Original Article

Clinical Patterns of Superficial Fungal Infections in Children Attending Outpatient Department of a Tertiary Hospital in Bangladesh

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ABSTRACT

Superficial fungal infections (SFIs) are common skin infections worldwide. These infections significantly affect the health and well-being of children, particularly in a developing country like Bangladesh. Therefore, there is need to provide up-to-date information on this disease for evidence based effective interventions. The aim of the present study was to determine clinical patterns of superficial fungal infections in children attending the outpatient department of Dermatology and Venereology of Mugda Medical College Hospital, Dhaka, Bangladesh. This cross-sectional, descriptive study was conducted from January to June of 2024. A total of 385 children aged ≤18 years with superficial fungal infections were included in this study. Demographic data, medical history and systemic disease were documented. 10% potassium hydroxide microscopy and Wood's lamp examination were done when necessary. The groin was the most frequently affected site (41.8%), followed abdomen (24.9%), limbs (23.4%) and face (22.1%). Tinea corporis is the most prevalent type of superficial fungal infections (57.7%), followed by tinea cruris (42.9%), tinea faciei (20.5%), and tinea capitis (16.6%). Tinea capitis, tinea faciei, and cutaneous candidiasis were more prevalent in 0-6 years age group, while tinea corporis, and tinea cruris were more prevalent in 13-18 years age group; the differences were statistically significant (P<0.05). Tinea capitis and pityriasis versicolor were found significantly prevalent in males in comparison to females (P<0.05).

Keywords: *Superficial fungal infection, children*

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INTRODUCTION

Superficial fungal infections (SFIs) are caused by dermatophytes belonging to the microsporum, trichophyton, and epidermophyton.[1] Dermatophytes grow on keratin, which is found in the skin, hair, and nail. The continuous movement of people and the significant influx of tourists are thought to influence the changing patterns of disease.[2,3] Tinea infections are named based on the Latin term that indicates the specific anatomic site of infection, for example, tinea capitis (scalp), tinea corporis (body), tinea manuum (hand), tinea cruris (groin), tinea pedis (foot), and tinea unguium (nail).

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It is currently estimated that fungal infections affecting the skin, nail, and hair impact approximately 20%–25% of the world's population[3]. This makes it one of the most common illnesses in dermatological outpatient department (OPD). It is a significant public health issue in school-age children, particularly in low- to middle-income countries. There has been an increase in infections among children in recent decades[4]. What was once a common infection is now a global pandemic. Around 7-15% of pediatric clinical cases are associated with SFI[5], which includes various superficial fungal infections like dermatophytes (e.g., tinea capitis, tinea faciei, tinea corporis, tinea unguium, tinea manum, and tinea pedis) and non-dermatophytes such as pityriasis versicolor, cutaneous candidiasis, tinea nigra, black piedra, and white piedra.[6] Tinea capitis stands out as the most prevalent superficial fungal infection among elementary school kids.[3] Research suggests that the prevalence and underlying factors of a specific condition can vary with time, influenced by factors like age, gender, location, hygiene and humidity level.[7] Hence, it is essential not only to determine the occurrence of SFIs but also to analyze its distribution based on socio-demographic factors and the responsible organisms. Despite limited research on pediatric SFI, this study seeks to evaluate the current prevalence and clinical attributes of SFIs in Bangladesh by examining patients at the outpatient department (OPD) of the Department of Dermatology and Venereology, Mugda Medical College Hospital in Dhaka, Bangladesh.

METHODS

This cross-sectional, descriptive study was conducted at the outpatient department of the Department of Dermatology and Venereology, Mugda Medical College Hospital, Dhaka, Bangladesh, which is a tertiary level hospital in the country. The study was conducted between January and June of 2024. A total of 385 children with superficial fungal infections attending the outpatient department included in this study. A thorough physical examination, conducted in a well-lit room with minimal clothing, was performed from head to toe to detect any superficial fungal infections in the presence of an attendance or guardian to ensure privacy. Demographic information, medical history and systemic diseases such as asthma, allergy, chronic infection, liver dysfunction, renal disease, epilepsy, etc, of the participants were documented. Skin scrapings (scales and crusts), hair pluck, and nail clippings were collected for 10% potassium hydroxide microscopic examination and Wood's light examination were done to aid our diagnosis. The findings from the laboratory tests were duly noted. Data entry was done, and analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 22.0. P-value <0.05 was considered statistically significant.

The study was approved by the Institutional Review Board (IRB) of Mugda Medical College, Dhaka, Bangladesh.

