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Original Research Article

Clinico-mycological study of dermatophytosis in children

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ABSTRACT

Background: The picture of dermatophytosis in pediatric population is changing and requires data from different geographical locations. The present study was conducted to assess the clinico-mycological characteristics of dermatophytosis in children presenting to our department. Aim of the study was to assess the clinico-mycological characteristics of dermatophytosis in children

Materials and Methods: We included patients aged 18 years or less with suspected dermatophytosis infection and a complete physical examination of the skin, including nails and hair, was performed on all children. All the children were subjected to potassium hydroxide (KOH) examination and culture on Sabouraud's Dextrose Agar.

Results: 150 patients were included, 104 were aged more than 10 years, 81 out of 150 were males and most common clinical variant was that of Tinea cruris (48.7%) followed by corporis (35%). KOH positive patients were fungal culture positive. Most common species on culture was Trichophyton rubrum followed by Trichophyton mentagrophyte. 55 patients were using topical corticosteroids and it was found that KOH positivity was higher among the patients not using topical corticosteroids (91.6%) n=87 compared to those using corticosteroids (67.30%) n=37.

Conclusion: Our study represents a changing clinical scenario of paediatric dermatophytosis in western India. Education and counselling the parents regarding hygiene practices are very important and should be included in the management strategy.

1. Introduction

A significant increase in the number of dermatophytosis has been noted in recent years in India. Numerous cases with chronic recalcitrant disease, atypical presentations, frequent relapses, and treatment failures have been reported.[1] Two hypotheses have been put forward: this may have been caused by zoonotic emergence of dermatophytes from pets or pests, or by irrational use of corticosteroid-containing antifungal combinations sold over the counter, which has enhanced acquired multi-resistance to common antifungals.[2] Several environmental factors are contributing to the current pandemic.

Changing clinical patterns, an epidemiological shift towards Trichophyton mentagrophytes from *T. rubrum* and a background of topical steroid abuse have characterized this raging epidemic in India.[3]This has also reflected in the pediatric population although there is a relative lack of published evidence. High incidence of superficial dermatophytosis in adult contacts, easy transmission through contacts/pets, sharing of clothes/toys, outdoor play, comparatively lower immunity in children, humid conditions of intertriginous/ napkin areas, and malnutrition make children more vulnerable to this disease. Untreated

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family members are an important source of infection in children, especially in overcrowded conditions. It is especially common among children aged 3–9 years, particularly among those, who live in crowded conditions in urban areas. Dermatophyte infection spreads by direct skin-to - skin contact with an infected person, by sharing items with an infected person or by touching a contaminated surface.[4] The presence of infection in multiple family members in the present scenario also increases the chances of transmission. Epidemiological and mycological picture of dermatophytosis in pediatric population needs more data from different geographical locations due to the lack of recent and multicentric studies.[5,6] This study was done to assess the clinico-mycological characteristics of dermatophytosis in children with the efficacy of correlation of KOH mount and fungal culture findings with the clinical profile in these patients to improve the diagnostic approach of dermatophytosis in children.

2. Materials and Methods

After approval from the institutional Ethics Committee of our medical college hospital in Navi Mumbai. A written informed consent was obtained from the study participants. 150 subjects with clinical diagnosis of dermatophyte infection of age 18 years and below were studied over 18 months.

For the diagnosis and isolation of dermatophytes, primary site were sampled for KOH examination from the peripheral, actively growing margins of the lesions. For isolation of dermatophytes, the samples were cultured under sterile conditions on the Sabouraud's Dextrose Agar (Himedia, India) and Sabouraud's Dextrose Agar-containing Cycloheximide (0.05%) and chloramphenicol (0.004%). The colonies on the slants were examined for their morphology, texture and pigmentation. The confirmation was done by microscopic examination of the stained preparations in Lactophenol Cotton Blue and observed under low as well as high power of light microscope. (Figure 3)

3. Results

In the present study, 150 patients were included. It was observed that 69.3% of the children were aged more than 10 years (n= 104), 46% were females (n=69) and rest being males (n= 81) (Table 1)

