Int. J. Ayur. Pharma Research, 2014; 2(3): 86-93 **ISSN: 2322 - 0910**

International Journal of Ayurveda and Pharma Research

Research Article

ROLE OF *PALASH* (BUTEA MONOSPERMA) *KSHARA* IN THE MANAGEMENT OF *DUSTA VRANA* (CHRONIC ULCERS) WITH SPECIAL REFERENCE TO INFECTED WOUND

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ABSTRACT

Wound infection is one of the most important factors that cause delayed wound healing. Wound healing occurs as a fundamental response to tissue injury. Several natural products have been shown to accelerate the healing process. *Dusta vranas* (chronic ulcers) are a frequently encountered problem in present era produced commonly as a complication of trauma or pathological insult and it causes long term agony to the patient. The present study was undertaken to determine the efficacy of topical administration of *Kshara* of stem bark of *Palash* (*Butea monosperma* (Lam.) Taub.) on *Dusta vrana* with special reference to infected wound. These drugs possess *Vrana shodhana* and *Ropana* properties. It was used topically in chronic or infected wound once daily for 14 days or till the wound bed is prepared whichever is earlier. It is a clinical study wherein 30 patients were selected and divided in three equal groups of ten patients each. It was found to reduce pain, discharge and slough tissue. It also helped in improved floor and granulation tissue formation that is to prepare wound bed as compared to control group. Hence it can be speculated that *Palash kshara* possess sufficient efficacy in *Vrana shodhana* (wound debridement) and *Vrana ropana* without producing any adverse affects.

KEYWORDS: Butea monosperma, *Dusta vranas, Palash kshara,* Wound infection.

INTRODUCTION

Wounds are inescapable events of life which arise due to physical injury, chemical injury or microbial infections. It is a breach in the normal tissue continuum, resulting in a variety of cellular and molecular sequelae. Wounds may develop the deposition and multiplication of bacteria in tissue with an associated host reaction wherein they are called as infected wounds. In *Sushruta Samhita* a lot of description is available regarding the wound and its management under the heading of *Vrana (Su.Su. 21/40)*[1]. If we ignore simple *Vrana* or do not manage it properly, then it can be converted into *Dusta Vrana (Su.Su. 22/7).* In management of *Vrana*, *Acharya Sushruta* has explained *Shasti-Upakrama* (the sixty types of wound management). *Vrana Shodhana* (wound bed preparation) and *Vrana Ropana* (wound healing) are the two main steps of wound management. *Kshara karma* has strong *Shodhana* and *Lekhana* property so it could be a better option for *Vrana Shodhana*. The main aim of *Vrana Shodhana* is to remove the dead tissue, keeping the wound bed free from unwanted and harmful material thus minimise the reactionary inflammation. *Palash* (Butea monosperma)[2] is one of the drug which give *Kshara* in sufficient quantity. At present time it has been found in studies that *Palash* has beneficial affect on wound healing in experimental and animal models (Suguna et al 2005, Muralidhar et al)[3].

A systematic scientific study on the action of such drugs in Wound Bed Preparation[4] enhancing the formation of granulation tissue, effect on epithelisation and wound contraction based on researches is need of present era. Considering these facts the present work "Role of *Palash* (Butea monosperma) *Kshara* in the Management of *Dusta Vrana* with special reference to Infected Wound" initiated to explore the new Ayurvedic procedures on local administration in infected/ chronic non healing

wound. Availability in abundance, standardised methods of extraction and application (with *Kshara pitchu*), established phytopharmacological and phytochemical analysis in favour of its anti-inflammatory agent[5], healing power and curative properties, recognized safety of other parts of B. Monosperma in human models and beneficial affects of alcoholic bark extract in animal model prompted us to study Role of *Palash Kshara* in the management of *Dusta Vrana.*

MATERIAL & METHODS

The present study was planned to evaluate the Effect of *Palash* (Butea monosperma) *Kshara* for their possible wound debridement and healing effect on *Dushta vrana* (Infected wound) exclusively on clinical parameters.

