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Review Article

The Efficacy of *Lactobacillus ferment* Lysate-Derived Prebiotics in Mist and Serum Form on Skin Inflammation: A Two-Week Prospective Study

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Abstract

Background: Prebiotics derived from *Lactobacillus ferment* lysate support beneficial cutaneous microbiota, helping to reduce inflammation and strengthen the epidermal barrier. However, evidence assessing their topical efficacy in distinct formulations remains limited.

Objective: To evaluate the efficacy of *Lactobacillus ferment* lysate-derived prebiotics in mist and serum formulations, applied twice daily, on facial erythema as an indicator of skin inflammation.

Methods: Twenty healthy adults (15 women, 5 men; aged 29-46 years) participated in a two-week prospective study using *Lactobacillus fersment* lysate prebiotic mist and serum, both applied twice daily. Participants followed a standardised skincare regimen including a gentle cleanser and SPF50 sunscreen, with no other products permitted. Facial erythema was objectively measured before and after intervention using a Quantificare Life Viz® Mini 3D camera to determine red area percentage (erythema index). Imaging was standardised with controlled temperature and humidity, consistent morning imaging times, device calibration, fixed subject positioning and Quantificare's integrated cross-polarised LED lighting.

Results: All participants exhibited visible and quantifiable reductions in facial redness after two weeks. The mean red area decreased by 28.6% ± 6.5% compared with baseline ($p < 0.01$). No irritation or adverse reactions were reported.

Conclusion: Twice-daily application of *Lactobacillus ferment* lysate-derived prebiotic mist and serum significantly reduced facial erythema within two weeks. These findings support the role of topical prebiotics in maintaining microbiome balance and reducing cutaneous inflammation.

Keywords: Prebiotic Skincare; *Lactobacillus ferment* Lysate; Skin Microbiome; Inflammation; Erythema; Quantificare; Barrier Function

Introduction

The skin hosts a complex ecosystem of microorganisms, collectively known as the skin microbiome. It includes bacteria, fungi and viruses that play essential roles in immune modulation, infection prevention, wound healing and inflammatory regulation [1,6,8]. A balanced microbiome contributes to skin health, while microbial imbalance, known as dysbiosis, has been implicated in a range of inflammatory skin conditions such as acne vulgaris, rosacea, atopic dermatitis, psoriasis and chronic wounds [1,8]. In acne, disruptions among *Cutibacterium acnes, Staphylococcus epidermidis* and *Malassezia* species promote follicular inflammation. In atopic dermatitis, *Staphylococcus aureus* overgrowth and loss of commensal species lead to barrier dysfunction [1,8]. *Rosacea* has been associated with microbial shifts and alterations in innate immunity, while psoriasis involves decreased microbial diversity and increased pro-inflammatory signalling. These examples highlight the interaction between microbial imbalance and immune activation in inflammatory skin disease [1,6,8]. Prebiotics in skincare are non-living ingredients that act as nutrients for beneficial skin bacteria, promoting a balanced microbiome and improving barrier integrity [2,3,15]. By supporting the growth of commensal species, prebiotics can modulate immune responses and reduce inflammation, with demonstrated benefits for conditions such as atopic dermatitis, acne, erythema and dryness [3,15,16].

Lactobacillus ferment lysate is a bioferment derived from *Lactobacillus* species that promotes the growth of beneficial bacteria while strengthening the epidermal barrier [4,5,13]. It has been shown to improve hydration, enhance barrier recovery and reduce redness caused by inflammation or environmental stress [4-6,13,14]. This study aimed to evaluate the effects of *Lactobacillus ferment* lysate prebiotics, applied as both a mist and a serum, on facial erythema over a two-week period in healthy adults, in order to assess the potential of microbiome-targeted skincare to promote cutaneous health.

Materials and Methods

Study Design

This was a single-arm, open-label, two-week prospective study conducted in accordance with the Declaration of Helsinki. All participants provided written informed consent.

