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ROLE OF *PATRANGA PATRA QWATH PARISHEK* WITH SPECIAL REFERENCE TO WOUND HEALING: A REVIEW ARTICLE

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ABSTRACT

Description of wound healing is a recent concern of modern surgery and medical therapeutics, but first evidences are available in ancient Indian system of medicine, namely *Ayurveda* in the name of *Vrana* (wounds) and *Vranaropaka* (wound healing drugs). It has been reported that in different classical *Ayurvedic* texts, about 164 medicinal plants, 24 metals and minerals and 18 animal products are described for their wound healing activity. The mechanism of the healing process and the selection of drugs from natural resources are very specific in *Ayurveda*, and some of these have been scientifically screened. Wound is an anatomical and functional disruption of the skin following an injury. In response to the injury, wound healing is a complex process of tissue repair or remodeling. Historically, plants and plant-based constituents have been extensively used for the treatment and management of different types of wounds. In the current times, different types of biopolymers are being researched for developing economical, sustainable, stable, and effective delivery system for the treatment of wounds.It will be helpful in providing them a directional view in understanding the role and importance of plant-based components for the treatment and management of wounds. Caesalpinia Sappan, a plant widely used in the traditional medicinal systems of India has been reported to possess antibacterial, anti-inflammatory, antioxidant, anticancer and immunosuppressive activities. This review highlights some of the phytochemical and pharmacological aspects. Honey is an ancient remedy which has been re-discovered for the treatment of wounds. Many therapeutic properties have been attributed to honey including antibacterial activity and the ability to promote healing evidence of antibacterial activity is extensive, with more than 70 microbial species reported to be susceptible. Honey has been described to possess the properties of *Ropana*. It promotes healing.The main aspect of wound healing is the rate. It mustbe fast, so that the patient can recover as early as possible. This combination of *Patranga Patraqwath* along with *madhu* works faster as compared to the natural healing or the other agents available.

KEYWORDS: Wound healing *Vrana Patranga Madhu*, *Pathya - Apathya.*

INTRODUCTION

Sushruta the father of Indian surgery in 1000 BC has elaborated the concept of *Vrana*. *Sushruta*has elaborately explained sixty types of *(Shasti upakramas)* for the management of wounds to achieve good approximation, early healing, without complication and acceptable scar. He advocated numerous herbal drugs for local application as well as systemic use. His techniques are broadly classified as *Vrana Shodhana* (wound cleaning) and *Vrana Ropana* (wound healing). The concepts and principles of *Vrana* such as causes, classification, examination, treatment, bandaging, complications etc. mentioned in Ayurved classic *Sushruta Samhita* by *Acharya Sushruta* remained unchanged even in this 21st century *Sushruta* mentioned as leprotic wound, diabetic wound, tubercular wound are nonhealing in this advance era. Wounds are physical injuries that result in opening or break of the skin. Proper healing of wounds is essential for the restoration of disrupted anatomical continuity and disturbed functional status of the skin.

Wound healing is complex phenomenon and is differing from patient to patient. The causes of delay healing are many that is local causes and systemic diseases but the root causes are reduced tissue regeneration, angiogenesis and neurological problems.

Patranga is a herbal drug from Leguminosae family with Latin name Caesalpinia sappan .It's properties are *Vranaropak, Raktastambak, Dahaprashaman* and *Kushthaghna.Rasa- Kashay tikta madhur ,Vipaka-katu,Virya – shita* ,Chemical composition- Brazilin tanin.

Madhu is having *Rasa -Madhur ,Anuras – kashay ,Guna – guru,ruksha,vishaghna ,Vipak –madhur,Virya -Shita* , Chemical composition-fructose,flavonoids,proline,

gluconic acid.

MATERIALS AND METHODS

Collection of data was done by using *Ayurvedic Samhitas like Sushrut Samhita,Charak Samhita,Ashtang Hridaya Dhanvantari Nighantu Bhavprakash* and standard online database. The drugs promoting mechanism of healing of wounds are elaborated that may be found effectivein general practice.

