Original Article

Microbiology Section

The Incidence of Tinea capitis in a Tertiary Care Rural Hospital - A Study

SEEMA BOSE, SANJEEV G KULKARNI, IRFAAN AKHTER

ABSTRACT

Tinea capitis continues to contribute to the pathological burden, especially in school children. This study was undertaken to document the clinicomycological pattern of the patients who were infected with Tinea capitis, who attended the dermatology OPD in a rural hospital of Maharashtra and to find out the type of infection from the close contacts of the patients. Hair and skin scrapings were obtained from 79 clinically suspected cases of Tinea capitis over a period of one year. In the suspected contacts, brushes and moistened sterile carpet discs were used to collect the samples. Dermatophytes were isolated from the samples and were identified by conventional methods. Out of the 79 suspected cases of Tinea capitis, 19(24.05%) were culturepositive. The commonest isolate was Trichophyton mentagrophytes 9(47.36%), followed by Microsporum gypseum, Microsporum canis and Trichophyton rubrum. It was seen more commonly in the 5 – 10 years age group, i.e. 12(63.15%). The male: female ratio was 2.8:1. The seborrhoid type was the commonest clinical type, 9(47.36%). Out of 26(32.91%) close contacts of the patients, 6(7.59%) were culture positive and the isolates were the same as that which were obtained from the patients.

Key Words : Tinea capitis, Trichophyton, Microsporum, Seborrhoid

INTRODUCTION

Tinea capitis, a dermatophytic infection of the scalp, eyebrows and the eyelashes, continues to contribute to the pathological burden, especially in school going children. The infection includes:

a. Dry scaling lesions of the scalp, resembling seborrhoeic dermatitis.
b. Black dot appearance, because hairs are broken below the surface.
c. Favus which is caused by Trichophyton schoenleinii and is seen sporadically as cup like crusts around the infected hair follicles.
d. Deep inflammatory boggy lesions (kerions), often with secondary bacterial infection.

The genera Microsporum and Trichophyton are most commonly involved in causing Tinea capitis.[1].

The causative agents of the Tinea infections of the beard and scalp were first described by Remak and Schoenlein and then by Gruby during the 1830s. But for all practical purposes, the history of Tinea and it's causative organisms .i.e., dermatophytes, started with Sabouraud's monograph, "Les Teignes" in 1910. His work on school children who were suffering from Tinea capitis was acknowledged at St Louis hospital and it was one of the most important milestones in the history of medical mycology.[2]. It is unreliable to depend on the clinical diagnosis alone to identify the cases of Tinea capitis, given the range of the clinical expression and the high numbers of children with mild infections, which are difficult to detect. So, laboratory methods should be used for the diagnosis, whenever possible.

The prevalence of Tinea capitis in a particular area depends upon the environmental conditions, personal hygiene and individual susceptibility. The isolation of different species of dermatophytes also varies from one ecological niche to another, depending on their primary natural habitat.[3].

AIMS AND OBJECTIVES

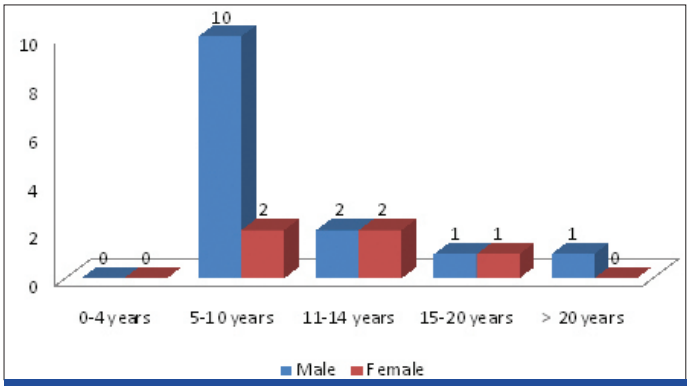
This study was undertaken to document the clinicomycological pattern of the Tinea capitis infection in patients who attended the dermatology outpatients department in a rural hospital of Maharashtra and also to find out similar type of infections in the close contacts of the patients.

