Letter to the Editor

Effects of Pomegranate on Wound Repair and Regeneration

Mohammad Bahadoram [1], Shakiba Hassanzadeh [1], Sara Bahadoram [1], Karim Mowla [2*]

1. Thalassemia and Hemoglobinopathy Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
2. Department of Rheumatology, Faculty of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

***Corresponding Author:**

Karim Mowla

Associate Professor of Rheumatology, DepartmentofInternalMedicine,School of Medicine, Golestan Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

Email: mowla_k@yahoo.com, mowla-k@ajums.ac.ir

Received: 25 Sep 2021
Accepted: 20 Dec 2021

Please cite this paper as:
Bahadoram M, Hassanzadeh S, Bahadoram S, Mowla K. Effects of Pomegranate on Wound Repair and Regeneration. World J Plast Surg. 2022;11(1):157-159. doi: 10.52547/wjps.11.1.157

Dear Editor-in-Chief

Wounds may occur during both surgical and non-surgical procedures. The processes of repair and regeneration of injured tissues are important in wound healing[1]. These processes involve an integrated action of cellular events beginning with inflammatory reactions, and then, the proliferation of the granulation tissue mostly fibroblast cells, and angiogenesis. The final stage includes the remodeling of the collagen fibers which determines the tensile strength[2]. Reduction of the recovery period may facilitate wound repairing and reduce complications such as infection and swelling.

To date, many medications such as antibiotics, vitamins, and minerals have been introduced as wound healers. Despite these advances, more investigations are required to find new therapeutic medications for wound healing that have more healing effects, better clinical outcomes, and fewer side effects[1, 2]. For example, the World Health Organization (WHO) has recently considered using complementary and traditional medicine, especially the administration of medicinal herbs[3].

In traditional Iranian medicine, pomegranate (*Punica granatum*) has been introduced as an effective wound healing medication[4]. Some studies have been performed on the wound-healing effects of the pomegranate extract pomegranate peel and seeds[5]. For example, a study by Tavangar et al. showed that the mucoadhesive gel of pomegranate (*Punica granatum*) was significantly effective in treating and controlling the symptoms of recurrent aphthous stomatitis and the results were comparable to Triadent mucoadhesive oral paste (4). Zekavat et al. performed an animal experimental study on the wound-healing effect of pomegranate (*Punica granatum*) peel extract. They evaluated the effects of hydroalcoholic extract-based carboxymethylcellulose (CMC) gel of *Punica granatum* peel (PCMC) and CMC on wound-healing. Their results showed that wound-healing occurred more rapidly in the group of rats that was treated with PCMC and CMC gel compared to the group that was treated with normal saline. Therefore, they suggested that CMC has effects against inflammation, hemorrhage, and necrosis and, in turn, results in early healing of skin wounds[6].

The principal constituents of the pomegranate peel include polyphenol compounds such as ellagic and gallic acid, flavonoids, and alkaloids.

Pomegranate peel and seeds have wound-healing properties that are mainly attributed to its ellagic and gallic acid and other phenolic compounds[5, 7]. In addition, pomegranate seeds are rich in delphinidin-3-glucoside, delphinidin-3, 5-diglucoside, cyanidin-3-glucoside, cyanidin-3, 5-diglucoside, pelargonidin-3,5-diglucoside, and pelargonidin-3-glucosid[5, 8].

The process of wound healing includes the following four steps; coagulation and hemostasis, inflammation, proliferation, and wound remodeling[9]. The molecules of collagen have a key role in the tensile strength and contraction of wounds as well as the integrity of the tissue matrix. Therefore, it is considered as a main extracellular protein in the process of wound healing[10]. Pomegranate has an inducing effect on collagen production. This effect is probably due to increased growth factors released by the macrophages that lead to the proliferation of fibroblastic cells, the main producers of collagen[5]. Among the inflammatory cells, neutrophils are the first to arrive at the wound site and are necessary for chemotaxis and bactericidal effects[9]. Subsequently, macrophages and other mononuclear leukocytes including lymphocytes arrive at the wound site about 24 hours after the injury. This cascade reaction is mediated by chemotactic factors released from the platelets, fibroblasts, and leukocytes[11]. The anti-inflammatory effects of pomegranate improve the rapid closure of wounds[5, 12]. Another important part of wound healing is the proliferation phase. Fibroblastic cells have a key role in this stage. These cells produce collagen fibers, which are the main extracellular matrix proteins. Pomegranate extract enhances the production of fibroblasts[5, 10, 13, 14]. In addition, at the first week of wound injury, increased neovascularization is essential for supplying oxygen and essential nutrients to the wound site as well as stimulating the formation of granulation tissue[15]. Furthermore, one of the main stages of tissue repair is the proliferation of epithelial cells. The epithelial cells at the marginal areas of wounds immigrate to the injury site and merge the edges of the wound. It has been reported that pomegranate pomegranate seeds and peel are capable of increasing the proliferation of epithelial cells[5, 15].