Vrana

व्रण गात्र विचुर्णने|[1] (सु.चि.1)

गात्रविचुर्ण गात्रवैवर्ण्यमित्यर्थ। (डल्हण)

The destruction break rupture discontinuity of the body tissue or part of body is called as *vrana*. *Sushruta* has described 15 types of *Nija Vrana* according to *dosha*. It includes 1.*Vataj 2. Pittaja 3. Kaphaja 4. Shonitaja 5. Vata pittaja 6. Pitta 7. Kaphaja 8. Sannipataja 9. Vata Shonitaja 10. Pitta Shonitaja 11. Kapha Shonitaja 12. Vata Pittaja Shonitaja 13. Pitta k Kapha Shonitaja 14. Vata Kapha Shonitaja 15. Vata Pitta Kapha Shonitaja Sushruta* has described 6 types of *agantuj vranas*

- ***Chinna:*** Extensive cut injury oblique or straight, separation of parts of body.
- ***Bhinna:*** Perforation of ashaya and mild discharge.
- ***Viddha***: Deep injury without perforation of ashaya.
- ***Kshat***: Neither a cut nor a perforation but exhibits the nature of both uneven shaped.
- ***Picchit***: Crushed injury extended filled with blood and bone marrow.
- ***Ghrushta:*** Rub injury skin gets peeled off, burning sensation and discharge.

Shuddha vrana lakshana

Unaffected by the three *Doshas*.Edges with a slight Blackish colour and having Granulation tissue. Absence of pain.

Absence of secretion. Even surface through out the wound area. Slimy surface. Regular surface.

Dushta vrana

Extremely narrow or wide ,mouthed,too soft, elevated or depressed, black or red or whitecoloured,too cold or hot. Full of slough or pus or veins or flesh or ligaments or putrid pus.

Upward or oblique course of suppuration.Pus runs into cavity and fissures cadaverous smell.Burning sensation, redness, itching, pustules crop up around secrete with blood.

Ruhyaman vrana

Absence of any type of discharge,presence of healthy and new granulation tissues yellowish colored wound, surrounding area of wound Is hard.

Samyak rudha

Edges: Firmly adhere. Pain: No pain. Swelling: Not appears. Leaves cicatrices of the Same line with the Surrounding skin.

Vrana vastu

Scar of the wound remains lifelong though wound is completely healed.

Vrana akar

Elongated Elliptical Rectangular Circular Triad.

Stages of wound healing[2]

1. Haemostasis- It occurs within minutes of the initial injury. Process involves vasoconstriction platelet aggregation, fibrin deposition and clot formation at the end.

Vasoconstriction: It is initiated by release of vasoactive amines (epinephrine and norepinephrine)and prostaglandins (e.g. Thromboxane) in response to dermal injury locally.

Platelet aggregation: Tissue factors stimulating aggregation of platelets is released by damaged cells .After aggregation and adherence, platelets release the contents of alpha granules (immunomodulatory and proteinaceous factors), dense bodies (calcium, serotonin, ADP, ATP) and lysosomes into their cytoplasm. These Alpha granules include albumin, fibrinogen, fibronectin, IgG, coagulation factors V and VIII, platelet-derived growth factor (PDGF), transforming growth factors a and b (TGF-a and TGF-b), fibroblast growth factor-2 (FGF-2), platelet-derived epidermal and endothelial cell growth factors.

Fibrin deposition and clot formation: Thrombin is responsible for conversion of fibrinogen to fibrin.The Fibrin mesh converts aggregated platelets to a stabilized platelet plug which secrete cytokinins like PDGF initiating further step in healing. Vitronectin (derived from serum and aggregating platelets) coats fibrin and facilitates the binding of fibronectins (second important component of the provisional matrix) produced by fibroblasts and epithelial cells.

2. Inflammation- It lasts upto 4 days after injury.
Vasodilation: It takes place within 10-15 minutes after injury. Mast cell derived factors such as leukotrins, prostaglandins and histamines are responsible for vasodilation leading to capillary leakage and also attracts neutrophils and monocytes.

Margination: Leucocytes adhesion to endothelial cells lining the capillaries of injured area is called as margination.