The most common diagnosis was that of Tinea cruris (48.7%), second being Tinea corporis (23.3%), and Tinea pedis being the least common (0.7%) as shown in Table 3. We found that KOH test was positive in 82.7% and culture was positive in 92% of the patients, We observed that both KOH and culture were positive in 80% of the patients. KOH positive Culture negative was found in 3%, KOH negative Culture positive in 12% and both KOH and culture negative was found in 5% As shown in Table 3 and Among the culture positive patients, *T. rubrum* was found in 72.5%, *T.mentagrophyte* in 24.6%, *E. floccosum* in 1.4% and T. *tonsurans* in 1.4% of the patients as shown in Table 4.

Table 1: Distribution of patients according to age

Age group	Frequency	Percent
<1 year	1	0.7
1-3 years	6	4
3-5 years	12	8
5-10 years	27	18
> 10 years	104	69.3
Total	150	100

Table 2: Distribution of patients according to the final diagnosis

Diagnosis	Frequency	Percent
Tinea cruris	73	48.7
Tinea corporis	35	23.3
Tinea cruris + corporis	29	19.3
Tinea faciei	4	2.7
Tinea capitis	3	2
Tinea cruris + corporis + faciei	3	2
Tinea corporis + faciei	2	1.3
Tinea pedis	1	0.7
Total	150	100

Table 3: Distribution of patients according to KOH and culture

Frequency	KOH	Percent (%)	Culture	Percent (%)
Positive	124	82.7	138	92
negative	26	17.3	12	8
total	150	100	150	100

Table 4: Species found in culture positive patients

Species	Frequency	Percent
T. rubrum	100	72.5
T.mentagrophyte	34	24.6
E. floccosum	2	1.4
T. tonsurans	2	1.4
Total	138	100

Association of KOH and culture positivity with topical corticosteroid use (Figure 1)

analyzed using chi-square test and it was found that among patients who used topical corticosteroids, 67.3% were positive on KOH test, while among those not using topical corticosteroids 91.6% were KOH positive. We observed a significant association of KOH positive and not using topical corticosteroids (p value < 0.01). Similarly, culture positivity was higher in patients not using topical corticosteroids as compared to those using steroids (93.7% vs 89.1%). However, this association was not statistically significant (p value = 0.31).

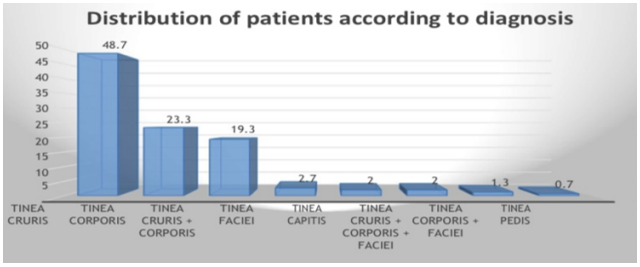

Fig. 1: Distribution of patients according to the final diagnosis

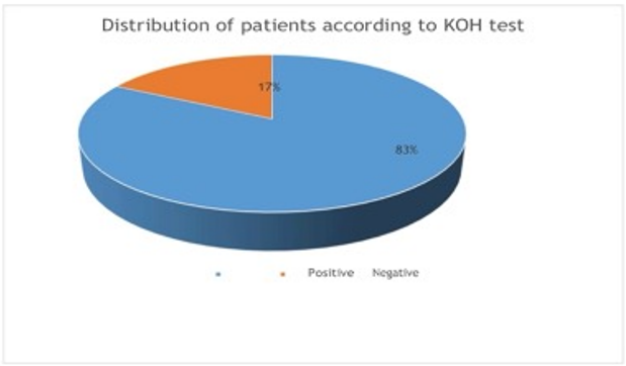

Fig. 2: KOH test was positive in 82.7% of the patients.

