ISSN: 2457-0400

Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

www.wjahr.com

Volume: 10, Issue: 1

Page N. 63-68

Year: 2026

Original Article

Coden USA: WJAMA3

PROBIOTIC AS AN ADJUVANT THERAPY FOR RECALCITRANT DERMATOPHYTOSIS: A PROSPECTIVE STUDY CONDUCTED IN MOSUL GENERAL HOSPITAL

***Dr. Ahmed Shfaa Aldeen Alqazzaz**

M. B. Ch. B, HD. D & V, Mosul General Hospital.

Article Received: 01 December 2025 **Article Revised:** 22 December 2025 **Article Published:** 01 January 2026

***Corresponding Author: Dr. Ahmed Shfaa Aldeen Alqazzaz**

M. B. Ch. B, HD. D & V, Mosul General Hospital.

DOI: https://doi.org/10.5281/zenodo.18105997

How to cite this Article: *Dr. Ahmed Shfaa Aldeen Alqazzaz (2026). Probiotic As An Adjuvant Therapy For Recalcitrant Dermatophytosis: A Prospective Study Conducted In Mosul General Hospital. World Journal of Advance Healthcare Research, 10(1), 63–68.

ABSTRACT

Background: Recalcitrant dermatophytosis is a significant health problem. It is a worldwide growing health issue. The problem is either resistant to antifungals or relapses quickly after drug discontinuation. Probiotics are living microorganisms that can treat different body infection including skin dermatophytosis. **Objectives:** Is to investigate the clinical role of probiotic as adjuvant therapy for recalcitrant dermatophytosis. **Methods:** The study is a case control prospective study conducted at Mosul General Hospital in Mosul, Iraq from the 1st of November 2024 to the end of October 2025. The study included 150 patients with recalcitrant dermatophytosis, divided into two groups. Cases group include 50 patients who treated with Itraconazole 100 mg once daily, Probiotic cap once daily and Luliconazole topical cream twice daily, while control group include 50 patients treated only with Itraconazole 100 mg once daily and Luliconazole topical cream twice daily only. These groups were followed for 6 months. Clinical and photographic assessment was done at each of day 0, day 30, day 60 and day180. The questionnaire includes four parts. Part one for demographic information of the study patients. The second part for the patients' body mass index. Part three for patients' clinical profile. Part four for symptom severity score at starting point and at follow up results (1^{st}, 2^{nd}, and 6^{th} months) after starting of treatment. **Results:** The mean age ± standard deviation of the study patients was 39.42 ± 11.61 years. Males represent 76 (50.67%) of the study patients and females represent 74 (49.33%) of the study patients, with male to female ratio equal to 1.02:1. Statistically significant difference between cases and controls started after the second month of treatment initiation (P value <0.001) then subsequently the difference decrease (P value = 0.003). **Conclusion:** In conclusion, this study revealed that Adding probiotic to antifungal treatment can decrease MMP and disrupt biofilm formation thus effectively treat recalcitrant dermatophytosis.

KEYWORDS: Antifungal, Infection, Probiotics, Resistance, Skin.

1-INTRODUCTION

Today, recalcitrant dermatophytosis is a significant health problem. It is a worldwide growing health issue.[1-2] The problem is either resistant to antifungals or relapses quickly after drug discontinuation.[3] It manifests as fast spread throughout the entire body and to other family members.[4]

Probiotics are living microorganisms (bacteria or yeast) that can treat irritable diarrhea, bowel syndrome and even cancer.[5] Probiotics have been shown to improve gut microbiome and skin health, reducing inflammation, oxidative stress, and improving skin barrier function.[6] The gut-microbiota imbalance can affect skin conditions such as acne, atopic dermatitis, and fungal infections. This is referred to as the probiotic skin gut axis.[7] Oral probiotics can reduce inflammation, oxidative stress, and enhance skin barrier function.[8]

