

Clinical study of Tinea capitis in Northern Karnataka: A three-year experience at a single institute

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ABSTRACT

Background: Tinea capitis is a superficial fungal infection of the hair follicle of scalp. Most of the dermatophytosis do not have such age propensity as tinea capitis which almost invariably involves the paediatric age group. The exact incidence of tinea capitis is not known. This study is done in order to isolate the species variation in an area, to know the changing patterns of occurrence of different species and their association with clinical pattern
Materials and Methods: All clinically diagnosed cases of tinea capitis which presented to our out patient department over a period of one year were included in the study. **Results:** 70 cases of Tinea capitis were studied. **Discussion:** Tinea capitis is a disease of prepubertal children with common in age group of 5- 15 years. The incidence varies from 0.5% to 10%. Most common presenting feature was alopecia.

Key words: Tinea capitis, trichophyton, children

INTRODUCTION

The cutaneous infections of man due to fungi include a wide variety of diseases, in which the integument and its appendages, the hair, and nail are involved. Infection is generally restricted to the non-living cornified layer due to variety of pathological changes that occur in the host because of the presence of infectious agent and its metabolic product.^[1]

Tinea capitis is a superficial fungal infection of the hair follicle of scalp. Most of the dermatophytosis does not have such age propensity as Tinea capitis, which almost invariably involves the pediatric age group. The incidence is high in developing countries due to factors like poverty compounded by overcrowding, improper hygiene, and illiteracy.^[2]

There are over 40 species of dermatophytic fungi, only about 12 of which are common causes of human infection. Tinea capitis is caused by approximately 6 dermatophytes.^[3]

The exact incidence of Tinea capitis is not known; in India, it varies from 0.5% to 10%.^[4-6] In a

recently conducted study in 2002 at Cleveland, US infection rate was found to be 13% and *T. tonsurans* was found to be most common causative agent.^[7]

The major etiological agents of Tinea capitis in a given geographical area can change over time.^[3] During the late 19th and the early 20th century, *M. audouinii* and *M. canis* were the predominant agents of Tinea capitis in Western Europe,^[8] whereas *T. schoenleinii* predominated in Eastern Europe.^[9] Now *T. tonsurans* is found to be the most common organism in US and Western Europe, whereas in India and Eastern Europe, *T. violaceum* is found to be the most common species. This shift is thought to be due to the widespread use of griseofulvin, which is more effective against *M. audouinii* than *T. tonsurans*; also, changes in immigration patterns and increases in international travel have likely spread *T. tonsurans* to new areas.^[9-12] In few individuals, asymptomatic carrier state can be seen.^[10]

Tinea capitis can be transmitted via infected persons, fallen infected hairs, and select animal vectors. Spread of Tinea capitis by fomites (contaminated barbershop instruments hairbrush

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combs and shared hats) is common.^[13]

Recent studies have revealed a high incidence of carrier state rather than overt clinical manifestations. Therefore, this study has been taken in view of the changing trends in the causative agents as well as the various host factors and the relationship of fungi with clinical manifestation.

MATERIALS AND METHODS

All clinically diagnosed cases of Tinea capitis, which presented to our outpatient department over a period of one year, were included in the study. The diagnosis was confirmed by wood lamp examination and also by mycological examination like direct microscopy of the scraped material and culture of the fungi in special media.

Inclusion criteria

All new cases clinically diagnosed cases of Tinea capitis like kerion, black dot, grey patch, favus were included in study.

Exclusion criteria

Cases of Tinea capitis on treatment.

Seventy cases which fulfilled these criteria were included in the study. All cases were examined clinically, and data regarding age, sex, nature and duration of lesions were recorded in a proforma for each patient. General examination and systemic examination were conducted in all cases. Routine blood and urine examinations were done in all cases. Mycological examinations including direct microscopy and culture studies were done.

Procedure for collection of material

The affected area was cleaned with 70% alcohol, which was allowed to evaporate before taking the specimen. The scrapings were taken from the edge of lesion with the blunt end of the Baird Parker knife held at 90°, the hair were epilated with the help of forceps and collected in autoclaved paper, which permits drying of material and can be stored for long periods without appreciable loss to viability of the fungal agents.

