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Original Article

Prevalence of tinea capitis and asymptomatic carriage amongst school going children

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Abstract

Background Tinea capitis is one of the most common dermatophytosis seen in school going children, with diverse clinical presentations and a worldwide prevalence. Causative fungi belong to *Trichophyton* and *Microsporum* species, but vary with geography and time. Clinically it is characterized by erythema, scaling, pruritus and alopecia. Moreover, the infection can exist as an asymptomatic carriage in children, which in turn may be a source for anthroponotic transmission of tinea capitis.

Objective To see the frequency of tinea capitis and its asymptomatic carriage in school going children, thus correlating the frequency of disease and carriage rates.

Patients and methods The current study was centered at Ali Bhai, Karachi Municipal Corporation School and students of the nearby schools in the residential area were sampled during the months of April and May 2004. Students with the consent of their parents were enrolled randomly. Both normal boys and girls and students suspected to be suffering from tinea capitis were included. Hair samples obtained from normal as well as diseased subjects by sterile hairbrush technique were subjected to light microscopy after treating with 25% potassium hydroxide and inoculated onto Sabouraud's medium for culture. Colonial morphology and microscopy specified the causative organisms in cultures with growth.

Results A total of 682 students were enrolled in the study comprising 602 boys (88%) and 80 girls (12%), 31 were suffering from the suspected disease i.e. tinea capitis. Of these, 30 patients i.e. 21 males (70%) and 9 females (30%) were confirmed mycologically to be suffering from tinea capitis accounting for 4.3% of all the studied subjects ($p<0.001$). The clinical features included itching in 27 patients (90%), scaling in 22 (73.4%) hair loss in 14 (46.6%), and lesions with discharge and erythema in 3 patients (10%). *T. violaceum* was the isolate in 27 patients (90%), while only three patients were culture positive for *M. canis*. Four students (0.58%, [$p<0.001$]), with no clinical signs and symptoms revealed positive cultures for *T. violaceum*.

Conclusion Tinea capitis prevails amongst school going children, *T. violaceum* being the most common organism. Asymptomatic carriage of this organism may be a potential source for the anthroponotic spread of tinea capitis in this age group.

Key words
Tinea capitis, *Trichophyton violaceum*, asymptomatic carriage.

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Introduction

Tinea capitis is one of the most common dermatophytosis seen in school going

children, with diverse clinical presentations and a worldwide prevalence.[1] The disease may present in different patterns i.e. kerion, agminate folliculitis, favus, black dot or grey patch type.[2] Causative fungi belong to the genera *Trichophyton* and *Microsporum*, but vary with geography and time. Large family size, crowded living conditions, and low socioeconomic status may contribute to an increased incidence of tinea capitis.[2,3] Transmission occurs via infected persons, shed infected hair, animal vectors, and fomites. Clinically it is characterized by erythema, scaling, pruritus and alopecia. Moreover, the infection can exist as an asymptomatic carriage in children, which in turn may be a source for its anthroponotic transmission.[4-10] Anthropophilic organisms *Trichophyton tonsurans* and *T. violaceum* are presumed to be associated with higher rates of asymptomatic carriage.[8,9] Asymptomatic carriage is considered to correlate with the incidence of tinea capitis in a community.[9] Asymptomatic carriers are the subjects with no clinical signs and symptoms of the disease but are culture positive for the fungi responsible for tinea capitis. In Spain and Italy, the frequency of asymptomatic carriage is reported to be 0.2%and 0.3%, respectively.[7,11] A higher rate of the carriage and asymptomatic disease has been reported from South Africa.[9] Most of the studies in our part of the world have shown *T. violaceum* to be the most common pathogen although other organisms are occasionally found.[12,13,14] Previous data from Lahore also reveals this dermatophyte to be the most common pathogen.[15,16]

The current study was aimed to see the frequency of tinea capitis and asymptomatic carriage rates in school going children, thus correlating the frequency and carriage rates.

Patients and methods

The current study was centered at Ali Bhai, Karachi Municipal Corporation School, situated in Rexor Old Golimar, Karachi, and students of the nearby schools in the residential area were sampled during the months of April and May 2004. Students with the consent of their parents were enrolled randomly. Both normal boys and girls and students suspected to be suffering from tinea capitis were included. Students with any other concomitant dermatological, medical or surgical problem were not studied. With an agreement from school authorities, a predesigned questionnaire was distributed to the volunteers obtaining information regarding housing, living conditions, family size and other habits. The clinical signs (erythema, scaling, edema, pustules, pruritus and hair loss) in suspected cases were observed.

