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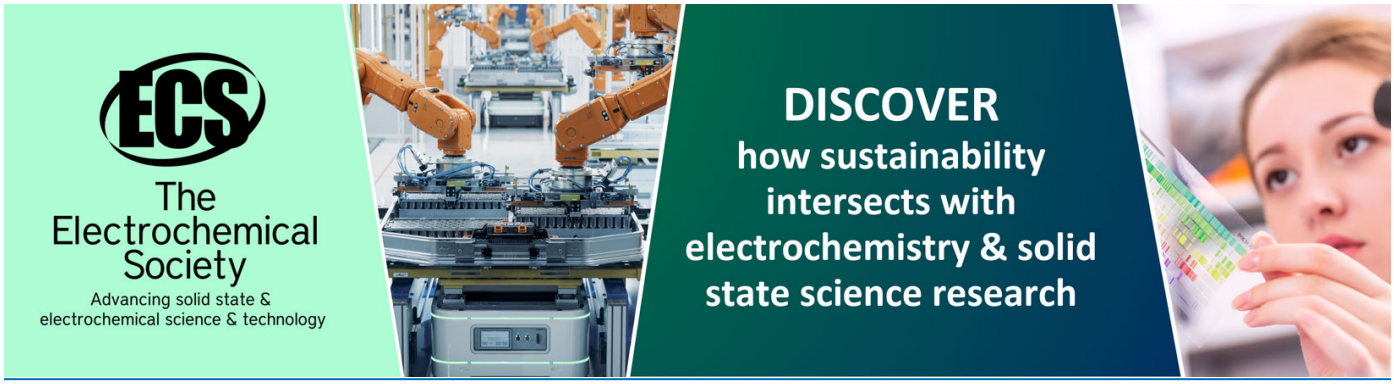

IOP Conf. Series: Journal of Physics: Conf. Series **1232** (2019) 012019 doi:10.1088/1742-6596/1232/1/012019

Bioactive Compounds In Pegagan Leaf (Centella asiatica L. Urban) for Wound Healing

Wardatul Husna Irham[1]*, Tamrin[2], Lamek Marpaung[2], Marpongahtun[2]
[1]Postgraduate School, Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Sumatera Utara, Medan, 20155, Indonesia
[2]Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Sumatera Utara, Jl. Bioteknologi No. 1, Medan20155, Indonesia

*wardatulhusna96@gmail.com

Abstract. Plants that contain properties as medicines have been widely studied, both of which are still used traditionally and modern. Compounds that play a role in wound healing include asiatic acid, this compound is generally used to heal wounds. Gotu Kola contains asiatikosida in the form of glycosides and is widely used in herbs or traditional medicine. This plant is included in 50 main types of medicinal plants. Gotu kola (Centella asiatica (L.) Urban) contains various active ingredients including: triterpenoid saponins, genin triterpenoids, essential oils, flavonoids, phytosterols, and other active ingredients. The most important active ingredient of several other active ingredients is triterpenoid saponins. The active ingredients of triterpenoid saponins include: asiatikosida, centellosida, madekossida, and asiatic acid. Saponins stimulate the formation of collagen, a protein structure that plays a role in the process of wound healing.

1. Introduction

Skin wounds are something people don't like, but sometimes these wounds cannot be avoided, such as punctures, sharp cuts, or surgical injuries. Wounds are damage to the skin which will change the structure and function of the tissue [1]. Wound healing is a natural but systematic and complex process which involves three different phases i.e. inflammatory phase, proliferative phase and maturation phase [2].

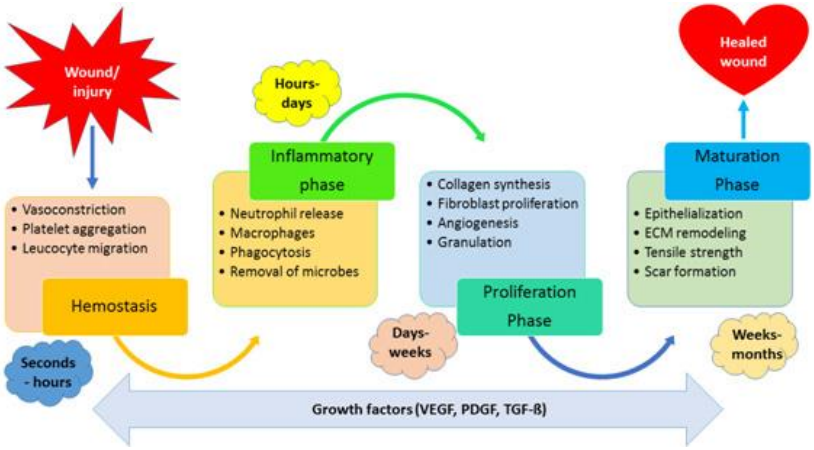

Figure 1. Phases of wound healing

Wounds affect the quality of life of patients at high costs for treatment [3]. Plants that contain properties as medicines have been widely studied, both of which are still used traditionally and modern. Compounds that play a role in wound healing include asiatic acid. Asiatic acid acts as an anti-septic agent and has the potential as an anti-fungus, this compound can also protect the body from the effects of free radicals, these compounds are generally used to heal wounds. For the therapeutic application, C. asiatica extracts were applied on the treatments of chronic wound infections [4].