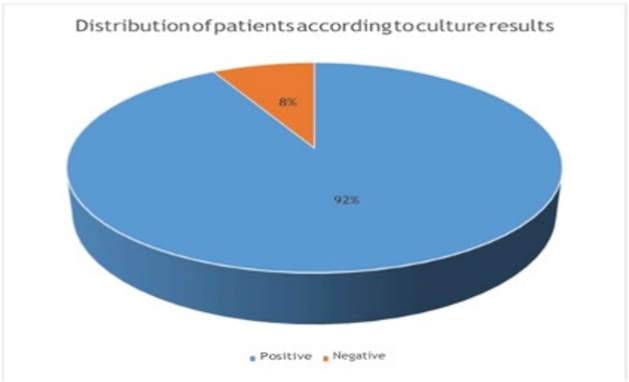

Fig. 3: Culture positive in 92% of the patients

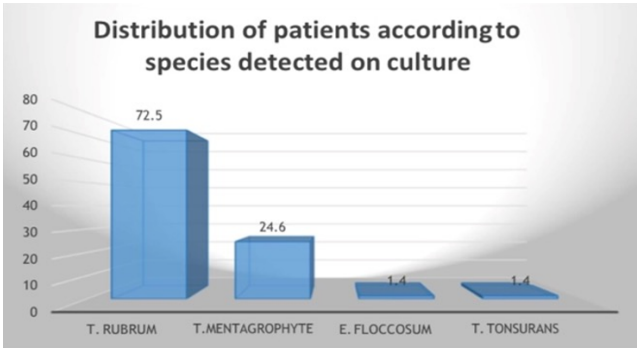

Fig. 4: Species found in culture positive patients

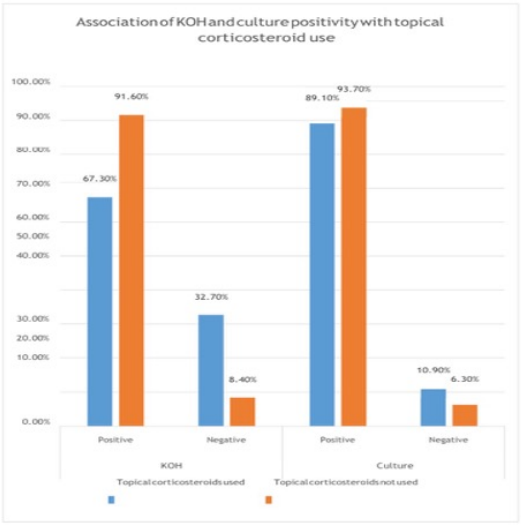

Fig. 5: Association of KOH and culture positivity with topical corticosteroid use

Fig. 6: Tinea faciei - Few well defined erythematous plaques with elevated borders and central clearing present over left side of the face (Left) & Tinea capitis -(kerion) Ill defined plaque present over the occipital area of the scalp (Right)

Fig. 7: Tinea cruris & Tinea corporis - Few well defined erythematous scaly plaques with active border present over b/l groin folds

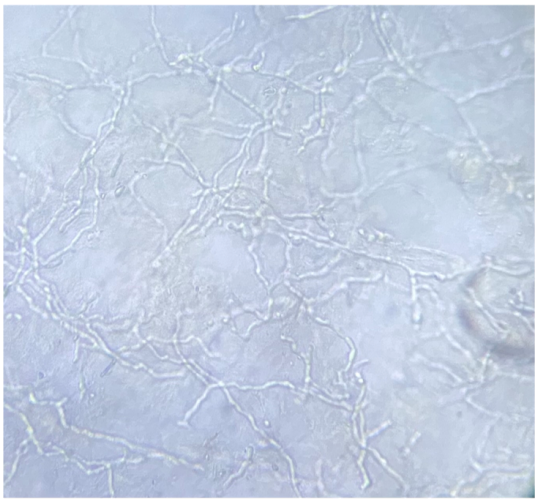

Fig. 8: KOH stain (40x): Skin scrapings and KOH mount of the fungal hyphae of dermatophytes

