



Superficial Mycoses in Relation to Age and Gender

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Authors' contributions

This work was carried out in collaboration between both authors. Author OAO conceived and designed the study, analyzed the data and wrote the first draft of the manuscript. Author SOO contributed to the writing of the manuscript and analyzed the data. Authors OAO and SOO agree with manuscript results and conclusions and jointly developed the structure and arguments for the paper. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: To determine the type of superficial fungi infections of the skin affecting different ages and gender at a dermatology clinic in a developing country.

Study Design: A descriptive cross-sectional study.

Place and Duration of Study: Dermatology Clinics of Obafemi Awolowo University Teaching Hospitals' Complex, (OAUTHC), Ile-Ife, Osun State, Nigeria between October 2009 and September 2012.

Methodology: Demographic information, history and clinical examination of consecutive patients with fungi infections of the skin were documented. The diagnoses were mainly clinical, and necessary laboratory procedures were performed for confirmation. Statistical analysis was done using SPSS 16 and odds ratio with 95% confidence interval obtained using WINPEPI version 11.

Results: The total number of new cases of dermatoses presenting during the study period were 1454, from few weeks to 90 years of age, and 55% were females. Patients affected constituted

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39.5%. Superficial fungi infections found were Dermatophytes (13.1%), Pityriasis versicolor (4.3%), and Candidiasis (2.1%). Children had more infections than adults ($P = 0.000$; $OR = 9.31$; 95% C.I. = 6.93; 12.50). The most common type was tinea capitis (children), pityriasis versicolor (adults), tinea unguium (females), and tinea cruris (males). Dermatophytic infections and candidiasis were significantly associated with childhood and female gender respectively.

Conclusion: Superficial fungi diseases are the most common dermatoses presenting to dermatologists in Nigeria and affect different ages and both gender invariably. Tinea capitis occurred predominantly in children, and pityriasis versicolor, tinea unguium and tinea cruris in adults, females and males respectively. Adequate control will lead to drastic fall in the number of skin problems confronting the general populace.

Keywords: Superficial fungi; skin infections; dermatoses; childhood infections.

1. INTRODUCTION

Skin conditions affecting the Nigeria populace are mostly infective skin diseases [1-3]. Majority of these infections are fungal diseases [4,5]. Superficial fungi skin infections are fungal diseases affecting primarily, the skin, the mucous membranes (oropharyngeal, esophageal, vulvovaginal and urethral), nails, and hair [6,7,8]. They have been found to be prevalent and account for most of the skin diseases in schools, prisons, community and among patients presenting to the hospitals [9-14]. The superficial fungi infections mainly consist of dermatophyte infections caused by Trichophyton species, Epidermophyton species and Microsporum species, candidiasis due to Candida albicans, glabrata etc, and pityriasis versicolor due to Malassezia furfur [15].

Superficial fungi infections still need to be addressed as a public health problem among the growing populace of Nigeria. The favorable environment of hot and humid climate, poverty, poor sanitary conditions and overcrowding are well known factors that favor these fungi growth. These conditions well abound in Nigeria. The aim of the study was to determine the superficial fungi infections presenting in a specialist hospital setting. The objectives are 1) to find out the types of superficial fungi infections predominant here and 2) assess the relationship of these infections with age and gender.

2. METHODOLOGY

2.1 Study Design and Setting

A prospective and descriptive cross-sectional study of consecutive patients referred to the Dermatology and Venereology Clinics of Obafemi Awolowo University Teaching Hospitals'

Complex, Ile-Ife, Osun State was done from October 2009 to September.

2.2 Patients and Methods

Information on age, gender, residential address, and presenting complaints were recorded. A thorough physical examination of the patient and the skin presentations was done in broad daylight. The diagnoses were mainly clinical, and where necessary laboratory procedures were performed for confirmation using skin scrapping with 10-20% KOH solution and culture in Sabouraud Dextrose Agar with chloramphenicol. All consenting patients with history and clinical presentations of lesions suggestive of superficial fungi infections were eligible for inclusion. Excluded from the study are those without clear clinical and / or laboratory diagnosis.