MATERIAL AND METHODS

The duration of this prospective study was one year. The total study population was 79, among which 53(67.08%) were patients and 26(32.91%) were close contacts of the patients, usually parents and siblings. The scalp of each patient was thoroughly examined in all areas for the evidence of scaling, crusting, follicular inflammation, hair loss and erythema. The scale scrapings were collected from at least two areas with number 15 sterile surgical blades and approximately 12 hair stumps were pulled out with sterile epilator forceps. Both the hairs and the scales were placed in a sterile petri dishes. Direct microscopy was done with 20% potassium hydroxide (KOH) + 36% dimethyl sulfoxide (DMSO). Cultures were put up on Sabourauds's dextrose agar with or without cycloheximide and on the dermatophyte test agar medium. The tubes and plates were incubated at 37ºC and 25ºC for four weeks.

Age	T.mentagro phytes		M.gypseum		M.canis		T.rubrum	
	M	F	M	F	M	F	M	F
0-4	0	0	0	0	0	0	0	0
5-10	5	1	2	0	2	1	1	0
11-15	2	1	0	1	0	0	0	0
15-20	0	0	1	1	0	0	0	0
>20	0	0	0	0	0	0	1	0
Total	**7**	**2**	**3**	**2**	**2**	**1**	**2**	**0**
%	**36.84**	**10.52**	**15.78**	**10.52**	**10.52**	**5.26**	**10.52**	**0**

[Table/Fig-1]: Age and sex distribution in relation with aetiological agents (n= 19) Male:Female= 2.8:1



[Table/Fig-2] : Age & Sex Distribution of cases with Tinea Capitis

The detailed history of the age, sex, predisposing factors, etc of the patients and their close contacts was recorded.

The pathogenic fungi were identified by the gross colony morphology and microscopically by lactophenol cotton blue mounts and slide cultures.

No of cases	KOH Positive Culture-Positive	KOH Positive Culture-Negative	KOH Negative Culture-Positive	KOH Negative Culture-Negative
79	17	3	2	57
%	21.51	3.79	2.53	72.15

[Table/Fig–3]: Relation between Clinical Types of T.capitis and Mycological investigation n = 79

Trichophyton rubrum was differentiated from the other Trichophyton species by the urease test and the hair perforation test.[1],[3],[4],[5].

Samples of scalps and hairs were also obtained from the close contacts of the patients. These contacts had to have clinically obvious signs of Tinea capitis. The close contacts of the patients, who had recently used a sporicidal shampoo, were excluded from the study. The samples of the scalp and hair from the contacts were obtained by briskly rubbing the scalp with a disposable tooth brush or a sterile carpet disk.[6],[7].

The patients and contacts were questioned about the presence of any other skin lesion.

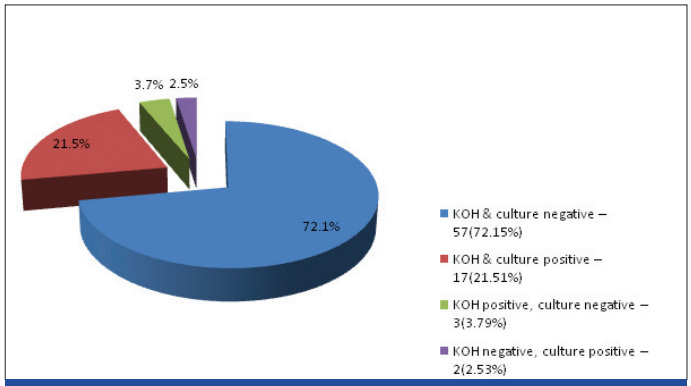
Clinical types	Aetiological agents				Total
	T. mentagro-phytes	M.gypseum	M.canis	T.rubrum	
Seborrhoid	5	2	-	2	9 (47.36%)
Black dot	2	3	-	-	5 (26.31%)
Kerion	2	-	3	-	5 (26.31%)
Total	9 (47.36%)	5 (26.31%)	3 (15.78%)	2 (10.52%)	19

