



Sal (shorea robusta) in vrana ropana (wound healing)- A Clinical Study

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Abstract

During this fast life every person fell into some or the other injuries due to trauma; either it may occur on roads with some weapons, in office or even in kitchen while doing household work. Acharya Sushruta has described six types of wounds which occur accidentally by sharp or blunt instruments called sadyo vrana or agantuja vrana (Su.Chi. 2/9).

So, after going through different texts it has been found that resin of shorea robusta has been described to have good healing property. It is a good disinfectant, antiseptic and fumigant.

30 patients fulfilling the inclusion criteria of wound were randomly selected from OPD/IPD, Deptt. Of shalya, G.A.C.H., Patna. Dressing of the wound with the above drug was done to the subjects. The results were assessed in pre and post treatment designed proforma. In this group bleeding was completely relieved whereas more than 90% relief was obtained in pain, tenderness, size. Symptoms like itching sensation, color, surface, smell, discharge were relieved upto 50 to 75 % respectively. The details of drug action, statistics, reports are as below.

Introduction

“shashtram jyoti prakashartham darshnam buddhi atmanah” as told by Acharya Charaka . Science is the light and our acumen is the perception. From the earliest times healing of wounds has been the central problem in surgical practice. This applies equally to all types wounds including those deliberating made by the surgeon. Peacock, E.E.Jr.(1970) states that there is no known catalyst for wound healing. All known methods of wound care are directed towards preventing the wound from harmful effects of physical factors, chemical irritation and bacterial invasion. This aim is being achieved by different kinds of occlusive dressings, topical antibiotics and minimising the contamination.

Recently, attention has been drawn towards old time tested folk medicines. Among them sal and its resin has got excellent reputation as an adjuvant for the acceleration for the wound healing. Sal is kashaya, sheetavirya, ruksha, grahi, vranasodhana. Sal is easily available drug in our villages. It is cheap and easily preserved. It can be used in minor injuries and even in chronic ulcers and burns. It does not favour bacterial growth, rather it suppresses infection.

This work aims at establishing the healing value and properties of sal so that this non-toxic, non-allergic easily available medicine may be recommended safely for topical application in cases of non-healing wounds.

Drug Review

SAL Nirukti – ‘saro dadhyam atishayitasya’
Vyutpatti – ‘seti’ ‘salyate’ ‘sal gatau’ karmani
dhan vyakhyasudha tika (Halayudh kosh)

There is no description of sala in Rigveda, Samaveda, Yajurveda. In Atharva veda it is described as sala tree.(Atharva veda 2.14.1). In Hindu tradition the sal tree is said to be favoured by Vishnu. Its name "shala", "shaal" or "sal", comes from Sanskrit; other names are *Ashvakarna*, *Chiraparna* and *Sarja*. According to Tibetan belief, Buddha Kashyapa had prophesied that he would reborn in a human form. One day while strolling in garden, Maya Devi felt that she would soon give birth to her child. She grasped the branch of a sal (*Shorea robusta*) and yawned. The child was named Siddhartha. (Ref. Buddhistische Bilderwelt: Hans Wolfgang Schumann, *Ein ikonographisches Handbuch des Mahayana- und Tantrayana-Buddhismus*. Eugen Diederichs Verlag.

In Charak Samhita Sal is mentioned as Shal, Aswakarna, Sarja, Sarjarasa. The word vrana ropana is mentioned in Dwivarniya adhyaya in Kampillakadi taila. In Sushruta Samhita it is used in excessive bleeding, pramehapidaka, prameha, pittaja upadansa, swasa, wound healing (Su.Su.36/28), etc. In Mishraka adhyaya and Sadyo Vrana Chikitsa adhyaya the word ropana has been used in context of shal. Shal has also been used with other drugs for purification of pool or tank. In excessive flow of blood the wound is gently rubbed with sal, arjuna etc. In Astangsangrah sal is used as lepa in ekanga sophra, udara roga. As Devadhup it is a constituent of sodhana gana and used for rubbing in mukharoga. In Chakradutta, sal is mentioned as salniryasa in ankoth vatak.

