

Journal of Molecular Science

www.jmolecularsci.com

ISSN:1000-9035

Clinico-Mycolological Profile Of Recalcitrant Dermatophytosis: A Study Of Species Diversity, Risk Factors And Recurrence.

Dr.K. Lavanya¹, Dr. Sireesha.Chava², Dr. D.Sisira³, Dr. G. Suguneswari^{4*}¹Associate professor, Department of Microbiology, Government Medical College, Rajamahendravaram, AP.²Assistant professor, Department of Microbiology, Government Medical College, Rajamahendravaram, AP.³Associate professor, Department of Microbiology, Malla Reddy Medical College for Women, Hyderabad, Telangana.^{4*}Professor, Department of Microbiology, Great Eastern Medical School and Hospital, Srikakulam, AP.

Article Information

Received: 15-10-2025

Revised: 12-11-2025

Accepted: 26-11-2025

Published: 24-12-2025

Keywords

Dermatophytes, Recalcitrant dermatophytosis, Trichophyton mentagrophytes, T. rubrum

ABSTRACT

Dermatophytosis is a disease of hair, nail and skin produced commonly by dermatophytes. The predominate dermatophytes involved are Trichophyton and less predominately Microsporum and Epidermophyton. Mostly conventional regimens of antifungals appear to be ineffective in the present clinical scenario; a combination drugs offer no significant advantage over antifungal agents alone in treating dermatophytosis.

Objectives: A study was conducted to find the species contributing to recalcitrant dermatophytosis and to identify the risk factor and the correlation of age and disease recurrence.

Method: The study utilized an observational approach which was carried out in the out-patient department of Dermatology-King George-Hospital, Visakhapatnam, Andhra Pradesh for a period of 24 weeks. Skin scrapings from the patients were screened for fungal hyphae in direct KOH mount and all the specimens were cultured in Sabouraud's dextrose agar with chloramphenicol (0.04gms/litre) and cycloheximide (0.5g/litre). The growth was observed in lactophenol cotton blue, and were confirmed by slide culture.

Results: Among the 50 samples collected, 19 samples were obtained positive for fungal culture. According to the laboratory results of fungal culture of recalcitrant dermatophytosis skin scrapings, *T. mentagrophytes*, showed predominance followed by *Trichophyton rubrum* and *Trichophyton tonsurans*.

Conclusion: Recalcitrant dermatophytosis is a superficial mycotic infection produced by dermatophytes, such as *Trichophyton*, *Epidermophyton* or *Microsporum* species, does not respond well to standard treatments. This can be a challenging condition to manage, as the typical antifungal therapies may not effectively eliminate the infection or prevent its recurrence

©2025 The authors

This is an Open Access article distributed under the terms of the Creative Commons Attribution (CC BY NC), which permits unrestricted use, distribution, and reproduction in any medium, as long as the original authors and source are cited. No permission is required from the authors or the publishers. (<https://creativecommons.org/licenses/by-nc/4.0/>)

INTRODUCTION:

Back ground: Dermatophytosis is an invasion of superficial keratinized tissue of skin, hair and nails caused dermatophytes. A specific set of fungi known as ringworms or tinea such as *Trichophyton*,

Microsporum and *Epidermophyton*. Mode of transmission of the disease directly either by infected humans or indirectly by contaminated fomites. Dermatophytosis is the common skin infection in developing countries like India and reported prevalence rates range from 36.6% to 78.4% recently. The commonly used conventional regimens of various antifungal agents appear to be ineffective in the present clinical situation. Patients with dermatophytosis are commonly experiencing recurrence after discontinuing treatment with antifungals, but was proved wrong due to the failure antifungal agents in management of the disease. The other factors such as host immune response and impaired epidermal barrier function, the use of corticosteroids in fixed dose

combinations with antifungal agents.¹ According to most studies in India, depending on the body site involvement the majority of tinea infections are tinea corporis and tinea cruris, and identified *Trichophyton rubrum* (*T. rubrum*) as the predominant isolate, only few researches showed tinea unguium as the leading disease clinically. In nearly 90% of chronic cases of dermatophytosis, *T. rubrum* is the major cause with tinea cruris and tinea corporis being the predominant clinical types. Misuse of topical steroids may play a prominent role in the surge of recalcitrant dermatophytosis is merely a convenient. Topical administration of antifungal agents in combination with steroid. Since longer time the use of antifungal agents in combination with steroid are in practice even some evidence supports their use for shorter or ultra shorter duration, the most recent well constructive studies observed that the combination drugs show no significant improvement over antifungals alone in the management of dermatophytosis.² Generally, Dermatophytosis is more common in post pubertal individuals, exempting tinea capitis. Dermatophytosis show higher predominance in men over women due to the higher occurrence of tinea cruris, tinea pedis and tinea unguium in men.^{2,3}