[Table/Fig–5]: Clinical types in relation with culture positive aetiological agents n = 19

RESULTS

In our study, the total number of isolates was 19(24.05%). Trichophyton mentagrophytes was the commonest isolate, [9(47.36%)], followed by Microsporum gypseum [5(26.31%)], Microsporum canis [3(15.78%)] and Trichophyton rubrum [2(10.52%)]. [Table/Fig-1,8, 9,10, 11, 12 13, 14]

Tinea capitis was more common in the 5-10 years age group, i.e. 12(63.15%). The male:female ratio was 2.8:1.[Table/figure 1,2].



[Table/Fig-4] : KOH and culture positivity in suspected cases of Tinea capitis

Out of the 19 isolates, 17(21.51%) were KOH and culture positive and 2(2.53%) were KOH negative and culture positive. [Table/Fig-3,4].

The seborrhoid type was the commonest clinical type,i.e. 9(47.36%), followed by black dot and kerions, 5(26.31%) each. [Table/Fig-5].

Out of 26(32.91%) close contacts of the patients, 6(7.59%) were both KOH and culture positive. None of them were KOH negative and culture positive. Out of 6 culture positive contacts, 3(3.79%) showed the growth of Trichophyton mentagrophytes and 1(1.26%) each showed the growth of Microsporum gypseum, Microsporum canis and Trichophyton rubrum. The same species of dermatophytes were isolated from the patients and their contacts..

DISCUSSION

Tinea capitis is not a reportable disease, but because of its contagious nature, an early diagnosis is important in order to control transmission of the disease. This also prevents possible scarring and permanent hair loss.[5]

In our study, the seborrhoeic type was most common clinical presentation [9(47.36%)], followed by the black dot and the kerion type [Table/Fig-5]. Al Samarai A G M also found the highest incidence of the seborrhoid type of Tinea capitis in his study [3]. Kumar AG et al also reported a higher incidence of Tinea capitis of the non inflammatory type [8].

There was a male predominance in our study, the male: female ratio being 2.8:1[Table/Fig-1, 2]. The higher incidence of the Tinea capitis infection in males may be attributed to the easy implantation of the spores due to short hair and the frequency of sharing combs, brushes, caps, etc.[9][10].

Singal et al reported that the Tinea capitis infection had the same amount of incidence in both males and females. [11].

Woodgyer observed that the cases of Tinea capitis which were found in children upto the age of 10 years, showed no predilection for either sex. [12].

The relatively increased incidence in our set up might be due to its rural background, where, there was a low standard of health education, over crowding, poor hygiene and close personal and animal contacts[13] [14].

The commonest age group which was affected in our study was the 5–10 years age group i.e. 12(63.15%).[Table/Fig-1,2]. Similar results were obtained by Grover C et al [15].

There are rarities in the scalp infections in post pubertal teenagers

[Table/Fig-6] : A case of Tinea Capitis

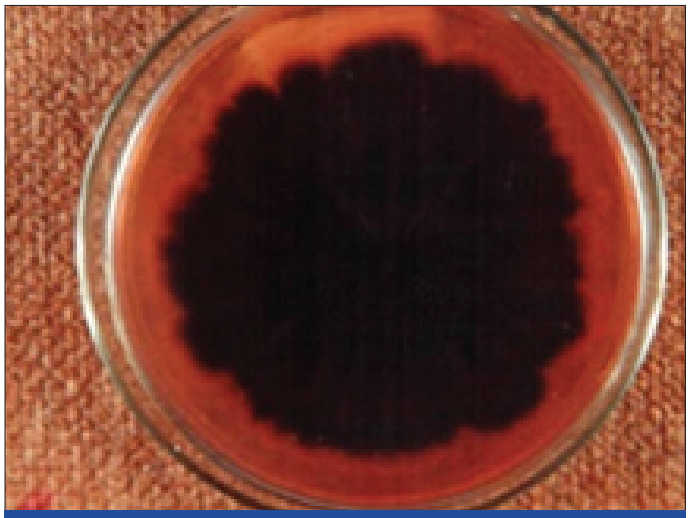
[Table/Fig-7] : Infection of scalp extending to the beard area of the patient.

