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Original Research Article

Incidence of steroid modified tinea in pediatric age group at tertiary centre in North India

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ABSTRACT

Background: Uncontrolled use and abuse of topical steroids has led to increase in number of cases of superficial dermatophytosis of skin, hair and nail in pediatric age group as well. Our study aimed to analyse epidemiological and microbiological profile of steroid modified tinea (SMT) in pediatric age group.
Methods: Clinically diagnosed tinea childhood patients with history of usage of topical steroids in children were included in our study. Detailed history was taken and clinical examination along with KOH mount and culture was done.
Results: 112 patients were clinically diagnosed as tinea out of which 61cases gave the history of topical steroids and were included in our study. Most common age group was 12-18 years with female:male of ratio approximately 3:1 and disseminated and atypical form was the most common variety. KOH mount was positive in 73.2% cases and culture was positive in 69.6% cases. Most common species found out to be *Tinea mentagrophytes* followed by *Tinea rubrum*. Among non-dermatophyte group, *Candida* was the commonest.
Conclusions: There is rise in incidence of dermatophytosis, especially steroid modified, atypical and disseminated.

Keywords: Steroid modified tinea, Dermatophytosis, Topical steroid, Tinea, Superficial mycosis, *T. mentagrophytes*

INTRODUCTION

Dermatophytoses constitute a group of superficial fungal infections of keratinized tissues, namely, the epidermis, hair and nails.[1] The causative fungi are moulds belonging to three asexual genera *Microsporum*, *Trichophyton* and *Epidermophyton*.[2] The distribution and frequency of dermatophytosis and their etiologic agents vary according to the geographic region studied, the socioeconomic level of the population, the time of study, the climatic variations, the presence of domestic animals and age.[3] The high frequencies are observed in the tropical and subtropical countries like India, where the environmental temperature and relative humidity are high. In India it has shown an increasing prevalence of cutaneous dermatophytosis with detection of some uncommon species.[4,5]

As per WHO, the prevalence of superficial fungal infection worldwide has been found to be 20-25% and its more prevalent in tropical and subtropical countries like India where the heat and humidity is high throughout the year.[6] The most common infections in children are *Tinea corporis* and *Tinea capitis*.

The clinical suspicion of dermatophytosis can be confirmed with diagnostic tests which is a simple potassium hydroxide (KOH) preparation with mycologic examination under a light microscope in most of the cases. Another method is the culture and antifungal

sensitivity, in which the Sabouraud dextrose agar (SDA, 4% peptone, 1% glucose, agar, water) is taken as isolation media for dermatophytes.[7] To treat dermatophytosis, the evidence on the use of existing topical antifungals Rotta et al evaluated the efficacy of 14 different topical antifungals while Cochrane review on treatment of *T. cruris* and *T. corporis* suggests that the individual treatments with terbinafine and naftifine are effective with few adverse effects.[8] Other topical antifungals like azoles are also effective in terms of clinical and mycological cure rates.[9]

METHODS

Prospective cross-sectional study was conducted after ethical clearance, in outpatient department of dermatology in collaboration with department of microbiology, Era's Lucknow medical college and hospital (ELMCH) between March 2018 to May 2018. All patients of paediatric age group attending dermatology OPD of ELMCH during study duration were screened and clinically diagnosed patients of tinea were asked about the application of topical steroids following which patients with history of usage of topical steroids were included in the study.[10] Detailed predesigned proforma was filled which included, name, age, family history, type of topical medications applied, prescription details, duration of illness and history of oral medications. KOH smear and culture was done. Patients not willing to participate in the study were excluded from the study.

Specimen collection[11-17]

Skin, hair or nail specimens were collected as per standard techniques in the department of microbiology in ELMCH, Lucknow. This was performed only after an informed written consent from each patient/guardian and he/she was assured that the information would be kept strictly confidential. The affected part was first cleaned with 70% alcohol (and left to dry) to remove contaminants. As the site of invasion and localization of infection differ in the different types of superficial mycoses the following collection techniques were followed.

Skin scrapings

Scrapings were collected from the border of skin lesions with a sterile scalpel blade. The specimen was collected in a piece of stiff black paper 10×10 cm and fastened with a paper clip after folding. Each specimen was labelled with name, age, sex of patient, site of lesion and identification number and was kept at room temperature till further processing.

Hair

Affected site was disinfected with alcohol before collecting specimen. Basal root portion of hair was taken by plucking, scraping scales and excavating hair for direct examination and culture.

Skin scraping and hairs stubs were examined by direct microscopy and culture using following techniques:

Microscopic examination

Two methods of direct microscopy were used. They were potassium hydroxide (10% KOH) preparation and potassium hydroxide (10%) with dimethyl sulfoxide (40%) (KOH/DMSO) preparation.

