Exploring Dermatophytosis: Epidemiology, Clinical Patterns, and Causative Agents in a Local Population

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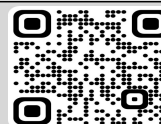[3]-Medical Officer, Akshar Complex, Satellite, Ahmedabad
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ABSTRACT

Introduction and Objectives: Dermatophytosis, a superficial fungal infection affecting keratinized tissues, presents significant public health challenges globally. This study aimed to investigate clinic-mycological correlations, demographic variables, and identify causative fungi to formulate effective treatment strategies.**Materials and Methods:**A cross-sectional study from January 2022 to September 2023 in Ahmedabad enrolled 100 dermatophytosis patients meeting specific criteria. Informed consent was obtained, ensuring confidentiality. Specimens were collected, divided for various analyses, and underwent microscopic examination and culture. Data were entered into Microsoft Excel for analysis.**Results:**The study identified a notable female preponderance (59%) among 100 clinically diagnosed cases, with the highest incidence in the 30-39 age group. Clinical presentations included tinea corporis (42%) and T. corporis with cruris (23%). Fungal KOH and culture exhibited a significant correlation, with Trichophyton mentagrophytes (38%) as the most common species.**Conclusion:**This study provides crucial insights into dermatophytosis epidemiology, clinical patterns, and causative agents. While guiding clinicians in refining diagnostic approaches, it emphasizes the need for ongoing research to address diagnostic limitations and improve management strategies for enhanced patient outcomes.

Key words: Dermatophytosis, Epidemiology, Causative Agents

INTRODUCTION

Dermatophytosis, commonly known as fungal infection is a superficial infection affecting keratinized tissues like skin, hair, and nails, caused by dermatophytes such as Trichophyton, Microsporum, and Epidermophyton[1].These closely related fungi invade and degrade keratin, leading to the disease. Their unique ability to break down keratin allows them to invade the skin and its appendages[2].This condition is characterized by discomfort, and the severity varies from mild to severe reactions.

The severity of dermatophytic infections varies based on factors like host reactions, fungal virulence, anatomical location, and local environment. More than 50% of dermatology outpatient cases face these common infections, exacerbated by overcrowding, poor hygiene, low living standards, and high humidity. A study was conducted to explore clinic-mycological correlations along with demographic variables. Another aim was to identify the causative fungi based on which effective treatment strategies could be formulated, leading to more precise and successful therapeutic interventions.

MATERIALS AND METHODS

Study design, study population and sampling:
A cross-sectional study was undertaken at a private dermatology OPD in Ahmedabad from January 2022 to September 2023. The study aimed to include 25-30 dermatophytosis patients per month who willingly participated, meeting the predefined inclusion and exclusion criteria. Over the specified period, 100 patients were enrolled, and their clinical history, demographics, and specimens from affected areas were assessed.

Inclusion Criteria:
1. Patients with clinical symptoms consistent with dermatophytosis diagnosis.
2. Willingness to participate and provide informed consent.

Exclusion Criteria:
1. Patients who used steroids in the last 20 days.
2. Individuals with skin conditions other than dermatophytosis.
3. Individuals unwilling or unable to provide informed consent.
4. Individuals unable to comply with follow-up visits.

Consent and Confidentiality:
Informed consent was obtained from all patients, ensuring confidentiality at every stage of the study.

Specimen Collection:
Patients were thoroughly examined, and specimens were collected from affected areas after cleaning with 70% alcohol. For skin lesions, scrapings were taken from the growing margins, while tinea capitis involved epilated hair strands. Nail clippings and undersurface scrapings were obtained for suspected onychomycosis cases. In situations with multiple sites, samples were taken from the most active area. Each specimen was divided for various analyses, including fungus culture with 10% KOH, gram stain, ZN stain, organism culture, and colony count.