RESULTS

The largest of patients were within the age range of 0-6 years. The average age of the patients was 8.89±5.85 years. Females were more affected than males. The proportion of children attending school was 56.9%, while 13.8% were enrolled in Madrasa. The remaining 29.4% were not participating in any formal educational institution. A majority of the study participants (57.1%) came from low socioeconomic backgrounds. Socio-economic status was determined using parent's occupation and highest educational attainment as described by Oyedeji[8]. The majority of the study participants had a medium-sized family, often consisting of 4 to 6 members[9] (Table-I). 76.9% of the study subjects reported bathing daily, while 71.4% reported washing their clothes daily and 26.5% reported touching animals/birds (cat, dog, duck, pigeon). In terms of clothing, 47.0% reported frequently wearing synthetic clothes, while 53.0% reported not wearing them frequently. Furthermore, 49.4% reported using sweaty clothes or socks for a prolonged period. The mean frequency of hand washing among the subjects was 6.54±2.66 times per day (Table-II). The most prevalent type of superficial fungal infection (SFI) was Tinea corporis, accounting for 57.7% of cases, followed by tinea cruris at 42.9%, tinea faciei at 20.5%, and tinea capitis at 16.6%. Multiple infections were seen in some patients for which percentage of clinical pattern of SFIs was more than 100 (Table-III). Tinea capitis, tinea faciei, and cutaneous candidiasis were more prevalent in 0-6 years age group, while tinea corporis, and tinea cruris were more prevalent in 13-18 years age group; the differences were statistically significant (P<0.05) (Table-IV). Tinea capitis and pityriasis versicolor were found significantly prevalent in males in comparison to females (P<0.05) (Table-V).

Table I: *Demographic profile of the study subjects (N=385)*

	Frequency	Percentage
Age (years)		
0 – 6	149	38.7
7 – 12	103	26.8
13 - 18	133	34.5
Mean ± SD	8.89 ± 5.85	
Min – max	0.08 - 18	
Sex		
Male	174	45.2
Female	211	54.8
Type of education		
Not attending school	113	29.4
School	219	56.9
Madrasa	53	13.8
Socio-economic status		
Upper class	4	1.0
Middle class	161	41.8
Lower class	220	57.1
Size of family		
Large (>7)	38	9.9
Medium (4-6)	299	77.7
Small (≤3)	48	12.5

Table-II: *Hygiene related baseline characteristics of the study subjects (N=385)*

Variables	Frequency	Percentage
Bathing (daily)	296	76.9
Washing cloths (daily)	275	71.4
Touching animals	102	26.5
Synthetic cloths wearing		
Frequently	181	47.0
Not frequently	204	53.0
Use sweaty cloths or socks for prolonged period	190	49.4
Frequency of daily hand wash (Mean ± SD)	6.54 ± 2.66	

Table-III: *Clinical pattern of superficial fungal infections (SFIs) (N=385)*

SFIs	Frequency	Percentage
Tinea capitis	64	16.6
Tinea corporis	222	57.7
Tinea unguium	2	0.5
Tinea faciei	79	20.5
Pityriasis versicolor	10	2.6
Cutaneous candidiasis (oral, genital, intertrigo)	14	3.6
Tinea cruris	165	42.9
Tinea manum	19	4.9
Tinea pedis	8	2.1

Table-IV: *Age distribution of clinical pattern of superficial fungal infections (SFIs) (N=385)*

Clinical pattern of SFIs	Age group (in years)			P-value
	0 - 6	7 - 12	13 - 18	
Tinea capitis	47 (73.4)	16 (25.0)	1 (1.6)	0.001
Tinea corporis	67 (30.2)	51 (23.0)	104 (46.8)	0.001
Tinea unguium	0 (0.0)	0 (0.0)	2 (100.0)	0.114
Tinea faciei	39 (49.4)	26 (32.9)	14 (17.7)	0.002
Pityriasis versicolor	2 (20.0)	4 (40.0)	4 (40.0)	0.430
Cutaneous candidiasis	12 (85.7)	2 (14.3)	0 (0.0)	0.001
Tinea cruris	40 (24.2)	26 (15.8)	99 (60.0)	0.001
Tinea manum	5 (26.3)	4 (21.1)	10 (52.6)	0.231
Tinea pedis	4 (36.4)	4 (36.4)	3 (27.3)	0.748

To reach the P-value, Chi-Square test was done.