Culture and isolation of causative fungi

Specimen was cultured for the isolation of dermatophytes, non-dermatophytes as well as yeast. They were SDA: chloramphenicol (0.05 g/l) was added to the culture media to inhibit bacterial growth; SDA with chloramphenicol (0.05 g/l) and cycloheximide (0.5 g/l) to inhibit the growth of contaminated fungi; dermatophyte test medium (DTM) (Hi Media India) with chloramphenicol (0.05 g/l).

Procedure

The specimens were inoculated on the surface of the medium (two sets of tubes containing SDA with chloramphenicol with/without cycloheximide and DTM with sterile forceps or loop (L shape) breaking the surface of medium without becoming completely embedded. The use of cycloheximide free media allows other potentially pathogenic fungi to grow and is usually added to culture media to inhibit bacterial overgrowth.[18]

Identification of fungal isolates

Fungal isolates were identified by procedures detailed in standard mycology textbooks by Rippon and Larone.[13,15,16]

Identification of moulds

Colonial morphologic features

Colony obverse: Colour (e.g. white, pearl, ivory andblack), consistency (e.g. cottony, fluffy, suede like, wiry) and topography (e.g. flat, folded, plicate, rugose) were noted.

Colony reverse: Extent and color of pigmentation was noted, colony color and morphology including folds and rugosities on reverse were also noted.

Microscopic morphologic features

Definitive identification was made by micro-slide culture method.

Slide culture technique: It was carried out to observe intact microscopic morphology of the fungus, particularly the position of the macroconidia, micro conidia and chlamydoconidia in relation to each other and the mycelia. The growth was examined under microscope with high power (40×) magnification for appearance of morphological features.

RESULTS

112 patients were clinically diagnosed as cases of tinea. Most common age group involved was adolescent (12-18 years) with a contribution of 81.3% cases. Female preponderance (68.8%) was noted (Table 1). Out of 112 patients, 61 (54.5%) had positive family history of application of topical steroids. Disseminated form of tinea was most common variety followed by *T. corporis*, *T. faciei*, *T. cruris* (Table 2). The highly significant difference in proportion of various varieties was found ($p<0.0001$). The morphology of lesions was not typical, mainly seen as *T. pseudoimbricata* that is with multiple rings. Itching was very common symptom. Duration of treatment varied from few days to 36 months. Most of the patients were using topical steroids for less than 12 months (Table 2). Most commonly used topical steroids were betamethasone, clobetasol and mometasone. Among them use of MTS was significantly higher than other treatments as its proportion was lying above the UCL (upper confidence line). These were being used by 39 (34.8%) subjects (Table 3) (Figure 1). Use of multiple drug combinations was very common which included antifungals, antibacterials and steroid combinations.

Table 1: Age and sex distribution of cases.

Variables	Number	%	95% CI
Age (in years)			
Infant (0-2)	4	3.6	(0.15-7.05)
Young child (2-6)	6	5.4	(1.21-9.59)
Child (6-12)	11	9.8	(4.29-15.31)
Adolescent (12-18)	91	81.3	(74.08-88.52)
Sex			
Male	35	31.3	(22.71-39.89)
Female	77	68.8	(60.22-77.38)
Total	112	100	-

Table 2: Distribution of *Tinea* according to family history, type and duration.

Variables	Number	%	95% CI
Family history			
Positive	61	54.5	(45.28-63.72)
Negative	51	45.6	(36.38-54.82)
Significance	Chi square=0.89, p=0.345		
Type of *Tinea*			
Disseminated *Tinea*	65	58	(48.86-67.14)
T. capitis	1	0.9	(0.0-2.65)
T. corporis	26	23.2	(15.38-31.02)
T. cruris	7	6.3	(1.80-10.80)
T. faciei	11	9.8	(4.29-15.31)
T. mannum	2	1.8	(0.0-4.26)
T. pedis	0	0	
Significance	Chi square=205.25, p<0.0001		
Duration (in months)			
0-12	104	92.9	(88.14-97.66)
13-24	7	6.2	(1.73-10.67)
25-36	1	0.9	(0.0-2.65)
Significance	Chi square=248.07, p<0.0001		

Table 3: Topical medication used.

Compositions	Frequency	Percentage
Ayurvedic preparations (ayur)	03	2.7
Betamethasone (B)	14	12.5
Clobetasol (C)	05	4.5

Continued.