[Table/Fig-8 : Velvety growth of Trichophyton rubrum on Sabouraud's Dextrose Agar (Auberse view

and adults as the changes occur in the composition of the medium chain length fatty acids (MCLFAs) of the sebum [2]. 3 of our culture positive patients were in their early teens.

2 patients had curly hairs. Curly hairs are more prone to the infection and this may be due to the difficulty in washing the hair. [3].

In our study, 17 (21.5%) cases were both KOH and culture positive and 2 (2.53%) were KOH negative and culture positive



[Table/Fig-9] : : Red pigmentation of Trichophyton rubrum on Sabouraud's Dextrose Agar (Reverse view).

[Table/Fig-3, 4].

Trichophyton mentagrophytes was the commonest isolate [9 (47.36%)], followed by Microsporum gypseum [5 (26.31%)], Microsporum canis [3 (15.78%)] and Trichophyton rubrum [5] (26.31%)].[Table/Fig-1].

Trichophyton rubrum is not infrequently involved in the infections with Tinea capitis, but it rarely invades the hair [2]. Infections caused by anthropophilic fungi are mostly acquired by direct contact with infected humans. Fomites also play an important role and the infection may even be acquired after aerosolization. [16]

We isolated Trichophyton rubrum from one patient and the father of that patient also showed culture positivity for the same.

Geophilic fungi such as Microsporum gypseum are usually transmitted form a soil source and can be secondarily transmitted by animals to humans. [16]

We isolated Microsporum gypseum from 5 (26.3%) patients. 3 of them used to work in the fields with their parents.

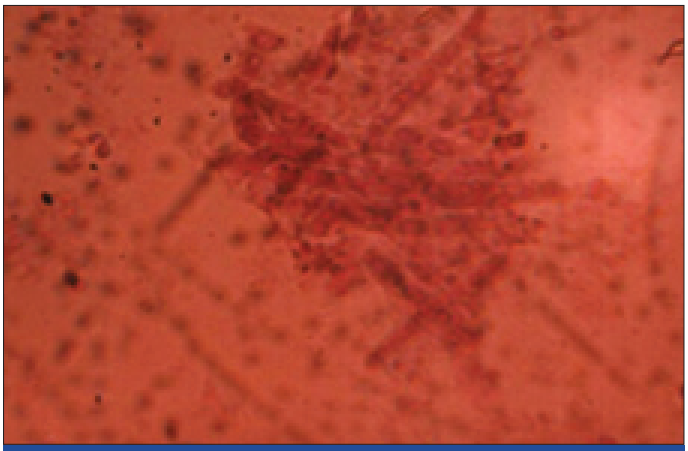
We had 5 cases with Kerion. From 2 of them, we isolated Trichophyton mentagrophytes and from the other 3, we isolated Microsporum canis.4 among them had close contact with cats and dogs. The infections which are acquired from animals are usually inflammatory. Sehgal et al [9] found that animals played a significant role in causing the Tinea capitis infection.

Trichophyton violaceum is one of the commonest isolates from patients with Tinea capitis which has been reported by various workers from India and other parts of the world. [17][18].[19] But we could not isolate Trichophyton violaceum from the cases of Tinea capitis.

