

Potential of moringa fruit (*moringa aloifera lamk*) seeds as an anti-inflammatory agent of oral cavity lesion



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Abstract

Objective: To know the potential of moringa fruit seed extract (*moringa Aloifera Lamk*) as an anti-inflammatory agent of oral cavity lesion.

Material and Methods: One of the natural ingredients that are widely obtained in South Sulawesi is moringa plants and from several researches this plant has been proven to have a variety of properties. Moringa fruit extracts contain components in the form of flavonoids, saponins and tannins. The content serves as an antibacterial and anti-inflammatory. Wound is the loss or partial damage of tissues on the body, one form of wounds that occur in the gingival is a lesion due to

irritation, traumatic wounds or wounds due to preoperative incision in the extraction of impacted teeth.

Results: Therefore, a natural ingredient that is easily obtained at a low price and not a b-ingredient that is made from chemicals that will provide negative effects such as hypersensitivity and resistance for those who use these drugs.

Conclusion: Moringa Oleifera Lamk seed oil has an effect on the formation of collagenase and an increase in the amount of fibroblast so that it has the potential to become an anti-inflammatory drug of the oral cavity.

Keywords: Moringa seeds (*moringa Aloifera Lamk*), Anti-inflammatory, Lesions of the oral cavity

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Introduction

Knowledge about the utilization of medicinal plants is a national heritage based on knowledge and experience carried out through generations until now, that it creates a variety of medicinal herbs which is characteristic of Indonesian traditional medicine.¹

One plant that is efficacious as a folk remedy is moringa (*moringa Oleifera*). Moringa (*moringa Oleifera*) is well known in Indonesia, but has not been optimally utilized. Behind this, moringa plant (*moringa Oleifera*) is widely used in to support nutritional needs in children and to improve the body's immune system.¹

Moringa (*moringa oleifera*) contains a good source of natural antioxidants because it contains various types of antioxidant compounds such as accsorbic acid, flavonoids, phenolic and keratonoid. Especially in moringa fruit seeds contain tannins, saponins, and flavonoids as antibacterial and antiinflammatory agent.^{1,2} Saponins, flavonoids, and tannins can help the wound healing process because it functions like an antioxidant and also accelerates epithelialization.³

The results of the study stated moringa seeds (*moringa Oleifera lamk*) as an antibacterial because moringa seed extract contains pterygospermin, moringine, glycosides 4-(α -L-rhamnosyloxy) benzylisothiocyanate and 4-(α -L-rhamnosyloxy)-p henylacetoneitrile.^{4,5}

Flavonoid compound that serves as an anti-inflammatory agent works by composing cells such as macrophages to produce growth factors and cytokines such as EGF, TGF- β , IL-1, IL-4, IL-8 and IL 10. TGF- β and EGF play a role in the induction of proliferation and migration of fibroblasts as well as induction of fibroblasts in the production of extra cellular matrices. IL 10 induces the process of chemotaksis fibroblasts and keratinocytes, activate the proliferation of fibroblasts, induce collagen synthesis and proteoglycans, activate macrophages to start the process of chemotaksis, induce margination and maturation of keratinocytes.⁶

In the field of dentistry, the wound that is commonly encountered is traumatic ulcers. Ulcers are damage to epithelial tissue that is clearly bordered and forms hollows. Traumatic ulcers can be caused by mechanical trauma such as biting the flat mucosa, lips, or tongue, being hit by a toothbrush due to hasty brushing, and surgical procedures, as well as from chemical burns, other forms of wounds that are deeper wounds i.e. wounds due to tooth extraction and removal of molars as well as oral cavity cancer removal surgery.⁷

Currently, the treatment that can be given to patients with wounds in gingiva is by administering various topical agents, antibiotics, local

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anesthesia, antihistamines, and non-steroidal anti-inflammatory agents, but the treatment is less effective to eliminate symptoms and cure lesions from traumatic ulcers. In addition, these ingredients are ingredients made from chemicals that will provide negative effects such as hypersensitivity and resistance for those who use these drugs. Therefore, treatment using natural ingredients needs to be developed.⁷

Therefore, we needed a natural ingredient that is easily obtained at a low price. One of the natural ingredients that are widely obtained in South Sulawesi is moringa plants from that several researches about this plant has been proven to have a variety of properties. Parts of the leaves and stems have been widely reported its efficacy and usefulness. Therefore, the author is interested to study the seeds of moringa fruit (*moringa aloifera lamk*) as an herbal ingredient of anti-inflammatory drug of oral cavity lesions.⁸

