Original article

Prevalence of Tinea capitis in Primary School Children

Muge Oguzkaya Artan[1], A. Nedret Koc[2], Zeynep Baykan[3], Hikmet Buldu[2]

Received: 18 March 2013 / Accepted: 12 May 2013

1- Erciyes University, Halil Bayraktar Health Services Vocational College, Kayseri, Turkey

2- Erciyes University, Medical School, Department of Microbiology and Clinical Microbiology, Kayseri, Turkey

3- Erciyes University, Medical School, Department of Medical Education, Kayseri, Turkey.

Abstract

Objective: This study is planned to determine the prevalence and causative agents of tinea capitis in rural area of Kayseri province.

Patients and Methods: From March 2005 to May 2005, a school survey of 1396 primary school children was carried out. Data regarding clinical semptoms (itching), and signs (scaling, hair loss, black dots, kerion, scutulum, pustules, and id reaction) were noted and a presumptive clinical diagnose was made. Hair roots, the content of plugged follicles and skin scales were obtained from these children with one or more signs associated with tinea capitis. All collected specimens were analyzed by direct microscopy and culture.

Results: Twenty-five cases of tinea capitis were clinically diagnosed. Four (0.3%) of them were diagnosed both clinically and using culture. Seven cases (28%) were diagnosed microscopically whereas the remaining 18 (72%) cases had a clinical diagnose. We also isolated and identified *Trichophyton verrucosum* (four cases).

Conclusion: The study indicated that tinea capitis in our region is rare and the causative organism of tinea capitis is *T.verrucosum*. In order to prevent children from tinea capitis infection it is important to improve sanitary conditions.

Key words: Tinea capitis, children, prevalance

Corresponder:

Assoc.Prof.Dr. Muge OGUZKAYA ARTAN

Erciyes University, Halil Bayraktar

Health Services Vocational College

e-mail: martan38@gmail.com

Introduction

Tinea capitis is a common infection of the scalp and hair caused by dermatophytes. It is a superficial fungal infection characterized by invasion of dermatophytes in to hair follicles and keratinized layer of hairy skin. Tinea capitis is an exogenous infection that originates from different sources (human, animals and/or soil). This fungal infection is predominantly found in prepubertal, school-going children, and most prevalent between 6 and 10 years of age, although infection can occur in all age groups. It is highly contagious and represents a significant public health problem. Large outbreaks often occur in schools or other places where children are congregated. It has a worldwide distrution but is most prevalent in Africa, Asia, and Southern and Eastren Europe. Tinea capitis is caused by a number of *Trihophyton* and *Microsporum* species [1-3].

Prevalence of the infection is related to individual's sex, age, socio-economic status and personal hygiene. The aims of our study were to determine the prevalence, and causative agents of tinea capitis among primary school children in rural area of Kayseri province, Turkey.

PATIENTS AND METHODS

Eleven primary schools from rural area of Kayseri province were included to the study and a total of 1396 students were examined from March 2005 to May 2005, 675 (48,3%) female and 721 (51.2%) male students. The local ethical consideration was taken from Erciyes University Medicine Faculty. The age range of students was 7-12 years with a mean of 9,5.

In total, there were 33 schools in rural parts, and 11 of them were selected by cluster sampling method. After explaining the purpose of the study to the teachers and obtaining their consent, children were examined in their classroom. Our team consisted of two microbiologist whom one of them study on clinical mycology, and one public health specialist. A questionnaire form included questions about age, sex, number of siblings, self-awareness of skin disease, type of housing, overcrowding, living conditions, and income level. Data regarding clinical semptoms (itching), and signs (scaling, hair loss, black dots, kerion, scutulum, pustules, and id reaction) were noted. A presumptive clinical diagnose was made in children who had one or more signs associated with tinea capitis. Hair roots, the content of plugged follicles and skin

scales were obtained from these children after cleaning the lesion with 70% alchol and biological materials were transported in Petri dishes to ErciyesUniversity Medical Faculty Hospital Mycology Laboratory, Kayseri, Turkey.