Compositions	Frequency	Percentage
Mometasone (M)	04	3.6
Betamethasone, clioquinol, gentamicin, tolnafate (B+Cl+G+T)	03	2.7
Betamethasone, gentamycin, miconazole (B+G+Mi)	04	3.6
Clobetasol propionate, miconazole, neomycin (C+P+Mi+N)	07	6.3
Clobetasol, gentamicin, clotrimazole, clioquinol, tolnafate (C+G+Ct+Cl+T)	04	3.6
Clobetasol, ofloxacin, ornidazole, terbinafine (C+O+Or+Tr)	10	8.9
Homeopathic (Hom)	01	0.9
MTS	39	34.8
Antifungal (AF)	03	2.7
None (No)	15	13.4
Total	112	100

Table 4: Source of medication.

Sources	Frequency	Percentage
Chemist	27	24.1
LMP	54	48.2
Relatives	07	06.2
Self	12	10.7
Not told	12	10.7
Total	112	100

Table 5: Morphology according to age group.

Tinea types	Infants (0-2 years)		Young child (2-6 years)		Child (6-12 years)		Adolescent (12-18 years)		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Disseminated *Tinea*	03	75.0	0	0.0	3	27.3	59	64.8	65	58.0
T. capitis	0	0.0	1	16.7	0	0.0	0	0.0	1	0.9
T. corporis	1	25.0	3	50.0	07	63.6	15	16.5	26	23.2
T. cruris	0	0.0	0	0.0	1	9.1	6	6.6	7	6.2
T. faciei	0	0.0	2	33.3	0	0.0	9	9.9	11	9.8
T. mannum	0	0.0	0	0.0	0	0.0	2	2.2	2	1.8
Total	04	100	06	100	11	100	91	100	112	100

Chi square=41.3, p<0.001.

Table 6: KOH and culture characteristics.

Results	KOH examination		Culture examination		KOH sensitivity (%)	KOH specificity (%)
	No.	%	No.	%		
Positive	82	73.2	78	69.6	100	88.20
Negative	30	26.8	34	30.4		
Total	112	100	112	100		

Table 7: Types of dermatophytic and non-dermatophytic species isolated.

Variables	Number	%	95% CI
Dermatophytic species			
T. mentagrophytes	25	32.05	(23.41-40.69)
T. rubrum	19	24.35	(16.40-32.30)
T. verrucosum	3	3.84	(0.28-7.40)
T. tonsurans	2	2.56	(0.00-5.49)
Microsporum sp.	1	1.28	(0.00-3.36)
Non-dermophytic moulds			
Aspergillus sp.	8	10.25	(4.63-15.87)

Continued.

Variables	Number	%	95% CI
Acremonium sp.	6	7.69	(2.76-12.62)
Fusarium sp.	2	2.56	(0.00-5.49)
Candida sp.	12	15.28	(8.62-21.94)

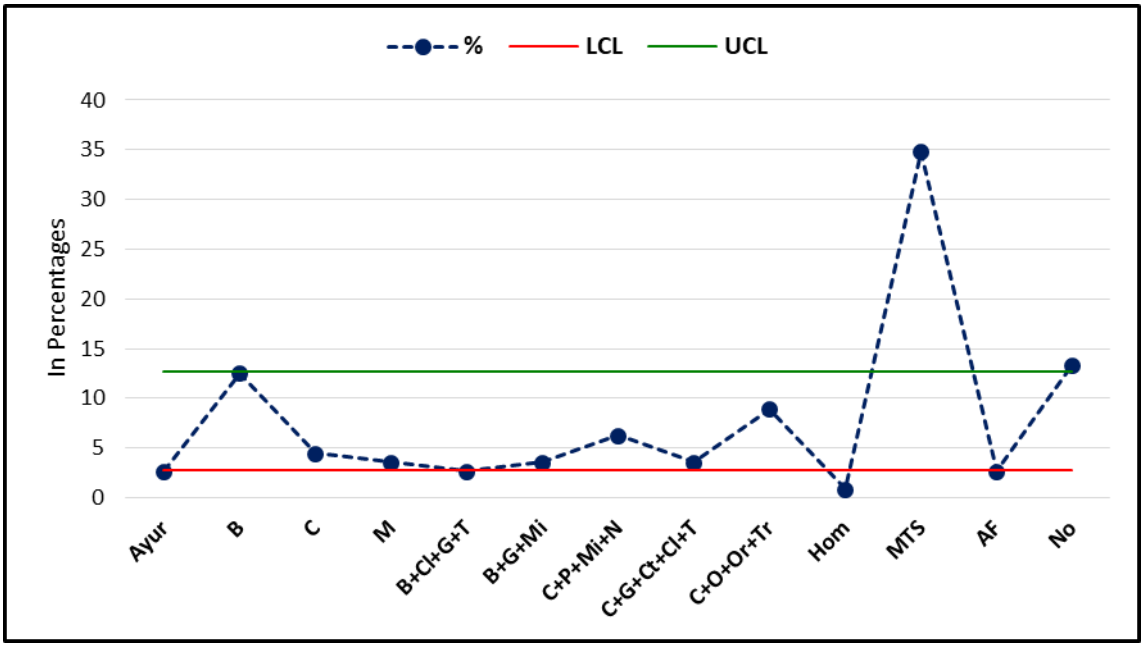

Figure 1: Topical medication used.