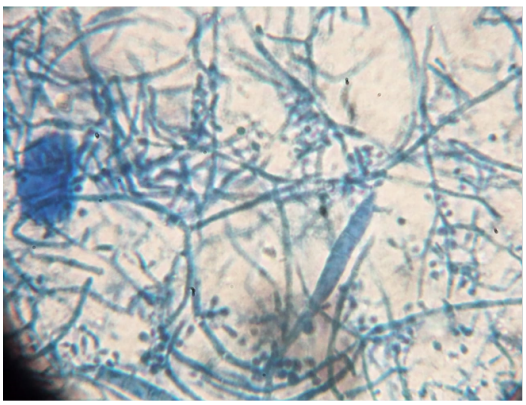

Fig. 9: Microscopic examination (40x) with lactophenol cotton blue showing Trichophyton rubrum [Bird fence appearance of microconidia with long slender macroconidia]

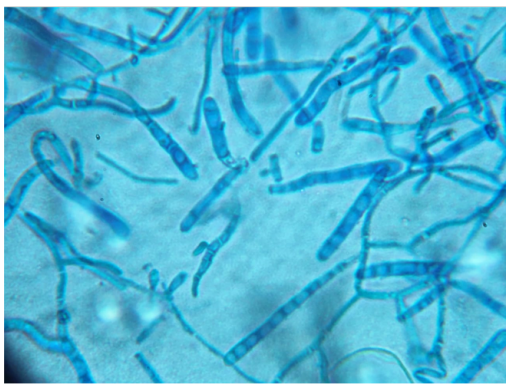

Fig. 10: Microscopic examination (40x) with lactophenol cotton blue showing Trichophyton mentagrophyte [spiral microconidia and cylindrical macroconidia]

Fig. 11: Microscopic examination (40x) with lactophenol cotton blue showing Epidermophyton floccosum with club shaped macroconidia in clusters.

Fig. 12: Sabouraud's dextrose agar tube showing raised creamy white colonies suggestive of Trichophyton rubrum

Fig. 13: Sabouraud's dextrose agar media showing violet waxy colonies suggestive of Trichophyton violaceum

4. Discussion

Dermatophytoses is the commonest cutaneous fungal infection seen in humans, and are receiving increasing attention in the recent years. Very few studies are performed in children wherein the incidence varied from 2.5% to 15.5%.[7,8]

In the present study with 150 patients, maximum children were in the age group of 10 to 18 years (69.3%) with a male:female ratio of 1.17:1. Similar epidemiological studies in children by Poojary et al, Kashyap et al and Gandhi et al also reported a higher male:female incidence ratio with a majority cases in age group of 10-14 years. It has been postulated that low prevalence in girls could be associated with better practice of personal hygiene when compared to males.[9] In the present study 85 subjects (56.7%) had a family history of dermatophytosis whereas only 46 (30.7%) had dermatophytic infection in the past, which corresponds to the past studies by Poojary et al and Kashyap et al.[10–14] In our study 66% had disease limited to one site while 10.7% had extensive disease involving more than 3 sites with similar findings reported by Mishra et al.[7]

In our patients 22.7% were anaemic, 14% had leucocytosis and 1.3% had leukopenia. None of the previous studies commented on the haematological profile of patients with dermatophytosis. Monitoring of complete blood count is advisable in patients taking longer treatment for Tinea.

In the past studies done among pediatric populations, Tinea corporis was found to be the most common dermatophytic infection[10,11] in contrary our study reported Tinea cruris as the most common finding (48.7%). Tinea capitis was seen in only 2% of the total study subjects which is in contrast to studies done by Coulibaly et al and Nweze et al where it was the most common clinical variant.[15,16] This difference in the pattern of the clinical distribution can be attributed to the geographical differences, climate conditions, humidity, and hair care practices. [Figures 6 and 7]

Out of 150 cases, 124 cases (82.7%) were positive on KOH mount similar higher positivity was reported in studies of Poojary et al, Kashyap et al, Kurukkanari R et al.[10,11,17]

Positive cultures were observed in 138 cases (92%), Such similar culture positivity was observed in studies by Coulabaly et al, Naronha et al.[16,18]

