



Yoghurt (Probiotics) and Skin

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Abstract

Yoghurt is an excellent food for improving the condition of the GI and skin. Probiotics, an ingredient of yoghurt, play an especially important role in these improvements.

There is a very close interaction between the gut and the skin, and for instance, diarrhea often worsens skin condition. For good gut health, the ingestion of yoghurt is a well-known precautionary approach. The ingredients of yoghurt are protein, fat, calcium, vitamins and probiotics. As a probiotic supplement, yoghurt provides various health benefits. The ingestion of yoghurt (probiotics) produces beneficial effects such as anti-inflammation and inhibitory effect on allergic reaction. These actions lead to the improvement of atopic dermatitis, acne, rosacea and photoaging. We focus on probiotics that benefit human skin health and live in the microflora of the healthy gut.

Yoghurt is a common fermented food. The ingredients of yoghurt are protein, fat, calcium, vitamins and probiotics. The ingestion of yoghurt or probiotics is a well-known precautionary approach for good gut health. As a probiotic supplement, yoghurt provides various health benefits. Probiotics promote human health such as gut health (improving diarrhea and constipation), improve immune function, promote healthy skin and have an inhibitory effect on allergies. The ingestion of yoghurt (probiotics) produces beneficial skin effects such as anti-inflammation, moisturization, and improvement of the immune situation. These actions play a role in anti-inflammatory skin conditions, leading to the improvement of atopic dermatitis, acne, rosacea and photoaging. Studies in mice and skin models have shown decreases in pro-inflammatory cytokines, as well as improvements in skin hydration, TEWL, and the production of skin barrier proteins. We can say that probiotics (yoghurt) improve skin condition and the immunological skin situation through the above actions.

Keywords: Yoghurt; Skin; Lactic acid bacterium

Introduction

It has been our experience that the condition of the bowels affects skin health. For instance, diarrhea often worsens acne and atopic dermatitis, and may lead to the development of urticaria, itching, and more. There is a very close interaction between the gut and the skin, and this relation is also often affected by one's mental state. Athletes who continue intense exercise may suffer mentally, and then experience worse gut health and infectious disease. Non-athletes who work hard and experience daily mental stress may develop diarrhea, stomach pain and worsened skin health. Improving gut health also improves skin condition. For good gut health, the ingestion of yoghurt or probiotics is a well-known precautionary approach. Common probiotics are *Lactobacillus* and *Bifidobacterium* species [1], and we often eat these bacteria in yoghurt or a lactic fermenting beverage. After they are eaten, these probiotics adhere to the interstitial mucosa, where they improve the microflora of the gut [2]. A healthy Gastrointestinal (GI) environment affects the relation between skin and brain [3]. Throughout the world, yoghurt is a common fermented food. Its ingredients are protein, fat, calcium, vitamins and probiotics. As a probiotic supplement, yoghurt provides various health benefits. In this review, we focus on probiotics, bacteria that benefit human health and live in the microflora of the healthy gut [1].

Probiotics

The Food and Agriculture Organization (FAO) together with the World Health Organization (WHO) define probiotics as "live microorganisms that, when administered in adequate amounts, confer a health benefit on the host" [4], and have published their "Guidelines for the evaluation of probiotics in food" [5]. For microorganisms to be used successfully as food additives, they should maintain their viability during food processing, be stable biologically and genetically, be low cost, and resist physicochemical processing of the food [6-8]. There are over 1014 microorganisms in the Gastrointestinal Tract (GIT), a number 10 times higher than the number of cells in the entire human body [9]. A certain set of microorganisms (bacteria, viruses, fungi, archaeobacteria, protozoa) shows microbiome benefits, and these microorganisms co-exist physiologically and sometimes pathologically [10]. The skin microbiome includes bacteria, fungi, viruses, micro-eukaryotes (mites), archaea and phages in the epidermis, sweat glands, sebaceous glands and hair follicles [11,12]. The common skin microbiome includes *Staphylococcus epidermidis*, *Cutibacterium acnes* and *Corynebacterium*, which account for 45-80% of the skin microbiome [13,14]. Dermatological diseases, including acne, Atopic Dermatitis (AD) and psoriasis, show alterations in the skin microbiome [15,16], however, probiotics have been shown to have a significant impact in combatting their skin effects. The ingestion of yoghurt (probiotics) can improve not only dermatoses and allergic reactions but also the skin barrier.