Objectives: Objectives: Our study was designed to detect the causative organisms and risk factors for Recalcitrant Dermatophytosis. This study also determined the average duration for relapse of Dermatophytosis after initial recovery.

Significance of the study: This study attempts to identify the exact species contributing to Recalcitrant Dermatophytosis and to find out the risk factors for Recalcitrant Dermatophytosis and the frequency of recurrence of Dermatophytosis in relation to patient demographics age and sex.

The study was conducted in accordance to the Declaration of Helsinki. The study was initiated only after the approval from the Institutional Ethics Committee of King George Hospital, Visakhapatnam. The patient's Informed Consent was obtained before start of the study.

MATERIALS AND METHODS:

An observational study was carried out in the out-patient department of Dermatology, King George Hospital, Visakhapatnam, Andhra Pradesh for a period of 24 weeks. An ethical committee approval and informed consent from the patients were obtained prior to the study. In the course of this study, 496 patients were included who were diagnosed with Recalcitrant dermatophytosis through screening. Patients of Recalcitrant Dermatophytosis for less than 3 months duration

were enrolled and were divided into Arm-A consists of those who had been diagnosed with Recalcitrant dermatophytosis for less than three months duration and had scaling in the affected area as a result of the disease. The skin scraping method was used to collection of samples, and sent to the microbiology laboratory for fungal culture. In contrast, individuals in Arm-B who were diagnosed with Recalcitrant dermatophytosis but did not exhibit scales were included in an epidemiological study. The skin scrapings were screened for fungal hyphae in direct KOH mount. All the specimens were inoculated onto Sabouraud's dextrose agar supplemented chloramphenicol (0.04gms/litre) and cycloheximide (0.5g/litre). The growth obtained were teased with teasing needles and were observed by Lactophenol cotton blue. Slide cultures were made for confirmation of the fungal growth.

Statistical analysis: Gender -wise distribution among Study subjects in Arm-A & Arm-B were assessed by the repeated measures of Chi-square test (X²). Age group-wise distribution among Study subjects in Arm-A & Arm-B were assessed by the repeated measures of One-way ANOVA. Duration of History of Recalcitrant Dermatophytosis among Males and Females in Arm-A and Arm-B were assessed by the repeated measures of Two-way ANOVA. Duration of History of Recalcitrant Dermatophytosis among Age groups in Arm-A and Arm-B were assessed by Two-way ANOVA.

RESULTS:

Out of 496 study participants, 50 individuals enrolled in Arm-A and 446 in Arm-B. In Arm-A 22 (44%) participants were males and 28 (56%) were females. In Arm-B 255 (57.18%) participants were males and 191 (42.82%) were females (Table 1).

The enrolled patients were within 10-to-70-year age range, and, the most predominant age group in Arm-A was 31-40 years comprising 15 subjects, followed by age groups 21-30 and 41-50 comprising 12 subjects, 51-60 comprising 5 subjects. In Arm-A the age group with least patients was seen in 10-20 and 61-70 years comprising of 3 subjects. Whereas in Arm-B, the most predominant were 31- 40 years comprising 122 subjects, followed by 10-20 comprising 103 patients, 41-50 comprising 86 patients, 21-30 comprising 78 patients, and 51-60 comprising 42 patients. In Arm-B the age group with the least patients was 61-70 years comprising 15 subjects. A statistically significant difference was identified among distinct age groups was calculated by One way ANOVA test (P-Value-0.4481) (Table 2).

