



Utilization of Red Fruit on The Growth of Tissue Granulation in Diabetic Wounds

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Abstract: The utilization of red fruit on the growth of granulation tissue in diabetic wounds aims to determine the benefits of red fruit which have been scientifically proven through research in Indonesia. Methods: Conducting a literature search using the Google Scholar application and conducting an analysis of the literature included in the inclusion criteria. Results: From the search results and research results which conclude about the benefits of red fruit. Conclusion: The benefits of red fruit on the growth of granulation tissue in diabetic wounds, namely red fruit contains carotene (12,000 ppm), beta-carotene (700 ppm), tocopherol (11,000 ppm). The benefits of red fruit on the growth of granulation tissue also affect diabetic wound healing because granulation tissue is the growth of new tissue that occurs when a wound is undergoing a healing process, consisting of new capillaries and fibroblast cells that fill the cavity. Granulation tissue formation is an important step in the proliferative and healing phase of the wound. Granular tissue is a reddish network that contains capillaries at the base of the wound.

Keywords: Diabetic; Red Fruit; Tissue Granulation

Introduction

Pandanus conoideus Lam. Including monocots which are native Pandan plants of the Papua Islands and are widespread in Maluku, Papua Indonesia and Papua New Guinea (Abidin et al., 2020; Amani, 2022). The people of the Papua Islands use red fruit as a dye to give a strong red color to food and food products (Purwanto & Munawaroh, 2010), functional food and sources of vegetable oil, as well as traditional medicines from the oil (Sirait et al., 2021; Surono et al., 2008).

Granulation tissue is the growth of new tissue that occurs when the wound is undergoing a healing process, consisting of new capillaries and fibroblast cells that fill the cavity (Han, 2023; Shah et al., 2020). Granulation tissue formation is an important step in the proliferative and wound healing phase (Visha & Karunagaran, 2019). Granular tissue is a reddish network that contains capillaries at the base of the wound (Alhadj & Goyal, 2020). Wound healing is a complex physiological

response of living systems to physical, chemical, mechanical or thermal injury, in which cells and matrix components act in concert to facilitate wound regeneration and restore tissue integrity (Stallworth, 2021). Diabetes affects wound healing (Burgess et al., 2021; Deng et al., 2021). High Blood Sugar Levels prevent nutrients and oxygen from energizing cells (Cherkas et al., 2020). Prevents the immune system from functioning efficiently. Increases inflammation in body cells. This effect slows wound healing.

Diabetes mellitus is a disease caused by disturbances in changes in glucose metabolism (Poznyak et al., 2020; Sun et al., 2020). This is due to impaired glucose transport in cells due to decreased insulin action. The impact is very broad and will affect the patient's quality of life. Diabetes mellitus has now become an epidemic disease. The results of the report from the International Diabetes Federation (IDF), show that in 2013 there were 382 million people suffering from diabetes mellitus and it is estimated that by 2035 there

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will be an increase of 592 million people living with diabetes mellitus or around 55%. Of the 382 million people with diabetes mellitus, the majority are aged between 40 and 59 years and as many as 80% of them live in poor and middle-income countries. Indonesia ranks seventh in the morbidity rate of diabetes mellitus in the world after China, India, USA, Brazil, Russia and Mexico.

Medicinal plants have been reported to accelerate wound healing activity and are useful in the treatment of wound models (new incisional and excised wounds) in experimental animals, in vitro studies and in humans. The topical use of Pandanus conoideus or red fruit has an effect on healing gangrenous wounds which are complications of diabetes mellitus (H. K. Dewi et al., 2019; Rumbrawer et al., 2016). Therefore, researchers are also interested in knowing the utilization of red fruit on the growth of granulation tissue in diabetic wounds.