Participants

Twenty healthy adults (15 women, 5 men; mean age 36.8 ± 4.8 years) with mild to moderate visible facial redness were enrolled. Inclusion required a baseline Quantificare red area percentage between 15-25%. Participants were screened to exclude active dermatological disease, recent retinoid or anti-inflammatory use and known allergies to skincare ingredients. None had clinical or subclinical rosacea, atopic dermatitis or chronic erythematous disorders. Some participants self-reported sensitive skin, but this was not exclusionary. Fitzpatrick phototype distribution within the cohort was as follows: type I (n = 2), type II (n = 7), type III (n = 7) and type IV (n = 4). Phototypes V-VI were not included due to limitations in erythema quantification reliability.

Intervention

Participants followed a standardised skincare routine consisting of a mild, pH-balanced, fragrance-free facial cleanser; twice-daily application of the prebiotic mist followed by the serum (two sprays of mist allowed to dry fully before applying one drop of serum); and daily application of broad-spectrum SPF50 sunscreen. No other skincare or cosmetic products were allowed during the study.

Product Composition

The formulations were supplied by Omniere Skincare.

Glowbiotics Mist

Aqua/Water, Alcohol[1], Betaine, *Lactobacillus ferment* Lysate (approx. 2%), Sodium PCA, Hydrolyzed Glycosaminoglycans, Glycerin, Propanediol, Potassium Hydroxide, Potassium Sorbate, Sodium Benzoate, Hydrolyzed Hyaluronic Acid, Sodium Hyaluronate, Rhamnose, Glucose, Glucuronic Acid.

[1]Made using organic ingredients.

Glowbiotics Serum

Aqua/Water, Alcohol[2], Glycerin[2], Sodium PCA, Cellulose Gum, Algin, *Lactobacillus ferment* Lysate (approx. 2%), Sodium Phytate, Potassium Sorbate, Sodium Benzoate, Hydrolyzed Hyaluronic Acid, Sodium Hyaluronate, Pogostemon Cablin Oil.

[2]Made using organic ingredients.

Measurement of Skin Redness

Facial erythema was measured at baseline (Day 0) and after two weeks (Day 14) using the Quantificare Life Viz® Mini 3D imaging system. The software calculated the erythema index across standardised regions, including the cheeks, nose and forehead. To enable reproducibility, imaging conditions were carefully standardised. The Quantificare system's integrated cross-polarised LED lighting was used for all captures. Participants were positioned using a fixed chin rest and alignment guidance to maintain consistent distance and angle relative to the camera. All imaging was performed in a temperature-controlled room maintained between 21-23°C with relative humidity of 45-55%. Assessments were conducted between 9:00 and 11:00 AM to minimise diurnal variation in vascular responses and participants underwent a 15-minute acclimatisation period prior to imaging. Device calibration was performed before each imaging session in accordance with manufacturer recommendations.

Statistical Analysis

Paired t-tests were used to compare baseline and post-treatment erythema values. Data are expressed as mean ± Standard Deviation (SD). Statistical significance was defined as $p < 0.05$.

Subjective Assessment

In addition to objective imaging, participants completed a structured self-assessment questionnaire at baseline (Day 0) and after two weeks (Day 14) to evaluate perceived changes in skin condition. The questionnaire assessed four key domains: reduction in visible redness, improvement in skin hydration, overall skin comfort and sensitivity and product texture, absorption and tolerability. Each domain was rated using a 5-point Likert scale, where 1 indicated no improvement and 5 indicated marked improvement. Participants also provided qualitative comments regarding product experience, including ease of application, sensory feel and any occurrence of irritation, tightness or dryness. Responses were summarised as mean Likert scores ± SD for each domain and the proportion of participants reporting improvement (scores ≥4) was expressed as a percentage. Descriptive statistics were used to present these data and qualitative comments were thematically analysed to identify recurring perceptions of efficacy, comfort and cosmetic acceptability.

Results

Adherence and Safety

All 20 participants completed the study protocol. No irritation, dryness or adverse effects were observed. All subjects rated product tolerability as excellent.

Quantitative Findings

Quantitative assessment using the Quantificare Life Viz® Mini 3D system demonstrated a significant reduction in the percentage of red area after two weeks of treatment (Fig. 1, Table 1). The mean red area percentage decreased by 28.6% ± 6.5% from baseline ($p < 0.01$), confirming objective improvement in erythema. 3D imaging confirmed visible reductions in erythematous regions, especially on the cheeks and around the nose.

