



Study of Clinico-Epidemiological and mycological aspects of Tinea Capitis in North India

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ABSTRACT

Background: Tinea capitis is a superficial fungal infection of the scalp, hair follicles, and the adjoining skin by dermatophytes which commonly affects pediatric population. The etiological factors vary from region to region and also with time, and exact incidence remains obscure.

Methods: 112 clinically diagnosed patients of tinea capitis in age group less than 18 year were studied for period of one year in a tertiary care centre of North India, epidemiological features were studied, and Woods lamp examination, KOH examination and fungal culture were performed.

Results: Most of the patients were in age group of 3-9 years. The duration of disease was from 1-3 months in most patients. The grey patch was the most common clinical variant seen. 72(64.2%) yielded KOH positivity, and on fungal culture growth of dermatophytes was seen in 81 (72.3%) cases. The most common species of dermatophytes isolated was *Trichophyton tonsurans*.

Conclusion: Tinea capitis is a common infection in pediatric age group. Early detection and treatment is important to prevent spread of infection and to prevent complication like scarring alopecia.

Keywords: Tinea capitis, Dermatophytes, *Trichophyton tonsurans*

INTRODUCTION

The superficial fungal infection of the scalp, hair follicles, and the adjoining skin by dermatophytes is known as tinea capitis. Dermatophytes are fungi that commonly infect the keratinous tissues of humans and lower animals¹. It is common scalp infection associated with varying degrees of hair loss and is more common in developing countries due to factors like overcrowding, improper hygiene and lack of education^{2,3}. Unlike other dermatophytic infection which do not have any age predilection, tinea capitis is commonly seen in pediatric age group, with small percentage of cases in adults^{4,5}.

There are many dermatophytic species of fungi, about 12 of which cause human infection. Tinea capitis is caused by more than four dermatophyte

species⁶. Tinea capitis is transmitted via infected persons, fallen infected hairs, and selected animal vectors. Spread of tinea capitis by fomites (combs, shared hats etc) is common⁷.

There is wide variation in species of dermatophytes causing tinea capitis in different geographical regions. There is also change in species causing tinea capitis in a given geographic region over a period of time⁶. Also the clinical patterns vary from place to place depending on climate, standard of living, immune status of the host and genetic constitution, hygiene, use of different antimycotic agents, resistance to antifungals, and dermatophyte related factors. So the present study was designed to study

clinical patterns and likely causative agents of tinea capitis in this region of North India.

Methods:

The present study was carried out in the department of dermatology over a period of 12 months from December 2017 to November 2018, after taking clearance from the institutional ethical committee. It was a hospital based prospective cross-sectional study where one hundred and twelve clinically diagnosed cases of tinea capitis in patients with age less than 18 years were included after obtaining a proper consent from the accompanying person. A short questionnaire was formulated, and the relevant

details were obtained from the patient and his/her parents/acquaintances, including demographic variables such as age, sex, and residence (whether rural or urban). This was followed by a relevant history pertinent to the chief complaints (hair loss/scaly lesion/pus discharge from scalp/scalp swelling), duration of the lesions, involvement of any other body site, treatment history, and whether any family member is/was affected. Patients who had received any topical or systemic treatment were excluded from the study. Clinical and Wood's lamp examination were performed to ascertain the clinical variant of tinea capitis (grey patch, black dot, kerion, or favus). (Image 1, 2 & 3)



Grey Patch

Kerion

Black Dot

Images 1 2& 3:- Clinical variants of Tinea capitis (grey patch, kerion and black dot)

KOH examination of the lesional skin scrapings and hair follicles was then performed to confirm the fungal etiology (Image 4). Finally, a fungal culture was obtained to identify the causative fungal strain.



Image 4: KOH mount of skin scrapings showing branched septate hyphae (400X)

Method of sample collection:

The sample was collected after proper cleaning of the affected area with an antiseptic solution and allowing it to dry for about 1 minute. The scrapings and the affected hairs were collected, respectively, using sterile surgical blade, and fine forceps. Each specimen was collected in autoclaved folded paper with proper labelling and then sent to the laboratory and subjected to culture. The media used for culture was Sabouraud's dextrose agar with chloramphenicol, and Sabouraud's dextrose agar with chloramphenicol and cycloheximide with incubation temperatures of 25–28°C and 30–35°C, respectively. Identification was done by phenotypic methods that included observing the colony obverse and reverse for pigmentation, type of growth, and preparation of lactophenol cotton blue mount from colony for final identification. (Images 5, 5a, 6, 6a, 7 & 7a)