Method

This research is a library research (Library Research). The type of research used is a type of qualitative research. The type of this research is literature research or library research. Library research is collecting library data obtained from various sources of library information related to research objects such as through research abstracts, indexes, reviews, journals and reference books (Connaway & Radford, 2021; Siddique et al., 2021). In this study, researchers got from several sources and references related to "red fruits or Pandanus conoideus on the growth of granulation in diabetic wounds". The series of research concepts are summarized in Figure 1.

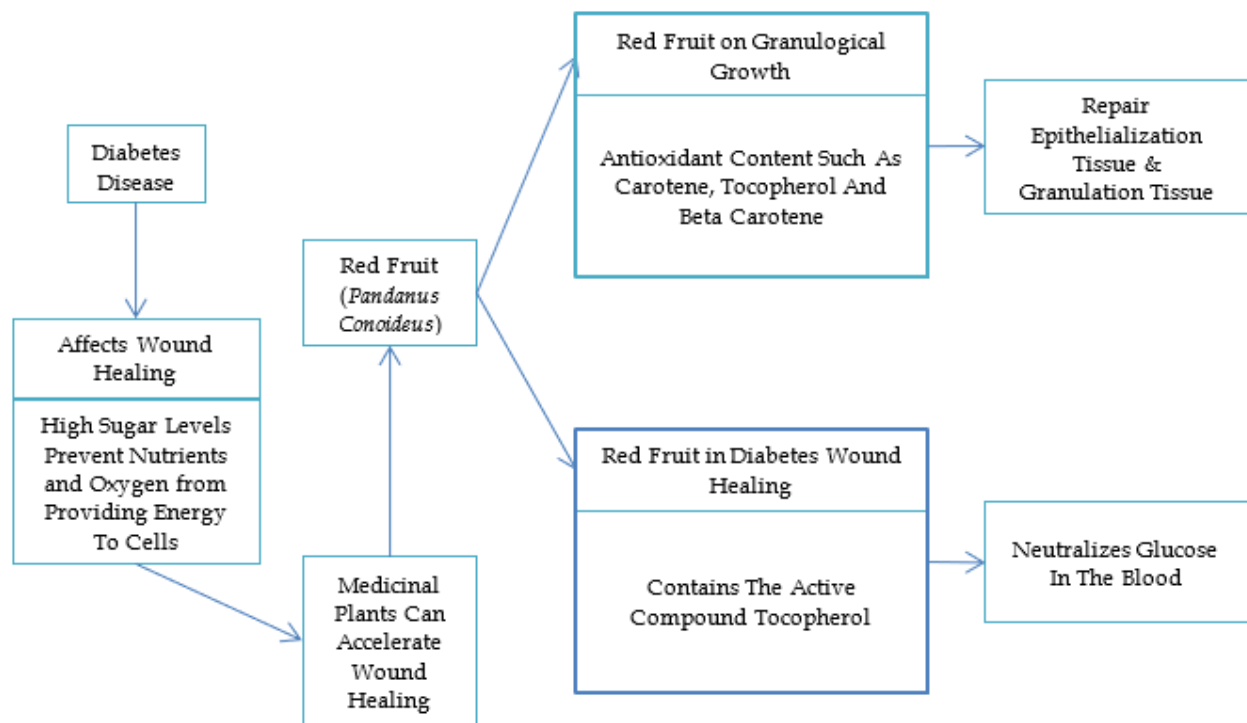


Figure 1. Conceptual Framework

Result and Discussion

Red fruit on the growth of granulation tissue

Red fruit contains nutritional composition, it turns out that in the form of red fruit juice it contains a lot of antioxidants (average content): Carotene (12,000 ppm), Beta-carotene (700 ppm), Tocopherol (11,000 ppm) (Noviyanti, 2010; Sarofa et al., 2015). In Papua, Red Fruit is one of the traditional foods by the people of Wamena, Papua (F. C. Dewi et al., 2022; Zebua et al., 2019), this fruit is called kuansu. Its scientific name is Pandanus

conoideus because the Red Fruit plant belongs to the pandan-pandanus family with trees resembling pandanus (Keim & Sujarwo, 2021; Walujo et al., 2007). One of these traditional medicines comes from the red fruit plant as a medicinal plant that has good prospects for development. One of the reasons for its development is the active ingredient content which is diverse and high enough to prevent and treat various diseases.