A portion of material was placed on a clean glass slide and a drop of 10% potassium hydroxide solution was placed over it. A cover slip was put over the material, and slide was heated gently and pressed against the slide so that material was flattened and spread uniformly. The excess fluid was wiped using a filter paper, the slide was kept for 15 to 20 minutes depending on the thickness of scales, warming on low flame can be done to hasten digestion of keratin. The prepared slide was examined under the microscope with reduced light for the presence of hyphae and arthrospores. The high power objective was used for more minute study.

The rest of the material was sent to department of microbiology where the material was inoculated into Sabourauds dextrose agar slope (SDA) with chloramphenicol (0.5 mg/ml) and cycloheximide (0.5 mg/ml). The inoculation was done with a sterile chromium wire spud and center of the slope. The tubes were labeled and then incubated at room temperature. The tubes were examined everyday for evidence of any growth. They were discarded as negative if there were no growth after 4 weeks. In positive cases the growth were subcultured on to Sabarauds dextrose agar slopes without antibiotics. The growths in tubes were seen for gross morphological characteristics, and details were recorded namely:

- Rate of growth
- General topography i.e., whether flat heaped up regular or irregularly folded.
- Characteristics of colony i.e. yeast like, powdery granular velvety or cottony, pigmentation on the surface and on reverse.

RESULTS

A total of 70 clinically diagnosed cases of Tinea capitis attending dermatology and venereology OPD were included in the study.

Out of 4340 cases of dermatophytosis attending dermatology OPD, 70 cases were clinically diagnosed as Tinea capitis, which accounted for an incidence of 1.61%.

Males formed the majority of the cases; 65 out of 70 (92.8%). Male:Female: 13.2:1 [Table 1]. The highest incidence was seen in the age group of 6 to 10 years with 44 (62.9%). The youngest patient was an 11-month-old male child, whereas the oldest was male aged 16 years.

There was almost equal incidence between the urban and rural population. Out of 70 patients, 10 resided in hostels around (14.3%). Majority of the cases (60 out of 70-85.7%) belonged to the lower socio-economic status.

Most of the patient gave the duration of illness (that is history of alopecia or scaling of scalp with loss of hair) to be between 1-3 months, which was seen in 44 cases (62.95%), next common duration was >3 months seen in 20 cases (28.6%), least common duration was <1 month seen in 6 patients (8.5%).

Table 1: Distribution of cases according to age and sex

Age group	Male	Female	Total	Percentage
0-5	5	1	6	8.5
6-10	42	2	44	62.9
11-15	16	2	18	25.7
>15	2	-	2	2.9
Total	65	5	70	100

Shaving of scalp (tonsuring) was seen in 36 cases (51.4%). Out of the 10 hostel inmates, all had history of tonsuring done (100%).

The most common clinical type was black dot seen in 38 patients (54.3%), the next common type was grey patch seen in 23 patients (38.6%), and the third common was the inflammatory type seen in 5 cases (7.1%). [Figures 1 - 3] Out of the 5 cases of inflammatory, 2 showed features of kerion and remaining 3 showed presence of pustules.

Most of the patients presented with 2-5 patches of alopecia that was seen in 48 cases (68.5%), 13 patients presented with more than 5 patches (18.5%), 9 cases showed only 1 patch (12.8%).

All the cases were subjected to woods lamp examination. None of them showed fluorescence.

Direct microscopic examination

Out of the 70 cases of Tinea capitis, 45 showed KOH positivity (64.28%). Ectothrix was present in 11 cases (15.7%), microscopy revealed Endothrix in 28 cases (40%), both ectothrix and endothrix were present in 6 cases (8.57%). Out of the 6 cases of those showing both, ectothrix and endothrix, on culture, one showed positivity for *T. violaceum*, one for *T. rubrum*, remaining showed no growth. Clinically, 5 were grey patch and 1 was black dot [Table 2].

Culture

Out of 70 cases of Tinea capitis, culture was positive in 32 cases (45.7%). Out of these 70 cases, when culture and direct microscopy was compared,

- 28.6% (20) showed both culture and KOH positivity,
- 35.7% (25) were culture-negative and KOH-positive,
- 17.1% (12) were culture-positive and KOH-negative,
- 18.5% (13) were KOH-negative and culture-negative.