Source of the drug

For preparation of *Kshara*, Stem bark of *Palash* were collected from peripheral area of Varanasi (*Barkachha*).

Methods of the study

Selection of cases

All patients with Infected Wound were registered from Shalya OPD/IPD of Sir Sundarlal Hospital IMS, BHU, Varanasi. Random selection was made irrespective of group, age, sex, religion, socio-economic status, inhabitancy, occupation, diet, addiction, type, site, onset, duration of wound, sign-symptom, including infected surgical wound were also registered. However, malignant, tubercular, diabetic ulcers were excluded from the study.

Grouping of cases

The present study was carried out clinically. 30 patients were selected with infected wound, diagnosed after detail clinical history and investigatory finding as per designed proforma.

They were divided into three groups.

(i) Group a: 10 patients were registered for *Palash Kshara* application.

(ii) Group b: 10 patients were registered for Ethenolic extract of stem bark of *Palash* application.

(iii) Group c: Control group - 10 patients were registered for application of normal saline.

Patients were cleaned & dressed daily & all the criteria were assessed on day 1, 3, 7, 14 and so on till the wound healed as per designed proforma.

Inclusion criteria - Moderately Infected wound

Exclusion criteria - Malignant ulcer, Diabetic ulcer, Tubercular ulcer, Syphilitic ulcer, Leprotic ulcer, Actinomyecetes, HIV (+) patient, Anemic patient, CRF.

Assessment criteria

Clinical features – Pain, Discharge, Slough tissue, Measurement of wound (Linear measurement – Length, Width, Depth, & Area, Sequential Photography, Unit Healing Time.

Criteria for assessing clinical feature

A. Pain rating scales - Visual analogue scale (VAS)[6]

The prototype as below was printed and folded at the dotted line such that the line was superimposed on the number scale (1-10). Patients were asked to mark pain severity while the printed scoring on the reverse was not shown to him/her.

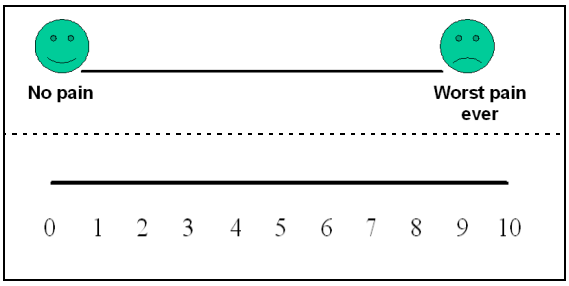


Figure 1: Visual analogue scale (VAS)

B. Discharge Scores

No discharge	:	0
Serous discharge	:	1
Seropurulent discharge	:	2
Purulent discharge	:	3

C. Slough tissue Scores

No slough tissue	:	0
Up to 30% area covered with slough	:	1
31 to 60% area covered with slough	:	2
More than 60% area covered with slough	:	3

Method of Preparation of *Palash kshara*

Stem bark of *Palash* were taken from healthy plant, and then kept in shadow for drying. After proper drying in shadow it was burnt in a windless place. When the fire was extinguished the ash was collected and

separated. Ashes were mixed in water (six times in volume) and the precipitate was allowed to settle down. Finally the supernatant fluid was collected in a separate vessel of stainless steel. The residual ashes were again mixed with four times of water and the same procedure was repeated at least twice in order to take away all the alkaline material from ashes. Ultimately the ashes remain as a neutral residue which should be thrown. The collected fluid was now filtered drop by drop through a double Whitman Filter Paper into a clean glass bottle. Finally, *Kshara* was a phytochemical substance obtained from evaporation of filtered solution of ash prepared by incineration of *Palash*.