Data was analyzed with Statistical Package for Social Sciences Statistics version 16.0 (SPSS Inc. Released 2007. SPSS for Windows Version 16.0, Chicago, SPSS Inc.) (SPSS) was used to obtain percentage frequencies, and cross-tabulation for data presentation. Fishers exact test (with a P value < 0.05 taken as statistically significant), odds ratio (OR), and confidence interval (CI) were performed using WINPEPI version 11.15 [16] to determine relationship of these infections to age and gender.

3. RESULTS AND DISCUSSION

Adults and children were 1013 and 367 respectively giving a total of 1380 patients studied with ages ranging from 2 weeks to 90 years. Males were 637 and females 743. There were 273 (19.8%) patients with superficial fungi infections of the skin. Of those affected 65.6% were adults and 34.4% were children while 45.6% of the infections occurred in males and 54.4% in females (Table 1).

The superficial fungi infections found comprises of 3 major groups- dermatophytes, pityriasis versicolor, and candidiasis (intertrigo and paronychia). Dermatophytic infections were the most common affecting 13.4% of studied population. Pityriasis versicolor and candidiasis were found in 4.2 and 2.2% respectively. Among infected patients, 67.8% had dermatophytic infections while 21.2% had pityriasis versicolor and 11.0% had candidiasis (Fig. 1).

Dermatophytes constituted the majority of infections in both adults and children (Table 1).

The most common type in children was tinea capitis followed by tinea corporis, and then tinea unguium. In adults, the predominant type was tinea corporis, then tinea pedis, and tinea unguium. Tinea capitis was significantly associated with childhood (Table 2). Tinea unguium was very common in both adult and children. There was a significant association of pityriasis versicolor with adulthood. Although candidiasis was more in adults, there was no significant difference in both children and adults.

