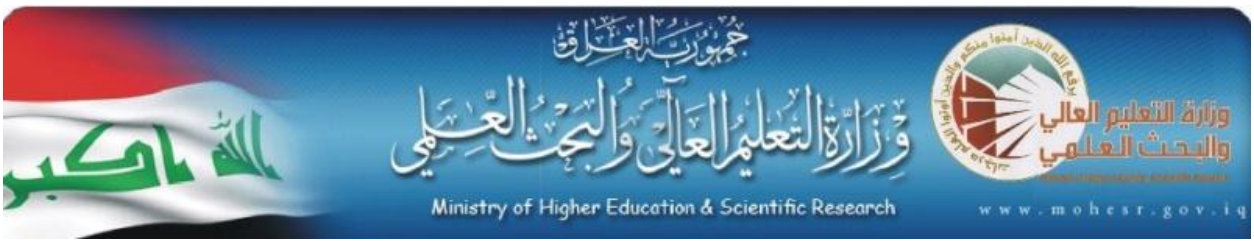

COLLEGE OF MEDICINE
UNIVERSITY OF DIYALA

TINEA CAPITIS AMONG CHILDREN

Supervised by

Dr.Mohammed Jassim Shaker

Done by

Areej Qasim Ahmed

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Abstract

Background: Dermatophytes are a type of fungus that infiltrates and grows in the dead keratin of the skin, hair, and nails. Tinea capitis, an infection of the scalp and hair shaft, is the most common dermatophytosis in children aged six months to prepubertal.. The study's goal was to determine the prevalence, causative agents, and predisposing factors among rural residents' primary school kids. Following a physical examination, children with tinea capitis had scalp and hair scrapings held for microscopy and culture. Tinea capitis was confirmed in 15.4 percent of patients. Trichophyton mentagrophyte (51.7%) and Microsporum aoudoui (20.7%) were the most prevalent organisms.

Literature review: Most of the similar studies reveal that non-inflammatory types of Tinea capitis were more common (51%) than in-flammatory variants (32%) (Hussain I et al. 1994, Kalla G et al. 1995, Singal A et al. 2001, Jha BN et al. 2006). In our study, Seborrhoeic type was more common followed by Black dot and grey patch types., study by Bose et al (2011) and Singal A et al (2001) have reported seborrhoeic variant as the predominant type followed by black dot.

Methodology: The study was conducted on two classes of preadolescent children ranging in age from 4 to 15 years. A total of 115 students had visible clinical signs of tinea capitis infection, including scaling, while another 115 students had no evidence of infection. The research included students whose parents/guardians had signed the permission form. They were screened and interviewed. Personal hygiene habits (whether they shower with soap, how often they bathe, and how frequently they wash their clothes) were collected from them.

Results: The most popular dermatophytes among the students were Tricophyton rubrum (34%), Tricophyton mentagrophyte (31%), and Microsporum canis (18%). Other dermatophytes found included Microsporum nanuum (3%) and Epidermo*phyton floccusum* (6%)*, Tricophyton verucosum* (1%) and *microsporum gypseum* (8%).

Conclusion: A requirement for intensive national healthcare promotion and educational programs to facilitate hygiene practices among schoolchildren, including early identification and treatment of dermatophytosis. Teachers and school health care providers play an important role in such services.

Aim: to determine the correlation between tinea capitis and the younger age group (4–7 years), and some unsanitary lifestyle choices, and forms of tinea capitis.

Introduction

Tinea capitis is a fungi infection of the skin that disproportionately affects children in rural and underserved communities and is among the top five diseases seen in dermatology clinics world - wide. (Bennassar A., 2010) A high burden of severe fungal infections caused by nondermatophyte fungi (e.g., Malassezia furfur in tinea versicolor) and Candida a species has been demonstrated in some parts of the world. Tinea capitis is one of the most common dermatophytoses in children, infecting the scalp and hair shaft. 4 Transmission is a possibility could be:

1) anthropophilic
2) zoophilic
3) geophilic.

