ISSN 2456-3110
Vol 2 · Issue 5
Sep-Oct 2017

Journal of Ayurveda and Integrated Medical Sciences

www.jaims.in

JAIMS

Charaka Publications

Indexed

ISSN: 2456-3110 REVIEW ARTICLE Sep-Oct 2017

Scientific aspect on Diet explained by *Susrutha* in Wound Healing

Manoj Kumar,[1] Amareshappa,[2] Anjali Bharadwaj,[3] Shailaja SV.[4]

[1,2]Post Graduate Scholar, [3]Professor, [4]Professor & HOD, Dept. of Shalya Tantra, Sri Kalabyraveshwara Swamy Ayurvedic Medical College, Hospital and Research Centre, Bangalore, Karnataka, India.

ABSTRACT

Wound healing has been the burning problem in a surgical practice because of a remarkable increase in the number of traumatic cases. A wound causes a number of changes in the body that can affect the healing process, including changes in energy, protein, carbohydrate, fat, vitamin and mineral metabolism. Various Ayurveda literatures, particularly, *Sushruta Samhita,* which is said to be an ancient textbook of surgery in Ayurveda, has mentioned about the diet for the person suffering from the wound, and the author said that diet plays a very important role in the wound healing process. *Sushruta* - The father of surgery has scientifically classified it in a systemic manner, whose wealth of clinical material and the principles of management are valid even today. *Shalya Tantra* (surgical branch in Ayurveda Science) is one of the important branch of Ayurveda, in which surgical and para-surgical techniques has described for management of various diseases. *Vrana* is the most important and widely described chapter of *Shalya Tantra*. *Vrana* (wound) is one of them, which have been managed by human being from starting of civilization. Under the circumstances, the first thing which the men came across was the injury from different sources which caused him the *Vrana*. *Vrana* is seen as debilitating and scaring disorder, usually seen affecting the human being at any age. Well balanced nutrition plays an essential role in the wound healing.

Key words: *Ayurveda, Vrana, Wound healing, Diet, Nutrition.*

INTRODUCTION

In this modern era, there is a remarkable increase in the number of traumatic cases, where the treating modalities like antibiotics, and local management is not sufficient for rapid wound healing. Along with this, a well-balanced dietetic pattern is needed. Diet and Health are more connected in the area of wound care. Balanced diet plays an important role in wound healing process, as it enables quick reaction to the wound or trauma itself, as well as enhanced the healing capabilities throughout the curative process. Wound management is a significant and growing health burden on the community.[1] Delayed wound healing and wound infection place a substantial financial burden on health care systems, as a result of increasing dependency and increased hospital admissions.

Chronic wounds also have a very large social and quality of life impact on individuals and careers.[2] Nutrition plays an essential role in wound healing and wound care practices and nutritional support needs to be considered a fundamental part of wound management. Attending to nutrition in wound care is also cost-effective.

Poor nutrition before or during the healing process may delay healing and impair wound strength, making the wound more prone to breakdown. Neglecting the nutritional health of an individual with a wound can

Address for correspondence:
Dr. Manoj Kumar
Post Graduate Scholar, Dept. of Shalya Tantra, Sri Kalabyraveshwara Swamy Ayurvedic Medical College, Hospital and Research Centre, Bangalore, Karnataka, India.
E-mail: sanjeevani.life@yahoo.in

Submission Date : 09/09/2017 Accepted Date: 28/10/2017

Access this article online

Quick Response Code

Website: www.jaims.in

DOI: 10.21760/jaims.v2i05.10268

ISSN: 2456-3110 REVIEW ARTICLE Sep-Oct 2017

Compromise the entire wound management process.[3]

Patho-physiology of wound healing in Ayurveda

The destruction[4] / break / rupture / discontinuity of body tissue / part of body, is called *Vrana*.[5]

Factors influencing wound healing

Certain factors will influence the wound during the healing process, which is explained in *Sushruta Samhita.* They are general factors include *Vaya* (age), *Poshaka Tatwa* (nutrients) and the diseases like *Madhumeha* (Diabetic), *Paandu* (anaemia) etc.

Local factors include *Twak Sthaan* (Position of skin), *Shalyavastu* (foreign bodies), *Bhootasanghaata* (Infection) etc.

Healing process in open wound complete in 3 phases,

In any type of open wound, three stages or phases are mandatory in healing process. They are as follows.