Parameter	Baseline (Mean ± SD)	Week 2 (Mean ± SD)	Mean % Change ± SD	p-value
Red area (%)	18.2 ± 4.0	13.0 ± 3.4	-28.6 ± 6.5	< 0.01

Table 1: Quantitative assessment of facial redness following two weeks of treatment with *Lactobacillus ferment* lysate prebiotic mist and serum.

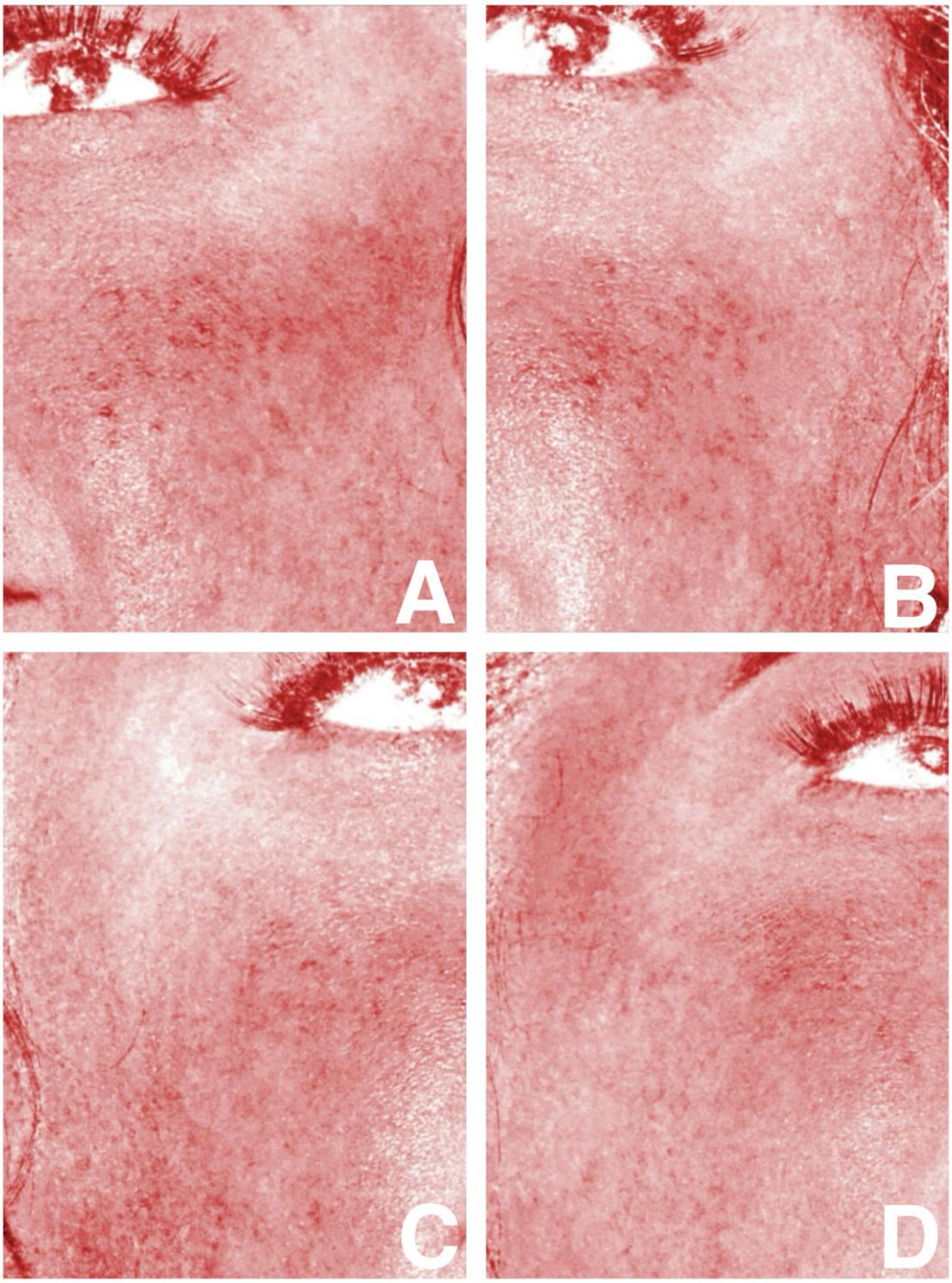

Figure 1: Quantificare 3D imaging of two representative subjects before and after two weeks of twice-daily application of *Lactobacillus ferment* lysate prebiotic mist and serum. (A) Subject 1 baseline; (B) Subject 1 after two weeks; (C) Subject 2 baseline; (D) Subject 2 after two weeks. Visible reduction in erythema is observed in both subjects, demonstrating consistent improvement in redness and overall skin appearance.