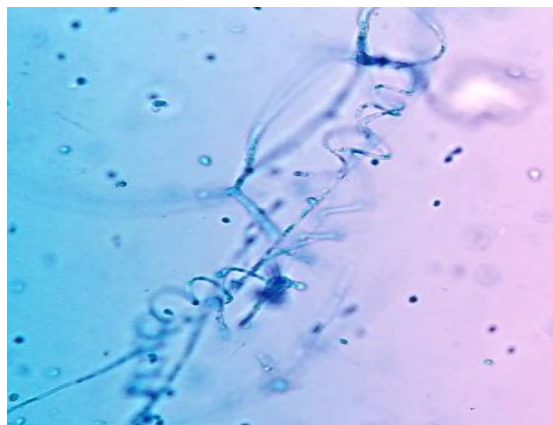
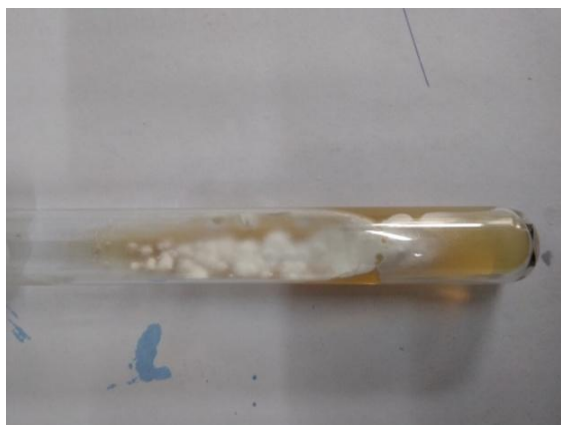


Image 5: *T. tonsurans* Image 5a: *T. tonsurans*

Images 5 & 5a: SDA slant showing growth of *T. tonsurans* with spiral hyphae (400X).

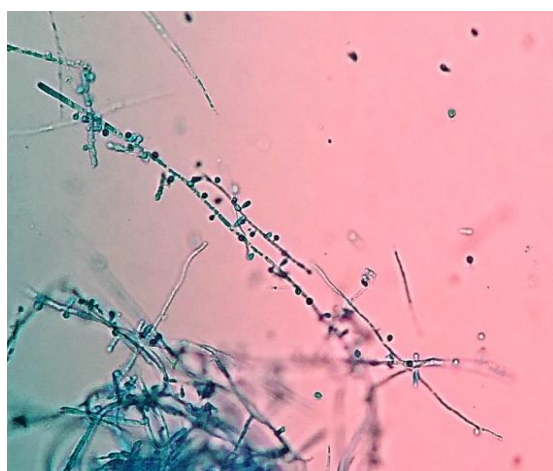


Image 6: *T. rubrum*

Image 6a: *T. rubrum*

Image 6 & 6a: SDA slant showing growth of *Trichophyton rubrum* with wine red diffused pigment & tear drop micro conidia. (400X)

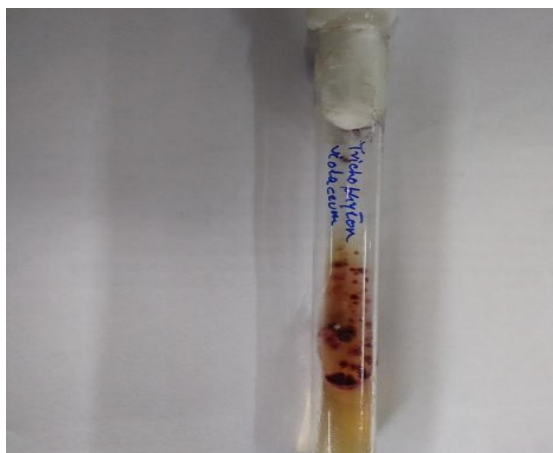
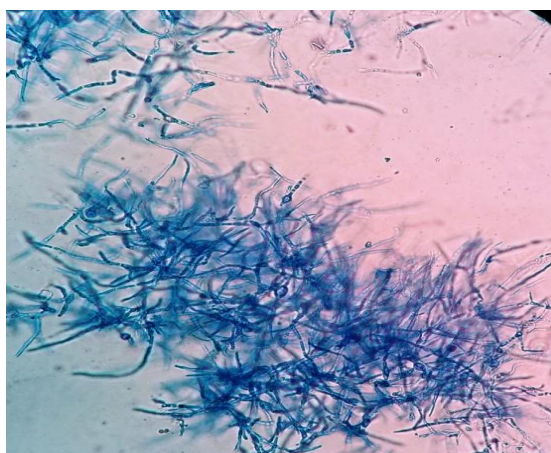
**Image 7: Trichophyton violaceum****Image 7a: Trichophyton violaceum**

