

Short Report**Tinea capitis: A preliminary study in diabetic and non-diabetic patients attending the dermatology clinic in a tertiary care hospital, Sri Lanka****TM Madushani, SF Shafnas, J Kottahachchi***Sri Lankan Journal of Infectious Diseases 2023 Vol.13(2):E45:1-6*DOI: <https://doi.org/10.4038/sljid.v13i2.8497>**Abstract**

Tinea capitis is a superficial fungal infection of the scalp caused by *Trichophyton* and *Microsporum* species. It presents as one or more rounded scaly patches of the scalp which expand, forming typical lesions with brittle or fragile hair. The study was conducted to detect the proportion of patients with tinea capitis, compare tinea capitis in diabetic and non-diabetic patients and identify any associated factors.

A descriptive cross-sectional study was carried out enrolling diabetic and non-diabetic patients who attended the dermatology clinic in Colombo South Teaching Hospital, Sri Lanka from January to June 2021. Skin samples from infected sites were processed for direct microscopy and culture, followed by examination of a tease mount and slide culture to identify the microorganisms. Of the 112 (56 diabetic and 56 non-diabetic) patients attending the clinic, fungal growth was observed in 9 (8.0%), of which 5 (55.6%) were dermatophytes with 3 of the 5 identifying as *Trichophyton* sp and *Trichophyton verrucosum*. Diabetic patients were more prone to infection when compared with non-diabetic patients ($P=0.022$). Sharing combs, association with overcrowded places and less frequency of bathing were risk factors for tinea capitis.

Keywords: *Tinea capitis, Diabetes mellitus, Trichophyton verrucosum*

Introduction

Tinea capitis is a superficial fungal infection of the scalp, hair, hair follicles and adjacent skin caused by dermatophytes, mainly by *Trichophyton* and *Microsporum* species.^{1,2} The infection typically presents as one or more rounded scaly patches of skin, where the hair has broken off at the scalp. Patches slowly expand, forming reddened or gray areas of affected skin and causing brittle or fragile hair that can be easily pulled out.³

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The severe inflammatory form of tinea capitis is kerion. There is a hypersensitivity reaction to the causative dermatophyte leading to a purulent and abscess like boggy mass. Pain, scaling, alopecia, and regional lymphadenopathy are associated with kerion.⁴ *Microsporum canis*, *Trichophyton mentagrophytes*, *Trichophyton verrucosum* and *Trichophyton tonsurans* are the most common fungi found in kerion.⁵

Diabetic patients have been identified as a vulnerable group for dermatophytic skin infections.⁶ Anaemic and immunosuppressed patients, extremes of age, overcrowding, attending hairdressing salons, use of shared combs, ethnicity, and exposure to pets such as cats or dogs are specified as risk factors for tinea capitis.^{3,7}

Dermatophytosis in society is reduced with increased awareness of precautionary measures in improvement of personal hygiene.⁶

Method

A descriptive cross-sectional study was conducted from January to June 2021. A total of 112 patients with other dermatological conditions who attended the dermatology clinic of Colombo South Teaching Hospital, Sri Lanka were enrolled, of whom 56 were known diabetics. Two samples were collected from an affected area of the scalp of each patient using a sterile cotton swab for direct microscopy and culture. Patient data was collected using a validated interviewer administered questionnaire.

A KOH mount was prepared using one swab and examined for fungi by direct microscopy. The other swab was inoculated on a Sabouraud dextrose agar plate and incubated at 26 °C and observed daily for 1-2 weeks. A tease mount was performed on positive cultures and examined microscopically to detect fungal hyphae, microconidia, and macroconidia. Slide culture was performed for all positive cultures to determine fungal morphology.

Data analysis was performed using Minitab version 16. Chi-square test and t-test were applied to detect associated factors and comparison of two groups. $P < 0.05$ was considered statistically significant.

Results

Table 1: Tinea capitis among the study population

	Frequency	Percent
Positive	5	4.5
Negative	103	92.0
Other organisms	4	3.6
Total	112	100.0

Of the 112 patients, 9 participants (8.0%) had positive fungal cultures. Five of the 9 patients with positive cultures (4.5%) had tinea capitis and were diabetic. The other 4 (3.6%) had fungal scalp infections other than tinea capitis. Fungal cultures were negative in the remaining patients (92.0%).

There were 6 (66.7%) male patients and 3 (33.3%) female patients who had a fungal infection. Among these patients 4 males and 1 female had tinea capitis.

Table 2: Isolated fungal species

Fungal growths	No of samples	%
<i>Trichophyton verrucosum</i>	3	33.3
<i>Trichophyton schoenleinii</i>	1	11.1
<i>Trichophyton yaoundei</i>	1	11.1
<i>Cladophialophora carrionii</i>	1	11.1
<i>Cryptococcus albidus</i>	1	11.1
<i>Phialophora verrucose</i>	1	11.1
<i>Acrophialophora fusipora</i>	1	11.1

Trichophyton verrucosum was the most common fungal isolate among the positive cultures. For the rest, only one case for each fungal isolate was recorded as shown in Table 2.

Diabetes, association with overcrowded places, sharing combs and lower frequency of having baths were significantly associated with tinea capitis ($P < 0.05$) as shown in Tables 3-6.