Subjective Feedback

Participants reported a high level of satisfaction with both the mist and serum throughout the two-week treatment period. Ninety percent of subjects observed a noticeable reduction in facial redness, which they described as improved evenness of skin tone and reduced blotchiness, particularly on the cheeks and perinasal area. Eighty-five percent of participants reported enhanced hydration and improved skin comfort, noting that the skin felt softer, smoother and less tight following application. Several participants also commented on reduced sensitivity and irritation during daily cleansing.

In addition, 95% rated the overall tolerability of the products as excellent, describing both formulations as lightweight, non-greasy and easily absorbed. Participants appreciated the fine mist texture, stating it felt refreshing and complemented the serum's hydrating properties when used sequentially. No stinging, itching or dryness was reported (Table 2).

Domain Assessed	Mean Score ± SD	Participants Reporting Improvement (≥4)	Qualitative Summary
Reduction in visible redness	4.3 ± 0.6	90%	Decreased redness and more even skin tone, especially on cheeks and nose.
Improvement in skin hydration	4.1 ± 0.7	85%	Improved moisture, softer texture and reduced tightness.
Overall skin comfort and sensitivity	4.2 ± 0.5	85%	Reduced irritation and greater comfort.
Product texture, absorption and tolerability	4.7 ± 0.4	95%	Lightweight, non-greasy and well tolerated, with no adverse effects.

Table 2: Participant-reported outcomes following two weeks of treatment with *Lactobacillus ferment* lysate prebiotic mist and serum. Data represent mean Likert scores ± SD for each domain. Percentages indicate the proportion of participants reporting noticeable improvement (scores ≥4).

Discussion

The skin serves as a physical barrier and an immunological interface that supports a diverse microbial ecosystem [6-8]. The composition of this microbiome varies among individuals due to differences in pH, temperature, moisture and environmental exposure [7,8]. Advances in sequencing technologies have improved understanding of host-microbe relationships and opened possibilities for therapeutic microbiome modulation [9]. Inflammation of the skin is a natural immune response that involves vasodilation, increased vascular permeability, cytokine release and immune cell recruitment [10]. Chronic inflammation can cause dehydration, barrier dysfunction, scarring and premature ageing, a process often referred to as inflammaging [10,12,13]. Prebiotics derived from *Lactobacillus ferment* lysate may help counteract these processes by restoring microbial balance, improving barrier function and reducing inflammatory activity [3-5,13,15]. Previous studies have shown that *Lactobacillus lysates* and topical *lactobacilli* can reduce pro-inflammatory cytokines such as IL-6 and TNF-α and selectively target skin pathobionts, supporting the findings in this investigation [13,14]. Topical application of probiotics and prebiotics has also demonstrated antimicrobial and immunomodulatory properties, decreasing *Cutibacterium acnes* and *Staphylococcus* species while improving acne lesions and skin health [15,16]. The combination of mist and serum delivery used in this study likely enhanced ingredient penetration and hydration. Prebiotic serums have been shown to increase water retention and reduce transepidermal water loss, while fine water sprays and similar hydrating mists improve skin moisture and viscoelasticity, thereby aiding absorption and comfort [3,16,17]. These effects together may explain the observed reduction in erythema. Despite the positive outcomes, this study has limitations. The sample size was small and there was no placebo or vehicle control group, which limits the ability to distinguish treatment effects from background variability. The mandatory use of SPF50 sunscreen and a gentle, barrier-supportive cleanser represents a significant confounding factor, as both can independently reduce erythema and improve hydration. As such, the observed improvements cannot be attributed solely to the prebiotic formulations. The two-week intervention period, while sufficient to detect early changes in erythema and comfort, may be insufficient to fully evaluate long-term soothing or anti-inflammatory effects, durability of response or structural changes associated with inflammaging. Future research should include longer follow-up periods to determine persistence of benefits [10,12]. A split-face design could have reduced inter-individual variability and strengthened causal inference by providing an internal control; however, this methodology was not adopted due to practical concerns, including the risk of mist diffusion across facial midline and potential cross-contamination, as well as participant burden. Larger, randomised, double-blind, split-face or vehicle-controlled trials incorporating biomarker analysis (for example IL-1α and TNF-α) are needed to confirm mechanisms and efficacy [18,19].

