



CLINICAL AND MYCOLOGICAL STUDY OF TINEA CAPITIS-A RESEARCH

Dr. Jyoti Karki*, Prof. Dr. Liu Jin Xian, Dr. Gong Shao Zhi and Dr. Shweta Aryal

Clinical School of Medicine, Yangtze University, Jingzhou 434000, Hubei Province, China

Department of Dermatology & Venereology, Jingzhou number 1 People's hospital, Shashi, Jingzhou, Hubei

ABSTRACT

Background:

Tinea capitis (TC) is a superficial fungal infection of the hair follicle of scalp that predominantly affects the pediatric population. The etiological factors vary from region to region, and the exact incidence remains obscure. The exact incidence of tinea capitis is not known. The clinicomycological study of this dermatophytosis was studied in the First Jingzhou Hospital, Shashi.

Objectives:

To determine the clinical aspects and mycological findings of dermatophytes involved in tinea capitis cases in First Jingzhou Hospital.

Materials and Methods:

Wood's lamp examination, KOH examination, and fungal culture were performed in one hundred twenty seven clinically diagnosed cases of tinea capitis with patients' age upto 18 years over a period of 11 years. The epidemiological factors associated with the disease were also evaluated. All clinically diagnosed cases of tinea capitis presented to our outpatient department over a period of more than ten years (January 2004 to June 2015) were retrospectively analyzed by fungal microscopy and fungal culture.

Results:

Tinea capitis was predominant in the 7-12 years age groups (33.86%) with a female preponderance (67.72%). Black dot tinea capitis was the most common variant (57.48%). *Trichophyton tonsurans* was the most common fungal isolate.

Conclusion:

In any location, the pathogenic species may change with time. A single pathogen may give rise to various clinical types. Tinea capitis is a very common fungal infection in prepubertal children, common in age group of 3 to 12 years according to my study.

Key Words: Tinea capitis, *Trichophyton*, Children, Adult, *Dermatophytes*.

INTRODUCTION

Tinea capitis (TC) is a disease caused by superficial fungal infection of the scalp and associated hair, especially common in the pediatric population. Several synonyms are used, including ringworm of the scalp and tinea tonsurans. The disease is considered to be a form of superficial mycosis or dermatophytosis. Dermatophytes are fungi that commonly infect the keratinous tissues of humans.

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] The clinical pattern varies from place to place. The incidence is high in developing countries due to factors like poverty compounded by overcrowding, improper hygiene, and illiteracy. [2] The highest incidence is seen in children 3-7 years of age. [3] Its occurrence is rare in infants in their first years of life, with only a few reports being available in the literature. [4,5] The presence of symptoms like hyperkeratosis of scalp, seborrhea-like symptoms, excoriation secondary to pruritus, alopecia, broken hair or "black dot" appearance, cervical lymphadenopathy, pustules, or indurated or boggy plaques in a child should alert the dermatologist toward the possibility of TC. [6]

Most species of dermatophyte are capable of invading hair but some species (e.g. *M. audouinii*, *T. schoenleinii* and *T. violaceum*) have a distinct predilection for the hair shaft. All dermatophytes causing scalp ringworm can invade glabrous skin and many attack nails as well. Those species of dermatophyte fungi most likely to be causing tinea capitis vary from country to country and from region to region. [7-11] Moreover, in any given location, the species may change with time, particularly as new organisms are introduced by immigration [12,13]. The clinical appearance of ringworm of the scalp is most variable, depending on the type of hair invasion, the level of host resistance and the degree of inflammatory host response [14,15]. The appearance therefore may vary from a few dull grey broken-off hairs with a little scaling, detectable only on careful inspection, to a severe, painful, inflammatory mass covering most of the scalp. Itching is variable. In all types, the cardinal features are partial hair loss with inflammation of some degree. [16] Spread of Tinea capitis by fomites (contaminated barbershop instruments hairbrush combs and shared hats) is common. [17] This study is designed to get an insight into the pattern of tinea capitis and the likely causative dermatophyte strains according to the age in the First Jingzhou hospital, Shashi.



Figure 1: “Black dot” tinea capitis caused by *Trichomonas tonsurans*.



Figure 2: Tinea capitis “Tinea kerion” type of the scalp.



Figure 3: Tinea capitis "Grey patch" type of the scalp.

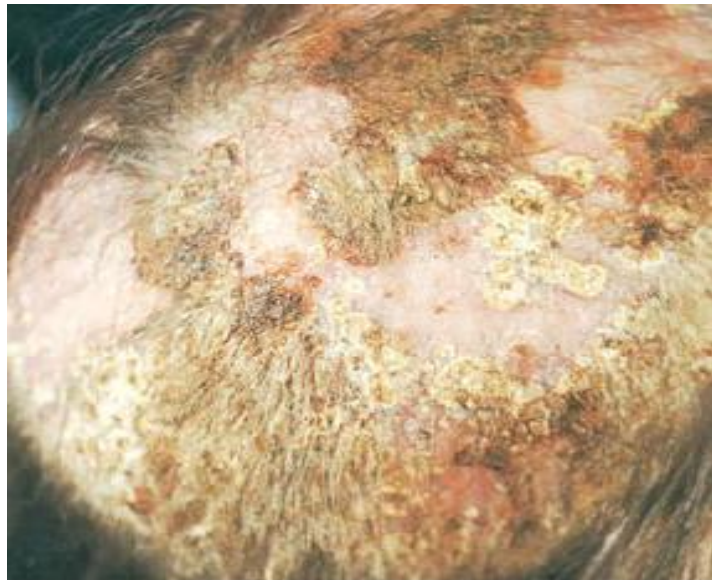


Figure 4: Tinea capitis "Tinea favosa" type of the scalp.