Image 7 & 7a: SDA slant showing growth of *Trichophyton violaceum* & sterile distorted hyphae of *T. violaceum* (400X) respectively.

Results:

In the present study, there were 112 clinically diagnosed cases of tinea capitis with males comprising 69 of cases (61.6%) and females 43 (38.4%) with male female ratio of 1.60. Most of the patients were in age group of 6-9 years and 3-6 years, comprising 46 (41.07%) and 30 (26.78%) cases respectively, followed by age group 9-12 years (26 cases), 0-3 years (17 cases), and >12 year age group (3 cases) in decreasing order. Most of the patients were from rural background, with 78 (69.6%) cases from rural background and 34 (30.4%) from urban background. The duration of disease was from 1-3 months in most patients (75%), followed by less than a month (17.85%), and very few with duration > 3 months (7.15%). The youngest patient was 10 month old male child, whereas oldest was 13 year old male.

The grey patch was the most common clinical variant seen in (64.3%), followed by black dot (21.4%), kerion (12.5%), and favus (1.8%).

Among the 112 patients on mycological examination with 10% KOH 72 (64.2%) yielded KOH positivity, and on fungal culture growth of dermatophytes was seen in 81 (72.3%) cases, whereas no growth or growth of non dermatophyte fungi like penicillium and candida species were seen in 31 (27.7 %). The most common species of dermatophytes isolated was *Trichophyton tonsurans* (48.1%), followed by *T. Violaceum* (29.6%), *T. Rubrum* (9.8%), *T. Schonleini* (4.9%), and *T. verrucosum* (3.7%) and multiple strains were seen in few patients (3.7%).

Discussion:

Tinea capitis is a disease of mainly pre-pubertal children with common in age group of 5-15 years^{8,9}. The prevalence varies from one place to other. Various factors like socio-economic status, nutrition, environmental factors, personal hygiene, education etc play a role¹⁰. The clinical presentation varies from non-inflammatory lesions (grey patch and black dot) to severe inflammatory lesions (kerion and favus). Inflammatory lesions if not treated promptly can lead to permanent scarring hair loss.

In the present study, disease was more common in males as compared to females with male: female ratio of 1.6:1. The result of our study are similar to many other studies including two earlier studies from Jammu and Kashmir^{11,12}. Greater exposure to external environment, short hairs, frequent trimming of hairs by contaminated scissors and blades, sharing caps, and contact with pets/cattle are some predisposing factors that make male children more vulnerable to tinea capitis.

Also, more patients were seen from rural background as compared to urban areas consistent with previous study¹². Poor personal hygiene, overcrowding, lack of education, low socio-economic status, inability to identify disease early in course, use of home based treatments, using contaminated scissors and blades, sharing caps and lack of proper and adequate medical access could be possible factors responsible for the rural predominance.

The maximum number of cases were in age group of 6-9 years and 3-6 years, this was in accordance to many previous national and international studies. In a study done in Rajasthan reported that more than 80% cases in age group 3-10 years¹³.

In the present study, grey patch was most common clinical variant seen, followed by black dot, kerion and favus similar to studies performed from India and Pakistan^{14,15}, however, black dot variant was seen more common than kerion in this study which is in contrast to previous study done in Kashmir¹². Also some studies from North India and few studies from Rajasthan and Karnataka demonstrated black dot to be more common variant^{4,13,16}. The regional differences are due to different infecting strains, environmental factors, and host immunity.

Both, direct microscopic examination and culture were positive in 64.2% and 72.3 % respectively. *T. tonsurans* was most common agent followed by *T. violaceum* and *T. rubrum* among other strains. This is different from many other studies carried out in different parts of India and few from Egypt, where *T. violaceum* was found more common agent^{4,13,16,17}. However, results are similar to many studies from UK, USA and previous studies from Kashmir where *T. tonsurans* is most common agent isolated^{12,18,19}. In this study *T. violaceum* is seen in higher percentage of patients as compared to previous studies from this part of North India. The results could be variations in geographical location and climate factors and use of different antimycotic drugs and drug resistance.