Material and Methods

Moringa is easily grows in the lowlands and highlands up to an altitude of \pm 1000 m. Moringa is resistant in long dry seasons and grows well in areas with annual rainfall ranging from 250 to 1500 mm. Although it prefers dry soil sandy clay or clay, but it can live in clay-dominated soils. Propagation of Moringa can be done by seeding directly with seeds or using stem cuttings.¹

Currently, moringa seeds are processed into flour or as raw materials for making medicines and cosmetics of high value, can also be used as coagulants and purification of surface water (pond water, river water, lake water to river water). It has been reported that moringa seeds are the best natural ingredients that play an important role in water management to improve water quality, reduce heavy metals, *E. coli* bacteria, algae as well as surfactants.²

Moringa seeds contains a lot of protein and fat. The protein concentration of moringa seeds (seeds in cotyledon) is 147,280 ppm / gram. Moringa seeds consist of 82% unsaturated fatty acids, 70% oleic acid.² The profile of these fatty acids is the same as that of olive oil except for linoleate acid. Seed extract provides a protective effect that lowers liver peroxide lipids, antihypertensives, isothiocyanate thiocarbamate compounds and glycosids has been isolated from the acetate phase of moringa pod ethanol extract.¹

Results

Some seeds of moringa fruit that have the potential to be anti-inflammatory and anti-inflammatory

include; Flavonoids themselves are the largest group of phenol compounds, phenol compounds have effective properties inhibiting the growth of viruses, bacteria, and fungi. The mechanism of action of flavonoids in inhibiting fungi works by denaturing proteins thus increasing the permeability of cell membranes. Denaturation of proteins causes disruption in cell formation thus changing the composition of protein components, so that by disrupting cell membranes can lead to increased permeability of cells causing damage to fungal cells. Such damage can lead to the death of fungal cells.⁴

Saponins are one of the compounds that spur the formation of collagen, which is a protein that plays a role in the healing process of wounds. Saponins also have the ability to clean so effectively for open wound healers. Saponins can increase the permeability of bacterial cell membranes so as to alter the structure and function of membranes, cause denaturation of membrane proteins so that cell membranes will be damaged and lysis, and cause bacterial destruction.⁹

Tannins have cellular mechanisms that clean free radicals and reactive oxygen, improve wound splicing, and increase the formation of capillary blood vessels and activation of fibroblasts.⁸

Wounds in the oral cavity can be caused by physical, thermal, or chemical wounds. The most frequent causes of mechanical wounds are denture irritation, bite trauma, burning and frictional irritation of sharp teeth or fractures, and tooth malposition. Other causes such as grinding teeth at night (nocturnal clenching) or biting the lips and tongue, thermal and electrical wounds, as well as food and hot drinks can also cause wounds.

Other wounds that are more severe and profound are tooth extraction wounds, postoperative wounds of molars and wounds after the removal of tumors or abnormalities of the oral cavity. The wound is usually ovoid and painful, which is limited to the damaged area. Ulcers can appear as yellowish-white necrotic regions surrounded by large areas of erythematosa. It is generally about 1 cm in size and can heal spontaneously at a certain period of 10-14 days, without leaving a scar.

Discussion

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Tannins that are widely contained by moringa fruit seed oil have cellular mechanism activities, namely cleaning free radicals and reactive oxygen, improving wound splicing, as well as improving the formation of capillary blood vessels and activation of fibroblasts.⁸

Saponins are also one of the compounds that spur the formation of fibroblasts and collagen that play a role in the wound healing process. Saponins also have the ability to clean so effectively for open wound healers. Saponins can increase the permeability of bacterial cell membranes so as to change the structure and function of membranes, cause denaturation of membrane proteins so that cell membranes will be damaged and lysis.

Based on the results of research conducted by Asmawati et al.¹⁰ that moringa seed extract has effectiveness to heal wounds gingiva rats characterized by increase the collagen thickness in wounds of white rat.^{9,10}

Result of One Way Anova test showed a meaningful difference in collagen thickness between CMC Na group 0.5% and moringa seed extract, while between aspirin and moringa seed extract had no meaningful difference.

On the 7th day the treatment group with moringa seed extract had the highest collagen thickness compared to other groups. The negative control group lacks antimicrobial, antioxidant, and anti-inflammatory agents thus allowing the invasion of microbes that interfere with wound healing. Similarly, aspirin, although aspirin has anti-inflammatory properties, but aspirin does not have antimicrobial and antioxidant agents, so the collagen density in the moringa fruit seed extract group is higher compared to other groups. In addition, moringa seed extract is also shown to increase collagen density due to kandungan tannins. Tannins have cellular mechanisms that clean free radicals and reactive oxygen, improve wound connection, and increase the formation of capillary blood vessels and activation of fibroblasts. Formation of granulated tissue, wound healing and initiation of maturation in the remodeling phase.

