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The Role of *L. plantarum* as an Immunomodulator Secretion of *Transforming Growth Factor*-β1, *Transforming Growth Factor*-β3, and *Interferon*-α Macrophages and Dermal Fibroblasts

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ABSTRACT— ***This research aims to see the effect of L.plantarum in modulating the secretion of Transforming Growth Factor-TGFβ1, TGFβ3 macrophages and fibroblasts, Interferon-IFNα macrophages, and to analyze the possibility of L.plantarum potency in supporting the process of scarless wound healing. The culture of peritoneal macrophages was treated with L.plantarum for 24 hours, while another macrophage was S.aureus stimulated for 6 hours before treatment of L.plantarum for 24 hours. The formed supernatant was separated and centrifuged to serve as a treatment on the culture of rat dermal fibroblasts for 24 hours. The supernatant was then separated and centrifuged; its cytokine level was measured with enzyme-linked immunosorbent assay-ELISA. Treatment of L.plantarum with medium and high doses increased the secretion of IFNa macrophages compared with the control; all L.plantarum doses can stimulate the secretion of TGFβ1 fibroblast and TGFβ3 macrophage significantly, but it does not affect the secretion of TGFβ1 macrophages. It can be concluded that L.plantarum increased the secretion of IFNα macrophages higher than the treatment preceded by S.aureus stimulation. The secretion of TGFβ1 fibroblasts and TGFβ3 fibroblasts also increased, but it was not as high as L.plantarum treatment stimulated by S.aureus. Therefore, the application of L.plantarum to support the process of wound healing, prophylactic of the excessive scar and fibrosis can be researched further.***

Keywords— *L.plantarum*, TGFβ1, TGFβ3, IFNα

1. INTRODUCTION

Skin is one of areas in human body inhabited by a complex ecosystem with thousands of microbe species, including *Lactobacilli*. There are many researches about benefit of probiotic and several mechanisms which allow probiotic to affect health. Host-microbe interactions underlie the mechanism of *Lactobacilli* until it has an important role in the physiology of host.

The modulation of immune response has been acknowledged as one of several benefits of probiotic. In order to modulate the immunity, the probiotic microbe must communicate with the immune cells equipped with the receptor which is able to identify the molecule from microbe-PRRs. *Lactobacilli* can cause innate and adaptive immune responses on host through the bond on pattern recognition receptors-PRRs on the surface of macrophage cells. The interaction between PRRs and microbe-associated molecular patterns-MAMPs on macrophages causes a signaling sequence[1],[2]. The signaling pathways of *Toll-like* receptors-TLRs will activate the transcription factors and stimulate the cytokine secretion and growth factors by macrophages[3],[4].

During wound healing process, *transforming growth factor-beta*-TGFβ1 and TGFβ3 play important role in inflammation, angiogenesis, re-epithelialization, and regeneration of connective tissue. TGFβ1 facilitates the recruitment of inflammation cells and improves the function of macrophage in tissue debridement[5],[6]. However, TGFβ1 also plays a role in fibrosis pathogenesis. Meanwhile, TGFβ3 plays a very important role in stopping the final differentiation in the healing process, so TGFβ3 is able to hamper the excessive scar and improve better collagen organization[7],[8]. Furthermore, *interferon alpha*-IFNα can be produced by almost all cells on the response of infection from virus and bacteria. On the macrophage cells, IFNα is produced as the result of bond of TLR3 and TLR9 with microbe DNA, and the induction of *interferon regulatory factor*-IRF7 transcription factor and expression of IFN genes type I. Due to its