All collected specimens were analyzed by direct microscopy and culture. Microscopic examination of these specimens was carried out in potassium hydroxide solution (15%). These specimens were cultured on Sabouraud's agar (Oxoid), supplemented with 0.05g/l chloramphenicol and 0.4g/l cycloheximide. Cultures were incubated at 28ºC for at least 4 weeks and examined for growth 7, 14, 21, and 28 days. Negative cultures were excluded at the end of fourth week. Identification and specification of the agents were made according to their morphological and microscopic characteristics of growing colonies [4].

Identification was effected by sub culturing the strains in bacto dextrose agar with thiamine and incubating at 26 and 32^{O}C for 6 to 8 weeks [4].

RESULTS

The survey of 1396 primary school children in 11 rural area primary schools revealed 25 cases of tinea capitis were clinically diagnosed. Four (0.3 %) students were diagnosed with tinea capitis after physical, direct microscopical examinations and culture results. Seven cases (28%) were diagnosed microscopically, and remaining 18 (72%) cases had a clinical diagnose. The etiological agent of tinea capitis was: *Trichophyton verrucosum* (n=4). Three (0.2%) students were diagosed physical and direct microscopical examinations. One of them was the brother of the patient no.2 (Table 1). The distribution of sex, age, number of siblings, income level, clinical findings, and culture results of the patients is presented in Table 1.

It was found that the addition of thiamine accelerated the growth of the organism. On macroscopic observation, the colony was slow growing, and required 4 weeks to produce conical thallus that was heaped up, waxy.

DISCUSSION

Tinea capitis is a superficial fungal infection always seen in children. The infection can be transmitted by comb, brush, as well as direct contact with animals. [1] Populationwise prevalence of the infection is not known exactly.

The prevalence of tinea capitis that found in our study was 0.3%. Sahin et al. [5] were detected dermatomycosis

in rural area of Duzce, Turkey. They were not found tinea capitis in their group because of not to detect the children. Altindis et al. [6] were detected 4760 suburban primary school children in Middle Anatolia. They were found 16 (0.3%) cases of tinea capitis both clinically and using culture. Ilkit et al. [7] found tinae capitis infection rate with a mean of 0.03% in primary school children in Mersin city center. They reported that socioeconomic status, and age may effect the prevalence rate of tinea capitis.

Table 1. Demographic data of tinea capitis cases.

No. Of cases	Sex	Age	No. Of siblings	Income level (L,M)[1]	Clinical findings	Results of culture
1	M	9	1	M	Local alopecia with 5 cm diameter	*Trichophyton verrucosum*
2	M	9	2	M	Keratinized layer of hairy skin and death or fractured hairs	*T. verrucosum*
3	M	8	7	L	Keratinized layer of hairy skin and local alopecia	*T. verrucosum*
4	M	7	3	M	Keratinized layer of hairy skin and local alopecia	*T. verrucosum*

[1] L:Low, M:middle.

All of our cases were 4 (100%) males. Due to easy inoculation of spores to short hairs and other factors easing meeting with inoculation by the agent, all of our cases were males. We reviewed our 4 cases and detected feeding animals by parents of three cases, having siblings and no history of the infection in family in all cases. Two of the cases were attending the same school, one of whose parents was busy with animals, the other was employee.

We concluded that our cases were suffering from risk factors.

T. verrucosum was the main cause of tinea capitis in Kayseri, this observation agrees with other report from Middle Anatolia. [6] Etiological agents of tinea capitis differ in relation to geographical areas. Whereas İlkit et al. [7] reported that *T. violaceum* was the most frequently isolated species followed by *T. mentagrophytes* in south-eastern Anatolia. Metintaş et al. [8] evaluated 2384 students from rural areas in Eskişehir and found *M. canis* as etiologic agent followed by *M. gypseum* in the Middle-west Anatolia. In Diyarbakir, South-east Anatolian city, Özel et al. [9] found that *T. violaceum* and *T. mentagrophytes* were the most common pathogenes causing tinea capitis.