Moringa seeds also contain tannins and saponin compounds that serve as antibacterials so that the

wound area avoids bacterial invasion and supports wound healing.

Similarly, the results of research by Asmawati et al.¹¹ showed the results of ANOVA test on day three and day seven obtained an increase in the number of fibroblasts in the gingiva mucosa of white rats with significant value after the application of moringa fruit seed extract in the gingival wounds of white rats.

Fibroblast play an important role in the repair process, which is responsible for the preparation of producing protein structure products that will be used during the tissue reconstruction process. Under normal circumstances, fibroblast cleavage activity is very rarely seen, but when the need for these cells is seen to be more active in producing extracellular matrices. The proliferation of fibroblasts in the wound healing process is naturally stimulated by interleukin-1b (IL-1b) platelet derived growth factor (PDGF), and fibroblast growth factor (FGF). The wound healing process is strongly influenced by the role of migration and proliferation of fibroblasts in the area of need.

Fibroblasts play a role in the healing process of wounds at the stage of proliferation occurs epithelial process, after the occurrence of wounds occur morphological changes in keratinocytes on the edges of the wound. On the wounded skin, the epidermis thickens, and marginal basal cells widen and migrate to meet defects in the wound. Then followed by the process of fibroplasia is a process of proliferation of fibroblasts, migration of fibrin clot to the wound area, and production of new collagen and other protein matrices, which are involved in the formation of granulation tissue.

Conclusion

Moringa fruit seeds extract effective to heal wounds gingiva rats characterized by increasing collagen thickness in the wound of white rats; Moringa oleifera lamk seed extract has an effect on the increasing number of fibroblasts that play a role in the healing process and tissue swelling; Moringa fruit seed extract has the potential to be an anti-inflammatory agent of oral cavity lesion.

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Conflict of Interest

The authors report no conflict of Interest.

References

1. Krisnadi AD. Moringa super nutrition. Blora Retreat: Kelorina.com; 2015. p. 8-17.
2. Aminah S, Ramdhan T, Yanis M. Nutritional content and functional properties of moringa plants (*Moringa oleifera*). *Bul Pertan Perkota* 2015;5: 35-44.
3. Tamimi AAP, de-Queljo E, Siampa JP. Analgesic effect test of moringa oleifera lam. leaf ethanol extract in male white rats wistar strain (*rattus norvegicus*). *Pharmacon* 2020;9: 325-333. (In Indonesia)
4. Nuryanti S, Mustapa K, Sudarmo IG. Test the tastelessness of moringa extract (*moringa oleifera* Lamk) against the growth of candida albicans fungus. *J Akad Kim* 2017;5: 178.
5. Wajdi SA, Kasmiyati S, Hastuti SP. Test the activity of mixed antibacterial extracts of moringa seeds (*Moringa oleifera*) and kersen leaves (*Muntingia calabura*) against *Pseudomonas aeruginosa* and *Bacillus subtilis*. *J Trop Biodivers Biotechnol* 2017;2: 10-15.
6. Ojo OA, Ojo AB, Ajiboye BO, et al HPLC-DAD fingerprinting analysis, antioxidant activities of *tithonia diversifolia* (Hemsl.) A. Gray leaves and its inhibition of key enzymes linked to Alzheimer's disease. *Toxicol Rep* 2018;5: 585-592.
7. Cavalcante GM, Paula RJSd, Souza LPd, et al. Experimental model of traumatic ulcer in the cheek mucosa of rats. *Acta Cir Bras* 2011;26: 227-234.
8. Palumpun EF, Wiraguna AAGP, Pangkahila W. Administration of betel leaf extract (*Piper betle*) topically increases the thickness of the epidermis, the amount of fibroblasts, and the amount of collagen in the wound healing process in wistar strain male rats (*Rattus norvegicus*). *J Ebiomedike Bm* 2017;5: 1-7.
9. Parampasi N, Soemarno T. Effect of administration of papaya leaf extract in ethanol 70% on the healing process of incision wounds. *Maj Patol* 2013;22: 31-36.
10. Asmawati, Thalib AM, Thalib B, et al. Analysis efectivness of moringga oleifera lamk on rat *rattus norvegicus* gingival wound. *Dent Health Curt Res* 2019;5: 27.
11. Asmawati, Thalib B, Natsir N, et al. The increase of fibroblast cells number in rat (*rattus norvegicus*) gingival wound after the application of moringa (*moringa oleifera* lamk) fruit oil. *J Dentomaxillofac Sci* 2020;5: 173-176.



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