This shows that the distribution of the various aetiological dermatophytes which cause Tinea capitis varies considerably with respect to the geography and the specific population group. This suggestion was also supported by Chen B K et al. [20]

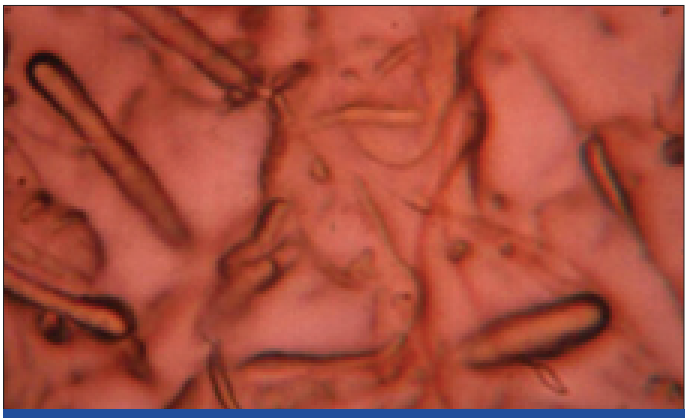
In our study, none of the specimens showed the growth of more than one fungal species. Sidat et al had reported multiple isolates from a single specimen. [21]

6(7.59%) close contacts of the patients were KOH and culture positive for dermatophytes. The species of the dermatophytes which were isolated from the contacts were similar to that of the patients. Isolation of the same species of dermatophytes from the patients and their contacts supported the fact that the inclusion



[Table/Fig-10] : Macro and micro conidia of Trichophyton rubrum

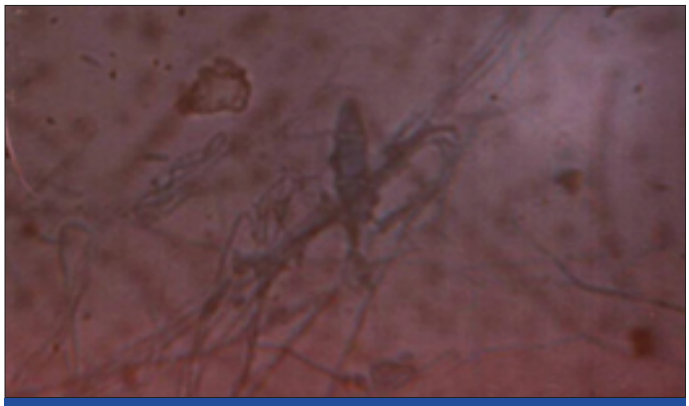
[Table/Fig-11] : Granular type colony of Trichophyton mentagrophytes on Sabouraud's Dextrose Agar (Reverse view).



[Table/Fig-12] :] Macro and micro conidia of Trichophyton mentagrophytes.

[Table/Fig-13] : Cottony growth of Microsporum gypseum on Sabouraud's Dextrose Agar.

of the close contacts of the patients in this study was useful, as they were likely to be a potential source of infection.



[Table/Fig-14] : Rough, thick walled, spindle shaped macro conidia of Microsporum gypseum.

CONCLUSION

Tinea capitis was not uncommon in our setup. Infected hair serves as a chronic reservoir of infection, which can give rise to repeated mycotic infections of the skin. Some of the species of dermatophytes showed a slower response to the azole derivatives. So, it is important to find out the aetiological agents upto the species level. The physical and psychosocial problems which are associated with Tinea capitis are not to be underestimated.

REFERENCES

[1] Chander J. Superficial Cutaneous Mycoses, In Section II. Textbook of Medical Mycology 3rd Edition. Mehta Publishers, New Delhi; 2009: 122-146.

[2] Rippon J M. Dermatophytosis and Dermatomycosis, In Chapter 8. Medical Mycology : The Pathogenic Fungi and Pathogenic Actinomycetes. 3rd Edition. W. B Saunders Company, Philadelphia; 1988: 169-275.

[3] Al Samarai AGM. Tinea Capitis among children: Public Health Implication. Journal of Clinical and Diagnostic Researh 2007; Vol I, 476-482.

[4] Betty AF, Daniel FS, Alice SW. Laboratory methods in basic microbiology, In Chapter: 50. Bailey and Scotts Diagnostic Microbiology 12th edition Mosby Elsevier 2007; 629-717.