Highly significant association was found between tinea type and paediatrics age group ($p<0.001$). Disseminated tinea was observed mainly in adolescents while *T. corporis* was found mainly in young child and child age group (Table 5).

Figure 2: A solitary erythematous well defined plaque present over the right cheek extending from tragus to right angle of mouth with central clearing.

Figure 3: A solitary well defined plaque with central clearing covering the bilateral buttock and upper thigh.

After specimen collection, KOH was done and it was positive in approximately 82 (73.2%) of cases, showing KOH wet mount-branched network of fungal hyphae under low power 40× (Table 6). Fungal culture was positive in 78 (69.6%) patients (Table 6). The sensitivity

and specificity of KOH with respect to culture was 100% and 88.2% respectively.

Figure 4: A large well defined erythematous plaque covering the lower abdomen and vulva.

T. mentagrophytes was positive in 25 cases that is 32.05%. *T. rubrum* showed white, cottony growth was positive in 19 cases that is 24.35%. *T. verrucosum* was positive in 3 cases (3.84%) and *T. tonsurans* in 2 cases (2.56%). Among non-dermatophyte group *Candida* was the most common causative fungus which contributes 12 cases, *Candida* species showed moist pasty cream colored growth and *Aspergillus* 8 cases, *Aspergillus* species colony showed blackish growth, followed by *Acremonium* species in 6 and *Fusarium* in 02 cases.

DISCUSSION

In this study most common age group involved was adolescent (12-18 years) with a contribution of 81.3% cases. The similar results were found in the study Gandhi et. al which showed maximum contribution from the age group 10-14 years with proportion 56%.[19] The prevalence of superficial fungal infections in children was found between 11.3% and 40.57% in different studies.[20-22] The high prevalence of infection in 11-15 years age in the study Dash et al can be attributed to the crowded hostel or mess type of accommodation in this age group and the highly contagious nature of the disease.[22] In this study, 54.5% had positive family history of application of topical steroids. Here, the role of family history is very much important. In the study Mishra et al family history was positive in 91.95% of children and similar results (83.84) were found in Dash et al.[22,23] Present study showed disseminated form of *Tinea* was most common variety followed by *T. corporis*, *T. faciei*, *T. cruris*. It was found that over the last few years, studies on dermatophytic infection has shown a rising trend in the prevalence of cutaneous dermatophytosis in India with change in spectrum of infection and isolation of some uncommon species.[5,6] Most commonly used topical steroids were betamethasone, clobetasol, mometasone. According to Medansky et al the efficacy of mometasone furoate ointment in patients with dermatophytic infections was significantly greater than that of the comparative drug.[24]

Highly significant association was found between *Tinea* type and paediatrics age group ($p<0.001$). Disseminated *Tinea* was observed mainly in adolescents while *T. corporis* was found mainly in young child and child age group.

The sensitivity and specificity of KOH with respect to culture was 100% and 88.2% respectively.

T. mentagrophytes was positive in 25 cases that is 32.05%. *T. rubrum* showed white, cottony growth was positive in 19 cases that is 24.35%. *T. verrucosum* was positive in 3 cases (3.84%) and *T. tonsurans* in 2 cases (2.56%). Among non-dermatophyte group *Candida* was the most common causative fungus which contributes 12 cases, *Candida species* showed moist pasty cream colored growth and *Aspergillus* 8 cases, *Aspergillus species* colony showed blackish growth, followed by *Acremonium species* in 6 and *Fusarium* in 2 cases. In the study Jaya et al the sensitivity and specificity of KOH microscopy for skin scrapings was 66.7% and 47.6% and for hair sample 67.4% and 100% respectively. The sensitivity and specificity of fungal culture for skin scrapings was 29.7% and 100% and for hair sample 100% and 34.9% respectively.

CONCLUSION

There is rise in incidence of dermatophytosis, especially steroid modified, atypical and disseminated.