The total number of enrolled participants were 496 from those, 50 individuals enrolled in Arm-A and 446 in Arm-B. In Arm –A ,23 (4.632%) participants were males, the recurrence of dermatophytosis was seen more in >1month to ≤ 2 months followed by < 1 month and >2 months to ≤ 3 months and 27 (5.443%) were females, the reoccurrence of dermatophytosis was seen more >1month to ≤ 2 months and then followed by >2 months to ≤ 3 months and < 1 month followed by >1month to less than 2 months and more than two months to less than three months and 190 (38.313%) were females , the reoccurrence of dermatophytosis was seen more in month followed by >1month or ≤ 2 months and >2 months or ≤ 3 months . A statistically significant difference was identified among males and females in duration (Table 3).

In Arm –A, the recurrence of Dermatophytosis was seen mostly in >1 month to ≤ 2 months with 29 participants from 10-70 age group followed by < 1 month with 11 participants and >2 months to ≤ 3 months with 10 participants from 10-70 age group. In Arm-B, the reoccurrence of Dermatophytosis was seen mostly in 1 month to ≤ 2 months with 122 participants and >2 months to ≤ 3 months with 46 participants from 10-70 age group. A statistically significant difference was identified (Table 4).

Sharing Clothing as a prevalent risk factor, particularly among females aged 10-20, where it constitutes most reported cases (57.66%). This behaviour gradually decreases with age but remains a significant concern across various demographic segments. Excessive Sweating is another noteworthy factor, showing a varied distribution across age groups and genders, with a peak in the 21-30 age range for both males and females (32.25%). Poor Hygiene follows its overall prevalence is lower. In contrast, Occlusive Footwear appears to be a relatively rare risk factor across all demographics (Table 5).

Among the 50 samples collected ,19 samples were obtained positive for fungal culture and 31 samples were obtained negative for fungal culture. According to the laboratory results we received for our study, *T. mentagrophytes*, which affected 16 individuals out of which 10 were females & 6 were males, was the most common organism producing Recalcitrant dermatophytosis. *T. rubrum*, which infected 2 people, both were males and *T. tonsurans* which infected 1 person was female. *T. mentagrophytes* infection, the predominant age group was between 31-40 comprising of 4 subjects of males, *T. mentagrophytes* infected 2 subjects in the age group of 51-60. *T. rubrum* infected only males belonged to age range of 21-30 covering of 2 subjects and *T. tonsurans* infected only females of

age group of 61-70 included only 1 subject (Table 6).

DISCUSSION:

Recalcitrant dermatophytosis denotes the relapse, recurrence, reinfection, persistence, and probably a microbiological resistance of dermatophytosis.⁴ Recalcitrant dermatophytosis, also known as Refractory dermatophytosis, refers to a condition where the fungal infection caused by dermatophytes, such as *Trichophyton*, *Microsporum*, or *Epidermophyton* species, does not respond well to standard treatments.⁵ This can be a challenging condition to manage, as the typical antifungal therapies may not effectively eliminate the infection or prevent its recurrence. The substantial change in the clinical profile of patients with an increase in the number of chronic, recurrent, or Recalcitrant dermatophytosis in India is alarming, and the paucity of evidence is disheartening.^{6,7,8} Apart from increasing urbanisation, overcrowding, poverty, non-compliance, and constitutional factors related to host immunosuppression (such as diabetes, HIV/AIDS, and immunosuppressive medications), what is really causing concern is the unchecked availability of inexpensive and irrational corticosteroid–antifungal–antibacterial combinations sold over the counter in India.⁹ These drugs are being prescribed rampantly as so-called fairness or anti-itch creams by general physicians and alternative medicine practitioners, or even self-medicated by the patients as a blanket treatment for virtually every kind of dermatosis.^{9,10} Our study is divided into two arms, A and B. Arm-A is used for sample collecting, while Arm-B is used for epidemiological research. In our study, Arm-A had a more female participants (56%) when it came to sample collection than males participants (44%). In the Arm-B epidemiological research, the percentage of male participants was greater at 57.19%. In Visakhapatnam, the percentage of female population is 51.1% and male population is 48.9%. Similarly, the percentage of female and male population enrolled in our study were 56% and 44%. The proportion of female and male population in Visakhapatnam and in our study were quite similar. The findings from Lakshmi V. P et al. showed that men were more impacted by Dermatophytosis than women.¹¹ The range of current dermatophytosis prevalence in India is 36.6–78.4%, as reported by Murlidhar Rajagopalan et al. Men were more affected than women.¹² According to our study, the age group of 31 - 40 years old presented with more scaling in Arm-A from Recalcitrant Dermatophytosis, and the same age group also had a higher incidence of Recalcitrant Dermatophytosis in Arm-B. In Shitij Goel et al.study , people in the 21–30 age range