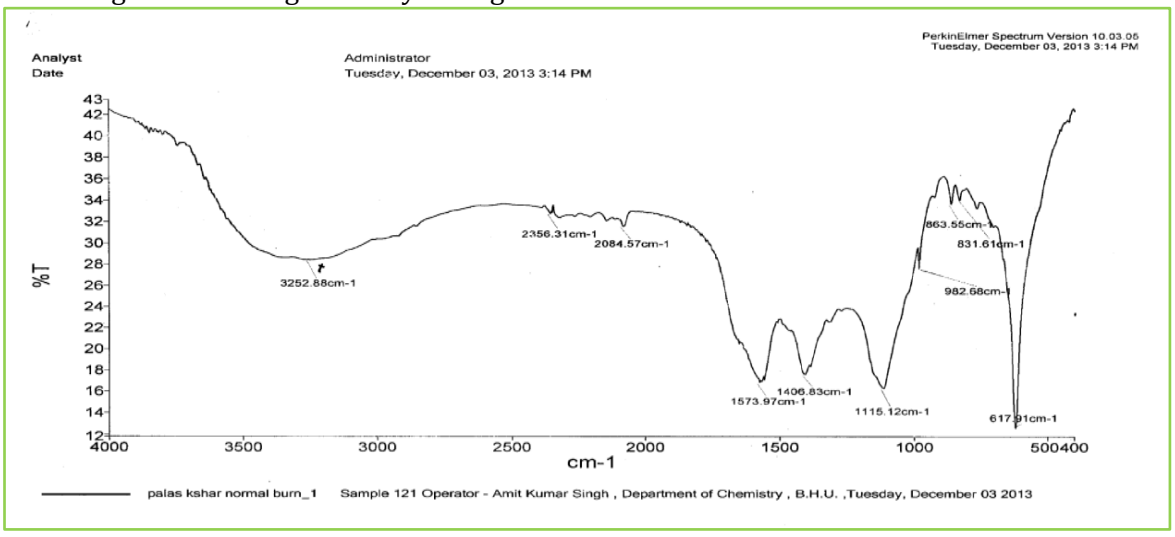
Application of Drug

After culture of the discharge of the *Dusta Vrana* (Chronic non healing / infected wound), the *Kshara* was used for cleaning of the wound and applied (as *Pichu* form) over wound. The dressing was changed daily. Surgical debridement was also done in cases of excessive and extensive sloughing and necrosis was present to remove the dead necrosed tissues. This procedure was repeated every day and the sequential change in the wound were recorded on day 1, 3, 7, 14 and so on till the wound healed completely.

Chemical analysis

Fourier transmission infrared spectroscopy

The main goal of IR spectroscopic analysis is to determine the chemical functional groups in the sample. It is the absorption measurement of different IR frequencies by a sample positioned in the path of an IR beam. To identify a component of certain compounds, they are exposed to high energy such as Infrared Radiation (IR). The reaction results to emission of energy showing the reactions of the molecules, which are automatically plotted to a graph by one of the programs embedded in spectroscopic instruments.