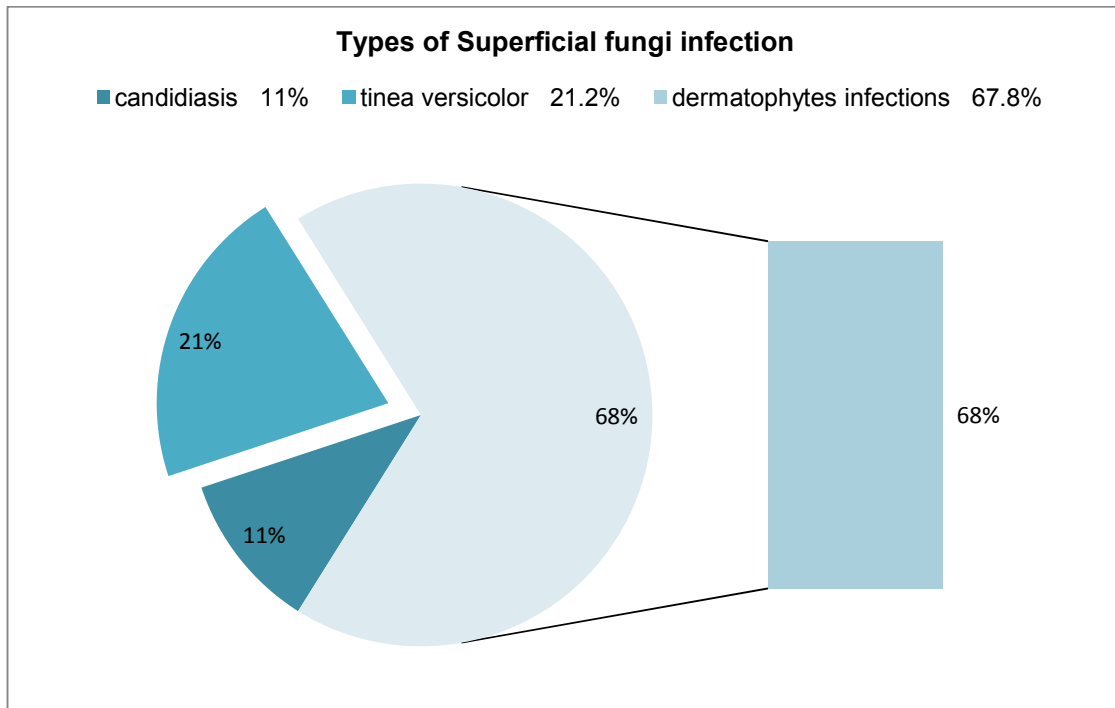


Fig. 1. Percentage distribution of superficial fungi infections

Table 1. Superficial fungi infections according to age and gender

Superficial fungi infections	Children		Adult		Total	% of total fungi (273)	% in 1,380 patients
	Males	Females	Males	Females			
Candidiasis	3	5	7	15	30	11.0	2.2
Tinea versicolor	2	6	24	26	58	21.2	4.2
Tinea capitis	19	11	2	0	32	11.7	2.3
Tinea corporis	15	8	18	25	66	24.2	4.8
Tinea cruris	4	0	4	1	9	3.3	0.7
Tinea faciae	0	1	1	1	3	1.1	0.2
Tinea manuum	1	0	2	3	6	2.2	0.4
Tinea pedis	3	4	11	17	35	12.8	2.5
Tinea unguium	1	11	8	14	34	12.5	2.5
Total	48	46	77	102	273	100%	19.8%

Table 2. Odds ratio of superficial fungi infections by age and gender

Superficial fungi infections	Gender		Odds ratio
	Males	Females	
Candidiasis	10	20	P = .11; OR = 0.58; 95% C.I. = 0.27; 1.24
Tinea versicolor	26	32	P = .47; OR = 0.95; 95% C.I. = 0.56; 1.60
Tinea capitis	21	11	P = .02; OR = 2.27; 95% C.I. = 1.09; 4.74*
Tinea corporis	33	33	P = .30; OR = 1.18; 95% C.I. = 0.72; 1.93
Tinea cruris	8	1	P = .01; OR = 9.44; 95% C.I. = 1.18; 75.55*
Tinea faciae	1	2	P = .56; OR = 0.58; 95% C.I. = 0.05; 6.43
Tinea manuum	3	3	P = .58; OR = 1.17; 95% C.I. = 0.24; 5.80
Tinea pedis	14	21	P = .29; OR = 0.77; 95% C.I. = 0.39; 1.53
Tinea unguium	9	25	P = .01; OR = 0.41; 95% C.I. = 0.19; 0.89*
Total (273)	125(45.8%) 19.6% of all males	148(54.2%) 19.9% of all females	All males = 637; all females = 743; Total = 1,380 P = .47; OR = 0.98; 95% C.I. = 0.75; 1.28

Superficial fungi infections	Age		Odds ratio
	Children	Adults	
Candidiasis	8	22	P = .57; OR = 1.00; 95% C.I. = 0.44; 2.26
Tinea versicolor	8	50	P = .000; OR = 0.17; 95% C.I. = 0.08; 0.37*
Tinea capitis	30	2	P = .000; OR = 45.00; 95% C.I. = 10.71; 189.15*
Tinea corporis	23	43	P = .08; OR = 1.51; 95% C.I. = 0.90; 2.54
Tinea cruris	4	5	P = .20; OR = 2.22; 95% C.I. = 0.59; 8.31
Tinea faciae	1	2	P = .61; OR = 1.38; 95% C.I. = 0.13; 15.24
Tinea manuum	1	5	P = .20; OR = 2.22; 95% C.I. = 0.06; 4.72
Tinea pedis	7	28	P = .25; OR = 0.68; 95% C.I. = 0.30; 1.58
Tinea unguium	12	22	P = .17; OR = 1.55; 95% C.I. = 0.75; 3.11
Total (273)	94(34.4%) 25.6% of all children	179(65.6%) 17.7% of all adults	All children = 367; all adults = 1,013; Total = 1,380 P = .001; OR = 1.60; 95% C.I. = 1.21; 2.13

Candidiasis was found mostly in females though not significantly so. This was also found to be the same for pityriasis versicolor (Fig. 2). Tinea capitis and tinea cruris were significantly associated with the male gender, and tinea unguium with the female gender (Table 2). There was an equal preponderance of tinea corporis in both genders. Tinea faciae and manuum showed no relationship with gender.

4. DISCUSSION

Majority of skin diseases presenting to referral centers particularly dermatology centers are superficial fungal dermatoses [7,17,18]. In some centers where eczemas are the most common, fungi diseases are next in line [18]. Dermatophytes are most often the prevailing fungal diseases in many schools, hospital and community [18-23]. A similar result was obtained in this study.