Tinea capitis is spread by a lack of hygiene in the environment, overcrowding, and infected hats, brushes, pillows, and other inanimate items. (E. I. H. Ménan, 2002) A local barber who used the same barbing equipment as the students was identified as the source of infection transmission. Clinical manifestation is determined by geographical area, host immunity, and prevailing species. In the transmission environment and mode, Trichophyton violaceum was most commonly found in Iran and Nairobi, whereas Microsporum canis is the most common organism causing T. capitis in Europe.

Several dermatophyte genera, including Epidermophyton, Microsporum, and Trichophyton, usually invade human skin and nails. They grow on the skin's surface, forming a ring-like shape, hence the name "ringworm." (R. L. Guerrant, 2011) They are extremely common and affect various parts of the body. Dermatophytosis infections, also known as tinea, are categorized clinically based on the body regions involved. Tinea capitis is characterized clinically by scalp scaling, pruritus, cervical and occipital lymphadenopathy, alopecia (diffuse, distinct, or patchy), and a boggy mass. ((L. M. Prescott, 2002)) A recent study of dermatophyte infections at a skin clinic in the United Kingdom discovered that tinea capitis was detected in all age groups and accounted for 72.2 percent of fungal infections between the ages of 0 and 9; however, the frequency of presentation decreases with rising age. ((Lacroix, 2001))

Tinea capitis (caused by Trichophyton and Microsporum species) is the most common pediatric dermatophyte infective disease. The affected age is thought to be caused by a lack of specific florae and fungistatic sebum in this age group. Clinical presentations can take up to two weeks to complete. Tinea capitis has a normal course of spontaneous cure with growing up especially at time of puberty, once sebum production begins. (A. Bennassar and G. Ramon, 2010) There are many forms of hair invasion. The species causing the invasion is classified based on the location of the formation of spore-forming bodies.

Tinea capitis; gray ringworm patches refers to the scaling with a lack of inflammation that had been noted in this patient. Hairs in the affected areas have a dull, grayish, discolored color and are broken and shorter. (V. Mane, 2013)

Hair invasion is divided into several types which includes the following:

- Ectothrix species: Conidia grow on the outside of the hair shaft; the cuticle is damaged, and affected areas fluoresce a green-yellow under a Wood lamp; this is caused by M canis, Microsporum distortum, M ferrugineum, M audouinii, as well as nonfluorescent T rubrum, T verrucosum, Trichophyton megninii, T mentagrophytes, M gypseum
- Endothrix species: Conidia appear within the hair shaft, each filled with hyphae and spores; the cuticle is unaffected, and hairs do not fluoresce under a Wood lamp; this is caused by anthropophilic organisms (T rubrum, Trichophyton gourvilii, T tonsurans, T violaceum, Trichophyton yaoundei, T soudanense). (Rayala BZ, .2017 .)

Gray-patch ringworm (microsporosis) is an ectothrix infection or prepubertal tinea capitis seen here in an African American male child. Gray patch refers to the scaling with lack of inflammation, as noted in this patient. Hairs in the involved areas assume a characteristic dull, grayish, discolored appearance. Infected hairs are broken and shorter. Papular lesions around hair shafts spread and form typical patches of ring forms, as shown. Culture from the lesional hair grew Microsporum canis.

- Favus species: Hyphae structure throughout and around the hair shaft; this is a rare and serious type resulting in favuslike crusts or scutula and hair loss with honey comb destruction pattern of the follicles; this is caused by T schoenleinii (as shown in the image). Tinea favosa of the scalp is characterized by erythematous lesions with pityroid scaling, as well as short and brittle hair. (Favus, ". 2017-07-17.)

An infant with favus, in Kharah, Akhnoor District, Jammu & Kashmir, India.(https://en.wikipedia.org/wiki/Favus)

Appearance is that of a number of yellowish, circular, cup-shaped crusts (scutulum or shield) grouped in patches like a honeycomb, each crust about the size of a split pea, with a bundle of hair projecting in the center. These increase in size and become crusted over, so that the characteristic lesion can only be seen round the edge of the scab.

