

An epidemiological study of *Tinea capitis* in patients attending a tertiary care hospital

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Abstract

Background: *Tinea capitis* (scalp ringworm) is the most common dermatophyte infection of the scalp affecting mainly children and rarely adults. The epidemiology of *Tinea capitis* varies within different geographical areas throughout the world. It may occur sporadically or epidemically and an increase in its incidence has been noted over the last few decades.

Objective: To study the pattern of various species of dermatophytes causing *Tinea capitis*, to find out the incidence of various clinical types and to study the epidemiology of *Tinea capitis*.

Methods: Present study was hospital based cross sectional study. It was carried out for a period of four years at Department of Microbiology. Patients presenting with scalp lesion suspected to be *Tinea capitis* in the out-patient departments of Dermatology department and giving due consent for the study were sent for detailed history and examination. Those not willing to participate in the study were not included in the study. 75 patients were confirmed as *Tinea capitis* and they were included in the study.

Results: The commonest age group affected was 0-7 years (36%). Prevalence of *Tinea capitis* was almost equal in both the sexes. Male to female ratio was 1.02:1. Out of 75 clinically diagnosed cases, 68% were positive in direct examination and 74.66% were positive by culture method. 94% of cases were positive in direct examination but negative in culture. The most common clinical type was Seborrheic in 58.66%. 52% of cases were found to be of endothrix type of hair invasion. *T. violaceum* was the species observed most frequently. Black dot pattern was caused mainly by *T. violaceum*.

Conclusion: *Trichophyton violaceum* was the commonest cause of *Tinea capitis* and this was supported by observations of different workers from different regions of India and from other parts of the world. The pediatric age groups, low socioeconomic status, living conditions were the important factors influencing the disease.

Keywords: *Tinea capitis*, Dermatophyte, Scalp, Children

Introduction

Tinea capitis (scalp ringworm) is the most common dermatophyte infection of the scalp affecting mainly children and rarely adults. The epidemiology of *Tinea capitis* varies within different geographical areas throughout the world. It may occur sporadically or epidemically and an increase in its incidence has been noted over the last few decades.¹

Dermatophytes are a unique group of fungi that infect keratinous tissue of lower animals and humans. The genera include *Trichophyton*, *Epidermophyton* and *Microspora*. They are characterized by their ability to invade the superficial layers of the epidermis, particularly the stratum corneum and the high keratin-concentration containing appendages, the hair and nails of the living host. Only under exceptional circumstances do they survive or proliferate in the deeper tissues of the body. *Tinea capitis* is one of the most common dermatophytosis seen in school going children, with diverse clinical presentations and a worldwide prevalence. Children are particularly susceptible to dermatophytic infections because of their poor personal hygiene habits and poor environmental sanitation. The disease may present in different patterns i.e. kerion, agminate folliculitis, favus, black dot or grey patch type. *Tinea capitis* is mainly observed in the

school going children, more frequent in boys compared with girls.²

Tinea infections has remained a significant public health problem with poor hygiene, sharing of fomites, overcrowding and low socioeconomic status being among some of the factors that predisposes populations to infections.³

Present study has been carried out to study the incidence of various species of dermatophytes causing *Tinea capitis*, to find out the incidence of various clinical types and to study the epidemiology of *Tinea capitis*.

Methods

Present study was hospital based cross sectional study. It was carried out for a period of four years at Department of Microbiology. Patients presenting with scalp lesion suspected to be *Tinea capitis* in the out-patient departments of Dermatology department and giving due consent for the study were sent for detailed history and examination. Those not willing to participate in the study were not included in the study. 75 patients were confirmed as *Tinea capitis* and they were included in the study.

Detailed history included age, symptoms with duration, other body parts affected, occupation, having pets, social class etc. Patients were examined for type

of Tinea, site of lesion, number of lesions, other body parts affliction, body weight etc.

