International Journal of Medical Science and Education
pISSN- 2348 4438 | eISSN-2349- 3208
Published by Association for Scientific and Medical Education (ASME)
Int.J.Med.Sci.Educ. May-June. 2020; 7(3) : 52-57
Available Online at www.ijmse.com
Original Research Article

CLINICOEPIDEMIOLOGICAL TRENDS OF DERMATOPHYTOSIS IN PEDIATRIC PATIENTS: PRESENTING AT A TERTIARY CARE CENTER

Dr. Kamlesh Verma[1], Dr. Jaya Verma[2*]

1. Assistant Professor, Department of Pediatrics, 2. Assistant Professor, Department of Skin and VD, Gauri Devi Institute of Medical Sciences and Hospital, Durgapur, West Bangal.

***Corresponding author – Dr. Jaya Verma**
Email id – kamleshjayaverma@gmail.com

Received: 1***0/03/2020*** ***Revised:16/06/2020*** ***Accepted: 23/06/2020***

ABSTRACT

Background: Dermatophytosis, a prevalent fungal infection in pediatric populations, is caused by dermatophytes such as Trichophyton, Microsporum, and Epidermophyton species. The rising incidence of these infections, particularly in tropical and subtropical regions, necessitates a deeper understanding of demographic, clinical, and diagnostic factors influencing pediatric cases. Objective: This study aimed to evaluate the demographic and clinical characteristics of dermatophytosis in children, identify common infection sites, and assess the diagnostic accuracy of KOH and culture testing. **Methods:** A prospective, observational study was conducted over one year in a tertiary care hospital. Pediatric patients (0-14 years) presenting with clinical signs of dermatophytosis were included. Diagnoses were based on clinical evaluation, KOH preparation, and fungal culture. Samples were collected from infection sites and analyzed for fungal presence. Demographic and clinical data were statistically analyzed. **Results:** Out of 318 pediatric patients, the 6-9 year age group showed the highest infection rate (28.9%). The trunk (28.6%), face and neck (22.9%), and groin (20.4%) were the most affected sites. KOH positivity was observed in 84.9% of cases, while fungal culture demonstrated a higher positivity rate at 91.2%, indicating its superior sensitivity. A dual diagnostic approach was suggested to enhance detection accuracy. **Conclusions:** School-age children are particularly vulnerable to dermatophytosis, emphasizing the need for targeted hygiene education and preventive measures in communal settings. Combining KOH and culture tests offers improved diagnostic precision, crucial for effective management and treatment in pediatric populations.

Keywords: Dermatophytosis, Pediatric Fungal Infections, Tinea, Diagnostic Sensitivity, KOH Test, Epidemiology.

INTRODUCTION

Dermatophytosis, a common fungal infection caused by dermatophytes, is a major concern in pediatric health due to its rising prevalence and impact on quality of life. Dermatophytes, primarily Trichophyton, Microsporum, and Epidermophyton species, target keratin-rich tissues like skin, hair, and nails, leading to infections such as tinea capitis, tinea corporis, and tinea pedis, which are widespread among children **(1).** In recent years, studies have shown a marked increase in dermatophytosis cases globally, with notable prevalence in tropical and subtropical regions, where high humidity and temperature create ideal conditions for fungal proliferation **(2, 3).** India, with its diverse climate and population density, particularly in northern regions, has witnessed a concerning surge in dermatophyte infections among pediatric patients, prompting increased research into understanding the demographic, clinical, and epidemiological trends in this population **(4,5).**

Children, owing to their developing immune systems and close-contact environments like schools and playgrounds, are especially susceptible to dermatophytosis. The burden is amplified by factors such as poor hygiene practices, limited access to

healthcare, and in some cases, traditional medicinal practices that may exacerbate the infection **(5, 6).** Furthermore, the clinical presentation of dermatophytosis in children often varies, complicating diagnosis and management. While tinea capitis remains a predominant infection type in children, there is emerging evidence that other forms, including tinea corporis and tinea cruris, are becoming increasingly prevalent **(7).** Recognizing these clinicoepidemiological patterns is essential for guiding effective treatment protocols and preventive measures.