Dermatophytosis is an infection caused by a dermatophyte, often of the *Trichophyton*, *Microsporum*, or *Epidermophyton* genera, that affects the hair, skin, and nails.[9] *Tinea capitis*, *T. pedis* and *Onychomycosis* are all frequent cutaneous infections which are found

worldwide, especially in tropical and subtropical hot and wet areas like Iraq.[10] Although the species were formerly classified into these genera based on appearance and physical characteristics, current rRNA sequencing data shows that the dermatophytes are a coherent group with no obvious differentiation between the three genera.[11] Dermatophytes infect human skin cells based on their keratin protein concentration. The most important elements of the body that contain keratin are hair, skin cells, and nails.[12] As a result, dermatophytosis produced by dermatophytes affects only the keratinous tissues. Some species, such as *Epidermophyton floccosum* and *Trichophyton rubrum*, infect skin cells rather than hair or nails, but *Trichophyton mentagrophytes* and *Trichophyton tonsurans* may infect all keratinized cells.[13]

Dermatophyte-caused fungus infections can be treated with oral or topical antifungal medications. Generally, entails the use of allylamine antifungal drugs (mostly terbinafine) as well as azoles such as ketoconazole, miconazole, and oxiconazole. The majority of fungal infections may be treated only with topical medications.[14] However, early studies suggest that probiotics can improve skin health by introducing good microorganisms and creating a barrier to inflammation, which can lead to skin problems.[15] As a result, topical probiotics are an attractive field of research and many manufacturers are experimenting with adding probiotic strains or extracts to skin care products such as moisturizers, cleansers, peels, and lotions.[16]

The aim of study is to investigate the clinical role of probiotic as adjuvant therapy for recalcitrant dermatophytosis.

2-PATIENTS AND METHODS

The study is a case control prospective study conducted at Mosul General Hospital in Mosul, Iraq from the 1st of November 2024 to the end of October 2025. Ethical approval was given by Nineveh Health Directorate. The study is confidential and did not include any information that might be used to identify a specific individual. To be eligible to participate in the study, participants had to have more than 6 months duration of recalcitrant tinea to treatment (either no response or recurrence after stopping treatment). In contrast, those with less than 6 months duration, were excluded from the study.

The study included 150 patients with recalcitrant dermatophytosis, divided into two groups. Cases group include 50 patients who treated with Itraconazole 100 mg once daily, Probiotic cap once daily and Luliconazole topical cream twice daily, while control group include 50 patients treated only with Itraconazole 100 mg once daily and Luliconazole topical cream twice daily only. These groups were followed for 6 months. Clinical and photographic assessment was done at each of day 0, day 30, day 60 and day180. As shown in figures 1, 2 and 3 below.

Figure 1: A 27 years old lady with recalcitrant *Tinea Corporis* belong to case group.

Figure 2: A 68 years old man with recalcitrant *Tinea Corporis* belong to case group.

Figure 3: A 46 years old lady with recalcitrant *Tinea Corporis* belong to case group.

The questionnaire includes four parts. Part one for demographic information of the study patients (age, gender and residence). The second part for the patients' body mass index. Part three for patients' clinical profile (type of dermatophytosis and extent of involvement). Part four for symptom severity score at starting point and at follow up results (1st, 2nd, and 6th months) after starting of treatment.[17]

The statistical software SPSS-30 (Statistical Packages for Social Sciences, version 30) was used to analyze the data. Data were interpreted in simple measures of frequency, percentage, mean and standard deviation. Chi square test was used of comparing between two groups. P value of less than 0.05 was considered statistically significant.

3- RESULTS

The mean age ± standard deviation of the study patients was 39.42 ± 11.61 years. Males represent 76 (50.67%) of the study patients and females represent 74 (49.33%) of the study patients, with male to female ratio equal to 1.02:1.

Table 1 shows comparison between cases and controls regarding their demographic variables. No statistically significant difference found for the two groups regarding these variables (P value > 0.05).

Table 1: Comparison between cases and controls regarding their demographic variables (number= 150).

