

Clinicoepidemiological and Mycological Study of Tinea Capitis in the Pediatric Population of Kashmir Valley: A Study from a Tertiary Care Centre

Abstract

Background: Tinea capitis is a superficial fungal infection that predominantly affects the pediatric population. The etiological factors vary from region to region, and the exact incidence remains obscure. The clinicoepidemiological and mycological aspects of this dermatophytosis were studied in a tertiary care centre in Kashmir valley. **Aim:** To determine the clinicoepidemiological aspects and mycological findings of dermatophytes involved in tinea capitis cases in Kashmir valley. **Materials and Methods:** Wood's lamp examination, KOH examination, and fungal culture were performed in one hundred fifty clinically diagnosed cases of tinea capitis with patients' age upto 14 years over a period of 6 months. The epidemiological factors associated with the disease were also evaluated. **Results:** Tinea capitis was predominant in the 3–6 and 6–9 years age groups with a male preponderance. Grey patch tinea capitis was the most common variant. KOH positivity was 76%, and *Trichophyton tonsurans* was the most common fungal isolate. **Conclusion:** Tinea capitis is a very common fungal infection in our setting. Early detection and diagnosis is mandatory to prevent its spread in the community as well as the development of scarring alopecia in the affected individual.

Keywords: Dermatophytes, tinea capitis, *Trichophyton tonsurans*

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Introduction

Tinea capitis is a dermatophyte infection that involves the scalp, hair follicles, and the adjoining skin. Dermatophytes are fungi that commonly infect the keratinous tissues of humans and some lower animals. The superficial layers of the epidermis, particularly the stratum corneum, and the keratin rich appendages, such as the hair and nails of the living host, are invaded by these dermatophytes, where they eventually proliferate and multiply.^[1] It is a common scalp infection seen in children from developing countries, often causing varying degrees of hair loss.^[2,3]

Unlike other dermatophytosis that have no age predilection, tinea capitis is primarily seen in the pediatric population, with a small number of cases also encountered in adults.^[4,5]

Etiologically, in tinea capitis, wide variations have been seen in different geographic regions. Changes also occur in the etiology in a given area over a period of time.^[6] Even the clinical pattern varies from place to place. Climate,

standard of living, immune status of the host and genetic constitution, hygiene, use of different antimycotic agents, and resistance to different drugs in different regions, immigration patterns, and dermatophyte related factors could all play some role in governing the predominant causative species. Moreover, it is a common dermatophyte infection in Kashmir, seen in a significant number of children attending the dermatology outpatient clinic. This study was, thus, designed to get an insight into the pattern of tinea capitis and the likely causative dermatophyte strains in the Kashmiri population.

Materials and Methods

The present study was carried out in the outpatient department of dermatology over a period of 6 months from January to June 2014, after taking clearance from the institutional ethical committee. It was a prospective cross-sectional study wherein one hundred and fifty clinically diagnosed cases of tinea capitis in children upto 14 years of age attending the out patient

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department were included after obtaining a proper consent from the accompanying person. All the participants were new clinically diagnosed cases of tinea capitis.

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.

Cutaneous and Wood's lamp examination were performed to ascertain the clinical variant of tinea capitis (grey patch, black dot, kerion, or favus). KOH examination of the lesional skin scrapings and hair follicles was then performed to confirm the fungal etiology. Finally, a fungal culture was obtained to identify the causative fungal strain.

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. In addition, certain biochemical tests, such as urease, were also performed as and when required.

Results

The maximum number of children were in the age groups of 3–6 and 6–9 years, comprising 29.33% cases each, followed in decreasing order by the 9–12, 0–3, and >12 year age groups [Table 1]. Male cases were 104 in number (69.33%) whereas females comprised 46 cases (30.67%), with a male:female ratio of 2.26:1. Most of the children came from a rural background, comprising 94 cases (62.67%), whereas 56 cases (37.33%) were from urban localities. None of the children had any other affected area other than the scalp. Fifteen cases (10%) had a positive history of similar lesions in their siblings.

The most common clinical variant seen was the grey patch, followed by kerion, black dot tinea capitis, and favus [Table 2 and Figure 1 a-d].

Mycological examination using 10% KOH yielded 76.67% positivity. Subsequently, fungal culture revealed a positivity of 84%, whereas 16% revealed no growth or growth of some nondermatophyte fungi such as *Penicillium* and *Candida* species [Table 2 and Figure 2 a-d].

Among the isolated dermatophytes, *Trichophyton tonsurans* emerged as the leading pathogen followed by *T. rubrum*, *T. violaceum*, *T. schonleini*, and *T. verrucosum*, and multiple strains were seen to coexist [Table 3].

Discussion

Tinea capitis is a common and significant dermatophyte infection seen commonly in prepubertal children, and rarely in adults. The clinical presentation is quite varied ranging from the non-inflammatory lesions to the severe inflammatory variants.^[7] The noninflammatory variants include grey patch and black dot whereas the inflammatory lesions include kerion and favus, which if not promptly treated can result in cicatricial alopecia.

In our study, the disease was found to be more common in boys than girls, with a male–female ratio of 2.26:1, which is similar to the results of other studies, including an earlier study done in Kashmir.^[8] Short hair, frequent trimming of hair by contaminated scissors and blades, greater exposure to external environment (playing outdoors), and contact with cattle/pets are some predisposing factors that make male children more vulnerable to acquiring dermatophyte spores and providing a favourable environment for their proliferation.

Table 1: Age and sex-wise distribution of patients with tinea capitis

Age group (in years)	Males	Females	Total	Percentage
0-3	18	7	25	16.66
>3-6	30	14	44	29.33
>6-9	33	11	44	29.33
>9-12	21	11	32	21.33
>12	3	2	5	3.33
Total	104 (69.33%)	46 (30.67)	150	100

Table 2: Clinical variants of tinea capitis and their respective KOH and culture positivity.