Diapedesis: The transmigration of Leucocytes through endothelium is facilitated by plateletfactor IV.

Inflammatory cells: T- lymphocytes activate macrophages initiating wound debridement by phagocytosis of bacteria and foreign materials are engulfed, digested by oxygen radicals and hydrolytic enzymes. Eosinophills and basophills are other inflammatory cells which reach highest concentration in wound at 24 -48 hours after injury.Inflammatory cells remain in wound for approximately 7 days and then sloughed out.

Cytokines: Collagen synthesis and scar formation are influenced by cytokinins.

3. Repair/ Proliferation phase

Cellular migration and proliferation: After a week of injury, the cellular components of wound undergo considerable Fibrin – fibronectin mature which was initially dominated by inflammatory cells is now densely populated by fibroblasts and endothelial cells.

Angiogenesis: It starts after 2 days of injury.The endothelial buds grow by cellular migration and proliferation. Endothelial buds come in contact with another bud and gets interconnected giving rise to new capillaries.

Epithelialisation: In first 24 hours of injury, basal cells at the wound edge elongate and migrateacross the world . Migration of epithelial cells requires actin filaments within cytoplasm.

Further Proliferation forms new epidermis.

Wound contraction: It begins 4-5 days after injury and continues for approximately 2 weeks Average rate of contraction is approximately 0.6 to 0.7 mm/ day. Contraction of collagen and myofibroblasts are responsible for wound contraction.

4. Remodelling

It starts approximately 21 days after injury and may continue upto 2 years . This stage involves 3 changes - conversion of soft febrile collagen fibrils to insoluble elastic fibers, embryonic active fibroblasts mature into adult resulting fibrocytes and devascularisation. All these changes provide tensile strength to the wound.

Patranga

कुचंदनं तु तिक्तं स्यात् सुगन्धि व्रनरोपनम् |[3] (ध.नि.)

वातपित्तज्वरघ्नं च विस्फोटोन्मादभूतहुत | (रा.नि.)

पतंगं मधुरं शीतं पित्तश्लेष्मव्रणास्त्रनुत्।

हरिचन्दनवद् वैद्यं विशेषाद् दाहनाशनं। (भा.प्)

Latin name – Caesalpinia sappanFamily – Leguminosae
Rasa – *kashay* (astringent) *madhura* (sweet), *tikta* (bitter)
Guna – *RukshaVirya* -*sheeta*
Vipaka- *katu* (pungent)
Dosha effect- *pitta* and *kapha* pacifier

Removal of Local dhatu dushti: The gradings of *suddha vrana* depends upon the amount of *dushti* present in local *dhatu* i.e *twaka*, *mamsa*,and with *rakta dhatu.*

Patranga contain *lekhana* (scrapping), *Shoshana* (absorptive), *stambhana* (coagulation or contraction) and *rakta shodhak (*blood purifier) properties along with *samshoshana* (detoxifying andcleansing) which provides the desired effect.

The *ropana* of vrana could be possible after *shodhana* (Medical debridement) due to removal of local *dhatu dushti.*

Effects of *Patranga Patra qwath*:[4]

1. *Ropana*- Healing of any *vrana* cannot occur without the reduction of the clinical features of *shotha* .It is necessary for *ropana* (healing) of *vrana* at early stages as it delays healing ,if persists for a longer duration.

2. *Prinana* (nutrition) *Poshan* (nourishment) *Dhatuvardhan* (tissue growth)

All activities must be due to *madhur rasa* and it helps to contract the wound size by achieving fibrosis and Epithelialisation.

3. *Raktashodhan* (purification of blood)

It is due to *tikta* and *kashay rasa* of the drug.

4. *Stambhana karma*

It is done by *Shoshana guna* of *Kashay*,*tikta rasa* and *vishada guna* along with *kledahara*,*raktastambana* and *chhedana* activities followed by *Krimihara* (antimicrobial) leading to prevention of discharge and secretion.

5. *Vatahara*

It is due to *guru*, *snigdha guna*, *Dahaprashaman* and *shothahar* effects observed due to *shitaguna* and *kashay rasa* which helps to reduce the inflammation and thus helps to relieve pain and tenderness.