T.rubrum (72.5%) was the most common dermatophyte isolated followed by *T.mentagrophyte* (24.6%) in our study, which were also the findings by kashyap et al where T.rubrum was seen in 69.2% and rest were *T.mentagrophyte*.[10] As per recent literature there is an upsurge in the proportion of *T.mentagrophytes* in the pediatric population with overall prevalence of 47.2% in western India.[11,19] This has been corroborated by Nenoff et al, poojary et al and Mishra et al who also isolated *T.mentagrophytes* as a predominant species.[7,11,20] This changing clinico-mycological pattern of pediatric dermatophytosis can be attributed to rampant steroid abuse altering the local immunological milieu, increased proportion of T. mentagrophytes, and adult family members with persistent/recurrent dermatophytosis.

Growing misuse of topical corticosteroids containing fixed drug combinations at an early age adds to the burden of dermatophytosis in children.[21] Topical steroid abuse is responsible for the significant shift in clinical and mycological patterns of dermatophytosis in the Indian subcontinent.[22] In our study among 36.7% patients who used topical corticosteroids, KOH positivity was seen in 67.3% and culture positivity was in 89.1% patients while the topical corticosteroid naïve patients showed a higher culture and KOH positivity (93.7% and 91.6%). This low KOH and culture positivity in patients using topical corticosteroids could be attributed to the fact that using topical corticosteroid leads to deeper penetration of the fungus into the dermis as evidenced by histopathological findings in the study by Vineetha M and colleagues.[23] Most over the counter topical corticosteroids come in combination with antifungal agents, which could have contributed in clearing the fungal load and yielding a lower KOH positivity. Lastly it could also be due to sampling error.

5. Limitation

1. Molecular study was not possible due to resource limitations.
2. Our study was done in the western part of the Indian subcontinent, in the city of Mumbai, and it may not reflect the complete mycological picture of other parts of the country.
3. Further studies with a larger sample size for repeated KOH mounts and clinicopathological correlation in steroid modified tinea to confirm the low KOH positivity.

6. Conclusion

The present study shows the growing similarities between dermatophytosis in the adult and pediatric population. Further large-scale studies from other geographical regions would warrant a clearer picture of both the clinic-mycological as well as antifungal susceptibility patterns in the global pediatric population. Chronicity is a major problem encountered in treating a case of dermatophytosis and Injudicious use of topical steroid was high even among the pediatric patients. To reduce the burden and prevent persistence, parent education and counselling should be included in the management strategy and extending the therapy for at least 2–3 weeks after symptomatic relief should be advised along with appropriate treatment of any infected close contacts.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