Microscopic Examination of Collected Specimens:
KOH scraping samples (Fig-1) underwent direct microscopic examination in the microbiological laboratory. For fungus culture, all samples were cultured on Sabouraud's dextrose agar (SDA) (Fig-3,4). Cultures were examined 3-4 times a week for fungus growth, and after around one month, negative cultures were labeled and discarded. Fungal element identification was performed in lactophenol cotton blue (Fig-2) by evaluating colony morphology, fungus-produced pigment, and microscopic examination.
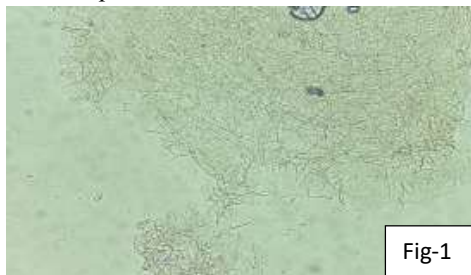

Fig-1

KOH Positive for dermatophytosis

Fig-2

Lacto phenol cotton blue mount showing pencil shaped macroconidia of microsporum

Fig-3

Colonies of microsporum on Sabouraud's dextrose agar

Fig-4

Colonies of T. mentagrophytes showing yellowish to brownish pigment on Sabouraud's dextrose agar

Analysis:

Clinic-mycological data were entered into Microsoft Excel, and appropriate statistical tests were applied for analysis.

RESULTS

In this study, a comprehensive analysis of 100 clinically diagnosed cases of dermatophytosis was done. The highest number of patients was observed in the third decade of life. A notable female preponderance of 59% was identified among the study subjects, resulting in a male-to-female ratio of 1:1.43. The age group with the highest incidence of cases was 30-39 years (25%), followed by 20-29 years (23%) and 40-49 years (20%). **[Table 1]**

Table 1: Age and gender-wise distribution of study subjects (n=100)

Age-group	Male(%)	Female(%)	Total(%)
10-19	2 %	1 %	3 %
20-29	9 %	14 %	23 %
30-39	6 %	19 %	25 %
40-49	3 %	17 %	20 %
50-59	14 %	5 %	19 %
60-69	5 %	3 %	8 %
70 and above	2 %	0	2 %
Total	**41%**	**59%**	**100 %**

The clinical presentations of dermatophytosis varied, with tinea corporis being the most common at 42%, followed by T. corporis with cruris at 23%, tinea cruris at 10%, tinea capitis at 8%, tinea faciei at 6%, tinea manuum at 7%, tinea pedis at 4%, and tinea barbae at 1%. T. corporis and T. corporis with cruris were more prevalent in the age groups of 20-40 years, while T. capitis was more common in children below the age of 10 years, aligning with findings from other studies.

Microbiological examination revealed that fungal KOH was positive in 66 cases and negative in 34 cases, with similar observations for fungus culture. Of the 66 KOH-positive cases, 55 exhibited growth in culture, while among the 34 KOH-negative cases, 11 showed growth in culture. Additionally, 23 cases were negative for both fungal KOH and fungus culture. The disparity between KOH and culture results was statistically highly significant (Z statistic= 4.8, 95% CI=3.9 TO 27.5, p <0.001).

Among the cultured organisms, Trichophyton mentagrophytes (38%) emerged as the most common species isolated, followed by T. tonsurans (3%), T. rubrum (2%), Microsporum sp. (1.24%), T. verrucosum (1.24%), Malassezia furfur (1.24%), and Epidermophyton sp. (0.62%).

DISCUSSION

Dermatophytosis Epidemiology and Clinical Patterns:

Dermatophytosis, commonly referred to as ringworm, is a superficial fungal infection that affects the skin, hair, and nails, posing a significant global public health concern. Its prevalence exhibits

variability across geographical regions and populations. Our study delved into 100 clinically diagnosed cases of dermatophytosis, aiming to unravel the epidemiological and clinical patterns prevalent in our population.

Incidence and Age Distribution:

Our findings illuminated a heightened incidence of dermatophytosis in individuals within their third decade of life, with the age group of 30-39 years exhibiting the maximum number of cases. This age distribution aligns with patterns reported in previous studies[3,4]. Notably, we observed a distinct female preponderance, with females constituting 59% of the cases compared to 41% in males, resulting in a male-to-female ratio of 1:1.43. This gender distribution mirrors findings from other studies documenting a higher prevalence of dermatophytosis among females[5,6].

Clinical Presentations:

Tinea corporis emerged as the most prevalent clinical manifestation in our study, followed by tinea corporis with cruris, tinea cruris, and tinea capitis. These clinical patterns align with the typical manifestations observed in dermatophytosis, demonstrating variations in prevalence influenced by geographic and demographic factors [7]. Interestingly, tinea capitis predominantly affected children below the age of 10 years, consistent with observations from various studies[8, 9].