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REFERENCES

1. Emmons CW. Dermatophytoses. In: Emmons CW, Binford CH, Utz JP, Kwon-Chung KJ, eds. Medical Mycology. 3rd ed. Philadelphia: Lea and Febiger; 1977: 117-64.
2. Hay RJ, Moore MK. Mycology. In: Burns T, Breathnach S, Cox N, Griffiths C, eds. Rook's Textbook of Dermatology. 7th ed. Oxford: Blackwell Science; 2004: 31.
3. Chinelli PA, Sofiatti ADA, Nunes RS, Martins JE. Dermatophyte agents in the city of Sao Paulo, from 1992 to 2002. Rev Inst Med Trop Sao Paulo. 2003;45(5):259-63.
4. Sharma Y, Jain S, Chandra K, Khurana VK, Kudesia M. Clinico-mycological evaluation of

dermatophytes and non-dermatophytes isolated from various clinical samples: a study from north India. J Res Med Sci. 2012;17(8):817-8.
5. Sahai S, Mishra D. Change in spectrum of dermatophytes isolated from superficial mycoses cases: First report from Central India. Indian J Dermatol Venereol Leprol. 2011;77(3):335-6.
6. Lakshmanan A, Ganeshkumar P, Mohan SR, Hemamalini M, Madhavan R. Epidemiological and clinical pattern of dermatomycoses in rural India. Indian J Med Microbiol. 2015;33(1):134-6.
7. Singh J, Zaman M, Gupta AK. Evaluation of microdilution and disk diffusion methods for antifungal susceptibility testing of dermatophytes. Med Mycol. 2007;45(7):595-602.
8. Rotta I, Ziegelmann PK, Otuki MF, Riveros BS, Bernardo NL, Correr CJ. Efficacy of topical antifungals in the treatment of dermatophytosis: A mixed-treatment comparison meta-analysis involving 14 treatments. JAMA Dermatol. 2013;149(3):341-9.
9. El-Gohary M, Zuuren EJV, Fedorowicz Z, Burgess H, Doney L, Stuart B, et al. Topical antifungal treatments for tineacruris and tineacorporis. Cochrane Database Syst Rev. 2014;8:009992.
10. Hardin AP, Hackell JM, Committee On Practice And Ambulatory Medicine. Age limit of pediatrics. Pediatr. 2017;140(3):20172151.
11. Jagdish C. Superficial cutaneous Mycosis. Text book of Medical Mycology. 2nd ed. New Delhi: Jaypee Brothers medical publishers; 2002: 69-86.
12. Evans EGV, Richardson MD. Medical Mycology: A practical approach. Oxford: IRL Press; 1989.
13. Lorone DH. Medically important fungi-a guidance to identification. 5th ed. Washington: ASM Press; 2011.
14. Collee JG, Mackie TJ, McCartney JE. In: Collee JG, Fraser AG, Marmion BP, Simmons A, eds. Practical Medical Microbiology. 14th ed. Churchill Livingstone: Elseiver; 2007.
15. Rippon JW. Medical Mycology. 3rd ed. Philadelphia, USA: WB Saunders; 1988.
16. Rippon JW. The changing epidemiology and emerging patterns of dermatophyte species. Curr Top Med Mycol. 1985;1:208-34.
17. Padhya AA, Weitzman I. Topley and Wilson's Microbiology and Microbial Infections. The Dermatophytes. 10th ed. London: Arnold; 2005.
18. Weitzman I, Summerbell RC. The dermatophytes. Clin Microbiol Rev. 1995;8(2):240-59.
19. 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.
20. Oke OO, Onayemi O, Olasode OA, Omisore AG, Oninla OA. The prevalence and pattern of superficial fungal infections among school children in Ile-Ife, South-Western Nigeria. Dermatol Res Pract. 2014;2014:842917.
21. Ogbu CC, Okwelogu IS, Umeh AC. Prevalence of superficial fungal infections among primary school pupils in Awka South local government area of Anambra state. J Mycol Res. 2015;2(1):15-22.
22. Dash M, Panda M, Patro N, Mohapatra M. Sociodemographic profile and pattern of superficial dermatophytic infections among pediatric population in a tertiary care teaching hospital in Odisha. Indian J Paediatr Dermatol. 2017;18(3):191-5.
23. Mishra N, Rastogi MK, Gahalaut P, Yadav S, Srivastava N, Aggarwal A. Clinicomycological study of dermatophytoses in children: presenting at a tertiary care center. Indian J Paediatr Dermatol. 2018;19(4):326-30.
24. Medansky RS, Brody NI, Kanof NB, et al. Clinical investigations of mometasonefuroate: a novel, nonfluorinated, topical corticosteroid. Sem Dermatol. 1987;6:94-100.

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