In Nighantukala, different Nighantukara have given different properties viz. ruksha, usna, snigdha guna. Different actions such as kaphapaha, vatakara, pittanasan, kaphapittahara, Vranaropana, have been advocated in Dhanwantari Nighantu, Madanpal Nighantu, Bhava Prakash, Saligram Nighantu, Nighantu

Ratnakar. It is kaphapittahara, Stambhana, Varnya, Vrana sodhana, Vrana ropana, Swedana. Some authors comment that *shorea robusta* and *vateria indica* are same plants. But, Sarja is believed to be *Vateria indica* which is found in western India. But it may be noted that many tree species characterised by resinous exudations especially those belonging to the families of Dipterocarpaceae and Combretaceae are given names such as laghusarja, mahasarja, nadisarja, nilasarja and sarjaka. Thus it may be presumed that sarja could better be a group name for all such trees showing resinous exudations. In popular usage also loka names such as saja (for *Terminalia tomentosa*) and Sarjam (for *Shorea robusta*) are prevalent in some tribal areas of U.P. and Bihar. It may also be noted that for the Sarjarasa of the texts salarasa is being actually used by vaidyas. In spite of what has been said above, it is very clear that sarja has been accepted in the text as a specific tree different from ashwakarna, ajakarna, sala and may be identified with *Vateria indica* (Balwantji – 424). Aswakarna and ajakarna now appear to be identified with oleoresin yielding tree of the family Dipterocarpaceae Shri Yadavji identified aswakarna, with *Dipterocarpus alatus* which is known as garjan, jayan, jarandruma all allied names and other synonyms such as Kushitaru (gum yielding tree), Sasyasamavarana (fruit covered by accrescent calyx lobes) and Chirparna (calyx lobes looking like wings of birds and helping in fruit dispersal by wind) are exactly applicable to it.

By analysing the opinions of authors of different Nighantus it may conclude that drug sal bark is kashaya rasa, tikta rasa, ruksha, snigdha guna. Shal was identified as *Shorea robusta* in R.R.I., C.C.R.A.S. unit of Lucknow which has been dealt in pharmacognostical study. It is said kaphahara, raktadosahara. It is kashaya rasa and its resin is madhura rasa with katu vipaka and sheeta virya. Its action is vedanasthapana as advocated by various Acharyas. Due to its vranasodhana, vranaropana, and antiseptic properties shal is efficient in wound healing. The bark & leaves are

astringent, acrid, cooling, anthelmintic, alexeritic, anodyne, constipating, urinary astringent, union promoter, depurative. They are useful in vitiated conditions of kapha and pitta, ulcers, wounds, otalgia, bacterial infections.

Fruits are sweet, astringent, cooling, aphrodisiac, cholagogue, and tonics are useful in dipsesis, burning sensation, tubercular ulcers, seminal weakness. On tapping the sal tree yields an oleoresin known as sal dammar or Bengal dammar. Annual yield 4-5 kg resin per tree. Sal occurs in rough stalactitic, brittle pieces 16-24 cu. mm in size, pale creamy yellow in colour, nearly opaque and having resinous balsamic odour. Sp. Gravity 0.94-0.9. Resin is sweet, acrid, cooling, anodyne, vulnerary, antibacterial, deodorant, constipating, detergent, carminative, stomachic, aphrodisiac, expectorant, ophthalmic and tonic. It is useful in vitiated conditions of pitta, wounds, ulcers, neuralgia, burns, pruritis, fractures, fever, diarrhea, dysentery, haemorrhoids, gonorrhoea, menorrhagia, splenomegaly, obesity, cephalalgia, odontalgia, burning of eyes.

Sal resin on dry distillation yields an essential oil known as chua oil. Chua oil is used a fixative in heavy perfumes and for flavouring chewing & smoking tobacco. It is used as medicine as an antiseptic for skin diseases and for ear troubles. Non-phenolic portion of the oil is reported to have a depressing effect on CNS. The phenolic portion is less effective.

Phytochemical study: The phytochemical study was done to screen the active constituents present in Sal. On screening the sample the active constituents that were found are alkaloids, carbohydrates, flavonoids, triterpenoids, proteins, saponins, steroids, tannins, starch and glycosides. Thin Layer Chromatography (TLC) along with UV spectrophotometry was done.