1. Inflammatory phase
2. Collagen phase or Proliferative phase
3. Maturation phase or regeneration phase/remodeling phase

Immediately following an injury, the healing process begins. A torn ligament or muscle is repaired, wounds heal and bones mend. The healing process first involves getting rid of damaged tissue, then rebuilding healthy connective tissue in a step-by-step manner. The redness, swelling, heat and pain of inflammation are a natural part of the healing process. Many nutrients are involved in connective tissue repair and wound healing, such as amino acids, selective vitamins and minerals.[6,7]

Diet and wound healing - An Ayurvedic aspect

Ahara/Pathya (food/diet) plays an important art for wound healing, which may not heal well, if we cannot eat food, which is not having proper calories of proteins, vitamins and minerals etc. The diet of a patient entertaining an open wound should preferably consists of *Laghu Ahara* (light dietetic articles) in small quantities. Food always should be taken freshly cooked with fatty articles (especially cow ghee). Above all digestive upsets should be avoided. Dietetic constituents, as prescribed by *Sushruta,* should be advised for quicker healing and avoiding the complications. Hot liquefied food (like *Manda / Peya / Vilepi* type of gruel) prepared form old rice, mixed with cow ghee (*Goghrita*) in small quantity with meat soup (*Mamsa Rasa*), a good diet for wounded by which quick healing of wound occur.

Pathya Ahara mentioned by *Sushruta*

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, i.e. *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* (green gram / 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.[8]

Purana Shastika Shaali[9]

Contains antioxidants to counteract free radicals. Red/brown rice is full of zinc, a mineral that can help accelerate wound healing and maintain the body's defense mechanisms to function effectively. Just like iron or manganese, zinc is additionally full of anti-oxidants that safeguard the body from free-radicals that may damage tissues and cells within the body. Zinc helps the body synthesize proteins and develop collagen, so it is an important mineral for wound healing. Contains Vitamin B6 and B12. This particular vitamin is required to help balance the development of serotonin, red blood cells helping the creation of DNA cells.

Jangala Mamsa[10]

Protein aids the body in repairing damaged tissues. As the NIH points out, deficiency in protein has been

ISSN: 2456-3110 REVIEW ARTICLE Sep-Oct 2017

shown to contribute to poor healing rates. When your body doesn't get enough of this essential element, it has a difficult time forming collagen. Unfortunately, the wound healing process further exacerbates protein loss, as the body can lose up to 100 milligrams of protein per day due to exudation, or fluid leakage from the affected area. For this reason, a high protein diet is essential during recovery. The best way to get enough protein is to eat a nutritious diet. When it comes to protein intake, you should select lean meats, seafood and poultry. The foods in this group include any product made from meat, seafood, poultry, eggs, peas, nuts, soy and seeds. Dairy products also tend to have high amounts of protein – 1 cup (8 fluid ounces) of milk has 8 grams of protein.

Jeevanti Shaaka[11]

Latest researchers have found that the Tannins contents of *Jeevanti* (*leptedenia reticulata*) has ant-inflamatory effect as well as it fastens wound contraction and epithelialization.

Tanduleeyaka Shaaka (red variety of Amaranthus leafy vegetable) [12]

One cup (2.4 dl, 245 g) of cooked amaranth grain (from about 65 g raw) provides 251 calories and is an excellent source (20% or more of the Daily Value, DV) of protein, dietary fiber, and some dietary minerals. Amaranth is particularly rich in manganese (105% DV), magnesium (40% DV), iron (29% DV), and selenium (20% DV). Cooked amaranth leaves are an excellent source of vitamin A, vitamin C, calcium, manganese, and folate. Amaranth does not contain gluten, so it may be a healthy and less expensive alternative to ingredients traditionally used in gluten-free products. It has high biological value and its benefits are not limited to people with gluten-related disorders, but are applicable to the general population. Quantity and quality of proteins of amaranth are superior to those of wheat. It also contains higher concentrations of folic acid than wheat (102 µg/100 g in amaranth vs. 40 µg/100 g in wheat), and its fiber and minerals contents are higher than those of other cereals. Amaranth contains phytochemicals that may be anti-nutrient factors, such as polyphenols, saponins, tannins, and oxalates which are reduced in content and effect by cooking.