T. violaceum was the most common organism cultured with 12 cases, showing positivity (37.5%) [Table 3], [Figures 4-7].

Table 2: Relationship between etiological agent and clinical pattern

Clinical type	organism	Black dot	Grey patch	Inflammatory	Total
<i>T. violaceum</i>		11	1	-	12
<i>T. rubrum</i>		-	7	-	7
<i>T. tonsurans</i>		2	2	-	4
<i>T. verrucosum</i>		-	2	2	4
<i>T. terrestre</i>		-	2	-	2
<i>T. mentagrophyte</i>		1	-	-	1
<i>M. vanbreushgemi</i>		-	1	-	1
<i>M. nanum</i>		-	1	-	1
No growth		24	11	3	38

DISCUSSION

Tinea capitis is a disease of pre-pubertal children with common in age group of 5-15 years.^[14,15] The prevalence rates vary from place to place.^[3] Various factors play a role like socio-economic factors, nutrition, personal hygiene etc.^[2]

Majorities of our cases in this series are from low socio-economic status with either a family member or schoolmate affected. This observation augments the prevailing concept that Tinea capitis is a communicable disease, in which several factors such as poverty, overcrowding improper personal hygiene, and habits are responsible for spread of the disease.

The incidence of Tinea capitis during the study period among dermatophytes was found to be 1.61% (70 out of 4340 cases of dermatophytes). This incidence rate is rather low, but the incidence of Tinea capitis is known to vary widely.

The variation of incidence reported by different workers range from 0.5% to 10%.^[4-6] Such variations may be due to difference in selection of cases, different geographical region, difference in socio-economic status, cultural factors, and others.

Even the patients who attend the OPD do not exactly reflect the true incidence of Tinea capitis in community as it is seen in a study done in Cleveland that 60% of the cases were in a carrier state i.e., without any signs and symptoms.^[7] Therefore, the true incidence of Tinea capitis may be much higher because there are hardly any symptoms and when there is inflammation, the condition resolves by itself, unless there is any underlying immunological problem.

More over since a predominance of referred cases, or refractory cases are seen in a tertiary care center, most of the less symptomatic cases go unnoticed.

Incidence is high in the age group of 5-15 years. Similar finding were noted in our study. The low incidence after puberty is believed to be due to the sebum containing fungistatic free fatty acids.^[16] The increased incidence in males is due to the

Table 3: Culture results on sabourauds dextrose agar media

Organism	Number	Percentage
<i>T. violaceum</i>	12	37.5
<i>T. rubrum</i>	7	21.8
<i>T. tonsurans</i>	4	12.5
<i>T. verrucosum</i>	4	12.5
<i>T. terrestre</i>	2	6.25
<i>T. mentagrophyte</i>	1	3.125
<i>M. vanbreushgemi</i>	1	3.125
<i>M. nanum</i>	1	3.125

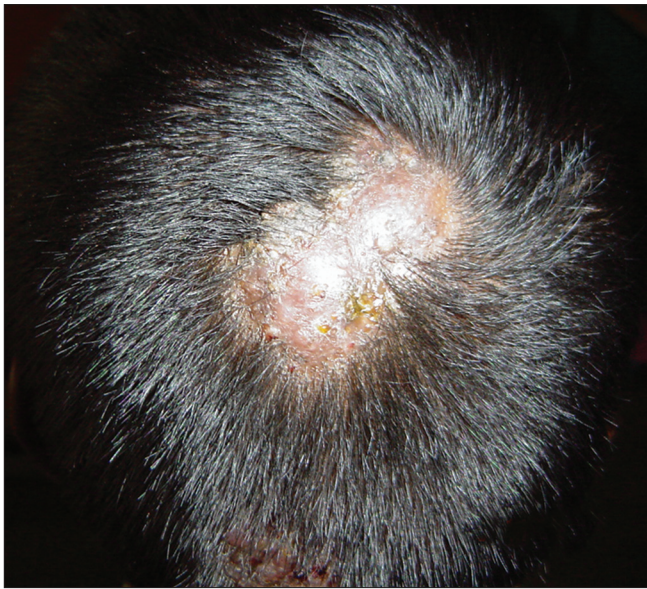


Figure 1: Boggy swelling studded with pustules (kerion)



Figure 2: Black dot variety of tinea capitis



Figure 3: Grey patch type of Tinea capitis with Tinea faciei

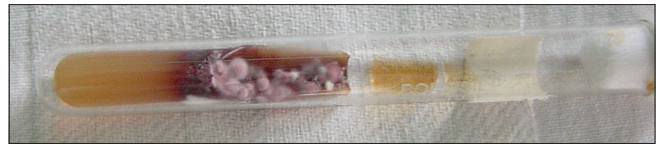


Figure 4: Culture of *trichophyton rubrum*



Figure 5: Culture of *trichophyton tonsurans*



Figure 6: Culture of *trichophyton mentagrophytes*



Figure 7: Culture of *trichophyton violaceum*

presence of short hair in male and spores; therefore, reach the scalp easily.^[16]

A strong association of tonsuring with the onset of Tinea capitis was seen, particularly among hostel inmates. The use of common blade to shave scalp may be the probable reason among hostel inmates having similar history, but in general population, this may be one of factors playing a role in addition to other factors.