Graph 1: Fourier transmission infrared spectroscopy report of *Palash kshara*

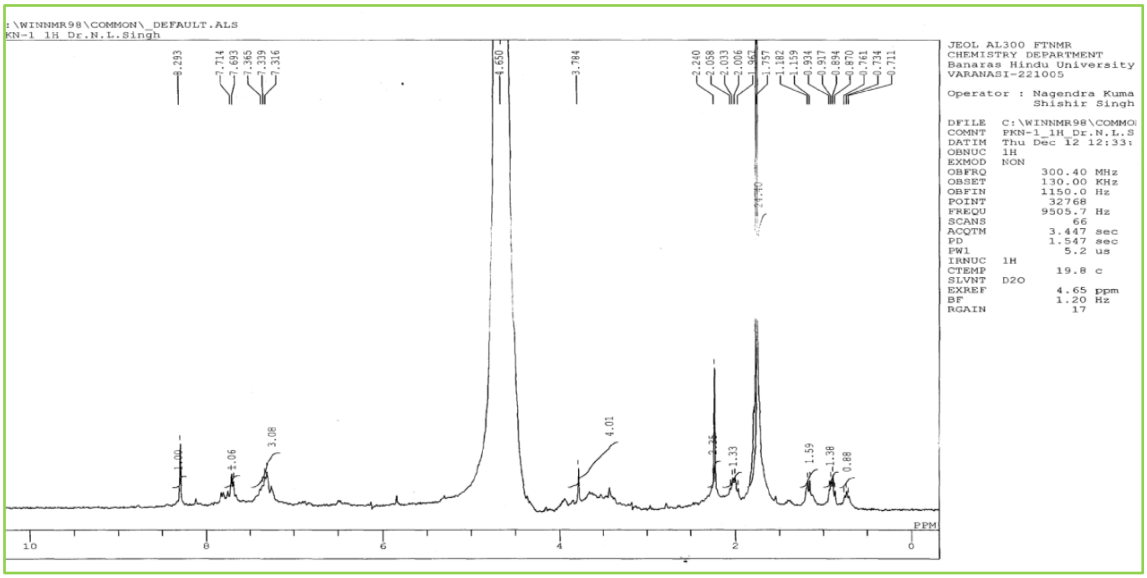
Major peaks were found at 1573.97, 1406.83, 1115.12 and 617.91 cm-1 which corresponds to C=C (aromatic compounds), N-H (primary amines), N-O (aliphatic and aromatic nitro compounds), C-X (trifluromethyl and chloroalkanes), C-O (alcohol, phenol, esters, ethers) and Iron.

Nuclear Magnetic Resonance (NMR) Spectroscopy

NMR allows characterization of a very small amount of sample (10mg), and does not destroy the sample (non-destructive technique). NMR spectra can provide vast information about a molecule's structure and can often be the only way to prove what the compound really is.

Principle - Any nucleus that has either an odd atomic number or an odd mass number has a nuclear spin that can be observed by an NMR spectrometer. The proton is the simplest odd numbered atomic nucleus (and also the most useful for organic characterization).