Understanding the demographic and clinical characteristics of dermatophytosis in pediatric populations is essential, as they reveal patterns in infection sources, risk factors, and potential disease transmission within communities. Reports from northern India, specifically, highlight that a considerable proportion of dermatophytosis cases in children stem from urban settings where crowded living conditions facilitate transmission **(8, 9).** The mode of infection is frequently contact-based, either through direct human-to-human interaction or indirectly via contaminated items, such as combs, hats, or clothing. These transmission dynamics underscore the role of communal settings and shared objects in the spread of dermatophytosis **(10,11).**

The dermatophytosis in pediatric populations, particularly in northern India, presents a multifaceted public health issue that calls for comprehensive studies to elucidate the clinicoepidemiological factors driving its spread. By analyzing demographic and clinical patterns, researchers and healthcare professionals can gain a deeper understanding of the disease's dynamics, enabling the formulation of targeted interventions to alleviate the growing burden of dermatophytosis among children.

MATERIALS AND METHODS

This prospective, observational study was conducted in the Dermatology Department of a tertiary care center, focusing on pediatric patients presenting with suspected dermatophytoses. The study spanned a period of one year, from January 2018 to December 2018, and included children aged 0-14 years who attended the outpatient department with clinical signs suggestive of dermatophytoses. Ethical clearance was obtained from the Institutional Ethics Committee, and informed consent was secured from the parents or guardians of all participants.

Study Population: The study population consisted of children diagnosed with dermatophytoses based on clinical evaluation. Inclusion criteria required patients to present with typical dermatophytic lesions, such as annular erythematous patches with scaling and itching, consistent with the clinical presentation of tinea infections. Exclusion criteria included children with other skin conditions that could mimic dermatophytoses, such as eczema, psoriasis, and bacterial skin infections, and those already receiving antifungal treatment.

Clinical Examination: A detailed history was taken from each patient, including demographic information (age, gender), the duration of symptoms, previous treatments, hygiene practices, and any known history of contact with infected individuals or animals. A thorough clinical examination was performed, and the lesions were classified based on their anatomical location into tinea capitis, tinea corporis, tinea cruris, tinea pedis, and other variants. The number of lesions, their size, and the extent of the affected area were also recorded.

Sample Collection: Samples were aseptically collected from active lesion margins: hair roots and scalp scrapings for tinea capitis, skin scrapings for tinea corporis and other forms, and nail clippings for tinea unguium. All specimens were sent to the microbiology lab for analysis.

Direct Microscopy: Each sample was subjected to direct microscopic examination using 10% potassium hydroxide (KOH) solution to detect fungal elements. The skin scrapings, hair, and nail samples were placed on a glass slide, treated with KOH, and examined under a microscope for the presence of fungal hyphae or spores. The KOH mount method is a rapid and simple procedure for diagnosing dermatophyte infections, providing immediate evidence of fungal infection.

Fungal Culture: For species identification, all KOH-positive samples were inoculated onto Sabouraud Dextrose Agar (SDA) containing antibiotics (chloramphenicol and cycloheximide) to inhibit bacterial and non-dermatophyte fungal growth. The inoculated plates were incubated at 25-30°C for up to four weeks and checked periodically for fungal growth. The identification of dermatophyte species was based on colony morphology, pigment production, and microscopic characteristics, such as the presence of macroconidia and microconidia.

Data Analysis: The collected data, including demographic details, clinical findings, and mycological results, were entered into a pre-

designed proforma and analyzed using statistical software. Descriptive statistics, such as percentages and frequencies, were used to summarize categorical variables, while continuous variables were expressed as mean ± standard deviation. Chi-square tests were employed to assess the association between various risk factors and the occurrence of dermatophytoses. A p-value of <0.05 was considered statistically significant.

This study was conducted in accordance with the Declaration of Helsinki. Prior to sample collection, written informed consent was obtained from the parents or guardians of all participating children. Additionally, anonymity and confidentiality of the patients' data were maintained throughout the study.