Probiotics, Cytokines and Disease (Dermatoses and Allergies)

Dysbiosis is a cofactor in the genesis of allergic disorders caused by a disruption of immune maturation [17]. Probiotics promote human health such as gut health (improving diarrhea and constipation),

improve immune function, promote healthy skin and have an inhibitory effect on allergies. The ingestion of yoghurt (probiotics) produces beneficial skin effects such as anti-inflammation, moisturization, and improvement of the immune situation. The use of probiotics in treating inflammatory and infectious diseases of various organ systems includes dermatological uses [18]. Probiotics involve living microorganisms that regulate Thelper cell Types 1 (Th1) and 2 (Th2) in the immune system, resulting in positive health benefits [19,20]. Improvements in immune function by the ingestion of probiotics include increased serum Immunoglobulin (Ig) G [21] and serum Transforming Growth Factor beta (TGF- β) [22], the inhibition of Interleukin (IL)-4 [23,24], and probiotic effects against Th1 immune systems such as IL-12, Tumor Necrosis Factor alpha (TNF- α) and Interferon gamma (IFN- γ) [23]. These immune functions modulate to become an anti-inflammatory state, preventing infection [25-28] and exerting immunomodulatory activity [29]. TGF- β affects skin integrity [30,31] and induces the production of IL-4, leading to the improvement of atopic dermatitis and decreasing the risk of developing atopic conditions [32-36]. Probiotics cause inhibiting Th2mediated actions by reducing cytokines, IL4, IL5, IL6, IL13, and INF γ , consequently improving the Th1/Th2 ratio and reducing the severity of atopic dermatitis [37,38]. Moreover, *Lactobacillus rhamnosus* GG (LGG) reduces IL-4, and this action also improves atopic dermatitis [39]. Interactions among the skin, gut and brain are known to affect the skin [40], and ingesting probiotics is known to improve the skin barrier, skin hydration and Trans-Epidermal Water Loss (TEWL) [41]. These actions play a role in anti-inflammatory skin conditions, leading to the improvement of atopic dermatitis, acne, rosacea and photoaging [41-43]. Marlowe reports that probiotic supplements modulate the genetic expression of Toll-Like Receptors (TLRs), which decreases eczema in children [44]. It is interesting that children with allergic disease have more *Staphylococcus aureus* and *enterobacteria* than children without allergies [45]. Probiotics improve allergic reactions by adjusting cytokines in the GI [46], affecting Th2 cytokines and IgE [47-49], and increasing the reactions of regulatory T cells (Tregs) in the spleen [50]. The ingestion of probiotics is associated with GI condition because it affects the immune reaction by producing cytokines. We can say that probiotics (yoghurt) improve skin condition and the immunological skin situation through the above actions.

Probiotics and the Skin Barrier

Probiotics improve the GI environment, resulting in healthy skin. Common probiotics such as *Lactobacillus* and *Bifidobacterium species* in yogurt improve the decreasing number of langerhans cells by ultraviolet radiation [51], and Gueniche [52] reports that the skin barrier is strengthened and skin sensitization against lactic acid is decreased by the application of *B. longum* extract to the skin. In a human epidermis model, the topical application of both the lysate and whole preparations of a *Lactobacillus species* (*L. reuteri* DSM 17937) upregulated the gene for a skin barrier protein, aquaporin 3 [18], and the topically applied lysate of the probiotic *Lactobacillus rhamnosus* improved the expression of integral proteins of the skin barrier such as loricrin and filaggrin [53]. A previous report found a significant decrease in candida colonization and infection in the vagina due to the daily ingestion of yogurt containing *Lactobacillus acidophilus* [25], and a potential role in the treatment of acne [54] and AD has been explored. Studies in mice and skin models have shown decreases in pro-inflammatory cytokines, as well as improvements in skin hydration, TEWL, and the production of skin barrier proteins. The topical application of both the lysate and whole preparations of a *Lactobacillus species* (*L. reuteri* DSM 17937) has been found to

upregulate the gene for aquaporin 3, an important skin barrier protein that transports water and glycerol [53], and the same application in an *ex vivo* skin model decreased the production of IL-1 and IL-8 [18]. The effect of probiotics on the skin barrier may be linked to their effects in immune regulation and the expression of skin barrier proteins. Not only ingestion but also topical application medicines including probiotics possess the potential to improve some dermatoses (skin conditions).

Conclusion

Yoghurt is an excellent food for improving the condition of the GI and skin. Probiotics, an ingredient of yoghurt, play an especially important role in these improvements.

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