In conclusion, pomegranate seeds and peel have positive wound healing effects on various mechanisms of wound repair.

COMPETING INTERESTS

The authors declare that they have no competing interests.

FUNDING

This study was financially supported by the Vice Chancellor of Research, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

REFERENCES

1. AlMatar M, Islam MR, Albarri O, Var I, Koksal F. Pomegranate as a Possible Treatment in Reducing Risk of Developing Wound Healing, Obesity, Neurodegenerative Disorders, and Diabetes Mellitus. *Mini Rev Med Chem* 2018;**18**(6):507-26.
2. Karim S, Alkreathy HM, Ahmad A, Khan MI. Effects of Methanolic Extract Based-Gel From Saudi Pomegranate Peels With Enhanced Healing Potential on Excision Wounds in Diabetic Rats. *Frontiers in Pharmacology* 2021;**12**:704503-.
3. Derakhshanfar A, Moayedi J, Derakhshanfar G, Poostforoosh Fard A. The role of Iranian medicinal plants in experimental surgical skin wound healing: An integrative review. *Iran J Basic Med Sci* 2019 Jun;**22**(6):590-600.
4. Tavangar A, Aslani A, Nikbakht N. Comparative Study of *Punica granatum* Gel and Triadent Oral Paste Effect on Recurrent Aphthous Stomatitis, a Double Blind Clinical Trial. *J Dent (Shiraz)* 2019 Sep;**20**(3):184-9.
5. Hayouni E, Miled K, Boubaker S, et al. Hydroalcoholic extract based-ointment from *Punica granatum* L. peels with enhanced in vivo healing potential on dermal wounds. *Phytomedicine* 2011;**18**(11):976-84.
6. Zekavat O, Amanat A, Karami M, Paydar S, Gramizadeh B, Zareian-Jahromi M. Wound Healing Studies Using *Punica granatum* Peel: An Animal Experimental Study. *Adv Skin Wound Care* 2016 May;**29**(5):217-25.
7. Yan H, Peng KJ, Wang QL, et al. Effect of pomegranate peel polyphenol gel on cutaneous wound healing in alloxan-induced diabetic rats. *Chin Med J (Engl)* 2013;**126**(9):1700-6.
8. Sreekumar S, Sithul H, Muraleedharan P, Azeez JM, Sreeharshan S. Pomegranate fruit as a rich source of biologically active compounds. *BioMed Research International* 2014;**2014**.
9. Velnar T, Bailey T, Smrkolj V. The wound healing process: an overview of the cellular and molecular mechanisms. *J Int Med Res* 2009;**37**(5):1528-42.
10. Aslam MN, Lansky EP, Varani J. Pomegranate as a cosmeceutical source: pomegranate fractions promote

proliferation and procollagen synthesis and inhibit matrix metalloproteinase-1 production in human skin cells. *J Ethnopharmacol* 2006;**103**(3):311-8.
11. Akbarpour V, Hemmati K, Sharifani M. Physical and chemical properties of pomegranate (*Punica granatum* L.) fruit in maturation stage. *American-Eurasian Journal of Agricultural & Environmental Sciences* 2009;**6**(4):411-6.
12. Mori R, Power KT, Wang CM, Martin P, Becker DL. Acute downregulation of connexin43 at wound sites leads to a reduced inflammatory response, enhanced keratinocyte proliferation and wound fibroblast migration. *J Cell Sc* 2006;**119**(24):5193-203.
13. Melgarejo P, Salazar DM, Artes F. Organic acids and sugars composition of harvested pomegranate fruits. *Europ Food Res Technol* 2000;**211**(3):185-90.
14. Özkan M, Kırca A, Cemeroğlu B. Effects of hydrogen peroxide on the stability of ascorbic acid during storage in various fruit juices. *Food Chem* 2004; **88**(4):591-7.
15. Huan Y, Peng K-j, Wang Q-l, et al. Effect of pomegranate peel polyphenol gel on cutaneous wound healing in alloxan-induced diabetic rats. *Chinese Med J* 2013;**126**(9):1700-6.