Variables	Cases		Controls		P- value
	No.	%	No.	%	
Genders:					
-Male	25	50%	51	51%	0.992
-Female	25	50%	49	49%	
Ages:					
- 18-25	12	24%	20	17%	
- 26-35	15	30%	26	29%	
- 36-45	17	34%	34	34%	0.620
- 46-55	4	8%	14	14%	
- More than 55	2	4%	6	6%	
Residence:					
-Urban	27	54%	56	56%	0.390
-Rural	23	46%	44	44%	

Table 2 shows comparison between cases and controls regarding their anthropometric variables. No Statistically significant difference between the two groups regarding their BMI (P value = 0.402).

Table 2: Comparison between cases and controls regarding their anthropometric variable (number = 150).

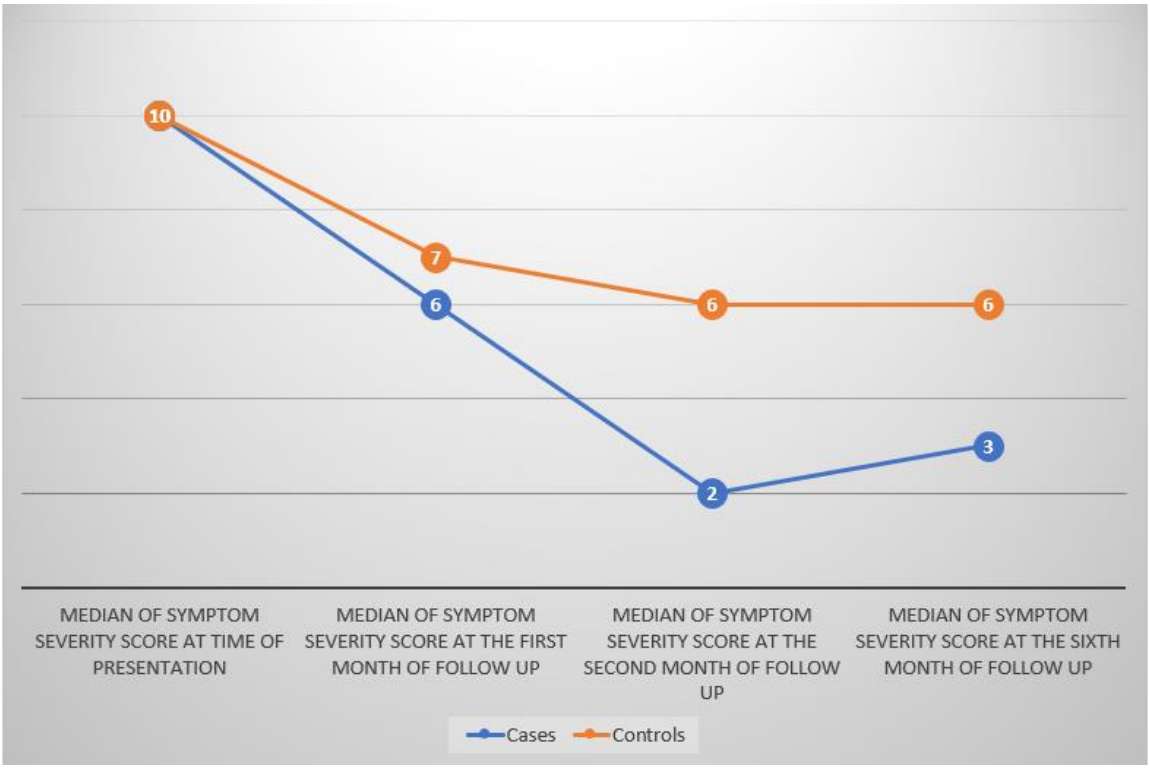
Variables	Cases		Controls		P- value
	No.	%	No.	%	
Body mass index:					
- Underweight	1	2%	3	3%	
- Normal	24	48%	54	54%	0.402
- Overweight	16	32%	30	30%	
- Obesity	9	18%	13	13%	

Table 3 shows comparison between cases and controls regarding their type and extent of tenia involvement. No significant difference between them regarding these topics (P value >0.05).