Figure 2. Pegagan Leaf

Pegagan contains asiatikosida in the form of glycosides and is widely used in traditional medicinal herbs or herbs. As a medicine, pegagan is used both in the form of herbs and as a single ingredient. This plant is included in 50 main types of medicinal plants. Pegagan (Centella asiatica (L.) Urban) contains various active ingredients including: 1) triterpenoid saponins, 2) genin triterpenoids, 3) essential oils, 4) flavonoids, 5) phytosterols, and other active ingredients. The most important active ingredient of several other active ingredients is triterpenoid saponins. The active ingredients of triterpenoid saponins include: 1) asiaticoside, 2) centelloside, 3) madekossida, 4) and asiatic acid [5]. Saponins stimulate collagen formation, namely protein structures that play a role in the process of wound healing [6].

This tropical plant has been reported to have been used for various medicinal purposes such as memory improvement [7] [8], as an antidepressant [9], antibacterial, antifungal [10], psoriasis [11] even though its primary application has been in promoting wound healing.

Table 1. Molecular formula of triterpenoid saponin [13]

Triterpenoid saponin	R1	R2	Molecular formula	Molecular weight
Asiatic acid	H	Oh	$C_{30}H_{48}O_5$	488
Asiaticoside	H	O-glu-glu-rham	$C_{48}H_{78}O_{19}$	958
Madecassoside	OH	O-glu-glu-rham	$C_{48}H_{78}O_{20}$	974

Asiaticoside

Triterpenoids are the most important compounds in gotu kola plants. Triterpenoid works improve mental function and provide a calming effect. This compound can also revitalize blood vessels so as to facilitate blood circulation to the brain. Asiatikosida is part of the triterpenoid which functions to strengthen skin cells and improve repair, stimulate blood cells and the immune system, and as a natural antibiotic. Asiatikosida belongs to the triterpenoid group. Asiatikosida is a triterpenic glycoside, an alfaamarin derivative with a sugar molecule consisting of two glucose and one rhamnosa. The triterpenic aglycone in Centella asiatica is called an asiaticoside which has a primary alcohol group, glycol, and one esterified carboxylic with a sugar group [12].

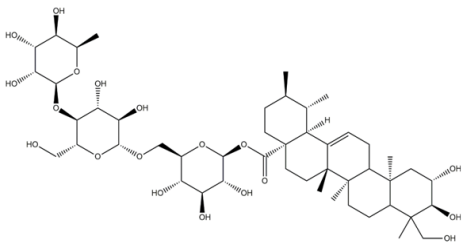

Figure 3. Structure of Asiaticoside [13]

Madecosside

Madecosside belong to the triterpenoid group [12]. Madecosside plays an important role in repairing cell damage by synthesizing collagen [14]. Collagen is a protein and covers 30% of all mammalian body proteins. Therefore, collagen fibers play a role in healing wounds or damaged tissue [3]. Madecassoside shows increased wound healing and reduced keloid formation in primary fibroblasts originating from human keloids [15].

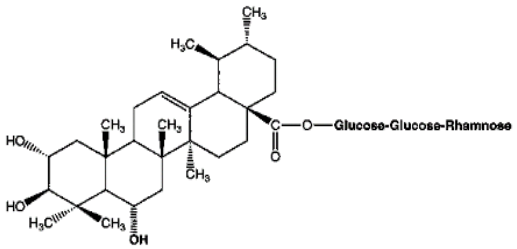

Figure 4. Structure of Madecassoside [17]

Asiatic Acid

Asiatic acid acts as an anti-septic agent and has the potential as an anti-fungus, this compound can also protect the body from the effects of free radicals, these compounds are generally used to heal wounds [4]. Helps in neuroglia generation, promotes wound healing, promotes cornification of cuticles, stimulates granulation, induces changes in gene expression, enhances learning and memory properties, antinociceptive activity, anti-inflammatory activity, inhibiting acetylcholinesterase activity, anti-apoptotic activity [16].

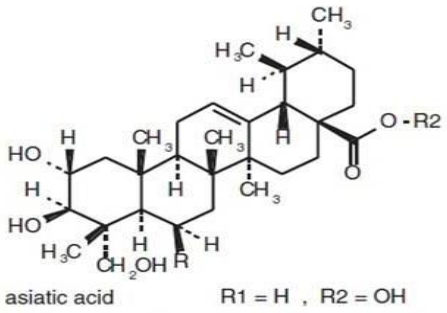

Figure 5. Structure of Asiatic acid

2. Conclusion

Pegagan leaves (Centella asitica L. urban) contain active ingredients that have the potential to heal wounds so that gotu kola leaves are well used as a medicinal herb. The active ingredient in the Centella asiatica leaf is triterpenoid saponin. Triterpenoid is the most important active ingredient in gotu kola plants. The active ingredients of triterpenoid saponins include: asiatikosida, centellosida, madekossida, and asiatic acid.

Based on the active ingredient in gotu kola plants for wound healing, the gotu kola plant will be one of the plants that has great potential to be developed. Because this gotu kola plant will be needed both in the pharmaceutical field and in the agricultural industry.

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