were the most likely to present with superficial dermatophytosis¹⁶ and the most commonly involved were aged 31–40, according to Gnanasuriyan et al.¹³ Based on the results of our study consisting of 496 participants, the recurrence of Dermatophytosis was observed in Arm-A with 29 persons aged between 10 and 70 to occur primarily between >1 month and ≤ 2 months, and in Arm-B with 278 patients aged between 10 and 70 to occur primarily within 1 month or ≤ 2 months old, as well as male (23; 46.32%) and female (27; 54.43%). Here, in Arm - A, females were selected for skin scraping since their scaling were more noticeable than those of males. The risk factors such as perspiration and poor hygiene in men contributes to a greater prevalence of dermatophytosis was found in less than a month for 256 participants (51.61%) who were male and 190 participants (38.313%) who were female in the Arm B group. According to Gnanasuriyan et al. study, 40.5% of patients experienced an illness for a duration of 3-6 months, followed by 35% for 2-3 months, and 10.5% for more than a year.¹³ On the other hand, every patient experienced different recurrence episodes, ranging from two to five. In the Gupta et al. trial, 62.5% of participants experienced the illness for more than three months.¹⁴ In research by Mahajan et al., 53.9% of the patients had a chronic illness lasting six months or more.¹⁵ According to the findings released by Shitij Goel et al., the majority of patients (76.6%) had chronic dermatophytosis that had persisted for more than six months¹⁶. In our study, which included 496 participants between the ages of 10 and 70, sharing clothing was found to be the main risk factor in the female subjects aged between 10-20years comprising of 100 participants. The primary risk factor for men between the ages of 31 and 40, based on 35 participants, is excessive perspiration. This is because these guys undertake more outside work and live in more humid environments. Because of the low literacy rate among the participants, poor hygiene is the main risk factor for men aged 10- 20. Four men aged 21 and 30 had occlusive footwear, which they attribute to wearing shoes for extended periods of time. Bhattacharya et al. stated that maintaining good personal hygiene has long been known to be crucial for preventing dermatophytosis and all of its manifestations, including persistence, recurrence, and dissemination. Individuals who reside in hot and muggy environments are more likely to get the illness. Experts concurred that in order to guarantee a good outcome, patients should get education regarding clothing, skin care, personal hygiene, corticosteroid usage, general precautions, and treatment compliance. Their research has shown that social norms and traditional beliefs might occasionally make it difficult to maintain personal

cleanliness.¹⁷ According to the information released by Gnanasuriyan et al., many individuals with resistant dermatophytosis exhibited shared clothing, poor personal hygiene, and misuse of topical corticosteroids.¹³ Among the 50 samples collected, 19 samples were obtained positive for fungal culture and 31 samples were obtained negative for fungal culture. According to the laboratory results we received for our study, *T. mentagrophytes*, which affected 16 individuals, was the most common organism producing Recalcitrant dermatophytosis. Usually, *T. mentagrophytes* inhabits damp, carbon-rich environments. *T. rubrum*, which infected 2 people, is known to live in moist, keratin-rich parts of the human skin, such as the folds in the skin or the nails. Moreover, bedding and clothes may become contaminated with *T. rubrum*. One case of *T. tonsurans*, which usually causes scalp ringworm in humans, was reported. Since this fungus likes warm, humid surroundings, sharing hats, combs, or other personal objects or having sweaty scalps are perfect circumstances for it to develop and spread. According to the data released by Gnanasuriyan et al., 53 samples had positive potassium hydroxide mount results, while 59 samples had positive culture results. The majority of the separated species was *Trichophyton rubrum*, with *Trichophyton mentagrophytes* coming in second.¹³

CONCLUSION:

In our study the prevalence of dermatophytosis was 38%, females were more affected. The predominant age group of dermatophytosis was observed in 31-40 years. *Trichophyton mentagrophytes* was the commonest species of dermatophyte isolated. *T. rubrum* predominance is seen in males aged 21-30, and *T. tonsurans* of age 61-70 years occurred in females. Sharing clothes and excessive sweating were attributed to be the risk factors of recurrence of dermatophytosis.