Etiological agents and incidence of tinea capitis differ in various parts of the world. Basnet et al. [10] , reported that 11 school-going Nepalese children whom suspected of tinea capitis, four of them were culture positive and the etiological agent was *Trichophyton violaceum*. Trivino-Duran et al. [11] were evaluated 1305 schoolchildren, ages 3-15, in the inner city of Barcelona, Spain. The prevalence of tinea capitis was 0.23% and the etiological agent was *Trichophyton mentagrophytes.* Ali-Shtayeh et al. [12] detected 8531 schoolchildren in Nablus area, Palestine and found 0.27% mycologically proven cases of tinea capitis. Two etiological agents were isolated from tinea capitis cases: *Trichophyton violaceum* and *Microsporum canis*. Figueroa et al. [13] in South-western Ethiopia, were examined 382 children whom only 7 of them were found to be clear of any skin disorder. They were found clinical evidence of tinea capitis in 63 (29%) children. Positive dermatophyte cultures were obtained from 72 (33%) children. *T. violaceum* was identified as the most prevalent dermatophyte species. Ghannoum et al. [14] detected 937 students from Cleveland, Ohio elementary schools and they were found *T.tonsurans* the only organism isolated (except one *M. canis* isolate).

The prevalence of tinea capitis was closely related to socio-economic status and life style, commonly occuring poor hygienic and economic conditions. In our study, even rare, we saw that there is a tinea capitis infection. And most of the students were in close contact with animals. This explains the frequency of *T. verrucosum* infection. In order to prevent children from tinea capitis it is

important to improve sanitary conditions.

Acknowledgements

We would like to thank the Governor of Kayseri the City health Department and the Department of Education of Kayseri for their help in making this study possible.

REFERENCES

1. Weitzman I, Summerbell RC. The dermatophytes. Clin Microbiol Rev 1995;8:240-59.

2. Yu J, Li R, Bulmer G. Current topics of tinea capitis in China. Jpn J Med Mycol 2005;46:61-66.

3. Padhye AA, Weitzman I. The dermatophytes. In: Ajello L, Hay RJ, eds. *Topley and Wilson's Microbiology and Microbial Infections.* Vol.4: Medical Mycology. 9th ed. London:Arnold Publishers,:215-36 1998.

4. Larone DH. Medically important fungi: a quide to identification, 2nd ed. Washington DC: ASM Pres 1993.

5. Sahin I, Oksuz S, Kaya D, Sencan I, and Cetinkaya R. Dermatophytoses in the rural area of Duzce, Turkey. Mycoses 2004;47:470-74.

6. Altindis M, Bilgili E, Kiraz N, and Ceri A. Prevalence of tinea capitis in primary schools in Turkey. Mycoses 2003;46:218-221.

7. Ilkit M, Hazar S, Atli T, Gumusay T, and Boga I. Tinea capitis in primary school children in Mersin city center:Infection in South-easst Anatolian immigrants. Turkish Journal of Infection 1999;13:145-149.

8. Metintas S, Kiraz N, Arslantas D, Akgun Y, Kalyoncu C, Kiremitci A, and Unsal A. Frequency and risk factors of dermatophytosis in students living rural areas in Eskisehir, Turkey. Mycopathologia 2004;157:379-82.

9. Ozel MF, Mete M, Mete O, Gul K, and Suay A. Agents of dermatomycoses in the Diyarbakır region. Turkish Journal of Infection 1996;10:275-8.

10. Basnet SB, Basnet NB, Hiruma M, Inaba Y, Makimura K, and Kawada A. Mycological examination of the hair samples of 11 school-going Nepalese children suspected of tinea capitis. Mycoses 2000;43:51-54.

11. Trivino-Duran L, Torres-Rodriguez JM, Martinez-Roig A, Cortina C, Belver V, Perez-Gonzalez M, and Jansa JM. Prevalence of tinea capitis and tinea pedis in Barcelona

schoolchildren. Pediatr Infect Dis J 2005;24:137-41.

12. Ali-Shtayeh MS, Salameh M A-A, Abu-Ghdeib SI, Jamous RM, and Khraim H. Prevalence of tinea capitis as well as of asemptomatic carriers in school children in Nablus area (Paletsine). Mycoses 2002;45:188-194.

13. Figueroa JI, Hawranek T, Abraha A, and Hay RJ. Tinea capitis in South-western Ethiopia:a study of risk factors for infection and carriage. Int J Dermatol 1997;36:661-666.

14. Ghannoum M, Ihsam N, Haijeh R, Cano M, Al-Hasawi F, Yearick D, Warner J, Long L, Jessup C, and Elewski B. Tinea capitis in Cleveland:survey of elemantary schoolstudents. J Am Acad Dermatol 2003;48:189-93.