Conclusion

Twice-daily application of *Lactobacillus ferment* lysate-derived prebiotic mist and serum for two weeks significantly reduced facial erythema in healthy adults. The treatment was well tolerated and improved hydration and comfort. These findings suggest that microbiome-targeted skincare formulations can effectively reduce skin inflammation and support barrier health.

Conflicts of Interest

Dr. Vincent Wong is the founder of Omniere Skincare and supplied the products used. All other authors declare no conflicts of interest.

Authors' Contributions

Author contributed to conceptualization, treatment execution, manuscript writing and final approval.

References

1. Ellis SR, Nguyen M, Vaughn AR. The skin and gut microbiome and its role in common dermatologic conditions. Microorganisms. 2019;7(11):550.
2. Simpson P. Good bacteria for healthy Skin. New York: Simon and Schuster. 2023.
3. Zeng M, Li Y, Cheng J. Prebiotic oligosaccharides in skin health: Benefits, mechanisms and cosmetic applications. Antioxidants (Basel). 2025;14(6):754.
4. Jung Y, Jeong H, Cho Y. Lysates of a probiotic, lactobacillus rhamnosus, can improve skin barrier function in a reconstructed human epidermis model. Int J Mol Sci. 2019;20(17):4289.
5. Cui H, Feng C, Zhang T. Effects of a lotion containing probiotic ferment lysate on enhancing skin barrier: A randomized self-control study. Sci Rep. 2023;13(1):16879.
6. Mustari AP, Agrawal I, Das A, Vinay K. Role of the cutaneous microbiome in dermatology. Indian J Dermatol. 2023;68(3):303-12.
7. Moitinho-Silva L, Boraczynski N, Emmert H. Host traits, lifestyle and environment are associated with human skin bacteria. Br J Dermatol. 2021;185(3):573-84.
8. Smith A, Dumbrava R, Ghori NUH. An overview of the skin microbiome and dysbiosis in common skin pathologies. Microorganisms. 2025;13(1):54.
9. Paetzold B, Willis JR, Pereira de Lima J. Skin microbiome modulation induced by probiotic solutions. Microbiome. 2019;7(1):70.
10. Agrawal R, Hu A, Bollag WB. The skin and inflamm-ageing. Biology. 2023;12(11):1396.
11. Camilion JV, Khanna S, Anasseri S, Laney C, Mayrovitz HN. Physiological, pathological and circadian factors impacting skin hydration. Cureus. 2025;17(10):e12345.
12. Mohiuddin A. Skin ageing and modern anti-ageing strategies. Global Journal of Medical Research. 2019;19(2):1-10.
13. Lebeer S, Oerlemans EFM, Claes I. selective targeting of skin pathobionts and inflammation with topically applied lactobacilli. Cell Rep Med. 2022;3(2):100521.
14. Liu Y, Auchtung T, Collins J. Selective Targeting of Skin Pathobionts and Inflammation with Topically Applied Lactobacilli. Microbiome. 2022;10(1):39.
15. Al-Ghazzewi FH, Tester RF. Impact of prebiotics and probiotics on skin health. Benef Microbes. 2014;5(2):99-107.
16. Hong KB, Hong YH, Jung EY, Jo K, Suh HJ. Changes in human skin microbiota with cosmetic serum containing prebiotics: A randomized controlled trial. J Pers Med. 2020;10(3):91.
17. Nishimura N, Inoue S, Yokoyama K, Iwase S. Effect of fine water particle spraying on facial skin moisture and viscoelasticity in women. Skin Res Technol. 2018;25(3):294-8.
18. Rothwell PM. External validity of randomized controlled trials: To whom do the results apply? Lancet. 2005;365(9453):82-93.
19. Pocock SJ, Friedman LM, Furberg CD, Demets DL. Fundamentals of clinical trials. Biometrics. 1982;38(3):873.