To conclude, since it is a hospital based study, the exact incidence and isolation of fungal species in general population cannot be estimated. With variation in epidemiological features, clinical types seen, and causative strains isolated from different parts of world, it is important to do a direct microscopic examination and culture of every patient of tinea capitis in order to isolate the species variation in an area, to know changing patterns of occurrence of different species and their association with clinical pattern. With early diagnosis, followed by adequate treatment of infection can greatly help in reducing transmission of infection in community, and thus preventing scarring and non scarring hair loss in children.

References:

1. Kundu D, Mandal L, Sen G. Prevalence of tinea capitis in school going children in Kolkata, West Bengal. *J Nat Sci Biol Med* 2012;3:152-5.
2. Gupta AK, Summerbell RC. Tinea Capitis. *Med Mycol* 2000;38:255-87.
3. Havlickova B, Czaika VA, Friedrich M. Epidemiological trends in skin mycoses worldwide. *Mycoses* 2008;4:2-15.
4. Pai VV, Hanumanthayya K, Tophakhane RS, Nandihal NW, Kikkeri NS. Clinical study of tinea capitis in Northern Karnataka: A three-year experience at a single institute. *Indian Dermatol Online J* 2013;4:22-6.
5. Frangoulis E, Athanasopoulou B, Katsambas A. Etiology of tinea capitis in Athens, Greece—A 6-year (1996–2001) retrospective study. *Mycoses* 2004;47:208-12.
6. Elewski BE. Tinea capitis—A current perspective. *J Am Acad Dermatol* 2000;42(Pt 1):1-20; quiz 21-4.
7. Mackenzie DW. Hairbrush diagnosis in detection and eradication of non-fluorescent scalp ring worm. *Br J* 1963;11:363-5.
8. Grin EI. Epidemiology and control of ringworm of scalp. International symposium on mycoses. Vol. 1. United States: Washington; 1970. P.149.
9. Leeming JG, Elliot TS. The emergence of *T. tonsurans* tinea capitis in Birmingham, UK. *Br J Dermatol* 1995;133:929-31.
10. Babel DE, Baughman SA. Evaluation of the adult carrier state in juvenile tinea capitis. *J Am Acad Dermatol* 1989;21:1209-12.
11. Wani MM, Kamili QA, Chisti M, Masood Q. Trends of tinea capitis in population attending dermatology department of a tertiary health care facility in Kashmir. *JK-Practitioner* 2006;13:131-3.
12. Bhat YJ, Zeerak S, Kanth F, Yaseen A, Hassan I, Hakak R. Clinicoepidemiological and mycological study of tinea capitis in the pediatric population of Kashmir valley: A

- Study from a tertiary care centre. *Ind Dermatol Online J* 2017;8:100-103.
13. Kalla G, Begra B, Solanki A, Goyal A, Batra A. Clinicomycological study of tinea capitis in desert district of Rajasthan. *Indian J Dermatol Venereol Leprol* 1995;61:342-5.
 14. Sajjan AG, Mangalgi SS. Clinicomycological profile of tinea capitis in children residing in orphanages. *Int J Biol Med Res* 2012;3:2405-7.
 15. Farooqi M, Tabassum S, Rizvi DA, Rahman A, Rehanuddin, Awan S, et al. Clinical types of tinea capitis and species identification in children: An experience from tertiary care centres of Karachi, Pakistan. *J Pak Med Assoc* 2014;64:304-8.
 16. Grover C, Arora P, Manchanda V. Tinea capitis in the pediatric population: A study from North India. *Indian J Dermatol Venereol Leprol* 2010;76:527-32.
 17. Abd Elmegeed AS, Ouf SA, Moussa TA, Eltahlawi SM. Dermatophytes and other associated fungi in patients attending to some hospitals in Egypt. *Braz J Microbiol* 2015;46:799-805.
 18. Hay RJ, Clayton YM, De Silva N, Midgley G, Rossor E. Tinea capitis in south-east London—A new pattern of infection with public health implications. *Br J Dermatol* 1996;133:955-8.
 19. Franks AG, Taschdjian CL. Incidence and etiology of tinea capitis: Special reference to *Trichophyton tonsurans*. *AMA Arch Derm* 1956;74:349-51.