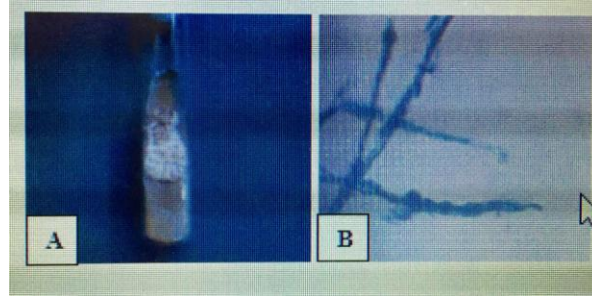


Figure 5: (A) Culture growth of *T. tonsurans*, (B) LCB mount of *T. tonsurans*.

MATERIALS AND METHODS

All new patients with tinea capitis who attended our dermatology department over a period of 11 years from January 2004 to June 2015 were selected for the study after KOH smear positivity. Age, sex and duration of the disease were recorded. Detailed history with regard to socio economic status, tonsure and similar lesions in siblings were taken.

Dermatological examination and systemic examination were done. Scalp scrapings and hair root samples were analyzed by KOH mount. KOH positive specimens were cultured on Sabouraud's dextrose agar with and without actidione. The rate of growth, colony morphology, pigment production on the reverse and microscopic examination in lactophenol cotton blue mount towards confirmation of the isolates.

Inclusion Criteria:

All new clinically diagnosed cases of Tinea capitis were included in study.

Exclusion Criteria:

History of malignancy:

The case data of tinea capitis was retrospectively analyzed, out of which 127 clinically diagnosed cases of tinea capitis attending the outpatient department were included in our criteria. A detail history was taken from the patient or with the patient's relative, including age, sex, address, chief complain (hair loss/scaly lesion/pus discharge from scalp/scalp swelling/itching), duration of the lesions, involvement of any other body site, treatment history, and whether any family member is affected. General and systemic examination was also done.

Wood's lamp examination was performed to ascertain the clinical variant of tinea capitis and 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. A scraped 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 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.

For the culture, the specimen was taken and inoculation was done with a chloramphenicol and actinomycin ketone peptidoglycan peptone place in 25~28°C for 2 to 4 days. The tubes were labeled and then incubated. The tubes were examined every day for evidence of any growth. They were discarded as negative if there were no growth after 4 weeks. In positive cases, the growth was sub cultured on to Sabarauds dextrose agar slopes without antibiotics. The growths in tubes were seen for gross morphological characteristics, and details were recorded.

RESULTS

A total of 127 clinically diagnosed cases of tinea capitis were included in the study. The most common affected age group was the 7 to 12 years with 43 children (33.86). Infection was less common in the age group above 16 years. Females formed the majority of the cases, 86 out of 127. 41 cases were males (32.28%) and 86 were females (67.72%). In our study, the result is little different. Our study shows that the result is more common in girls then in boys in comparison with other studies [18]

<i>AGE(years)</i>	<i>Males(n=41)</i>	<i>Females(n=86)</i>	<i>Total(n=127)</i>	<i>Percentage (%)</i>
<i><1</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>0.78</i>
<i>1-3</i>	<i>6</i>	<i>13</i>	<i>17</i>	<i>13.3</i>
<i>3-7</i>	<i>15</i>	<i>24</i>	<i>39</i>	<i>30.7</i>
<i>7-12</i>	<i>12</i>	<i>31</i>	<i>43</i>	<i>33.8</i>
<i>12-18</i>	<i>2</i>	<i>7</i>	<i>9</i>	<i>7.1</i>
<i>>18</i>	<i>8</i>	<i>10</i>	<i>18</i>	<i>14.1</i>

The age and sex distribution is given in **Table 1**

Pathogen	<1	1-3	3-7	7-12	12-18	>18	Total
Trichophyton mentagrophytes	0	3	4	8	0	3	18
Trichomonas rubrum	0	3	5	4	3	0	15
Trichomonas tonsurans	0	8	27	27	6	10	78
Trichomonas violaceum	0	2	0	0	0	1	3
Verrucosum Trichophyton	0	0	1	1	0	1	3
Canis Microsporum	1	0	2	3	0	1	7
Mixed strains	0	1	0	0	0	2	3
Total	1	17	39	43	9	18	127

The distribution of pathogens in different age groups given in **Table 2**

The distribution of clinical variants of tinea capitis in our study are black dot (57.48%), Tinea kerion(24.41%), Grey patch(17.32%), Tinea Favus(0.79%).