TLC of alcoholic extract of Shala Bark, Rf value of spots visualised in UV 254nm are 0.15, 0.20, 0.25, 0.30, 0.35 and 0.55. Rf value of spots visualised in UV 366 nm are 0.20, 0.30, 0.45, 0.50, 0.55 (light green), 0.60, 0.70. Rf value of spots visualised after spray of sulphuric acid

reagent and heated for 5 mins are 0.15, 0.20, 0.40, 0.45, 0.50 & 0.55. TLC of alcoholic extract of Shal Ral. Rf value of spots visualised after spray of sulphuric acid reagent and heated 1100C for 5 mins are 0.05, 0.10, 0.20, 0.25, 0.30, 0.43 and 0.90. Rf value visualised in UV 254 are 0.45 & 0.55.

Disease Review

The science of "Vrana Ropana" seems to be a serious matter of concern to the ancient healers. This fact can be very well understood while going through the surgical compendium – Sushruta Samhita where a good number of chapters deal with the science of Vrana alone. Though, wound healing is a physiological process which normally does not require much help. But its proneness to infections and situations like diabetes or immunocompromised conditions; burns or gunshots create problems which delay the repair process. Healing of wounds, whether internal or external, involves a series of overlapping events viz. inflammation, cell migration, angiogenesis, matrix synthesis, collagen deposition and reepithelization. Since this complex process involves interaction between several cell types, cytokines, adhesion molecules, growth factors and extracellular matrix proteins etc., it is difficult to develop ideal wound healing agents. It is therefore, necessary that wound healing agents of optimum biological activity have to be based on a border mechanism of the healing process. It is likely that more effective wound healing agents would be developed from natural products. The same is also being tried by Ayurvedic experts; present work is also a further step in this path under an herbal preparation of shal.

According to onset of wound, pathogenesis and characters; it can be established in the form of Agantuja (Traumatic wound) & Nija (Ulcers) Vrana.

Materials & Methods

Thirty four patients were selected with the symptoms of vrana attending the OPD/IPD

section of G.A.C.H., Patna. Fresh open wounds (of around 8 days) were selected for the study of *Shorea robusta* on wound healing. Patients selected were apparently healthy and not suffering from serious diseases. Four patients were LAMA during the study. So, the following study comprises of 30 patients. Sal bark was bought by P.G. Dept., G.A.C., Patna which were identified and pharmacognostical studies have been carried out in R.R.I.(C.C.R.A.S.) unit of Lucknow. Resin of sal was bought by P.G. Dept., G.A.C., Patna which was identified and pharmacognostical studies have been carried out in R.R.I.(C.C.R.A.S.) unit of Lucknow.

Preparation of Test Drugs: Sal bark was collected from the P.G. Dept., G.A.C., Patna. The upper dark portion of the bark was removed manually and then dried up in shade for about 4-5 days. Then it was powdered in the pharmacy of GACH, Patna. For the convenience of patients 100gm sal powder was sealed up in plastic bag.

Malhar was prepared in the pharmacy of GACH, Patna. It constituted four things - ghee – 1 part, til tail – 1 part, bee wax – 1 part, resin of shal – 1 part. For the convenience of patients 50gm of oint. was packed in a jar.

Parts used - resin, bark

Formulation - malhar(ointment), kwath(decoction)

Route of administration - local for dressing

Duration of treatment- depending upon the status of the wound

Procedure for dressing of wound: Wounds were washed / sterilised with sal kwath 4-5 times and then thin film of sal ointment was applied over it. A thin gauge was applied over wound to avoid any infection. After that wound was properly dressed and was followed up next day for dressing. No other wound care or systemic antibiotic was provided to them.

Criteria of Selection

Inclusion criteria:-Age group above one year, fresh wound, old wound due to mechanical trauma.

Exclusion criteria: Callous ulcer, tubercular ulcer, diabetic foot, rodent ulcer, deep sinuses, any other ulcer with some complications. To rule out the other pathology before treatment by routine as well as microscopic blood analysis were carried out like – Hb%, TLC, DLC, ESR, CT, BT, Blood sugar, pus culture. DOSE – depending upon the status of the wound. DURATION – 4 weeks

Criteria for Assessment– The assessment was done on the basis of change in sign and symptoms of vrana. Scores of clinical features: Scoring of all signs & symptoms according to severity were given marks (0-3) as –

Size:

0 – No discontinuity of skin/mucous membrane.