Table 3: Tinea capitis in diabetic and non-diabetic patients

Diabetic status	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Diabetic patients	5	8.9	51	91.1	56	50	0.022
Non-diabetic patients	0	00	56	50	56	50	
Total	5	4.5	107	95.5	112	100	

As shown in Table 3, the five patients with tinea capitis were diabetic.

Types of living/working place of the participants were recorded in order to identify the risk factors of tinea capitis as shown in Tables 4-9. There was a significant association of living in overcrowded accommodation, sharing of combs and frequency of bathing in the patient group studied (Tables 4-6).

Table 4: Association with overcrowded places

Overcrowded places	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Yes	4	14.8	23	85.2	27	24.1	0.003
No	1	1.2	84	98.8	85	75.9	
Total	5	4.5	107	95.5	112	100	

Table 5: Sharing combs by patients with tinea capitis

Share combs	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Yes	4	26.7	11	73.3	15	13.4	0.000
No	1	1.0	96	99.00	97	86.6	
Total	5	4.5	107	95.5	112	100	

Table 6: Association of frequency of baths with tinea capitis

Frequency of bath	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Twice a week	3	50	3	50	6	5.4	0.000
Thrice a week	1	2.3	42	97.7	43	38.4	
4 times a week	0	00	32	100	32	28.6	
5 times a week	1	9.1	10	90.9	11	9.8	
6 times a week	0	00	2	100	2	1.8	
Daily	0	00	18	100	18	16.1	

Rearing pets, exfoliating skin conditions, usage of shampoo over soap and frequent application of hair oil were not significantly associated with tinea capitis ($P > 0.05$) as shown in Tables 7-9. More patients claimed they used soap while bathing with only 38 patients were recorded as shampoo users. Shampoo users are less likely to have tinea capitis. As shown in Table 9, 3 of 14 participants who claimed to have never applied oil on their hair and one patient who claimed to be a daily hair oil user had tinea capitis.

Table 7: Association with pets

Having pets	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Yes	4	4.8	79	95.2	83	74.1	0.758
No	1	3.5	28	96.6	29	25.9	
Total	5	4.5	107	95.5	112	100	

Table 8: Use of soap and shampoo

Use of soap/shampoo	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Soap	4	5.4	70	94.6	74	66.1	0.501
Shampoo	1	2.6	37	97.4	38	33.9	
Total	5	4.5	107	95.5	112	100	

Table 9: Frequency of applying hair oil

Frequency of applying hair oil	Tinea capitis				Total		P value
	Positive		Negative				
	n	%	n	%	n	%	
Daily	1	2.8	35	97.2	36	32.1	0.051
Twice a week	0	00.00	8	100	8	7.1	
Thrice a week	1	2.2	44	97.8	45	40.2	
4 times a week	0	00.00	7	100	7	6.3	
5 times a week	0	00.	2	100	2	1.79	
Never	3	21.4	11	78.6	14	12.5	
Total	5	4.5	107	95.5	112	100	

Discussion

Tinea capitis is one of the highly contagious fungal infections affecting scalp, hair, and hair follicles.^{1,7} In this study, *T. verrucosum* was isolated as the most common causative organism, similar to previous studies.^{8,9} However, causative organisms can be diverse in different geographical areas.

Four of the 50 diabetic patients with tinea capitis had a fungal infection unlike the non-diabetic patients ($p=0.022$). There was a significant gender difference ($P= 0.026$) with 4 of the 5 patients with tinea capitis being males. Association between overcrowded places was identified as the risk factor for tinea capitis in the study ($P= 0.003$) similar to previous studies.¹⁰ There is a significant association between sharing combs and tinea capitis ($P= 0.000$). Previous studies have shown that sharing caps and headscarves are also risk factors.⁷ As clothing/combs are potential vehicles for transmission of the fungus, they should be limited to personal use.

A previous study shows that children who bathed daily had a lower risk of having tinea capitis.⁷ In this study, reduced frequency of bathing was significantly associated with tinea capitis ($P= 0.000$), showing that maintenance of good scalp hygiene prevents acquisition of the infection. The majority of patients with tinea capitis had pets. Although children who play with animals such as dogs and cats are reported to be positive for tinea capitis⁷ this study did not show a significant difference. This could be due to limited numbers in the present study.

There is contrasting evidence from different studies on the association between frequency of applying hair oil and tinea capitis. Development of tinea capitis was not associated with the frequency of application of hair oil in the present study.

Well educated people have awareness about the fungal diseases. Similarly, lack of knowledge about fungal infections could contribute to endemic nature of scalp ringworm.¹⁰ It is important to educate the public in order to reduce the prevalence of fungal infections such as tinea capitis. In addition, people who are prone to tinea capitis should be identified and informed on risk factors to avoid the perpetuation of the infection.

Conclusion

The present study shows an incidence of 4.5% patients who were positive for tinea capitis. There was an increased prevalence of tinea capitis in diabetic patients as compared with non-diabetic patients. *T. verrucosum* was identified as the most frequent dermatophyte isolated followed by *T. schoenleinii* and *T. yaoundei*. Sharing combs, association with overcrowded places and lesser frequency of having baths were identified as risk factors for tinea capitis.

Limitations of the study: The number of patients in the study with tinea capitis and low number of fungal isolates is a limitation of this study.

Declarations

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