The affected body parts from where the material for examination was to be collected was cleaned with 70% alcohol. Sterile black paper packets were used for collection of materials. Scrapings were collected from the advancing border of the lesions. Scale and hair stump were collected by scraping with a sterile scalpel and pulling hair to obtain hair roots by sterile forceps. After collection of the material, following methods were employed to identify the causative agent of *Tinea capitis*:

- A. Direct microscopic examination of sample by wet mount
- B. Culture of samples in suitable media and observation as follows:
 - a. Examination under microscope in 10% KOH preparation of colony fragments.
 - b. Microscopic examination of lactophenol cotton blue preparation of fragments obtained from colony
- C. Hair perforation test

Direct microscopic examination of sample by wet mount: One drop of mounting fluid was placed on the center of a clean microscope slide. The specimen collected was picked up with the help of a wet stiff teasing needle in KOH solution and was placed on the slide. Then material was teased into a thin preparation. Thereafter a cover slip was applied over it. Gentle heat was applied by passing through a flame a few times. Material was spread by pressing the cover glass gently with the butt-end of the needle. The preparation was examined under low power for screening and confirmed under the high power objective.

Culture of samples in suitable media and observation: Examination under microscope in 10% KOH preparation of colony fragments was done as described above.

Lactophenol cotton blue preparation of fragments obtained from colony and microscopic examination was done as follows:

A clean glass slide was placed upon a glass surface through which light was passing. A small drop of lactophenol was put on the centre of the above slide. A portion of the colony from the culture plate was lifted up by a sterile wire bended on the tip at 90° C and placed into the stain. Then the material was teased gently and spread by teasing needle to make the individual hyphae visible. There after the slide was warmed and a drop of cotton blue stain was put over it to have a uniform stain. A cover slip was put over the smear thus prepared taking care to remove any air bubble present by heating. This lactophenol cotton blue preparation was examined under the low and high magnifications of the microscope.

Hair perforation test: A filter paper disk was placed into the bottom of a sterile petridish. Surface of paper disk was covered with sterile distilled water. A small

portion of sterilized pre pubertal hair was added into the water. Then a portion of the colony to be studied was directly inoculated on to the hair. Thereafter it was inoculated at 25° C for 10-14 days. Hairs at regular intervals was observed by placing them into a drop of water on a microscope slide and covered with a cover slip and examined microscopically for the presence of conical perforations of the hair shaft.

Data was recorded in the pre designed questionnaire. Data was analyzed with the help of proportions.

Results

Table 1: Age and sex wise distribution of cases

Age group (years)	Male	Female	Total
0-7	12 (16%)	15 (20%)	27 (36%)
8-14	14 (18.66%)	09 (12%)	23 (30.66%)
15-21	09 (12%)	09 (12%)	18 (24%)
22-28	01 (1.33%)	03 (04%)	04 (5.33%)
29-35	01 (1.33%)	01 (1.33%)	02 (2.66%)
> 35	01 (1.33%)	01 (1.33%)	02 (2.66%)
Total	38 (50.66%)	37 (49.33%)	75 (100%)

The commonest age group affected was 0-7 years (36%) followed by 8-14 years (30.66%). Prevalence of *Tinea capitis* was almost equal in both the sexes. Male to female ratio was 1.02:1.

Table 2: Epidemiological characteristics of *Tinea capitis*

Epidemiological characteristics		Number	Percentage
Socio-economic status	Class III	12	16
	Class IV	63	84
Family history	Positive	22	29.33
	Negative	53	70.66
Residence	Rural	54	72
	Urban	21	28
Tribal status	Tribal	32	42.66
	Non tribal	43	57.33

There were no cases in socio economic classes I and II. Highest prevalence was found in the class IV i.e. 84%. In 70.66% of cases there was no family history. Maximum cases were found in rural population i.e. 72% compared to only 28% from urban area. Prevalence of *Tinea capitis* was slightly more in non-tribal compared to tribal.

Table 3: Results of direct examination and culture

Culture result	KOH positive	KOH negative	Total
Positive	48 (64%)	08 (10.66%)	56 (74.66%)
Negative	03 (04%)	16 (21.33%)	19 (25.33%)
Total	51 (68%)	24 (32%)	75 (100%)

Out of 75 clinically diagnosed cases, 68% were positive in direct examination and 74.66% were positive by culture. 64% were positive in direct examination as well as in culture. In 10.66% of cases, direct examination was negative but fungi were grown in culture. 32% were negative in direct examination and out of which 16 cases were negative in culture too. 94% of cases were positive in direct examination but negative in culture.