RESULTS

In this study, pediatric patients under 18 years of age with clinically diagnosed and KOH-positive dermatophytosis were recruited from the Dermatology Department of a tertiary care hospital between September 2018 and February 2019. Initially, 400 pediatric patients presenting with signs of tinea infections were assessed for eligibility, and 350 provided informed consent to participate. Out of these, 318 patients were confirmed KOH-positive and subsequently underwent fungal culture testing. Thus, following the inclusion criteria and after securing written consent, a total of 318 patients were included in the final analysis.

The table 1 presents the age distribution of 318 pediatric patients diagnosed with dermatophytosis, illustrating the prevalence of infections across different age groups. The school-age group (6-9 years) had the highest percentage of cases, accounting for 28.9% of the sample, suggesting that children in this age bracket may be at a heightened risk, possibly due to increased exposure in school and community settings. The preschool group (3-6 years) followed, with 21.4% of cases, indicating notable vulnerability among younger children as well. Infants (0-1 years) represented the smallest group affected, at 8.2%, potentially due to more limited social exposure and protective factors associated with infant care. Adolescents in the mid- and late-adolescence stages accounted for 11.3% and 8.8% of cases, respectively, reflecting a relatively lower prevalence as children age. This distribution emphasizes the need for targeted preventive measures in early childhood and school-age settings to reduce dermatophytosis transmission.

Table 1: Age Distribution of Pediatric Patients with Dermatophytosis

Age Group (years)	Number of Children (%)
Infant (0-1)	26 (8.2)
Toddler (>1-3)	41 (12.9)
Preschool (>3-6)	68 (21.4)
School Age (>6-9)	92 (28.9)
Preadolescence (>9-12)	27 (8.5)
Mid-adolescence (>12-15)	36 (11.3)
Late adolescence (>15-18)	28 (8.8)
Total	318 (100.0)

Table 2: Primary Sites of Dermatophytosis Involvement in Pediatric Patients

Predominant Affected Site	Number of Patients (%)
Trunk	91 (28.6)
Face and Neck	73 (22.9)
Groin	65 (20.4)
Thigh	37 (11.6)
Buttocks	25 (7.9)
Arm and Forearm	14 (4.4)
Scalp	8 (2.5)
Leg	4 (1.3)
Palm and Sole	1 (0.3)
Total	318 (100.0)

The table 2 shows the primary sites affected by dermatophytosis in 318 pediatric patients. The trunk was the most commonly affected area, with 28.6% of cases, followed by the face and neck (22.9%) and groin (20.4%), indicating these as the predominant infection sites. Other areas, including the thigh, buttocks, and arms, had lower infection rates, while the scalp, leg, and palm and sole exhibited minimal cases. This distribution suggests that dermatophytosis primarily affects areas with high moisture and friction, underscoring the need for targeted hygiene and preventive measures for these regions to reduce infection risks.

Table 3 : Laboratory Test Results of Dermatophytosis in Pediatric Patients

Test Result	KOH	Percent (%)	Culture	Percent (%)
Positive	270	84.9	290	91.2
Negative	48	15.1	28	8.8
Total	318	100	318	100

In this study, 84.9% of the patients tested positive via KOH, while a slightly higher 91.2% yielded positive results through fungal culture. Negative results were recorded in 15.1% and 8.8% for KOH and culture tests, respectively, underscoring culture as a more sensitive diagnostic method for detecting dermatophytosis in pediatric patients.

In this study, we observed that the KOH test yielded a positive result in 84.9% of patients, while the culture test was positive in 91.2% of cases. Notably, both KOH and culture tests were positive for 78% of the patients, indicating a high level of concordance between the two diagnostic methods. We found that 6.9% of patients were KOH positive but culture negative, while 12% had a positive culture result despite a negative KOH test. Additionally, both KOH and culture tests were negative in 3.1% of cases, as summarized in the table.

DISCUSSION

The study provides a comprehensive analysis of pediatric dermatophytosis, focusing on age distribution, affected anatomical sites, and diagnostic accuracy of different laboratory tests. The results yield significant insights into the patterns and diagnostic challenges of this common fungal infection among children.