Experiment on rat models : *A. viridis*, which suggests greater deposition of collagen. The formation and maturation of collagen may be due to the presence of flavonoids and steroids in *A. viridis*, which are responsible for free radical-scavenging activities and help to promote the most important phase of wound healing. Hence, on the basis of the observed results, the faster wound-healing activity.

Vaastuka (*Chenopodium album*)[13]

Leaves of *C. album* are used for the treatment of round worm and hookworm infections. Leaf juice is used for the treatment of burns. Infusion of the plant is used for the treatment of rheumatism, abdominal pain, constipation, eye disease, throat troubles and cardiovascular disorders. It is also used for the treatment of anemia, kidney stones and jaundice. It is used as a poultice to reduce inflammation and to relieve headache.

Baalamulaka (tender radish)[14]

These are loaded with fiber, vitamin C, folates, calcium, and phytochemical compounds that lower your risk of cancer. Phytonutrients boost the immune system so you're less prone to infections and wounds heal more quickly. Isothiocyanates and indoles reduce activity that turns normal cells into cancer cells. Research has shown that they cause cancer cells to turn on themselves rather than on healthy cells. Eating radishes and other crucifers over a long term reduces your risk of several types of cancer including melanoma, colorectal and others.

Vaartaka (Brinjal)[15]

This nightshade vegetable is found to be a good source of minerals that include manganese (11% DRA), copper (9% DRA), magnesium (3.5% DRA), and iron (3% DRA). Aside from its use in metabolism of macronutrients, manganese is vital in bone formation and wound healing. Copper, meanwhile, assists in the formation of red blood cells and in the absorption of iron. Many researches shows it has high amount of histamines which causes hypersensitivity and may

ISSN: 2456-3110 REVIEW ARTICLE Sep-Oct 2017

complicate wound healing, but the leaves can be used as direct application over the injured part immediately to arrest bleeding.

Patola (bitter variety of snakegourd)[16]

Cutaneous wound healing process requires interaction between cells in the dermis and epidermis and the release of chemical mediators from inflammatory cells, fibroblasts and keratinocytes. Influx of macrophages into granulation tissue serves to replace the dermal defect and provide substrates and inducers for re-epithelialization. From the histological analysis, it was observed that wounds treated with Trichosanthes cucumerina Linn seed demonstrated a higher intensity of inflammatory response.

Karavellaka (bittergourd/*momordica charantia*)[17]

When applied locally to diabetic wounds, bitter melon extract prevents regression of granulation tissue and blood vessels, thus accelerating and improving wound healing. A study has been conducted on rats showed the bitter melon treatment increased angiogenesis in the diabetic granulation tissue, marked by abundant micro vessels and large blood vessels.

Daadima (pomegranate)

A widely researched drugs having multiple medicinal value. Use of pomegranate extract and flower showed significant reduction in wound area and increased the well-organized bands of collagen, fibroblasts, and few inflammatory cells.[18,19] Properties of elevated wound contraction and the period of epithelialization, collagen, and protein synthesis were reported in hydro alcoholic pomegranate extract.[20]

Grutha Bhrusta Amalaki (gooseberries fried in cow ghee)

The fruits are reputed to contain high amounts of ascorbic acid (vitamin C), or ascorbic acid, has multiple functions as a co-enzyme and co-factor in many of the body's biochemical pathways. As it relates to connective tissue, vitamin C is required for collagen fiber synthesis, a process vital for tissue repair and healing. Specifically, it is involved in the hydroxylation of proline to form hydroxyproline. Research by Patel[18] confirms that ascorbic acid acts as a specific inducer of the collagenpathway. A deficiency in vitamin C is associated with poor collagen formation and delayed wound healing.[18] Vitamin C is considered a very important water-soluble antioxidant. Additionally, vitamin C is capable of regenerating other antioxidants, especially vitamin E.[21]

Saindhava Lavana (potassium chloride)