- Kerion: Thick plaques and boggy skin that grow frequently with bacterial infection superimposed; primarily caused by M canis [(R. L. Guerrant D. H., , 2011)]; this pattern evolves in such a way that it is frequently thought to be a reaction to the dermatophyte. A young Chinese boy's vertex scalp has typical kerion celsi lesions. Take note of the appearance of several bright yellow purulent areas on the skin's surface, which are surrounded by edematous, erythematous, and alopecic areas. Trichophyton mentagrophytes were grown in culture from the lesion. ((Seebacher C, 2008))

Typical lesions of kerion celsi on the vertex scalp of a young Chinese boy. Note numerous bright yellow purulent areas on skin surface, surrounded by adjacent edematous, erythematous, alopecic areas. Culture from the lesion grew Trichophyton mentagrophytes. Courtesy of Skin Diseases in Chinese by Yau-Chin Lu, MD. Permission granted by Medicine Today Publishing Co, Taipei, Taiwan,

Risk factors for tinea capitis infection include the following:

1. Moist weather.
2. Communal baths.
3. Immunocompromised children (including the use of immunosuppressive drugs)
4. Atopy like eczema or asthma.
5. Genetic predisposition.
6. Athletic activity that causes skin tears, abrasions, or trauma such as wrestling, judo, or soccer. (E. M. Higgins, , 2000)

Literature review

1) A cross-sectional study was carried out in the Department of Microbiology of a Rural Hospital of central India, during the period of 1st June- 31st July 2015. All children aged between 6-10 years of age from the six different Government Primary schools, were screened for routine examination and investigations. All total 323 children belonging to classes' I–V standard from six different Government Primary schools were included in this study (O. Ayanlowo, , 2014). Amongst the 81 screened positive Tinea capitis cases, a slight female preponderance was seen, with females comprising 55.5% of the patients. Also it was noted that Tinea capitis cases were more (67.90%) among chil-dren from families with low educational level of parents i.e. primary school or less compared to 32.09% amongst those students with high educational level of their parents. Almost 50.61% of students gave a history of pets at home or pro-longed contact with animals as most of the study population had farming business. Bathing habits among children such as frequency of head bath, use of shampoos and use of hair oils was obtained from all the students. It was observed that the measures of personal hygiene were similar in both students with Tinea capitis and without Tinea capitis
2) Most of the similar studies reveal that non-inflammatory types of Tinea capitis were more common (51%) than in-flammatory variants (32%) (Hussain I et al. 1994, Kalla G et al. 1995, Singal A et al. 2001, Jha BN et al.

2006). In our study, Seborrhoeic type was more common followed by Black dot and grey patch types., study by Bose et al (2011) and Singal A et al (2001) have reported seborrhoeic variant as the predominant type followed by black dot.

Materials and Methods

The study was conducted on two classes of preadolescent children ranging in age from 4 to 15 years. The research included students whose parents/guardians had signed the permission form. They were screened and interviewed. Personal hygiene habits (whether they shower with soap, how often they bathe, and how frequently they wash their clothes) were collected from them. whether they share combs, scarves, and hats with other children; their playing habits, which include interaction with animals or sand; their families' socioeconomic status; their living environments; and the number of students in their classrooms All information for the analysis was obtained directly from the child (via direct interview) and, in some cases, from the child's school personal profile. Children between the ages of 4 and 15 years old who were chosen were screened. A total of 115 students had visible clinical signs of tinea capitis infection, including scaling, while another 115 students had no evidence of infection.

Results

Approximately half of head scraping samples was determined from subjects with tinea capitis lesions, and 105 (91.35 percent) were cultured successfully, with 56 percent (59/105) being males and 44 percent (46/105) being females. The most popular dermatophytes among the students were Tricophyton rubrum (34%), Tricophyton mentagrophyte (31%), and Microsporum canis (18%). Other dermatophytes found included Microsporum nanuum (3%) and Epidermo*phyton floccusum* (6%), *Tricophyton verucosum* (1%) and *microsporum gypseum* (8%). Children aged 4 to 7 years had the highest distribution (67 percent), followed by those aged 8 to 11 years (39 percent). Pupils between the ages of 12 and 15 years (3%) had the lowest dermatophyte infective levels. In each patient, playing with animals, sharing combs, and not washing with soap were significantly associated with tinea capitis infection (p 0.05). Children with tinea capitis were most usually (93 percent) from low-income households, according to their parents' total

funding. The table below shows the socio-demographic features of the participants.