Figure 1. Red Fruit

The classification of red fruit plants is as follows (Lim & Lim, 2012; Limbongan & Malik, 2009):

Division: Spermatophyta

Class : Angiosperms

Subclass : Monocotyledonae

Order: Pandanales

Family : Pandanaceae

Genus: Pandanus

Species : Pandanus conoideus Lamk.

Red fruit extract in repairing granulation tissue and epithelialization tissue, so it has the potential to heal wounds (Tahir et al., 2017). Wound healing is a form of business process to repair damage that occurs to the skin. The physiology of wound healing naturally goes through several phases, namely the haemostasis phase, the inflammatory phase, the proliferative phase, and the maturation phase. In the proliferative phase, the processes of wound contraction, epithelialization, and granulation tissue formation occur. Granulation tissue is the growth of new tissue that occurs when the wound is undergoing a healing process, consisting of new capillaries and fibroblast cells that fill the cavity. Granulation tissue formation is an important step in the proliferative and healing phase of the wound.

Red fruit in diabetes wound healing

One of the plants that has a pharmacological effect and is well known today is the red fruit with the Latin name *Pandanus conoideus* Lam. Red fruit is one of the endemic plants in Papua which grows in forests. Several tribes in Papua, such as in Wamena, use red fruit as a medicine to cure various diseases.

Red fruit contains tocopherol which has an active compound in the form of tocopherol in red fruit which can neutralize glucose in the blood. The body controls blood sugar levels. Tocopherol can also help improve the work of the pancreas. This affects the insulin hormone to convert sugar into energy more effectively. That way, the risk of developing diabetes can be reduced. Tocopherol is a chemical compound that has vitamin E activity. Tocopherol (as an antioxidant) functions as a

hydrogen donor which is able to convert peroxy radicals into less reactive tocopherol radicals, thereby damaging fatty acid chains.

Based on data from the Central Statistics Agency (BPS) the number of people with diabetes in 2003 was 13.7 million people and based on the pattern of population growth it is estimated that by 2030 there will be 20.1 million people with diabetes with a prevalence rate of 14.7 percent for urban areas and 7.2 percent in rural areas. This situation is closely related to delays in diagnosis and consultation, inadequate treatment, and the extent of tissue damage (Tursina et al., 2018).

Diabetic wounds have become a major health problem worldwide (Boulton et al., 2005; Sen, 2019), because cases are increasing, wounds are chronic and difficult to heal, have infections and limb ischemia with the risk of amputation and even life-threatening, require large health resources, thus giving a socio-economic burden. economic benefits for patients, communities, and countries. Wound healing affects granulation tissue in diabetics. Red fruit is an alternative to traditional medicine which contains carotene (12,000 ppm), beta-carotene (700 ppm), tocopherol (11,000 ppm).

Conclusion

Red fruit is one of the endemic plants in Papua which grows in forests. Red fruit has various benefits to treat disease. One of the benefits of red fruit is in healing diabetic wounds. Red fruit contains carotene (12,000 ppm), beta-carotene (700 ppm), tocopherol (11,000 ppm). The benefits of red fruit on the growth of granulation tissue also affect diabetic wound healing because granulation tissue is the growth of new tissue that occurs when a wound is undergoing a healing process, consisting of new capillaries and fibroblast cells that fill the cavity. Granulation tissue formation is an important step in the proliferative and wound healing phase. Granular tissue is a reddish network that contains capillaries at the base of the wound.

Author Contribution

This article was prepared by five people, namely S.B.T, D.T, S.D.R, W.N, and N. All research members carried out each stage cooperatively until this article was completed.

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Conflicts of Interest

The authors declare no conflict of interest.

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