The finding of pityriasis versicolor and candidiasis in sequence also corresponds to other tertiary hospital reports by Ogunbiyi et al. [21] and Onayemi et al. [22]. The prevalence of 13.4% was, however, much higher than the 4.5% found at Ibadan [21] which is a larger city in an adjoining South-western State. This may be because the study centre subserves many

surrounding rural places. The prevalence of 4.2% and 2.2% for Pityriasis versicolor and candidiasis respectively, were similar to the 4.5% and 1.9% reported by Ogunbiyi et al. at Ibadan. In the Northern Nigeria tertiary hospital study by Onayemi et al., prevalence of dermatophyte infection was 13.4% while Pityriasis versicolor and candidiasis were 6.7% and 4.5% respectively.

A higher percentage of the infections were found in adults than children. However, the proportion of children that had fungi infection was more than adults, and this was significant. This means that the infections were more associated with childhood (P= 0.001). In a study of schoolchildren by Amoran et al. [23], 83.7% of all skin disorders seen in 480 pupils were infective dermatoses with superficial fungal infections (dermatophytoses and pityriasis versicolor) constituting 74.1%. Ogunbiyi et al. [19] reported skin diseases in 35% of school children with 20.6% having fungi infections (dermatophytes-15.9%; pityriasis versicolor- 4.7%) that are mostly tinea capitis (14.5%). Odueko et al. [20] in a prevalence survey of 5001 Nigerian children aged 0-12 years at the Urban Comprehensive Health Centre, Ile-Ife, Nigeria revealed that 492 children (9.8%) had dermatological conditions with dermatophytic infections in 17.1%.

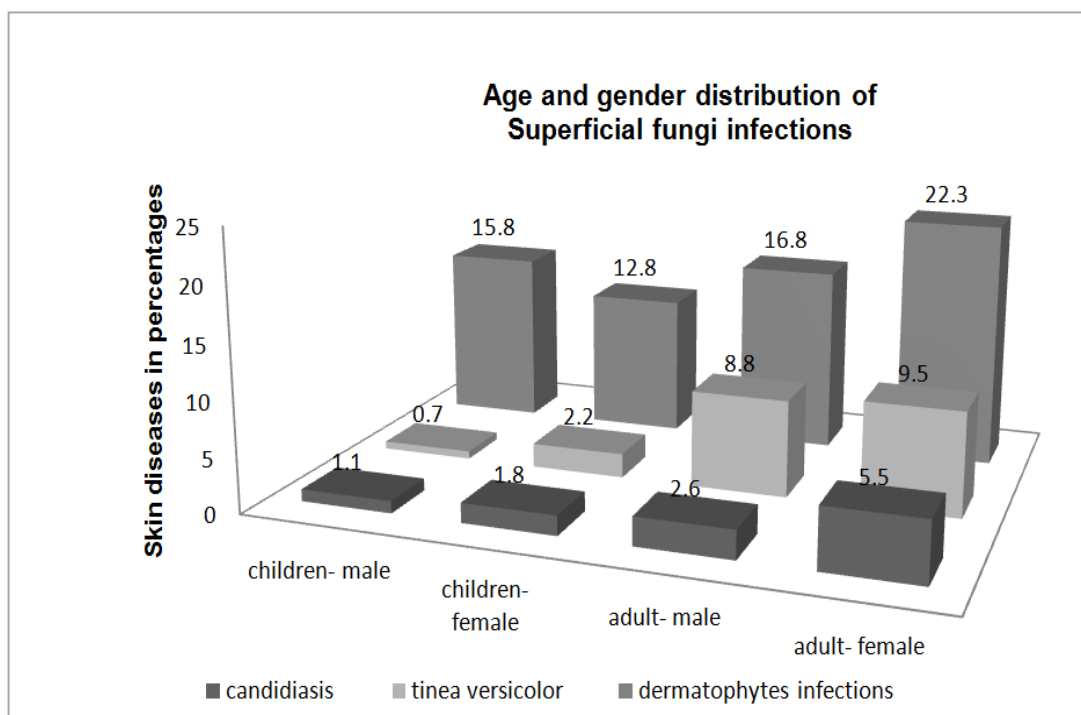


Fig. 2. Percentage distribution of superficial fungi infections according to age and gender