Table-V: *Sex distribution of clinical pattern of superficial fungal infections (SFIs) (N=385)*

Clinical pattern of SFIs	Total	Sex		P-value
		Male	Female	
Tinea capitis	64	41 (64.1)	23 (35.9)	0.001
Tinea corporis	222	94 (42.3)	128 (57.7)	0.189
Tinea unguium	2	2 (100.0)	0 (0.0)	0.204
Tinea faciei	79	36 (45.6)	43 (54.4)	0.940
Pityriasis versicolor	10	8 (80.0)	2 (20.0)	0.048
Cutaneous candidiasis	14	6 (42.9)	8 (57.1)	0.858
Tinea cruris	165	70 (42.4)	95 (57.6)	0.344
Tinea manum	19	5 (26.3)	14 (73.7)	0.090
Tinea pedis	8	8 (72.7)	3 (27.3)	0.072

To reach the P-value, Chi-square tests were done.

DISCUSSION

The majority of infections were observed in children aged 0-6 years (38.7%), followed by those aged 13-18 years (34.5%), and those aged 7-12 years (26.8%) in our study. A study conducted by Saraswat et al.[10] found that 41.2% of the participants were between the ages of 7 and 10, 30.0% were between the ages of 3 and 6, and 29.0% were between the ages of 11 and 14. Another study conducted by Ezomike et al.[11] found that the highest proportion of infected children fell within the age group of 9 to 12 years (60.7%), followed by 5 to 8 years (35.9%), and 13 to 15 years (8.3%). Presence of superficial fungal infection in younger age group observed in this study supports the suggestion that infection is related to poor hygiene at the younger age and absence of saturated fatty acids that provide a natural protective mechanism against fungal infection.[12] In our study, females were more predominant than males, similar female predominance was observed in the study done by Fattah et al.[13]; however, in the study conducted by Akbas et al.[14] reported that males were more predominant than females. Similarly, the study conducted by Saraswat et al.[10] found a higher proportion of males infected. Our observation suggests that wearing whole body covering clothes for prolonged period, not washing them regularly and frequent wearing of synthetic clothes predispose fungal infections especially in females. The percentage of children attending school was 56.9%, while the percentage of children attending madrasa was 13.8%. The remaining 29.4% of children were not attending any formal educational institutions. A majority of the study participants (57.1%) came from low socioeconomic backgrounds. Similar findings were observed in the study done by Karmakar et al.[15] The majority of the study participants had a medium-sized family, often consisting of 4 to 6 members. The person-to-room ratio in the majority of SFI households was from two to three individuals per room.[15] In this study, we found families with low socio-economic class can less likely to afford materials for personal hygiene as well as cleaner and less crowded home or school environments that facilitate spread of SFIs.

76.9% of the study subjects reported washing their bodies daily, while 71.4% reported washing their clothes daily. Additionally, 34.3% of the subjects reported walking barefoot, and 26.5% reported touching animals. In terms of clothing, 47.0% reported frequently wearing synthetic clothes, while 53.0% reported not wearing them frequently. Furthermore, 49.4% reported using sweaty clothes or socks for a prolonged period. The mean frequency of hand washing among the subjects was 6.54±2.66 times per day. Poor hygiene and sweating were found to be statistically significant in fungal cases detected by both 10% potassium hydroxide microscopy and culture.[16] One of the important causes of SFIs was wearing sweaty clothes.[15] Synthetic clothes and wearing shoes more than 8 hours were the risk factor of SFIs.[13] Poor personal hygiene, touched animals more often and washed hands less frequently favour the transmission of SFIs.

In our study, the most prevalent type of superficial fungal infections (SFIs) was tinea corporis (57.7%),

followed by tinea cruris (42.9%), tinea faciei (20.5%), and tinea capitis (16.6%). The pattern distribution in our study can be associated with the closed and humid areas of the body in children, lacking proper personal hygiene. In the study done by Akbas et al.[14], common SFIs were found as follows: tinea corporis (26.3%), pityriasis versicolor (19.1%), candidiasis (16.6%), tinea capitis (13.9%), onychomycosis (11.2%) and tinea inguinalis (9.1%). Oke et al.[17] found that most common of the SFIs was tinea capitis (76.8%). Dash et al. [18] found that the most prevalent type was tinea corporis i.e., 36.8% in west Bengal, India, while Lakshmanan et al.[19] reported 78% in rural area of Tamil Nadu, India.

CONCLUSION

Tinea corporis accounting for 57.7% of cases is the most prevalent superficial fungal infection found in children in our study. This small-scale study will show ways to larger studies at multiple centers, which will have a big impact on public health in Bangladesh. School children, their parents and teachers should regularly learn about fungal infections, how they spread and the problem they cause. Teaching about health and good personal hygiene can help reduce the number of fungal infections in Bangladesh.

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