LIMITATIONS:

The sample size in Arm-A has relatively smaller in number which had resulted in Identification of few species of microorganisms. Since the patients received antifungal medication for Dermatophytosis previously, the results of the fungal culture would be erroneous negative. Since the skin scraping procedure required skill and most of the patients did not provide consent, it was very challenging to perform this technique.

Table 1: Gender – wise distribution in Arm -A and Arm -B:

ARM	No. of subjects (N=496)	GENDER		P-value (x2)
		Male (n=277)	Female (n=219)	
ARM-A	50	22(44%)	28(56%)	
ARM-B	446	255(57.18%)	191(42.82%)	0.0752

B				
Total	496	277	219	

(X2) test

P value:< 0.05 statistically significant. Chi-square

Table 2: Age group -wise distribution in Arm -A and Arm -B:

ARM	Number of subjects (N=496) Age (completed in years)						P-value (One way ANOVA)
	1-20	21-30	31-40	41-50	51-60	61-70	
ARM-A	3	12	15	12	5	3	0.4481
ARM-B	103	78	122	86	42	15	
Total	106	901	137	98	47	18	

P value: < 0.05: statistically significant. One way ANOVA

Table 3: Disease duration of Recalcitrant dermatophytosis among Males and Females in Arm-A and Arm-B:

ARM	Duration of history of Recalcitrant Dermatophytosis	Number of Subjects (N=496)		P-value (Two way ANOVA)
		Male (n=279)	Female (n=217)	
ARM-A	< one month	6	5	0.0051
	> one month to ≤ two months	14	15	
	>two months to ≤ three months	3	7	
ARM-B	< one month	166	112	
	>one month to ≤ two months	65	57	
	> two months to ≤ three months	25	21	
TOTAL		279	217	

P value:<0.05: statistically significant. Two way ANOVA

Table 4: Duration of History of Recalcitrant dermatophytosis among Age groups in Arm-A and Arm-B:

ARM	Month of Diagnosis	No. of subjects (N =496) Age (completed in years)						P-value (Two-way ANOVA)
		10-20	21-30	31-40	41-50	51-60	61-70	
ARM-A	< 1 month	1	3	2	1	3	1	0.0010
	>1 month to ≤ 2months	2	10	7	7	2	1	
	>2 months to ≤ 3 months	0	0	5	3	1	1	
ARM-B	< 1 month	67	59	76	45	21	10	
	>1 month to ≤ 2months	28	15	27	30	16	6	
	>2 months to ≤ 3 months	7	4	18	11	5	1	
TOTAL		105	91	135	97	48	20	

P value:<0.05 statistically significant. Two way ANOVA

Table 5: Percentage of risk factors among the study participants

Risk factors	MALE						FEMALE					
	10-20	20-30	31-40	41-50	51-60	61-70	10-20	21-30	31-40	41-50	51-60	61-70
Sharing Clothing (286) (57.66%)	40	10	20	30	16	10	100	20	5	10	15	10
Excessive sweating (160) (32.25%)	50	20	35	20	5	3	2	10	30	25	4	1

Poor Hygiene (40) (8.06%)	10	6	8	4	1	2	5	0	0	0	3	1
Occlusive footwear (10) (2.03%)	0	4	2	0	0	0	0	3	1	0	0	0

Table 6: Identification of Causative organism through microbiological examination

Type of organism	Age group						Female (no:12)						Total (no:19)
	Male (no:7)												
	10-20	21-30	31-40	41-50	51-60	61-70	10-20	21-30	31-40	41-50	51-60	61-70	
T. mentagrophytes	1	0	1	1	2	0	0	3	4	3	1	0	16
T. rubrum	0	2	0	0	0	0	0	0	0	0	0	0	2
T. tonsurans	0	0	0	0	0	0	0	0	0	0	0	1	1

REFERENCES:

- Sumir kumar, Amandeep kaur et al. Auto implantation therapy in extensive and recalcitrant dermatophytosis: A case series Clin Aesthet Dermatol. 2021; 14(1):34-37.
- Saumya panda, Shyam Verma. The menace of dermatophytosis in India: The evidence that we need: Editorial 2017; 83:3; 281-284 Doi: 10.4103/ijdv.IJDVL_224_17 PMID: 28366915
- Bologna JL, Schaffer JV, Cerroni L, editors. Dermatologia. Elsevier Health Sciences; 2018 Nov 23.
- Kaur T, Bassan MS, Bisht M, et al. Hypothalamus-pituitary-adrenal axis (HPA axis) suppression with inappropriate use of steroids in recalcitrant dermatophytosis - A cross-sectional study. J Family Med Prim Care. 2024 May; 13(5):2026-2031.
- Mubasheera Begum, Habibullah V, Dua harmain, Nusrath Thasneem, Musaddiq Ahmed, Hafsa Patel, Mufasira Fathima, Bibi Aqila, Mohamed Nizamuddin, Farzana anjum, Firdhaus rumana. Dermatophytosis and Quba: Integrating Unani and Modern Medical Insights: A Narrative Review. Fortune Journal of Health Sciences. 8 (2025): 939-94
- Panda S, Verma S. The menace of dermatophytosis in India: The evidence that we need. Indian Journal of Dermatology, Venereology and Leprology. 2017 May 1; 83:281.
- Verma S, Madhu R. The great Indian epidemic of superficial dermatophytosis: An appraisal. Indian journal of dermatology. 2017 May 1; 62(3):227-36.
- Dogra S, Uprety S. The menace of chronic and recurrent dermatophytosis in India: Is the problem deeper than we perceive? Indian dermatology online journal. 2016 Mar 1; 7(2):73-6.
- Bishnoi, Anuradha et al. Emergence of recalcitrant dermatophytosis in India The Lancet Infectious Diseases, Volume 18, Issue 3, 250 – 251.
- Verma SB, Vasani R. Male genital dermatophytosis—clinical features and the effects of the misuse of topical steroids and steroid combinations—an alarming problem in India. Mycoses. 2016 Oct; 59(10):606-14.
- Poluri LV, Indugula JP, Kondapaneni SL. Clinicomycological study of dermatophytosis in South India. Journal of laboratory physicians. 2015 Jul; 7(02):0849.
- Rajagopalan M, Inamadar A, Mittal A, Miskeen AK, Srinivas CR, Sardana K, Godse K, Patel K, Rengasamy M, Rudramurthy S, Dogra S. Expert consensus on the management of dermatophytosis in India (ECTODERM India). BMC dermatology. 2018 Dec; 18:1-1.
- Gnanasuriyan R, Patnaik S, Patro S, Mohanty I. Clinico-Mycological Profile of Recurrent Dermatophytosis with Drug Sensitivity in a Tertiary Care Center in Southern Odisha. Clinical Dermatology Review. 2023 Jul 1; 7(3):240-6.
- Gupta AK, Mohan A, Singh SK, Pandey AK. Studying the clinic mycological pattern of the dermatophytic infection attending OPD in tertiary care hospital in eastern Uttar Pradesh and Bihar. Int J Res Dermatol. 2018 Apr; 4(2):118-25.
- Soniya Mahajan SM, Ragini Tilak RT, Satyendra Kaushal SK, Rabindra Mishra RM, Shyam Pandey SP. Clinico-mycological study of dermatophytic infections and their sensitivity to antifungal drugs in a tertiary care center.
- Goel S, Chaudhary AF. Study of clinical profile of dermatophytosis in a tertiary care center as per ECTODERM guidelines. Asian Journal of Medical Sciences. 2021 Oct 1; 12(10).
- Bhattacharya T, Datta J, Sen I, Patra AC, Roy S, Sarkar AP, Das NK. Perception among the sufferers of recalcitrant dermatophytosis regarding its causation, prevention, care-seeking behaviour and their personal hygiene: Qualitative research. Indian Dermatology Online Journal. 2022. Jan 24; 13(1):52-59. doi: 10.4103/idoj.idoj_211_21. PMID: 35198468; PMCID: PMC8809170