6. *Balya* and *poshan*

It helps in promotion of healing by *Dhatuvardhan* (growth of tissue) leading to healthy desired scar formation .*Snigdha* and *balya* properties of *madhura rasa* produce normal smooth scar.

Properties of Caesalpinia sappan leading to wound healing:[5]

Anti-inflammatory activity

It shows anti-inflammatory activity by inhibition of prostaglandins and nitric oxide production.Brazilin has been known as a natural red pigment.It exhibits an inhibitory effect on lipopolysaccharides (LPS) stimulating NO production.It is suggestive that the suppresive effect of isoform of nitric oxide synthetase

gene expression by brazilin might provide possible mechanism for its anti-inflammatory activity.

Antimicrobial activity
Antimicrobial activity of this drug against Methicillin resistant Staphylococcus aureus (MRSA) and inhibitory effect of Caesalpinia sappan extract on the invasion of MRSA to human mucosalfibroblast is studied. Methanol extract may have antimicrobial activity and the potential to restore effectiveness of B- lactum antibiotics against MRSA.

Analgesic activity
The ethanol extract of heart wood and three crude fractions (petroleum ether,diethyl etherand ethyl acetate) were subjected to pharmacological screening for analgesic activity. The ethanol extract of heartwood and 3 crude fractions were found to show peripheral analgesicactivity.

Acaricidal activity
Acaricide is a pesticide designed to control harmful species of mites (Acari) This indicated thatthe acaricidal activity of C. sappan heartwood is due to the effects of juglone. Accordingly, Juglone should prove to be quite useful as a potential control agent, lead compound and housedust mite indicator.

Antibacterial activity
Most of the bacteria in nature are pathogenic and can cause serious threat to human being. Caesalpinia sappan extract has been trusted against different microorganisms for its potential antimicrobial activity.The maximum zone of inhibition was observed in ethanolic extract against Psedomonas aeruginosa, Staphylococcus aureus, Entobacter aerogens etc.

Vasorealxation effect
Methanolic extract and two purified compounds (brazilin and hematoxylin) from C. sappan wereexamined for their relaxant effects in isolated rat thoracic Aorta. The methanolic extract significantly and dose-dependently relaxed the a-receptor against Phenylphrine-precontracted aortic rings, without affecting passive tension of these vessels. Brazilin induces vasorelaxation by the increasing intracellular Ca(2+) concentration in endothelial cells of blood helping in wound healing.

Phytoconstituents[6]	**Chief mechanism of action**
Tannins, Brazilin,[7] flavonoids, B – carotene.	Stimulation of wound contraction, increase tensile strength as well as hydroxyproline content, antioxidant stimulates homeostasis.
Glycosides	Decreased wound closuretime, increase Epithelialisation
Steroids ,triterpenes	Increase Epithelialisation,increase wound contraction, increase collagenisation .
Glycosides	Stimulation of granulation tissue
Vitamins and minerals	Increase wound healing rate reduces infection.

Honey

कषायानुरसं रुक्षं शीतलं मधुरं मधु।

दिपनं लेखनं बल्यं व्रण रोपणं उत्तमम्।। [8] (ध.नि.)

शीतंकषायंमधुरंलघुस्यात्सन्दीपनंलेहनमेवशस्तम्।

संशोधनंवाव्रणशोधनञ्चसंरोपणंहृद्यतमञ्चबल्यं।। (शा.नि.)

Honey is *madhura* by *rasa*, *kashaya* by *anurasa* ,*ruksha*,*sheeta virya* and good for normal complexion ,causes cleaning and healing of the wound penetrating deep into tissues.

Properties of honey[9]
Chedana –This property of *Madhu* is nothing but the separation of dead tissue fromsurrounding healthy tissue.

Ruksha guna – It is necessary to get rid of excessive discharge for proper wound healing. *Madhu* helps in this by virtue of its *ruksha guna*.

***Sandhana* property**- After proper *shodhan* of the wound it helps in healing and bringingtogether the cut edges by its *shodhana* property.