Socio-Demographic Characteristics	Frequency	Percent (%)
Age range (years)		
4–7	134	58
8–11	89	39
12–15	7	3
Gender		
Female	110	48
Male	120	52
Parents' income status (salary per month)		
≤[1]#29,999 (low)	214	93
#3000–#74,999 (medium)	13	6
≥#75,000 (high)	3	1

Table (1) Socio-demographic characteristics of the participants (Yemisi O. Adesiji study)

Risk Factors Associated with the Occurrence of Tinea Capitis among All the collected patients:

The observed risk factors are considered to be associated with the incidence of tinea capitis among the participants. This was determined by how often they cleaned their bodies, whether they bathed with soap or not, how often they changed their clothing, whether they shared the same combs, caps, or scarves as their mates, and their playing habits. The chi-square test of independence was used to determine if there is a connection between these risk factors

(independent variables) and Tinea capitis.

The frequency of baths n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
Daily	83 (48)	89 (52)	172 (75)
More than once daily	42 (72)	16 (28)	58 (25)
Note. $\chi^2 = 35.405$, df = 1. * $p < 0.001$			
Use of soap for bath n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
Yes	124 (92)	11 (8)	135 (59)
No	1 (1)	94 (99)	95 (41)
Note. $\chi^2 = 10.804$, df = 1. * $p < 0.001$			

Table 2 Risk Factors (frequency of baths and the use of soap) Associated with the Occurrence of Tinea Capitis among All the Participants(Yemisi O. Adesiji study)

Frequency of Baths, and Use of Bath Soaps

Three-quarters of the children (n = 172, 75%) reported taking one bath a day. Tinea capitis affected more than half of those who bathed every day. The study discovered a significant connection between tinea capitis and showering frequency; students who took more baths per day were less likely to be infected (p 0.00). Many students (59) said that they have used soap in their showers. Almost all of those who did not use soap on a daily basis (99 percent) had tinea capitis. Tinea capitis was found to be strongly associated with a lack of use of bath soaps. p 0.001 for 2 = 10.804, df = 1.

How often school uniform is changed n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
Daily	4 (100)	0 (0)	4 (2)
Once every week	52 (39)	82 (61)	134 (58)
Twice every week	63 (73)	23 (27)	86 (37)
More than twice weekly	6 (100)	0 (0)	6 (3)
Note. $\chi^2 = 33.383$, df = 3. * $p < 0.001$			
Playing habit n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
Play with animals	35 (34)	67 (66)	102 (44)
Play with sand	90 (70)	38 (30)	128 (56)
Note. $\chi^2 = 29.649$, df = 1. * $p < 0.001$			

Table 3 Risk Factors (how of change uniform and palying habits) Associated with the Occurrence of Tinea Capitis among All the Participants(Yemisi O. Adesiji study)

How Often School Uniforms Are Changed

The majority of participants (58%) claimed that they changed their uniform once a week. Another 37% reported that they change their uniforms twice a week. The infection was found to be strongly related to the frequency at which subjects changed their uniforms, 2 = 33.383, df = 3, p 0.001. Children who changed their uniforms only once a week were more likely to have tinea capitis than those who changed their uniforms twice a week; 23 (27 percent) versus 82 (61 percent), respectively.

Playing Habits

When asked if they preferred playing with animals or sand, more than half (56%) said they preferred sand. However, tinea capitis affected 66% of those who spent more time with animals. There was a strong correlation between the students' playing patterns and tinea capitis, 2 = 29.649, df = 1. * p 0.001. Those who interacted with animals were more likely to become infected.