1 – ¼ of previous area & depth of the wound.

2 – ½ of previous area & depth of the wound.

3 - > ½ of previous area of depth of the wound.

Shal oint. is made from four constituents viz. – resin of shal, ghee, til tail and bee wax. Lipophilic action of ghee, they easily facilitate transportation to a target organ and final delivery, inside the cell, because cell membrane also contains lipid. This lipophilic nature of ghee facilitates entry of the formulation into the cell and its delivery to the mitochondria, microsome and nuclear membrane. Til taila also has the wound healing property as mentioned in different Ayurvedic texts. So when ointment is prepared from these ghee, til tail, bee wax and resin of sal, it provides a thick coating over the wound which prevent from external infections and helps in process of healing which is the main purpose of ointment.

To remove the local Dhatu Dusti: To achieve the main goal of healing, it is necessary to remove the maximum local Dusti or debridement at the site of Vrana. By the virtue of Lekhana, Putihara, Dahahara, Kandughana and Vrana Ropana properties of ghee, the local Dhatu Dusti is ceased. The second step in the path of healing is to enhance, for this purpose ghrita made easy way. As described above ghrita is beneficial for Rasa Dhatu and Rakta Dhatu, it possess Shita Guna. With all this property Ghrita enhance the Rasagni and Raktagni thus increase the Ropana Karma.

Ghee and oil have the specific gravity and density more than water, so when the ointment containing ghee and oil is applied over wound the thin film of oint. prevents from moist and bacterial growth of wound.

Characteristic features

Size:- With the help of “Prinana” and “Vrana Ropana” action of trial drug acted as promoter on rate of contraction. Shal is kashaya dominant rasa and hence this kashaya rasa is responsible for contraction.

Pain and Tenderness:- Debridement of wound with Shal kwath relieves pain and tenderness as it is vedanasthapana. It contains triterpenoids Triterpenes are assembled from a C5 isoprene unit through the cytosolic mevalonate pathway to make a C30 compound and are steroidal in nature and hence it reduces pain.

Bleeding:- Shal is kashaya rasa which is the astringent property and it checks bleeding. It contains tannins which is hemostatic and effective in hemorrhage.

Burning Sensation:- In trial drug the resin of shal and ghrita both contains “Shita” property which helps to check the burning sensation. Sal powder showed presence of tannins, hence its burning sensation may be reduced with the presence of tannins.

Itching sensation: “Kandughana” is the property of shal, which helps to control the itching problem. The Ghrita has “Snigdha” property, which decrease the dryness of wound.

Smell:-Resin of shal containing very good fragrance of volatile oil and this is helpful in to bad odour of the infected Vrana.

Discharge: By the virtue of “Shita” and “Katu” property of trial drug, the discharge is ceased. Also sal kwath contains saponins which protect against microbes and fungi and hence it pacifies discharge.

Swelling: “Shothahara” property of the drug demolishes the “Shotha” (Swelling) of the Vrana. This may be due to presence of flavonoids as flavonoids are antioxidants with anti-inflammatory, anti-allergic, anti-tumour effect.

Colour: Ghrita contain Varnya properties which is helpful to enhance the local appearance of the wound.

Infection: The presence of stypto aponins and tannins in shal kwath protect against infection and resin of shal has antiseptic property. This help to sweep out the infections from the wound.

Unhealthy granulation tissue:-“Lekhana” and “Shodhana” stop the unhealthy granulation tissue in wound.

Hence, the shal has the basic qualities of controlling the cardinal symptoms of the “Vrana”, these proves the efficacy of the drug in “Vrana Ropana”. For the assessment of results of the therapy, the patients were examined subjectively and objectively. Signs and symptoms were assessed by adopting suitable scoring methods as mentioned in material and methods. The result obtained were statistically analysed and mean change in percentage S.D., S.E., ‘t’ value, p value were calculated for each criteria of assessment in all groups.

Objective Parameters

The objective parameters that were taken was blood for T.C., D.C., Hb%, ESR, CT, BT, Blood Sugar. The mean value of Hb%, T.C., D.C., etc. remained more or less unchanged during the course of study. It shows that no infection was there in 30 patients. Maximum 90% of the patients were not associated with any disease.