The age distribution data reveals that school-age children (6-9 years) represent the largest proportion of cases, comprising 28.9% of the study sample. This suggests that children in this age group are at increased risk for dermatophytosis, likely due to greater social interaction in school settings and participation in communal activities, which facilitate fungal transmission **(12).** Preschool children (3-6 years) also show a high prevalence at 21.4%, indicating that early social exposure in kindergartens and playgrounds contributes significantly to infection rates. In contrast, infants (0-1 year) have the lowest infection rate (8.2%), possibly due to limited environmental exposure and more consistent protective care provided by caregivers **(13).**

As children grow older, the infection rates gradually decline. Adolescents, particularly in the mid-adolescence (12-15 years) and late adolescence (15-18 years) groups, show lower infection rates at 11.3% and 8.8%, respectively. This decrease could be attributed to improved personal hygiene practices, increased immune maturity, and reduced physical contact in structured environments **(14).**

The study identifies the trunk as the most common site for dermatophytosis, with 28.6% of cases, followed by the face and neck (22.9%) and the groin area (20.4%). These findings highlight areas with high moisture and warmth, which are ideal conditions for fungal growth. The prevalence in these specific regions suggests the importance of targeted hygiene measures, especially in children prone to fungal infections **(15).** Conversely, less typical areas like the scalp, palms, and soles exhibit much lower infection rates, reflecting a decreased risk due to less moisture retention and lower exposure to potential environmental sources of infection **(16).**

The diagnostic results underscore the utility and limitations of two primary diagnostic methods—KOH preparation and fungal culture. In this study, the KOH test demonstrated an 84.9% positivity rate, while the culture test showed a slightly higher positivity rate at 91.2%. These results suggest that fungal culture is a more sensitive method for detecting dermatophytosis **(17).** This difference is particularly significant in the 12% of cases where patients were KOH-negative but culture-positive, indicating the culture's ability to detect infections with a lower fungal load **(18).**

However, there were also instances where the KOH test was positive, but the culture was negative (6.9%). This discrepancy could be due to non-viable fungal elements identified under the microscope during KOH testing that were unable to grow in a culture medium. Such results underline the necessity of a dual diagnostic approach to maximize detection accuracy **(19, 20).**

The study's limitations include its restriction to a single tertiary care hospital, which may limit the generalizability of findings to broader pediatric populations. The relatively short recruitment period of six months may also not account for seasonal variations in dermatophytosis prevalence. Additionally, the study relied on KOH and culture tests, which, despite being effective, may not detect all fungal strains or differentiate between dermatophyte species. The absence of molecular diagnostic methods may have led to underreporting or misclassification of some infections. Lastly, the study did not investigate potential risk factors like socioeconomic status, hygiene habits, or family history, which could provide deeper insights into infection susceptibility.

CONCLUSION

The study highlights the need for targeted preventive measures in school-age children, who are at a higher

risk for dermatophytosis. Public health strategies should emphasize hygiene education and preventive practices in schools and childcare settings. Additionally, combining KOH preparation and culture testing can provide a more accurate diagnosis, facilitating timely treatment and reducing the spread of infection. This dual diagnostic strategy is particularly beneficial in pediatric populations where early and accurate detection is crucial for effective management.

By understanding the age-specific risks and diagnostic challenges presented in this study, healthcare providers can better tailor their preventive and diagnostic efforts to curb the spread of dermatophytosis among pediatric populations.

REFERENCES

1. Hayette MP, Sacheli R. Dermatophytosis, trends in epidemiology and diagnostic approach. Current Fungal Infection Reports. 2015 Sep;9:164-79.

2. Ndako JA, Osemwegie O, Spencer TH, Olopade BK, Yunusa GA, Banda JM. Prevalence of dermatophytes and other associated fungi among school children. Global Advanced Research Journal of Medicine and Medical Sciences. 2012;1(3):49-56.

3.Sangüeza OP, Sangüeza M, Bravo F. Dermatopathology of Tropical Diseases: Pathology and Clinical Correlations. JP Medical Ltd; 2017 Mar 15.