Clinical type	No. of cases (%)	Cases with KOH positivity (percentage positivity)*	Cases with fungal culture positivity (percentage positivity)**
Grey patch	90 (60)	70 (60.87)	75 (59.25)
Kerion	36 (24)	26 (22.61)	30 (23.81)
Black dot	23 (15.33)	18 (15.62)	20 (15.87)
Favus	1 (0.66)	1 (0.87)	1 (0.79)
Total	150 (100)	115 (100)	126 (100)

*KOH positivity: 76.67% **Fungal culture positivity: 84%



Figure 1: Clinical variants of tinea capitis seen in our study. (a) Grey patch tinea capitis. (b) Black dot tinea capitis. (c) Kerion, presenting as a boggy swelling over the scalp. (d) Pustular variant of tinea capitis

In addition, a rural predominance of the cases was noted, with cases from rural communities far outnumbering the urban cases. Poor hygienic conditions, inability to identify the disease early in its course, use of home-based remedies, and lack of adequate and prompt medical access could be the possible factors responsible for the rural predominance. Therefore, socio-economic factors influenced the incidence of tinea capitis in the study population.

Use of woollen caps during the long winter months and sharing objects (caps, combs, towels) could be some possible risk factors for this infection in our community. Moreover, the positive family history in 10% of the cases favoured the role of fomites and close contact in spreading this infection in children.

The fact that the maximum cases were in the 3–6 and 6–9 year age groups was in accordance with the results of many national and international studies. A study done in Rajasthan reported that 85.5% cases were in the 3–10-year age group.^[9]

Among the clinical variants observed, we noted the grey patch variant to be the most common, followed by kerion, black dot, and favus. These results were similar to the studies conducted in Karnataka and Pakistan, where grey patch was the most common variant observed even though the sequence of other variants varied.^[10,11] However, another study from Karnataka and some studies from Rajasthan and North India demonstrated black dot to be the most common variant.^[4,9,12] The results are highly variable from region to region, possibly due to different infecting strains, environmental factors, and differing host immunity. In our population, variation in the immune response and good immunity of the host could possibly be responsible for the predominance of the noninflammatory variants.

Finally, regarding the etiology of tinea capitis, *T. tonsurans* was the most common agent followed by *T. rubrum*

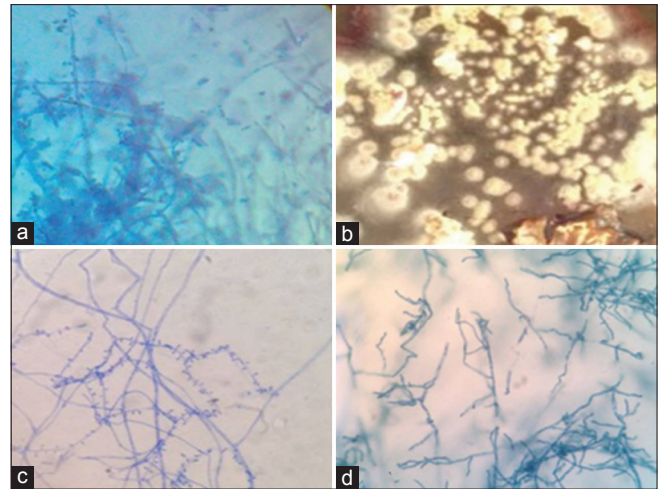


Figure 2: (Magnification ×400) (a) Photomicrograph of LCB mount showing hyphae and crossmatch stick arrangement of clavate microconidia of *T. tonsurans*. (b) Colony obverse of *T. rubrum* showing wine red colour. (c) Photomicrograph of LCB mount showing tear shaped microconidia on either side of hyphal strand (bird on a fence appearance) of *T. rubrum*. (d) Photomicrograph of LCB mount showing sterile distorted hyphae of *T. violaceum*

Table 3: Prevalence of various dermatophyte strains grown on culture

Dermatophyte	No. of cases isolated	Percentage
<i>T. tonsurans</i>	77	61.11
<i>T. rubrum</i>	17	13.48
<i>T. violaceum</i>	13	10.32
<i>T. schoenlenni</i>	8	6.35
<i>T. verrucosum</i>	6	4.76
Mixed strains	5	3.97

and *T. violaceum* among other strains. This is relatively different from studies carried out in other parts of India as well as in Egypt, where *T. violaceum* was found to be the most common causative agent.^[4,9,12,13] However, the results are similar to those seen in some parts of the world, such as the UK and USA, where *T. tonsurans* is the most common agent isolated.^[14,15] The results could be due to variations in the geographical location and climatic factors seen in the valley, which resembles the temperate climate of Europe and America, and differs from the tropical weather of the rest of India.

A study done in the USA in 1956 demonstrated that the role of *T. tonsurans* was increasing in the pathogenesis of tinea capitis, and in Mexico it was the major culprit, accounting for 90% of the clinical cases. It was also noted that black dot was the most common clinical pattern followed by kerion.^[15]

To conclude, dermatophyte infections are commonly seen in the pediatric population, with variations in the epidemiological features observed, clinical type seen, and the causative strain isolated in different areas of the world. Our study showed that in the Kashmiri population, tinea

capitis is a common infection in the 3–9-year age group, with males being affected much more than females. Further, the infection predominates in the rural communities. Grey patch is the most frequently seen clinical variant in children of the region, with *T. tonsurans* being the most common strain isolated.

Therefore, an early diagnosis, followed by an adequate treatment, of the infection can greatly help in reducing the transmission of the infection in the community, and thus, save many children from unsightly scarring and non-scarring alopecia.

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Conflicts of interest

There are no conflicts of interest.

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