Tinea capitis was found mostly in children. This is similar to earlier reports of fungal studies in children [24-30]. Amoran et al. reported a prevalence of 16.5% in 480 children [23] while Ogunbiyi et al. found the infection in 14.5% of 375 children [19]. Enemuor et al. [28], also showed that scalp infection (85.4%) was more frequent than infection of the glabrous skin (14.6%). Nweze screened domestic animals for the presence of dermatophytes both clinically and mycologically. An incidence of 39.8% of dermatophytes was obtained in the 538 animals studied. The species found were those pathogenic to man [24]. Children often play with domestic animals and soil, and these could account for the higher prevalence of *T. capitis* in them. The age predilection of tinea capitis is thought to be due to the fungistatic properties of fatty acids in post-pubertal sebum.

The populations of female and male pupils in the study by Enemuor et al. were 969 and 1215, respectively. The respective prevalence rates of superficial mycoses were 1.5% and 10.6%. Comparison of the prevalence rates of females and males pupils showed a significantly higher ($P = 0.0005$) prevalence rate in male pupils [28]. A lower prevalent rates of *T. capitis* was found in girls than boys in this study. Other reports by Mirmirani et al. [27], Enemuor et al. [28] and Adefemi et al. [29] showed greater affectation of boys by dermatophyte infections, and most especially, tinea capitis. However, Anosike et al. [30] found that girls were affected more though this was not significant. The higher prevalence in male in this environment may be as a result of increased contact between boys during play, sharing of combs and cutting of hair at local barber shops, and possibly more contact with pets during play.

Tinea unguium was more common in adults than children and it was reported as uncommon in children [31]. In this study, it was associated significantly with the female gender. A study by Asadi et al. [32] also revealed the same finding. Females in this environment are predisposed as they are usually involved in house-keeping and cooking resulting in frequent immersion of hands in water which may not be properly dried.

Tinea cruris was more in the male gender and the difference was significant. It is a dermatophytoses that mainly occurs in males [33] affecting men (particularly young) three times more than women [34]. This may be the result of occlusive dressing caused by the male

clothing. It has become more common in post-pubertal females who are overweight or wear tight clothing such as pantyhose [31].

Most of the cases of Tinea pedis found occurred in adults, and in the male gender. There was no significant difference, however, in the prevalent rates of children and adults, and gender. Exposure to a moist environment provided by wearing of occlusive foot-wears and macerated skin predisposes to this infection. It has been observed to be less in communities that do not wear shoes.

Pityriasis versicolor was more prevalent in adults than children [35]. This was also observed in this study. More females than males were, however, affected among both adult and children in contrast to male predominance in the report by Jena et al. [36], Zarrin et al. [37], and Abdul-Hussein [38]. A survey in school children by Uneke et al. revealed a female preponderance [26]. Candidiasis was more in adults and in females. Candidiasis was more in girls than in boys. Altraide et al. [39] also found candida intertrigo/ paronychia to be more in adults and females. This could be a result of domestic work often performed by the female gender involving regular immersion of hands in water. If the hands are not properly dry, the wetness provides good culture medium for candida species particularly *Candida albicans*.

5. CONCLUSION

Superficial fungi infections are still very common in this environment affecting about 20% of the study population. They were significantly associated with childhood. Dermatophytic infections were the most predominant in all ages and gender. Tinea capitis and pityriasis versicolor were the most significant types in children and adults respectively. Tinea capitis and tinea cruris were more associated with male gender, and tinea unguium with the female gender.

ETHICAL APPROVAL

Ethical approval for the study was obtained from Obafemi Awolowo University Teaching Hospitals' Complex (OAUTHC), Ile-Ife, Osun State Ethical and Research Committee. The research was conducted as part of a larger study on the prevalence and pattern of skin diseases in OAUTHC. The study was done in compliance with the principles of the Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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PICTURES OF SUPERFICIAL FUNGI INFECTIONS

Picture 1



Tinea capitis



Tinea corporis



Tinea unguium



Tinea pedis with Tinea unguiu

Picture 2



Candida paronychia



Candida intertrigo (poorly treated) in a young child



Pityriasis versicolor



Tinea pedis with fissures and lichenification

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