Incidence of Clinical Study

Incidence of type of wounds: In this study 43.33% of the patients wound was lacerated,10% of the wounds were of incised and penetrating type respectively. 6.67% of the patients were of burn wounds. An effort was made to get sushrutokta sadyo vrana. All of the 30 patients had pain and tenderness in the wound. 76.67% of the patients wound had swelling, 36.67% of the wounds had odour, 30% of wounds had burning sensation, 23.33% of the wounds had itching sensation and 56.67% of the wound had discharge. These all are characteristics features of wound. Maximum

76.67% of the patients were of exogenous type wounds which shows that the cases in the study were sadhyo vrana

Effect of Drug on Subjective Parameters

- 1) Pain in wound: The mean grade of pain in wound lowered from 2.0667 to 0.033 with S.D. 0.6149, S.E. 0.1127 giving a relief of 98.387% with 't' value 18.1105 ($p < 0.001$) which is statistically highly significant.
- 2) Tenderness in wound: The mean grade of tenderness in wound lowered from 1.9 to 0.1666 with S.D. 0.6914, S.E. 0.1262 giving a relief of 91.288% with 't' value 13.7295 ($p < 0.001$) which is statistically highly significant.
- 3) Burning sensation in wound: The mean grade of burning sensation lowered from 0.3667 to 0.1667 with S.D. 0.4642, S.E. 0.0884 giving a relief of 54.5454% with 't' test 2.2622 ($p < 0.05$) which is rather significant.
- 4) Itching sensation in wound: The mean grade of itching sensation lowered down from 0.2333 to 0.2 with S.D. 0.4138, S.E. 0.7555 giving a relief of 12.5% with 't' value 0.4417 ($p < 0.10$) which is less significant.
- 5) Colour of wound: The mean grade of colour of wound lowered down from 1.4 to 0.2 with S.D. 0.4842, S.E. 0.0884 giving a relief of 85.714% with 't' value 13.5733 ($p < 0.001$) which is highly significant.
- 6) Changes in surfaces of wound: The mean grade in surface of wound lowered down from 1.5333 to 0.16667 with S.D. 0.5660, S.E. 0.1015 giving a relief of 89.1304% with 't' value 13.4691 ($p < 0.001$) which is highly significant.
- 7) Base/floor of wound: The mean grade in base of wound lowered down from 1.1333 to 0.1 with S.D. 0.4138, S.E. 0.07555 giving a relief of 91.1764% 't' value 13.6762 ($p < 0.001$) which is statistically highly significant.

- 8) Smell of wound: The mean grade in smell of wound reduced from 0.43333 to 0.03333 with S.D. 0.56324, S.E. 0.10283 giving a relief of 92.3076 't' value 3.8897 ($p < 0.001$) which is statistically significant.
- 9) Swelling of wound: The mean grade in swelling of wound lowered down from 1.13333 to 0.06667 with S.D. 0.6915, S.E. 0.1262 giving a relief of 94.1176% 't' value 8.4489 ($p < 0.001$) which is statistically highly significant.
- 10) Discharge of wound: The mean grade of discharge lowered down from 0.7333 to 0.6667 with S.D. 0.71115, S.E. 0.12983 giving a relief of 90.9090% with 't' value ($p < 0.001$) which is statistically significant.

During the study it was found that wound site epidermis was absent along with skin appendages. The adjoining epidermis had started creeping, but cells at the margin were regenerated after 6-7 days. By the 11th day epithelisation had far advanced towards the centre of the wound which was of size minimum 2cm. Extra no: of days were taken of wounds of greater sizes. It was seen that some persons with small size wound took greater no: of days in wound healing and some patients with size more than 5cm were healed within minimum no: of days. This might be due to because different persons have different immunity. It was a chance that 46.67% patients under age 20. This age is a faster growing age and not much susceptible to infections if proper hygiene of the wound is maintained. The patients whose wound size was above 9cm they took above 25 days but since the study was limited for 4 weeks I had to reject from the study. It was also seen that the patients in which suppuration was massive washing with sal kwath and dressing with ral oint. Resulted in the severe suppuration and excessive swelling and in that case I have to use modern system of medicine.

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