Table 4: Clinical pattern of cases

Clinical types	Number	Percentage
Seborrheic	44	58.66
Black dot	11	14.66
Kerion	20	26.66
Total	75	100

The most common clinical type was Seborrheic in 58.66% followed by black dot type in 14.66%.

Table 5: Type of hair invasion seen under microscope

Type of hair invasion	Number	Percentage
Endothrix	39	52
Ectothrix	12	16
Negative	24	32
Total	75	100

52% of cases were found to be of endothrix type of hair invasion. It was negative in 32% of cases.

Table 6: Organisms in clinical types

Clinical types	Number of cases	T. violaceum	T. rubrum	T. tonsurans	T. mentagrophytes	Negative
Seborrheic	44	13	03	11	06	11
Black dot	11	05	00	02	03	01
Kerion	20	05	01	02	05	07
Total	75	23	04	15	14	19

All cases were subjected to fungal culture irrespective of KOH positivity. Out of 75 cases, 56 were culture positive. *T. violaceum* was the species observed most frequently. Black dot pattern was caused mainly by *T. violaceum*.

Discussion

75 clinically diagnosed cases were studied under direct examination and culture. 68% were positive in direct examination and 74.66% were positive by culture. 64% were positive in direct examination as well as in culture. In 10.66% of cases, direct examination was negative but fungi were grown in culture. 32% were negative in direct examination and out of which 16 cases were negative in culture too. 94% of cases were positive in direct examination but negative in culture. Maheshwari Amma et al⁴ studied 2057 cases of dermatophytoses and found 1020 cases positive in culture as well as in direct examination. The isolation rate was 52.26%. 480 cases (23.33%) were positive in direct examination but negative in culture. 55 cases (2.67%) were negative in direct examination but positive in culture. 502 cases (24.4%) were negative in both, direct examination as well as culture. The observation of Dalal et al⁵ revealed that out of 375 cases 220 cases (58.66%) were positive in direct examination as well as in culture. 26 cases (6.93%) were positive in direct examination and negative in culture. 95 cases (25.33%) were negative in direct examination but positive in culture and 34 cases (9.06%) were negative in both, culture as well as direct examination. The isolation rate was 83.99%. Verenker MP et al⁶ in Goa studied 80 cases and the isolation rate was 62.5%. Omidynia E et al⁷ observed an isolation rate of 55.59%.

In the present study, largest incidence was found in the age group of 0-7 years (36%) followed by 8-14 years (30.66%). Raimer SS⁸ observed that 2-15 years of age group was most commonly affected. Gupta AK et al⁹ found a mean age of 6.4 years.

We found that the cases were equally distributed among male and female with a male to female ratio of 1.02:1. It was observed in the present study that almost all patients were from lower social class and family history of *Tinea capitis* was found in 29.33% of cases. This may be due to communicability of fungus and overcrowding seen in lower social classes.

We noted that Seborrheic pattern was the commonest type of *Tinea capitis* in 58.66% of cases followed by Kerion in 26.66% of cases. Gargoom AM et al¹⁰ observed Seborrheic type in 53.6% of cases, black dot in 25.5%, and kerion type in 8.2% of cases. Raimer SS et al⁸ found Seborrheic type in 70% of cases.

In the present study it was observed that endothrix pattern was the commonest variety of hair invasion. 39 cases were of endothrix variety followed by 12 cases of ectothrix variety.

The most prevalent isolate in the present study was *Trichophyton violaceum* which shared 41.07% of cases. Other species in order of prevalence were *T. tonsurans* (26.78%), *T. mentagrophytes* (25%) and *T. rubrum* in 7.14% of cases. Similar findings were reported by Reddy et al.¹¹

Out of 75 cases in the present study, positive family history was found in 29.33% of cases. Babel DE et al¹² observed that large family size, crowded living condition and low socioeconomic status may contribute to increased incidence of *Tinea capitis*.

Conclusion

Trichophyton violaceum was the commonest cause of *Tinea capitis* and this was supported by observations of different workers from different regions of India and from other parts of the world. The age, socioeconomic status, living conditions are the important factors influencing the disease.

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