

Research Paper

Regulatory effects of *Lactobacillus plantarum*-GMNL6 on human skin health by improving skin microbiome

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Abstract

Bacteria response to their environment by producing some compounds which are used in cosmetic and pharmaceutical applications. Some probiotics can regulate immune response and modulate the symptoms of several diseases. Bacteria affect skin response to skin care products. Bacteria are thought to play an important role in acne incidence, skin moisture, and nutrient metabolism, but only a few studies have focused on the extracts of *Lactobacillus plantarum* in skin care. In this study, we identified that *L. plantarum*-GMNL6 enhanced collagen synthesis and the gene expression of serine palmitoyltransferase small subunit A. Meanwhile, *L. plantarum*-GMNL6 reduced the melanin synthesis, the biofilm of *Staphylococcus aureus*, and the proliferation of *Cutibacterium acnes*. Information from clinical observation during the ointment for external face use in people displayed that the syndromes of skin moisture, skin color, spots, wrinkles, UV spots, and porphyrins were improved. The diversification of human skin microbiomes was affected by smearing the face of volunteers with *L. plantarum*-GMNL6. Understanding the potential mechanisms of the action of *L. plantarum*-GMNL6 in dermatologic conditions promotes the development of care products.

Key words: *Lactobacillus plantarum*-GMNL6; probiotics; skin care; care products

Introduction

Some products of bacteria with anti-oxidative activity have been shown to play an important role in skin care. Bacteria can produce some compounds in response to environmental stress. These compounds of bacteria are generally used in medicine, cosmetics, even in sports [1]. Some probiotics have immunomodulatory activities and modulate the symptoms of several diseases [2]. Previously, the extracts of *Rhodobacter sphaeroides* inhibited inducible nitric-oxide synthase expression in activated macrophages, and reduced inflammation in colitis model [3]. The probiotics are complementary and alternative medicines and is used for promoting health [4]. Some specific probiotic strains, including *Bifidobacterium*, *Saccharomyces*, *Enterococcus*, *Bacillus*, and *Lactobacillus*, have been demonstrated for health

benefits [5]. Recently, *Lactobacillus* had been reported to ameliorate symptoms of diabetes in human studies [6]. *Lactobacillus* also reduced neuropsychiatric disorders, regulated blood pressure, provided physiological benefits, and exerted anti-inflammatory effects [7]. The pigmentary disorders and melanoma are abnormal melanogenesis is a feature of many human skin diseases. The wrinkles, melasma and age spots are often observed in skin lighteners in European. In Asia, the care products are used to make skin whiter and moisture [3]. Some probiotics is able to serve as a potential care products. Probiotics such as lactobacillus have been demonstrated to modulator skin symptoms [8]. *L. plantarum* is effective for alleviating atopic dermatitis symptoms in adults owing to its immunomodulatory effects [9]. *L.*