[5] Faithi HI, AGM Al Samarai. Prevalence of Tinea Capitis among school children in Iraq. Eastern Mediterranean Health Journal 2000; 6: 128-137.

[6] Pomeranz AJ, Sabnis SS, Mc Grath GJ, Easterly NB. Asymptomatic Dermatophyte carriers in households of children with Tinea Capitis. Archives of Paediatrics and Adolescent Medicine 1999; 153: 483-486.

[7] Claire Fuller. Changing face of Tinea Capitis in Europe. Current opinion in Infectious Diseases 2009; 22: 115-118.

[8] Kumar AG, Lakshmi N. Tinea Capitis in Tirupati. Indian Journal of Pathology and Microbiology 1990; 33: 360-363.

[9] Sehgal VN, Saxena AK, Kumari S. Tinea Capitis: A clincoetiologic Correlation. International Journal of Dermatology 1985; 24(2): 116-119.

[10] Reid BJ, Shimkin NB, Blank. Study of Tinea Capitis in Philadelphia using case and control groups. Public Health Report 1986; 83: 497-501.

[11] Singal A, Rawat S, Bhattacharya S, Mohanty S, Barua MC. Clinico-Mycological Profile in North India and response to griseofulvin. Journal of Dermatology 2001; 28: 22-26.

[12] Woodgyer A. Trichophyton tonsurans infections in New Zealand.Mycoses 1993; 3:1 – 15.

[13] Venugopal PV, Venugopal TV. Tinea Capitis in Saudi Arabia. International Journal of Dermatology 1993; 32: 39-40.

[14] Al Fozan AS, Nanda A. Dermatophytosis of children of Kuwait. International Journal of Dermatology 1994; 33: 690-693.

[15] Grover C, Arora P, Manchanda V. Tinea Capitis in Paediatric population: A study from north India. Indian Journal of Dermatology, Venereology and Leprology 2010; 76:527-532.

[16] Arvind A, Padhye and Richard C summerbell, In Part IV. Topley and Wilson's Microbiology and Microbial Infections 10th Edition. Edward Arnold (Publishers) London; 2005: 220-243.

[17] Kalla G, Begra B, Solanki A, Goyal A, Batra A. Clinicomycological study of Tinea Capitis in desert district of Rajasthan. Indian Journal of Dermatology, Venereology and Leprosy 1995; 61: 342-345.

[18] Jha BN, Garg VK, Agarwal S, Khanal B, Agarwalla A. Tinea Cpitis in eastern Nepal. International Journal of Dermatology 2006; 45: 100-102.

[19] Jehangir M, Hussain I, Khurhid K, Haroon TS. A clinico etiologic

Correlation in Tinea Capitis. International Journal of Dermatology 1999; 38: 275-278.
[20] Chen BK, Friedlander SF. Tinea Capitis update: A continuing Conflict with an old adversary. Current opinion pediatrics 2001; 13: 331-335.
[21] Sidat MM, Coreia D, Buene TP. Tinea Capitis among children at one suburban primary school in the city of Maputo, Mozambique. Revista da Sociedade de medicina tropical 2000; 40: 3-5.

AUTHOR:
1. DR SEEMA BOSE
2. DR SANJEEV G KULKARNI
3. DR IRFAAN AKHTER

NAME OF DEPARTMENT(S)/INSTITUTION(S) TO WHICH THE WORK IS ATTRIBUTED:
Rural Medical College, Loni-BK, Ahmednagar (M.S.)

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr Seema Bose, Professor of Microbiology
Rural Medical College, Loni-BK
Ahmednagar – 413736 (M.S.)
E-mail: drseema11ghosh@gmail.com

DECLARATION ON COMPETING INTERESTS: No competing Interests.

Date of Submission: **Nov 22, 2010**
Date of Peer Review: **Jan 25, 2011**
Date of acceptance: **Feb 18, 2011**
Date of Publication: **Apr 11, 2011**