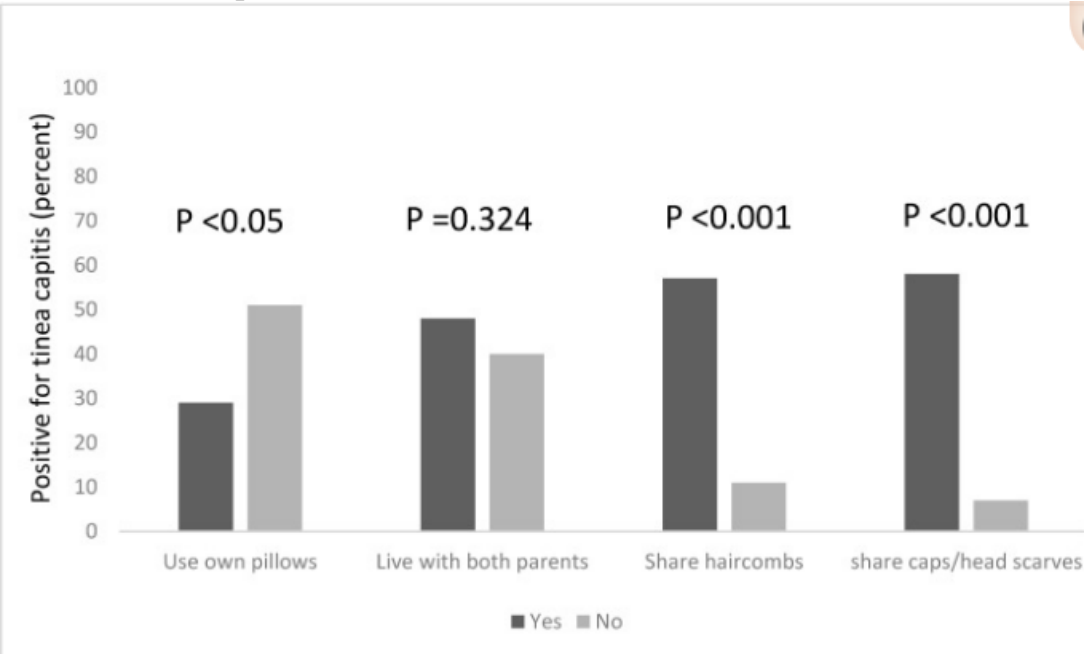
Age (years) n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
4–7	68 (51)	66 (49)	134 (58)
8–11	55 (62)	34 (38)	89 (39)
12–15	2 (29)	5 (71)	7 (3)
Note. $\chi^2 = 4.566$, df = 2. * $p < 0.001$			
Gender n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
Female	64 (58)	46 (42)	110 (48)
Male	61 (51)	59 (49)	120 (52)
Note. $\chi^2 = 1.249$, df = 1. * $p = 0.264$			
Socio-economic status n, (%)			
	Negative (row%)	Positive (row%)	Total (column%)
Low	120 (56)	94 (48)	214 (93)
Medium	5 (38)	8 (62)	13 (6)
High	0 (0)	3 (100)	3 (1)
Note. $\chi^2 = 5.151$, df = 2. * $p = 0.076$			

Table 4 Risk Factors Associated with the Occurrence of Tinea Capitis among All the Participants, Based on Socio-Demographic Characteristics.(Yemisi O. Adesiji study)

Hair Combs, Caps and Headscarves Sharing

Combs are known risk factors toward tinea capitis transmission, and this behavior is believed to promote tinea capitis transmission. More than half (57%) of the participants in this study who shared hair combs had the infection, compared to 11% of those who did not share but still had the infection. This was found to be statistically significant (p 0.001), 2 = 36.418, df = 1. Tinea capitis was also found

to be significantly correlated with the sharing of head wears such as caps and headscarves, 2 = 42.915, df = 1, p 0.001; among students who shared these clothing products with other children, 58 percent had tinea capitis, while 7 percent did not share caps and headscarves.



Risk factors associated with the occurrence of tinea capitis among the participants, based on the sharing of personal items and clothing.

Conclusions

This review's findings indicate a high prevalence of tinea capitis among children aged 4 to 15 years old. Tricophyton rubrum, Tricophyton mentagrophyte, and Microsporum canis were the most common dermatophytes found in schoolchildren. There was a substantial correlation between tinea capitis and the younger age group (4–7 years), some unsanitary lifestyle choices, and forms of tinea capitis. (M. Mayowa, 2015) There is also a high rate of infection among classmates who had pets, indicating that tinea capitis has a thriving animal–human transmission route in the study area. However, the study did not conduct a thorough investigation to validate the transmission path. A requirement for intensive national healthcare promotion and educational programs to facilitate hygiene practices among schoolchildren, including early identification and treatment of dermatophytosis. Teachers and school health care providers play an

important role in such services. (M. M. Sidat, 2007) It is important to facilitate regular veterinary examinations for pets and domesticated animals in order to identify and treat existing infections as soon as possible.

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