Table 3: Comparison between cases and controls regarding their type and extent of tenia involvement (number = 150).

Variables	Cases		Controls		P- value
	No.	%	No.	%	
Type of dermatophytosis:					
-Tenia Corporis	31	62%	59	59%	0.904
-Tenia Cruris	13	26%	31	31%	
-Mixed	6	12%	10	10%	
Extent of involvement:					
Less than 10%	29	58%	56	56%	0.892
10-30%	12	24%	27	27%	
More than 30%	9	18%	17	17%	

Figure 1 shows comparison between the two groups regarding different time interval according to their median of symptom severity score. Statistically significant difference between the two groups started after the second month of treatment initiation (P value <0.001) then subsequently the difference decrease (P value = 0.003).



4. DISCUSSION

Most skin infections cause the release of Matrix Metaloproteinase (MMP), a family of enzymes that play a role in inflammation and tissue remodeling. An overabundance of MMP can impede healing, resulting in excessive breakdown of the extracellular matrix and tissue damage, which can worsen the infection and contribute to the chronicity of the condition.[18] So, the resistance of the infection is not only attributable to the species itself, but also due to the damage of the tissue induced by the species.[19]

The study found no significant difference between the two groups regarding their initial parameters due to intentional matching between them. However, the main finding of the current study was adding probiotics to conventional antifungal treatment for fungal infections can lead to significant improvements in symptom severity and cure rates, which often becoming apparent after the second month of treatment. Probiotics appear to work as an effective adjunct therapy by enhancing the efficacy of antifungals and reducing recurrence rates. In a randomized controlled trial of patients with *vulvovaginal candidiasis* (VVC), a fungal infection similar to tinea, the group receiving both oral probiotics

(containing *Lactobacillus rhamnosus*, *L. crispatus*, *L. gasseri*, and *L. jensenii*) and a single dose of oral fluconazole had higher clinical and mycological cure rates and fewer relapses than the group receiving fluconazole alone.[20] Divyashree et al also demonstrate that Probiotics, a well-studied biological product, are safe to consume and are being used to treat a variety of fungal diseases including *Aspergillus*, *Mucor*, *Rhizopus*, *Candida*, *Fusarium*, *Penicillium*, and *Dermatophytes*.[21] These results could be occurred due to several mechanisms, including: restoring microbiome balance by helping repopulate the body with beneficial bacteria, which competes with pathogenic fungi for nutrients and adhesion sites, or by direct antifungal properties, as certain probiotic strains produce organic acids, hydrogen peroxide, and bacteriocin-like substances that directly inhibit fungal growth and the formation of biofilms.

There were a few limitations in the study. The small sample size limits its generalizability, necessitating more research using bigger, more diverse groups. However, this study may contribute to the creation of customized clinical practice guidelines for Iraqi patients with recalcitrant dermatophytosis when paired with other researches findings, which might significantly improve preventative efforts.

5- CONCLUSION

In conclusion, this study revealed that Adding probiotic to antifungal treatment can decrease MMP and disrupt biofilm formation thus effectively treat recalcitrant dermatophytosis.

ACKNOWLEDGEMENT

We appreciate the assistance offered by the medical staff at Mosul General Hospital and the thorough attention the Nineveh Directorate of Health gave to our study project. This study could not have been done without the assistance of each of these people.

Conflict of intertest

About this study, the authors disclose no conflicts of interest.