***Agnideepana* property**- *Madhu* possesses this property and hence acts on local *dhatwagni*.

Savarnikaran – It helps in preserving the natural skin colour.

Sukshma marganusari – The function of *Madhu* is performed only after its penetration deepinto the tissue at the cellular level.

***Yogvahi* property**- Due to this property, without changing its own properties *madhu* gives theeffect of the drugs added to it.

Effect of honey in wound healing:[10]
Antimicrobial activity-The enzyme glucose oxidase is added to the honey by bees and is together with other compound, responsible for honey's antimicrobial activity.

Low pH-pH of honey is commonly between 3.2-5.4. The acid is the major organic acid in honeyand regulates the acidic environment (low pH),which is important measure for antibacterial functionality and hence helping for wound healing.

Granulation tissue formation, epithelization- Honey seems to cause more rapid epithelization permeably because of antibacterial properties.The enzyme catalase present in honey has an anti- oxidant property.

Collagen- It activates the fibroblasts and induces density of fibroblast. It helps in improving keratinization of surface wound. Honey increase the thickness of collagen fibres.

Direct nutrition effect-The high osmolarity of honey causes an outflow of lymph which serves to provide nutrition for regenerating tissue. Healing is delayed if the circulation to an area is poor or if a patient is poorly nourished.

Hydrogen peroxide-Hydrogen peroxide in honey is activated by dilution. However unlike medical hydrogen peroxide, commonly 3 % by volume,it is present in the concentration of only 1 m mol/ lit in honey.The concentration of peroxide is high enough to kill pathogenic bacteria,but doesn't harm the healing tissue.
Glucose + H_2O -------- Gluconic acid + Pathya Apathya
Pathya ahara as mentioned in *Ayurveda* (Diet to be taken/ followed)

Purana shastika Shaali (old stored rice), *Jaangala mamsa (*less fatty chicken), *Jeevanthi shaaka* (leafy vegetable called Leptadenia reticulata), *Tanduleeyaka shaaka* (red variety of Amaranthus leafy vegetable), *Vaastuka* (green leafy vegetable, ie. Chenopodium album), *Baalamulaka* (tender radish), *Vaartaka* (Brinjal), *Patola* (bitter variety of snakegourd), *Karavellaka* (bittergourd/momordica charantia), *Daadima* (pomegranate), *Grutha bhrusta amalaki* (gooseberries fried in cow ghee), *Saindhva lavana* (potassium chloride), *Purana sarpi* (old stored cow ghee), *Mung* (Greengram/Phaseolus mungo), *Vilepi* (thick rice gruel), *Srutha jala* (cold water/potable drinking water). These vegetables and fruits are to be taken more during the wound healing process as mentioned in ayurveda.[12]

Apathya ahara as mentioned in *Ayurveda* (Diet not to be consumed)

Nava dhanya (newly harvested grain/cereals), *Masha* (blackgram), *Tila* (sesum oil), *Vishama bhojana* (intake of food at inappropriate time), *Ati-bhojana* (excessive eating), *Anista bhojana* (undesirable food), *Upavasa* (fasting), *Viruddha bhojana* (incompatible food), *Adhyashana* (eating when previous meal is not digested), *Kulattha* (horsegram), *Nishpava* (variety of pea), *Amla-lavana-katu rasa* (soursalty & pungent foods), *Vallura mamsa* (dried meat), *Shushka shaaka (*dried vegetables), *Vasaa* (animal fat), *Sheetodaka* (cold water), *Madya* (variety of alcohols) *Asuri* (mustard seeds), *Mulaka* (radish, which is not tender one) are *pooyavardhaka* (suppurative) and *Doshajanaka* (increases *tridosha*/ humour). So these are to be avoided during the wound healing time as mentioned in *ayurveda*.[13]

DISCUSSION

The emergence of bad pathogens those are resistant to major classes of antibiotics has been created a need of novel antibacterial agent. Caesalpinnia *qwath parishek* may be used along with honey having various wound healing properties may be used .The synergistic effect of *Patranga* and honey could be helpful in wound healing. This is one of the cheapest and easily available drug which may be used for wound healing.

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