Diagnostic Modalities and Causative Organisms:

Effective management of dermatophytosis hinges on accurate diagnosis and identification of causative organisms. Our study employed fungal KOH examination and culture, revealing a statistically significant difference between the two methods. This underscores the importance of utilizing both diagnostic techniques for precise identification of dermatophyte infections.

Trichophyton mentagrophytes emerged as the most frequently isolated organism from culture, followed by T. tonsurans, T. rubrum, and others. These findings resonate with prevailing etiological agents reported in dermatophytosis, with regional variations in the distribution of species [10,11].

CONCLUSION

In conclusion, our study offers valuable insights into the epidemiological characteristics, clinical presentations, and causative agents of dermatophytosis in our population. This understanding is pivotal for devising effective management and control strategies, including accurate diagnosis, appropriate treatment, and preventive measures.

This clinicomycological investigation of dermatophytosis highlights a predominant occurrence in the third decade of life, with a notable female bias. Tinea corporis and T. corporis with cruris are prevalent, particularly in the 20-40 age range. Fungal KOH and culture exhibit a strong correlation, with Trichophyton mentagrophytes identified as the predominant species. However, the presence of 23 cases negative for both microbiological examinations underscores diagnostic limitations, prompting the exploration of alternative diagnostic approaches.

Our study provides valuable guidance for clinicians, aiding in the refinement of diagnostic and therapeutic approaches. It underscores the importance of continued research to enhance accuracy and efficacy in managing dermatophytosis, ultimately improving patient outcomes.

LIMITATIONS

This study, conducted with 100 willing participants in a private setting, provides valuable insights. However, its limited scope suggests the need for extension to a broader subject base, including government healthcare settings, to offer more comprehensive and insightful information.

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Conflict Of Interest: There are no conflicts of interests.

REFERENCES

1. Poluri LV, Indugula JP, Kondapaneni SL. Clinicomycological study of dermatophytosis in South India. J Lab Physicians 2015;7:84-9.
2. Weitzman I, Summerbell RC. The dermatophytes. Clin Microbiol Rev, 1995;8:240-59.
3. Vena GA, Chieco P, Posa F, Garofalo A, Bosco A, Cassano N. Epidemiology of dermatophytoses: retrospective analysis from 2005 to 2010 and comparison with previous data from 1975. New Microbiol. 2012 Apr.
4. Das S, De A, Saha R, Sharma N, Khemka M, Singh S, Hesanoor Reja AH, Kumar P. The Current Indian Epidemic of Dermatophytosis: A Study on Causative Agents and Sensitivity Patterns. Indian J Dermatol. 2020 Mar-Apr.
5. Lagacé F, D'Aguanno K, Prosty C, Laverde-Saad A, Cattelan L, Ouchene L, Oliel S, Genest G, Doiron P, Richer V, Jfri A, O'Brien E, Lefrançois P, Powell M, Moreau L, Litvinov IV, Muntyanu A, Netchiporouk E. The Role of Sex and Gender in Dermatology - From Pathogenesis to Clinical Implications. J Cutan Med Surg. 2023 Jul-Aug.
6. Kaul S, Yadav S, Dogra S. Treatment of Dermatophytosis in Elderly, Children, and Pregnant Women. Indian Dermatol Online J. 2017 Sep-Oct.
7. Rashidian S, Falahati M, Kordbacheh P, Mahmoudi M, Safara M, Sadeghi Tafti H, Mahmoudi S, Zaini F. A study on etiologic agents and clinical manifestations of dermatophytosis in Yazd, Iran. Curr Med Mycol. 2015 Dec.
8. Rengasamy M. The Changing Scenario of Dermatophytosis in Children. Indian Dermatol Online J. 2022 May.
9. Gupta AK, Mays RR, Versteeg SG, Piraccini BM, Shear NH, Piguet V, Tosti A, Friedlander SF. Tinea capitis in children: a systematic review of management. J EurAcad Dermatol Venereol. 2018 Dec.
10. Jartarkar SR, Patil A, Goldust Y, Cockerell CJ, Schwartz RA, Grabbe S, Goldust M. Pathogenesis, Immunology and Management of Dermatophytosis. J Fungi (Basel). 2021 Dec 3.
11. Moskaluk AE, VandeWoude S. Current Topics in Dermatophyte Classification and Clinical Diagnosis. Pathogens. 2022 Aug 23. PMC9502385.