PROTON NMR

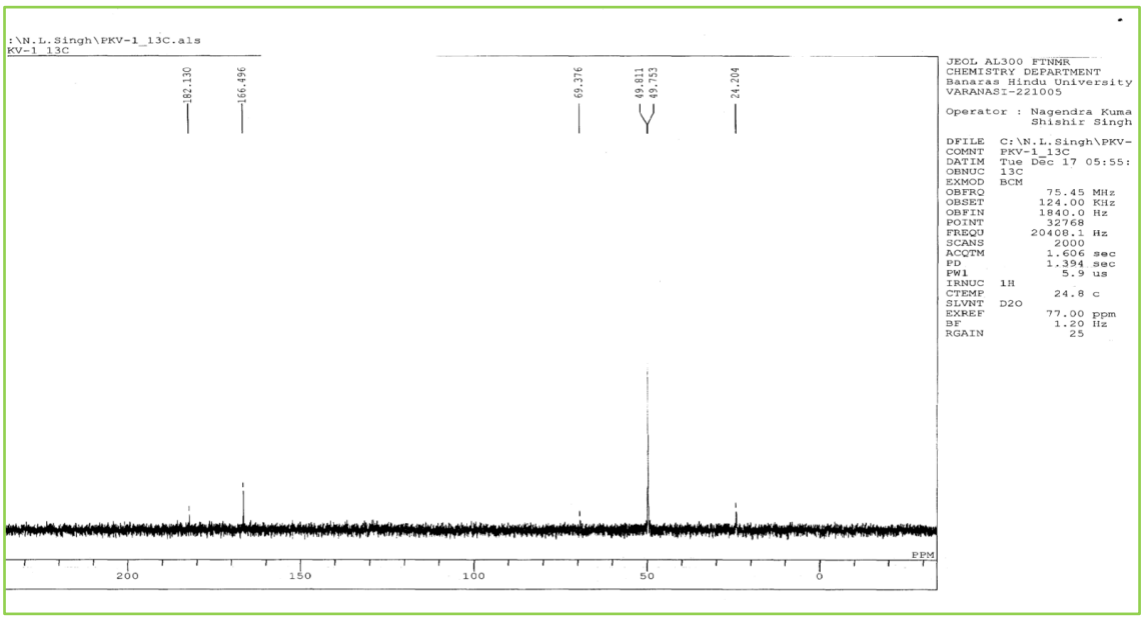


Graph 2: Proton nmr report of Palash kshara

Three major peaks found in proton NMR at 1.757, 4.650 and 2.240 ppm.

- 1.757 ppm corresponds to allylic and amino groups.
- 4.650 ppm corresponds to phenolic and vinylic groups.
- 2.240 ppm corresponds to acetylenic, bromide, iodides, acids, carbonyl compounds, hydroxylic and amino groups.

C-13 NMR-



Graph 3: C-13 NMR report of Palash kshara

Results for carbon NMR - Major peaks were found at – 49.811 and 49.753 which corresponds to R2CH2, R3CH, C-O, C-Cl, C-Br and C-N groups.

Peak at 166.496 ppm denotes ester, aldehyde, acid benzene groups.

OBSERVATION AND RESULTS

The present study out of 30 patients, maximum number i.e. 13 (43.33%) were from the age group of 41-60 years followed by > 60 years i.e.10 (33.33%). More number of patients were male i.e. 25 (83.33%), maximum number of patients were housewives and others i.e. 10

(33.33%) followed by farmers and businessmen. maximum 20 (66.66%) patients were from rural area. maximum no i.e. 9 (30 %) patients were of lower socio-economic status. Maximum number i.e. 26 (86.67%) patients were taking mixed diet. maximum i.e. 13 (43.30%) patients suffered multiple addictions, maximum number i.e. 18 (60.00%) were of *Nija Vrana* (ulcers due to systemic diseases). maximum number of patients with sudden onset were found which was 22 (73.33 %). maximum number of patients i.e. 22 (73.330%) had margin of the wound as regular. maximum number of patients with pale coloured wound floor were found which was 19 (63.33%) followed by necrosed which was 9 (30%). part of body found to be commonly involved with wounds was lower extremity i.e. 15 (50%), followed by scrotum and perianal region i.e. 9 (30%).

TOTAL RELIEF OF THERAPY

Table 1: Table showing relief percentage on the signs and symptoms of 30 patients of *Dushta Vrana*

S. No	Symptoms	Groups	Symptom Score			Relief % Diff/BT
			B T	AT	DIFF.	
1.	Pain	I	70	6	64	91.43
		II	72	19	53	73.61
		III	71	43	28	39.43
2.	Discharge	I	29	1.0	28	96.55
		II	30	8.6	21.4	71.33
		III	30	16	14.0	46.63
3.	Slough tissue	I	29	1.0	28	96.55
		II	30	10	20	66.66
		III	30	20	10	33.33
5.	Depth	I	29.9	0.57	29.33	98.09
		II	31.2	11.1	20.1	64.42
		III	30.5	25.8	4.7	15.40
6.	Surface area	I	273.76	118.5	155.26	56.89
		II	268.76	183.6	87.76	32.65
		III	286.94	282.0	4.94	1.720

According to the above table, the percentage of relief in pain symptom was 91.43%, 73.61%, 39.43 % in groups I, II & III respectively. The relief percentage in discharge symptom was 96.55%, 71.33%, 46.63% in groups I, II & III respectively. Percentage of relief in slough tissue of infected wound was 96.55%, 66.66% and 33.33% in groups I, II & III respectively. The percentage of reduction in depth of wound was 98.09%, 64.42% and 15.40% in groups I, II & III respectively. The percentage of reduction surface area of wound was 56.89%, 32.65% and 1.72% in groups I, II & III respectively. (Table 1)