4. World Health Organization. Epidemiology and management of common skin diseases in children in developing countries. World Health Organization; 2005.

5. Bhatia and Sharma: Epidemiological studies on Dermatophytosis in human patients in Himachal Pradesh, India. SpringerPlus 2014 3:134.

6. Pawar S, Wankhade VH, Supekar BB, Pratap Singh R. Pattern of pediatric dermatoses and seasonal variations in a tertiary referral center in central India. Iranian Journal of Dermatology. 2020 Jan 1;22(4):145-50.

7. Ndunge MJ. Prevalence of Trichophyton, Microsporum and Epidermophyton species causing tinea capitis in children aged 3–14 years in Mathare informal settlement, Nairobi, Kenya.

8. Nagarajan K, Thokchom NS, Ibochouba K, Verma K, Hafi NB. Pattern of pediatric dermatoses in Northeast India. Indian Journal of Paediatric Dermatology. 2017 Oct 1;18(4):286-91.

9. Nenoff P, Verma SB, Vasani R, Burmester A, Hipler UC, Wittig F, Krüger C, Nenoff K, Wiegand C, Saraswat A, Madhu R. The current Indian epidemic of superficial dermatophytosis due to Trichophyton mentagrophytes—A molecular study. Mycoses. 2019 Apr;62(4):336-56.

10. Seebacher C, Bouchara JP, Mignon B. Updates on the epidemiology of dermatophyte infections. Mycopathologia. 2008 Nov;166:335-52.

11. Kromer C, Celis D, Hipler UC, Zampeli VA, Mößner R, Lippert U. Dermatophyte infections in children compared to adults in Germany: a retrospective multicenter study in Germany. JDDG: Journal Der Deutschen Dermatologischen Gesellschaft. 2021 Jul;19(7):993-1001.

12. Chikoi R, Nyawale HA, Mghanga FP. Magnitude and associated risk factors of superficial skin fungal infection among primary school children in Southern Tanzania. Cureus. 2018 Jul;10(7).

13. Kalu EI, Wagbatsoma V, Ogbaini-Emovon E, Nwadike VU, Ojide CK. Age and sex prevalence of infectious dermatoses among primary school children in a rural South-Eastern Nigerian community. Pan African Medical Journal. 2015;20(1).

14. Adesiji YO, Omolade BF, Aderibigbe IA, Ogungbe OV, Adefioye OA, Adedokun SA, Adekanle MA, Ojedele RO. Prevalence of tinea capitis among children in Osogbo, Nigeria, and the associated risk factors. Diseases. 2019 Jan 27;7(1):13.

15. Alter SJ, McDonald MB, Schloemer J, Simon R, Trevino J. Common child and adolescent cutaneous infestations and fungal infections. Current problems in pediatric and adolescent health care. 2018 Jan 1;48(1):3-25.

16. Bloomfield SF, Exner M, Signorelli C, Nath KJ, Scott EA. The chain of infection transmission in the home and everyday life settings, and the role of hygiene in reducing the risk of infection. InInternational scientific forum on home hygiene 2012 Jul.

17. Ardakani ME, Ghaderi N, Kafaei P. The diagnostic accuracy of potassium hydroxide test in dermatophytosis. J Basic Med Clin. 2016;5(2):4-6.

18. Garg J, Tilak R, Garg A, Prakash P, Gulati AK, Nath G. Rapid detection of dermatophytes from skin and hair. BMC research notes. 2009 Dec;2:1-6.

19. Begum J, Mir NA, Lingaraju MC, Buyamayum B, Dev K. Recent advances in the diagnosis of dermatophytosis. Journal of basic microbiology. 2020 Apr;60(4):293-303.

20. Rudramurthy SM, Shaw D. Overview and update on the laboratory diagnosis of dermatophytosis. Clinical Dermatology Review. 2017 Oct 1;1(Suppl 1):S3-11.

How to cite this article: Verma K., Verma J. **C**linicoepidemiological trends of dermatophytosis in pediatric patients: presenting at a tertiary care center. Int.J.Med.Sci.Educ. May-June. 2020;7(3):52-57.