REFERENCES

1. Sardana K, Gupta A, Mathachan SR. Immunopathogenesis of dermatophytoses and factors leading to recalcitrant infections. Indian dermatology online journal, 2021 May 1; 12(3): 389-99.
2. Dellière S, Jabet A, Abdolrasouli A. Current and emerging issues in dermatophyte infections. PLoS pathogens, 2024 Jun 13; 20(6): e1012258.
3. Denning DW. Antifungal drug resistance: an update. European Journal of Hospital Pharmacy, 2022 Mar 1; 29(2): 109-12.
4. Hossain CM, Ryan LK, Gera M, Choudhuri S, Lyle N, Ali KA, Diamond G. Antifungals and drug resistance. Encyclopedia, 2022 Oct 10; 2(4): 1722-37.
5. Dahiya D, Nigam PS. Biotherapy using probiotics as therapeutic agents to restore the gut microbiota to relieve gastrointestinal tract inflammation, IBD, IBS and prevent induction of cancer. International journal of molecular sciences, 2023 Mar 17; 24(6): 5748.
6. Gao T, Wang X, Li Y, Ren F. The role of probiotics in skin health and related gut–skin axis: A review. Nutrients, 2023 Jul 13; 15(14): 3123.
7. Mahmud MR, Akter S, Tamanna SK, Mazumder L, Esti IZ, Banerjee S, Akter S, Hasan MR, Acharjee M, Hossain MS, Pirttilä AM. Impact of gut microbiome on skin health: gut-skin axis observed through the lenses of therapeutics and skin diseases. Gut microbes, 2022 Dec 31; 14(1): 2096995.
8. Jwo JY, Chang YT, Huang YC. Effects of probiotics supplementation on skin photoaging and skin barrier function: a systematic review and meta-analysis. Photodermatology, Photoimmunology & Photomedicine, 2023 Mar; 39(2): 122-31.
9. Zorab HK, Amin SQ, Mahmood HJ, Mustafa HH, Abdulrahman NM. Dermatophytosis. One Health Triad, 2023; 3: 99-106.
10. Farhan RK. Dermatophytes and Bacterial Super infections in antimicrobial resistant Tinea pedis patients in Dour city, Iraq. European Journal of Molecular and Clinical Medicine, 2021 Jan 1; 8(1): 1396-409.
11. Kabtani J, Ranque S. A comparative description of dermatophyte genomes: a state-of-the-art review. Mycopathologia, 2023 Dec; 188(6): 1007-25.
12. Martinez-Rossi NM, Peres NT, Bitencourt TA, Martins MP, Rossi A. State-of-the-art dermatophyte infections: epidemiology aspects, pathophysiology, and resistance mechanisms. Journal of Fungi, 2021 Aug 3; 7(8): 629.
13. Paul J. Skin Infections. InDisease Causing Microbes 2024 Jan 3 (pp. 65-98). Cham: Springer International Publishing.
14. Schaefer S, Corrigan N, Brunke S, Lenardon MD, Boyer C. Combatting fungal infections: Advances in antifungal polymeric nanomaterials. Biomacromolecules, 2024 Aug 23; 25(9): 5670-701.
15. Mathur N, Sai C. Probiotics Therapy for Dermatophytosis, 2020.
16. Puebla-Barragan S, Reid G. Probiotics in cosmetic and personal care products: Trends and challenges. Molecules, 2021 Feb 26; 26(5): 1249.
17. Bhat RM, Madhumita M, Jayaraman J, Antony B, Santosh G, Benny JV, Ancy A. Clinico-mycological validation of dermatophytosis severity score and its correlation with patient-reported outcome measures. Mycoses.
18. Stanescu C, Chiscop I, Mihalache D, Boev M, Tamas C, Stoleriu G. The Roles of Micronutrition and Nutraceuticals in Enhancing Wound Healing and Tissue Regeneration: A Systematic Review. Molecules, 2025 Aug 31; 30(17): 3568.

19. Reygaert WC. An overview of the antimicrobial resistance mechanisms of bacteria. AIMS Microbiol, 2018 Jun 26; 4(3): 482-501.
20. Akinosoglou K, Schinas G, Polyzou E, Tsiakalos A, Donders GGG. Probiotics in the Management of Vulvovaginal Candidosis. J Clin Med, 2024 Aug 30; 13(17): 5163.
21. Divyashree S, Shruthi B, Vanitha PR, Sreenivasa MY. Probiotics and their postbiotics for the control of opportunistic fungal pathogens: A review. Biotechnol Rep (Amst), 2023 May 4; 38: e00800.