Among the clinical variants observed, we noted that the black dot variant is more common in our study which is similar to the study from Karnataka and some other studies from Rajasthan and North India also demonstrated black dot to be the most common variant. [19] The results are highly variable from region to region, possibly due to different infecting strains, environmental factors, and differing host immunity.

Pathogen	Grey patch	Black dot	Tinea favosa	Tinea kerion	Total
Trichophyton mentagrophytes	5	2	0	11	18
Trichomonas rubrum	6	2	0	7	15
Trichomonas tonsurans	2	65	0	11	78
Trichomonas violaceum	0	3	0	0	3
Verrucosum Trichophyton	2	0	0	1	3
Canis Microsporum	6	0	0	1	1
Mixed strains	1	1	1	0	3
Total	22	73	1	31	127

The distribution of pathogen and clinical types given in **Table 3**

A total of 127 cases were isolated, among which the most common species were Trichomonas tonsurans (61.42%), followed by Trichophyton mentagrophytes (14.17%), and Trichomonas rubrum (11.81%). The incidence of TC in 7 to 12 years old (33.86%) the highest, Followed by 3 to 7 years old (30.71%).

The fact that the maximum cases were in the 3–12 years 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. [19]

The most common pathogens in children seen in our study is Trichomonas tonsurans, followed by Trichophyton mentagrophytes and then, Trichomonas rubrum. Similarly, in Adult, the most common is Trichomonas tonsurans.

DISCUSSION

In our study, the common age group affected was 7 to 12 years. Mubashir maqbool wani et al reported that trauma assists inoculation by clinical evidence of hair shaft infection.[20]

Kamalam et al and Seema bose et al reported a higher incidence of non-inflammatory type of tinea capitis.7 Of the 98 specimens subjected to KOH mount 46.9% showed endothrix spores. A similar observation of endothrix (58.8%) in KOH was noted by Reddy et al in their study.[21] Dermatophyte infections are commonly seen in the pediatric population, with variations in the clinical type and the causative strain

isolated in different areas of the world.

Our study showed that in the Jingzhou, tinea capitis is not very common infection because over more than ten years we could only find 127 cases in our hospital. Among the infected cases it is more common in 7–12 year age group, with females being affected much more than males. Black dot 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 nonscarring alopecia.

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. Babel DE, Baughman SA. Evaluation of the adult carrier state in juvenile tinea capitis. *J Am Acad Dermatol* 1989; 21:1209- 12.
3. Elewski BE. Tinea capitis: A current perspective. *J Am Acad Dermatol* 2000; 42:1-20. [PubMed]
4. Romano C, Gianni C, Papini M. Tinea capitis in infants less than 1 year of age. *Pediatr Dermatol* 2001; 18: 465-468[PubMed]
5. Gilaberte Y, Rezusta A, Gil J et al. Tinea capitis in infants in their first year of life. *Br J Dermatol* 2004; 151:886-890[PubMed]
6. Alvarez MS, Silverberg NB. Tinea capitis. *Cutis* 2006; 78:189-96. [PubMed]
7. Hay RJ. *Tinea Capitis*. London: Mosby Wolfe, 1999
8. Clayton YM, Midgley G. Tinea capitis in schoolchildren in London. *Hautarzt* 1977; 28: 32–4.
9. Elewski BE. Tinea capitis: a current perspective. *J Am Acad Dermatol* 2000; 42: 1–20.
10. Ginter-Hanselmayer G, Stary A, Messeritsch-Fanta C. Current situation of tinea capitis in southeastern Austria. *Clin Dermatol* 2002; 20: 183–6.
11. Verhagen AR. Distribution of dermatophytes causing tinea capitis in Africa. *Trop Geograph Med* 1978; 26: 101–20.
12. Karaoui R, Selim M, Mousa A. Incidence of dermatophytosis in Kuwait. *Sabouraudia* 1979; 17: 131–7.
13. Elewski B. Tinea capitis. *Dermatol Clin* 1996; 14: 23–31.
14. Gugnani HC, Njoku-Obi ANU. Tinea capitis in school children in East Nigeria. *Mykosen* 1986; 29: 132–44.
15. Ive FA. The carrier state of tinea capitis in Nigeria. *Br J Dermatol* 1966; 78: 219–21.
16. Burns, Tony, and Graham Arthur Rook. "Mycology." *Rook's Textbook of Dermatology*. 8th ed. Vol. 1. Oxford: Wiley-Blackwell, 2010. 36.26. Print.
17. Mackenzie DW. 'Hairbrush diagnosis' in detection and eradication onon- fluorescent scalp ringworm. *Br Med J* 1963; 11:363- 5.

18. 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.
19. 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.
20. Chisti MM, Wani MM, Kamli QUA, Masood Q. Trends of Tinea capitis in population attending dermatology department of a tertiary health care facility in Kashmir, JK-Practitioner. 2006;13(3);1313
21. Kamalam A, Thambiah AS. Tinea capitis, an endemic disease in Madras, Mycophthologica; 1980;70;45-51.