reddened area is clearly demarcated. In Ayurvedic texts, though no direct description is found but a similar condition of *yonivrana* and *prajananavrana* may be correlated with *garbhashayagrivagatavrana* (cervical erosion) based on etiology, site of involvement, sign, and symptoms such as *yonisrava* (mucopurulent vaginal discharge), *maithuna paschatraktasrav* (contact bleeding or postcoital bleeding), *maithuna asahiushnuta* (dyspareunia), *katishula* (low backache), *udarashula* (pelvic pain), etc.



*Dushta* and *shuddha* both are representing the inflammatory phase, *ruhyamana* is the proliferative phase and *rudha* is the maturation phase of wound healing. The time duration designated for specific phase are not found in Ayurveda. In modern medicine it is often managed through thermal cautery, cryosurgery and laser therapy. But there are certain limitations in terms of patient compliance (disease recurrence), side effects and cost, which leave many challenges in the management and permanent cure. In Ayurvedic texts, the treatment is mainly based on main symptoms of the disease in particular and of *vranain* general. The principle of wound management is based on the drugs that possess *vrana-shodhana*, *vrana-ropana*, *lekhana*, *krimighna* properties.<sup>1</sup> *Kshar* therapy is said to be superior to any other surgical or para-surgical measures and has the properties and action which are therapeutically useful for the management of *vrana* like *tridoshaghna*, *pachana* (digestive), *lekhana* (scrapping), *ksharana* (cauterizing), *shodhana* (cleansing), *ropana* (healing), *shoshana* (absorption), *stambhana* (styptic), *krimighna* (anti-microbial), *kaphaghna* (alleviates unctuousness), and *mamsadhatuksharana* (elimination of dead tissue). Further, the relapsing of the wound is also minimal.

Considering the general principle of wound management, cervical erosion, could be treated effectively with the application of *kshara*. *Kshara* is indicated in wound as an external application in the management of *vrana*. Different drugs of plant origin are advocated for the preparation of *kshara*, of which *palasha* is important to possess *vrana-shodhaka*, *vrana-ropaka* and *yonidoshahara* properties. Certain phyto-constituents present in *B. Monosperma* were also found to have an additive effect on wound healing. *Palash kshara* is high alkaline with pH 11.20, due to the presence of alkaline minerals like sodium, potassium, calcium, carbonate, phosphate, etc are also responsible for wound healing. *Palashakshara* is an excellent debridement agent that causes destruction of superficial tissue. Thus, sloughs off the unhealthy tissue from the wound. The anti-inflammatory, anti-microbial, antifungal properties further add to the healing of the wound.

The alkaline pH is favorable for granulation and tissue replacement at the site of the wound. Even many fungi and bacteria are not capable to survive at a pH above 8. The *kshara* being alkaline in nature, will prevent the proliferation of microbes at the site of application. Body pH is an indicator of health and disease. Most of the researchers appreciated an alkaline environment to be good for inflammatory cascades, wound healing, immunity, and even cancer. The inhibition of fungi and bacteria, enhancing cell proliferation, granulation, and slough tissue replacement is well observed in alkaline pH, which favours wound healing.

*Lekhana* (scrapping), *mamsadhatuksharana* (sloughing of dead tissue), *ksharana* (cauterizing), *krimighna* (antimicrobial), *shodhana* (cleansing), *ropana* (healing) actions of *kshara* could be well appreciated for better intervention in the healing and curing of cervical erosion. Hence, there was significant relief in the assessment parameters of cervical erosion.

## Conclusion

In the present study, the cervical erosion the *sthanika chikitsa* of *kshara karma* with *palasha kshara* have effective management in treating cervical erosion.

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