Most common presenting feature was alopecia, and most of the cases (70%) presented with three months of onset of alopecia, with occipital area being the most favored site. There is no fixed common pattern of Tinea capitis, it varies from black dot to grey patch.^[1,17] This may be because of the prevailing fungal, social, and environmental conditions in the area.

Both, direct microscopic examination and fungal culture, are necessary with positivity of 64.3% and 45.7%, respectively. Like in other studies, *T. violaceum* was the most common isolate followed by *T. rubrum* and *T. tonsurans*.^[11,18]

When the direct microscopic results were compared to culture

examination, both culture and KOH positivity was seen in 28.6%, and both culture and KOH negativity was seen in 18.5%. These results indicate that there is no specific investigation for Tinea capitis, and the investigator must rely on clinical skill also.

In conclusion, since it is a hospital-based study, the exact incidence and fungal isolation in the general population cannot be estimated. It is still beneficial to do a direct microscopic examination and culture of Tinea capitis in order to isolate the species variation in an area, to know the changing patterns of occurrence of different species and their association with clinical pattern, even though the treatment modalities do not vary significantly with different species.

REFERENCES

- Rippon JW. Dermatophytosis and dermatomycosis. In: Rippon JW, editor. Medical mycology: 3rd ed. Philadelphia: W B Saunders; 1988. p. 169-275.
- Babel DE, Baughman SA. Evaluation of the adult carrier state in juvenile tinea capitis. J Am Acad Dermatol 1989;21:1209-12.
- Elewski BE. Tinea capitis - A current perspective. J Am Acad Dermatol 2000;42:1-19.
- Nagabhushanum P, Singh N, Patniak R. Tinea capitis in Hyderabad. Indian J Dermatol Venereol Leprosy 1972;30:26-9.
- Debh V. Studies in medical mycology. Part one. Incidence of dermatomycosis in Warangal, AP (India). Indian J Med Res 1966;54:468.
- 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.
- Ghannoum M, Isham N, Hajjeh R, Cano M, Al-Hasawi F, Yearick D, et al. Tinea capitis in Cleveland: Survey of elementary school students. J Am Acad Dermatol 2003;48:189-93.
- Ajello L. Natural history of dermatophytes and related fungi. Mycopath mycology appl. 1974;53:93-110.
- Ally R. Ecology and epidemiology of dermatophyte infections. J Am Acad Dermatol 1994;31:521-5.
- Laude TH, Shah BR, Lynfield YT. Capitis in Brooklyn. Am J Dis Child 1982;136:1047-50.
- Gokhale BB, Phayde AA. Tinea capitis-A study of 102 cases from 1st July 1958 to 30th June 1961 at Sassoon hospitals. Vol. 31. Poona, India IJDV 1965. p. 1-5.
- Ray RJ, Clayton YM, De Silva N, Midgley G, Rosser E. Tinea capitis in southeast London: A new pattern of infections with public health implications. Br J Dermatol 1996;135:953-8.
- Mackenzie DW. 'Hairbrush diagnosis' in detection and eradication of non-fluorescent scalp ringworm. Br Med J 1963;11:363-5.
- Grin EI. Epidemiology and control of the ringworm of scalp. International symposium on mycoses. Vol. 1. United States: Washington; 1970. p. 149.
- Leeming JG, Elliot TS. The emergence of T tonsurans tinea capitis in Birmingham, UK. Br J Dermatol 1995;133:929-31.
- Kanwar AJ, De D. Superficial fungal infections. In: Valia RG, Valia AR, editors. IADVL textbook of dermatology. 3rd ed. Mumbai: Bhalani publishing house; 2008. p. 252-97.
- 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.
- Kamalam and Thambaiah. Tinea capitis an endemic disease in Madras. Mycopathologica 1980;71:45-51.

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