DISCUSSION

1. Clinical study showed that *Palash kshara* was most significant among three groups in terms of reduction of pain (91.43% overall result), discharge (96.55% overall result), slough tissue (96.55% overall result), depth (98.09% overall result) and surface area (56.89%).
2. In this way, on the basis of obtained results and their interpretations, it is clear that *Palash kshara* is far superior for management of infected wound when compared with ethenolic extract of stem bark of *Palash* and normal saline
3. Palash possess properties like *Katu, Tikta* and *Kashaya rasa, Ushna veerya, Ruksha, Laghu guna* and *Katu vipaka* hence acts as *Vrana sodhana* i.e. (wound debridement).
4. It may produce burning sensation due to its *Ushna veerya*.
5. The drug reduces excessive exudates, and necrotic tissues. It also reduces local discharge and facilitates granulation tissue formation which is necessary for wound healing.
6. *Palash* has element predominantly of *Vata* and *Agni* property, hence these types of drugs have tendency to reduce exudates of wound, decrease oedema. (i.e. helps in *Vrana lekhana*).(Su Su 41/9)
7. *Palash* as such has significant wound healing properties like fast epithelization, increase

collagen deposition and hydroxyproline in granulation tissue, increase tensile strength of wound, antioxidant properties and antimicrobial activities[7].

8. All of which helps in faster healing of wounds. But its application appears to be most effective in a prepared wound bed, which essentially is provided by debridement.
9. *Kshara* as method of application for *Palash* reaps the benefit of both, as *Kshara* of *Palash* is a very effective debriding agent, it helps to prepared wound bed, resulting healing take place faster.

From this study debriding property of *Palash kshara* can be demonstrated. *Palash kshara* is very effective debriding agent as there was significant reduction in discharge and slough tissue of wound was observed during clinical study. Healing after debridement by *Palash kshara* can also be seen by significant reduction in surface area and faster unit healing time of wound as compared to other two drugs used for this study. By considering overall effect of therapy *Palash kshara* is effective debriding material as compared to its ethanolic extract of stem bark of *Palash* and normal saline.

CONCLUSION

In this way, on the basis of obtained results and their interpretations, it is clear that *Palash kshara* is far superior for management of infected wound when compared with ethenolic extract of stem bark of *Palash* and normal saline.

Limitations

1. Sample size was small.
2. Preparation and application on wounds, is difficult hence some modification in drug formulations should be studied such as gel, hydrogel, ointment, cream, foam, spray, mesh-gauze dressing and patch should be done so that patient can easily apply drug on infected wound.
3. Further study on *Palash kshara* should be done to compare its effect in different formulations with dressing agents like silver sulfadiazine, silver alginates.
4. Further study on *Palash kshara* should be done to see its effect on cytokines, hydroxyproline and collagen synthesis, wound contraction and tensile strength in wound healing.
5. Further study on *Palash kshara* for its antimicrobial activity is advocated in infected wounds.

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Cite this article as:
Gupta S, Gupta S.J., Singh S. K. Role of Palash (Butea Monosperma) Kshara in the Management of Dusta Vrana (Chronic Ulcers) with Special Reference to Infected Wound. Int. J. Ayur. Pharma Research. 2014;2(3):86-93.
Source of support: Nil, Conflict of interest: None Declared

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Photographs

Weight of fresh drug Clean with tap water Weight of dried drug

Burn **Ash** **Mixed with distilled water**

Filter **Filter solution** **Extract**

Dried extract **Kshara** **Frame**

Kshara Coated frame **Kshara Pichu** **Packing**

Figure 2: Preparation of *Palash Kshara*

Day – 0

Day – 1

Day - 3

Day – 7

Day – 14

Day - 21

Figure 3: Healing chronic ulcer with treatment