Besides the routine investigations, hair samples were obtained from normal as well as diseased subjects by sterile hairbrush technique. Specimens were subjected to light microscopy after treating with 25% potassium hydroxide solution. The specimens were then inoculated onto Sabouraud's medium, containing chloramphenicol and cycloheximide. The cultures were incubated for 4-6 weeks and were examined weekly to confirm or rule out any growth. Colonial morphology and microscopy specified the causative organisms in cultures with growth.

All the findings were recorded, compiled, tabulated and analyzed.

Results

A total of 682 students were enrolled in the study comprising 602 boys (88%) and 80 girls (12%). The minimum age of presentation was 5 years and maximum 11 years, the mean age being 8.1 years. Of all the enrolled children, 31 were suffering from tinea capitis. Among these, 30 were confirmed mycologically to be suffering from tinea capitis accounting for 4.3% of all the studied subjects ($p<0.001$). Therefore, the frequency of tinea capitis in our study was found to be 4.3%. There were 21 males (70%) and 9 females (30%). Itching was the most common feature seen in 27 patients (90%), followed by scaling 22 (73.4%), hair loss 14 (46.6%) and the lesions with discharge and erythema in 3 patients (10%).

T. violaceum was the most frequent isolate found in 27 patients (90%), while only three patients were culture positive for *M. canis* Four students (0.58%), with no clinical signs and symptoms revealed positive cultures for *T. violaceum*. Thus, the frequency of asymptomatic carriers in our study was 0.58% ($p<0.001$).

Discussion

Tinea capitis is a fungal infection characteristically affecting children between 4 and 14 years of age.[1,2] It can be caused by any species of either *Trichophyton* or *Microsporum*. In the current study, of the 682 enrolled children, 30 students were mycologically confirmed cases of tinea capitis. This account for a frequency of 4.3% in the community studied ($p<0.001$). Tinea capitis has been reported from different parts of our country from time to time with a variable frequency.[17-20] Muzaffar *et al*.[20] have reported tinea capitis to be the most common dermatophytosis in children. Likewise, Karachi being hot and humid has a high prevalence of fungal infections, tinea capitis is quite common.[18] The community studied was of low socioeconomic group with poor hygiene and overcrowding, which adds to the hot and humid environment of Karachi. However, the frequency from other areas of Karachi is not available for comparison. A recent epidemiological observation is a striking increase in the incidence of tinea capitis, particularly among African-Americans.[21]

T. violaceum was the isolate in 27 patients (90%), which makes it the most common causative organism in this area. Faruqi *et al*.[13] reported *T. violaceum* to be the most common etiological agent in Karachi. Likewise, the etiological agent in our study is comparable with other past studies in our part of the world.[12-16] Only three of the patients had the disease due to *M. canis*. This in turn also correlates with the past figures.[12-16] Thus *T. violaceum* continues to be the predominant etiological agent of tinea capitis in this part of the world. This may be attributed to environmental factors, human migrations, host response and newer therapies.

The epidemiology of tinea capitis is in a constant state of flux and varies considerably with respect to geography and specific patient populations'.[22] In North America and UK, *T. tonsurans* is responsible for more than 90% of cases. *M.*

canis is the predominant pathogen in certain parts of Europe.[27,28] However, Ohst *et al*.[29] claims *T. violaceum* to be the most common cause of tinea capitis in Asia. Moreover, Mengistu *et al*.[30] from Ethiopia in an audit, reported 130 (76%) of 171 patients to be suffering from tinea capitis and 80% of these had *T. violaceum* isolated from the lesional skin. Therefore, regular epidemiological surveillance of causative fungal organisms in a community and their antifungal susceptibility is an essential component in the management of this condition.[31]

The detection of asymptomatic carriers is important in disease control and their treatment necessary to prevent disease spread. Adults living with diseased children become asymptomatic carriers.[32] Therefore, it may be necessary to determine the frequency of asymptomatic carriers in a community.[33] In the current study, the frequency of asymptomatic carriage was 0.43% (p<0.001). In Spain and Italy, the frequency of asymptomatic carriage is reported to be 0.2% and 0.3% respectively.[12,13] A higher rate of the carriage and asymptomatic disease has been reported from South Africa.[14] *T. violaceum* was the organism in all these carriers, as this fungus leads to varied signs of overt infection with mild or minimal inflammation and usually a lack of host response therefore, are good candidates for asymptomatic carriage.[9] However, the organism responsible may be in accordance with the predominant etiological agent leading to the disease state. These asymptomatic carriers in turn may be a potential source of spread for tinea capitis.[34] The prevalence of asymptomatic carriers in turn correlates with the frequency of tinea capitis in a community.[8]

Conclusion

Tinea capitis prevails amongst school going children, *T. violaceum* being the most common organism. Asymptomatic carriage of this organism may be a potential source for the anthroponotic spread of tinea capitis in this age group. Therefore, regular epidemiological surveillance of causative fungal organisms in a community is an essential component in the management of this condition.

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