The reason why salt water is widely used for wound healing is that it helps kill certain types of bacteria infesting the wound site. When these bacteria are killed, the wound site is cleaned and thus, the infection is inhibited, so that it will not spread into the other skin areas or getting worse. Killing the infesting bacteria also helps the new skin cells to grow faster and more properly. Once this proper growth is promoted, the wounded site will eventually heal. In addition, salt also helps wound to heal faster by drying it out. It is possible, since salt has an ability to absorb water and fluid discharge from a wound site. As a result, the wound site will dry out faster and thus, heal more quickly. At the wound site, the excessive moisture in the cells is the major cause of the inflammation. As salt is a potent absorbent, it helps removing this moisture, shrinking the cells down and take the infesting bacteria with them. As a result, the wound site does not only dry out faster, but also less swollen. Decreasing the inflammation means reducing the caused pain. While putting salt water on the wound site will badly sting at first, it helps future painful sensation around the wound site, which is very helpful for numerous people. Presently widely used in surgical practice marketed as betadine.[22]

Purana Sarpi (old stored cow ghee)

Cow ghee gets absorbed easily and cross the cell membrane. It is also a concentrated source of energy having dietetic value, easier for digestion and absorption. Nutrients present in the ghee delivered to tissue easily. "Cow ghee is sweet in taste and cooling in energy, rejuvenating, good for the eyes and vision, kindles digestion, bestows luster and beauty,

ISSN: 2456-3110 REVIEW ARTICLE Sep-Oct 2017

enhances memory and stamina, increases intellect, promotes longevity, is an aphrodisiac and protects the body from variousdiseases".[24] Cow ghee is used in most Ayurvedic formulations. Cow ghee's regenerative properties are also useful for healing wounds and promoting the growth of healthy cells. This wound healing ability has also been clinically proven.[23,24] Cow ghee is cold, oily qualities help protect the body's mucous membranes and ensure its usefulness in any condition with burning sensations. Finally, on a practical level, ghee is rich in antioxidants, and hence, does not go rancid for a long time.

Mudga (Green gram / Phaseolus mungo)

It contains 64.04% protein, 1.8% total lipids, 27.64% total carbohydrates, 1.68% crude fibre and 4.84% ash. Iron, calcium, magnesium, copper, zinc, potassium and sodium which promotes wound healing.[25]

Vilepi (thick rice gruel)

As mentioned above the qualities of rice promoting wound healing, a thick gruel of rice will also help in nourishing the wound.

Srutha Jala (hot water)

Hydration is important in wound healing, as dehydrated skin is less elastic, more fragile and more susceptible to breakdown. Dehydration will also reduce efficiency of blood circulation, which will impair thesupply of oxygen and nutrients to the wound.[26]

Discussion

Optimizing nutrition is important to best practice care in wound management. The overall goal for the healthcare team should be to make sure the patient is in the optimum nutritional state to give wounds the best chance to heal. This can be achieved by providing the individual with adequate calories and nutrients, preventing protein energy malnutrition and promoting wound healing.[26] Cow ghee's (*Goghrita*) widespread prevalence in Ayurvedic medicines and treatments is due to its beneficial effects on the digestion, absorption and delivery of Ayurvedic herbs, as well as its own healing properties. When the digestive capacity (*Agni*) and life-essence (*Ojas*) are weakened, the *Doshas (humours/Tridosha)* are disturbed, causing disease. Cow ghee's actions on both *Agni* and *Ojas* are, hence, at the heart of all Ayurvedic treatment. Cow ghee also nourishes and regenerates the body and mind, improving the overall quality of treatment. Our body produces new cells and tissues in a day. If our body doesn't receive proper nutrition and the building material may delay the wound healing.

Diet is considered as one of important factor for proper wound healing. Implementing the nutritional plan and providing appropriate nutritional support to the individual, helps to enhance the process of wound healing. There is a growing body of evidence and research demonstrating the vital role our diet plays in the healing of all types of tissue damage and inflammation. Eating a diet rich in fresh fruits, vegetables, seeds, legumes and whole grains will also help to ensure an abundance of phyto-chemicals, natural plant based chemicals that may promote health and healing. By combining knowledge of the wound healing process together with best practice provision of nutrition, healthcare professionals can help decrease the morbidity and mortality associated with chronic wounds, as well as reducing their cost and impact.

Conclusion

Acharya Sushruta has given lot of importance to nutritious foods that promote wound healing and is prevalent in today's era also. Most of the natural plants in this review are those with wound healing potentials. Plants are more potent healers because they promote the repair mechanism in the natural way. The healing process can be physically monitored by assessing the rate of contraction of the wound, period of epithelization, tensile strength, histopathology and weight of granuloma in different wound models. The healing tissue synthesizes more collagen to provide tensile strength. The demand of herbal drugs is increasing day by day in developed as well as developing countries because they are safer

ISSN: 2456-3110 REVIEW ARTICLE Sep-Oct 2017

and well tolerated as compared to those allopathic drugs. These plants should be subjected to animal and human studies to determine their effectiveness.