1. Sahoo AK, Mahajan R. Management of tinea corporis, tinea cruris, and tinea pedis: a compre- hensive review. *Indian Dermatol Online J*. 2016;7(2):77–86.
2. Dogra S, Shaw D, Rudramurthy SM. Antifungal drug susceptibility testing of dermatophytes: laboratory findings to clinical implications. *Indian Dermatol Online J*. 2019;10(3):225–33.
3. Poojary S, Miskeen A, Bagadia J, Jaiswal S, Uppuluri P. A study of in vitro antifungal susceptibility patterns of dermatophytic fungi at a tertiary care center in Western India. *Indian J Dermatol*. 2019;64(4):277–84.
4. Jain A, Jain S, Rawat S. Emerging fungal infections among children: A review on its clinical manifestations, diagnosis, and prevention. *J Pharm Bioallied Sci*. 2010;2(4):314–20.
5. Nagarajan K, Thokchom NS, Ibochouba K, Verma K, and NBH. Pattern of pediatric dermatoses in Northeast India. *Indian J Paediatr Dermatol*. 2017;18:286–91.
6. Gandhi S, Patil S, Patil S, Badad A. Clinicoepidemiological study of dermatophyte infections in pediatric age group at a tertiary hospital in Karnataka. *Indian J Paediatr Dermatol*. 2019;20(1):52–6.
7. Mishra N, Rastogi MK, Gahalaut P, Yadav S, Srivastava N, Aggarwal A, et al. Clinicomycological study of dermatophytoses in children: Presenting at a tertiary care center. *Indian J Paediatr Dermatol*. 2018;19(4):326–30.
8. Poojary S, Jaiswal S, Bhalala KB, Bagadia J, Shah KS, Arora S, et al. A cross sectional observational study of pediatric dermatophytosis: Changing clinico mycological patterns in Western India. *Indian J Paediatr Dermatol*. 2021;22(3):236–40.
9. Ogbu CC, Okwelogu IS, Umeh AC. Prevalence of superficial fungal infections among primary school pupils in Awka South, Anambra State. *J Mycol Res*. 2015;2(1):15–22.
10. Kashyap P, Kishan YK, Prakash R. Pediatric dermatophytosis of the skin: Current clinico epidemiological and antifungal susceptibility patterns in a tertiary care rural hospital. *Indian J Paediatr Dermatol*. 2021;22:215–9.
11. Poojary S, Miskeen A, Bagadia J, Jaiswal S, Uppuluri P. A study of in vitro antifungal susceptibility patterns of dermatophytic fungi at a tertiary care center in Western India. *Indian J Dermatol*. 2019;64(4):277–84.
12. Adefemi SA, Odeigah LO, Alabi KM. Prevalence of dermatophytosis among primary school children in Oke-oyi community of Kwara state. *Niger J Clin Pract*. 2011;14(1):23–8.
13. Shenoy MM, Shenoy SM. Superficial fungal infections. In: Sacchidanand S, Oberoi C, Inamdar AC, editors. IADVL Textbook of Dermatology. 4th Edn.. vol. 1. Mumbai: Bhalani Publishing House; 2015. p. 459–516.
14. Maulingkar SV, Pinto MJ, Rodrigues S. A clinico-mycological study of dermatophytoses in Goa, India. *Mycopathologia*. 2014;178(4):297–301.
15. Nweze EI. Dermatophytosis among children of Fulani/Hausa herdsmen living in southeastern Nigeria. *Rev Iberoam Micol*. 2010;27(4):191–4.
16. Coulibaly O, Kone AK, Niaré-Doumbo S, Goïta S, Gaudart J, Djimdé AA, et al. Dermatophytosis among Schoolchildren in Three Eco-climatic Zones of Mali. *PLoS Negl Trop Dis*. 2016;10(4):4675. doi:10.1371/journal.pntd.0004675.
17. Kurukkanari R, Rajagopal GK, Narayanan VA, Neelakandhan A. Clinico-mycological study of dermatophytosis in a tertiary care hospital. *J Evolution Med Dent Sci*. 2020;9(4):195–9.
18. Noronha TM, Tophakhane RS, Nadiger S. Clinicco- microbiological study of dermatophytosis in a tertiary care hospital in North Karnataka. *Indian Dermat Online J*. 2016;7(4):264–71.
19. Agarwal US, Saran J, Agarwal P. Clinico-mycological study of dermatophytes in a tertiary care centre in Northwest India. *Indian J Dermatol Venereol Leprol*. 2014;80(2):194–194.
20. Nenoff P, Verma SB, Vasani R, Burmester A, Hipler UC, Wittig F, et al. The current Indian epidemic of superficial dermatophytosis due to Trichophyton mentagrophytes - A molecular study. *Mycoses*. 2019;62(4):336–56.
21. Saraswat A. Topical corticosteroid use in children: Adverse effects and how to minimize them. *Indian J Dermatol Venereol Leprol*. 2010;76:225–8.
22. Verma SB. Sales, status, prescriptions and regulatory problems with topical steroids in India. *Indian J Dermatol Venereol Leprol*. 2014;80(3):201–4.
23. Vineetha M, Sheeja S, Celine MI, Sadeep MS, Palackal S, Shanimole PE, et al. Profile of dermatophytosis in a tertiary care center. *Indian J Dermatol*. 2018;63(6):490–5.

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