REFERENCES

1. Arana V, Paz Y, González A, Méndez V, Méndez JD (2004) Healing of diabetic foot ulcers in L-arginine-treated patients. Biomed Pharmacother 58: 588-597.
2. Williams JZ, Barbul A (2003) Nutrition and wound healing. Surg Clin North Am83: 571-596.
3. Wallace E (1994) Feeding the wound: nutrition and wound care. Br J Nurs 3:662-637..
4. Kaviraj ambiikanath shastri onSushruta Samhita, Commentary by Dalhanacharya Nibandha sangraha, chaukambha samskrit samsthan, varanasi (2007) chikitsa sthana 1chapter 6 verses pg no 3.
5. Kaviraj ambiikanath shastri on Sushruta Samhita, Commentary by Dalhanacharya Nibandha sangraha, chaukambha samskrit samsthan, varanasi (2007) chikitsa sthana 21 chapter 40 verses pg no 84.
6. Bucci LR (1995) Nutrition applied to injury rehabilitation and sports medicine.CRC Press, Boca Raton, USA pg no 76.
7. Bucci LR (1995) Nutrition applied to injury rehabilitation and sports medicine.CRC Press, Boca Raton, USA pg no 77.
8. Kaviraj ambiikanath shastri on Sushruta Samhita, Commentary by Dalhanacharya Nibandha sangraha, chaukambha samskrit samsthan, varanasi (2007) chikitsa sthana 19 chapter 34 verses pg no 82.
9. http://www.healthcare6.in/health-benefits-of-old-rice.
10. www.wikipedia.com/animalprotein.
11. http://ijpsr.com/bft-article/wound-healing-activity-of-aqueous-extract-of-leptadenia-reticulata-in-wistar-albino-rats/?view=fulltext
12. http://www.ijnpnd.com/article.asp?issn=2231-0738;year=2015;volume=5;issue=2;spage=50;epage=55;aulast=Sahoo)
13. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4486584
14. http://uses-and-benefits.com/healthy-life-style/benefits-of-radishes
15. http://servingjoy.com/health-benefits-of-eggplant
16. http://saspublisher.com/wp-content/uploads/2014/03/SJAMS-22D804-811.pdf
17. http://journals.lww.com/aswcjournal/Abstract/2017/01000/Bitter_Melon_Extract_Promotes_Granulation_Tissue.4.aspx
18. Pirbalouti AG, Azizi S, Koohpayeh A, Hamedi B. Wound healing activity of Malva sylvestris and *Punica granatum* in alloxan-induced diabetic rats. Acta Pol Pharm. 2010; 67:511–6. [PubMed]
19. Pirbalouti AG, Koohpayeh A, Karimi I. The wound healing activity of flower extracts of *Punica granatum* and Achillea kellalensis in Wistar rats. Acta Pol Pharm. 2010; 67:107–10. [PubMed]
20. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4007340
21. https://www.ncbi.nlm.nih.gov/pubmed/19152656
22. http://woundcaresociety.org/salt-water-make-wounds-heal-faster
23. Prasad V, Dorle AK (2006) Evaluation of ghee based formulation for wound healing. J Ethnopharmacol 107: 38-47.
24. Demling RH (2000) Oxandrolone, an anabolic steroid, enhances the healing of a cutaneous wound in the rat. Adv Skin Wound Care 8: 97-102.
25. https://link.springer.com/article/10.1007/BF01092296(moong)
26. Breslow RA, Hallfrisch J, Guy DG, Crawley B, Goldberg AP (1993) Theimportance of dietary protein in healing pressure ulcers. J Am Geriatr Soc 41:357-362.

How to cite this article: Manoj Kumar, Amareshappa, Anjali Bharadwaj, Shailaja SV. Scientific aspect on Diet explained by Susrutha in Wound Healing. J Ayurveda Integr Med Sci 2017;5:133-138.
http://dx.doi.org/10.21760/jaims.v2i05.10268

Source of Support: Nil, **Conflict of Interest:** None declared.