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Prevalence of superficial mycoses in primary school children in Anyigba, Kogi State, Nigeria

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A total of 2184 primary school children were screened for superficial mycoses in Anyigba, a university town in Kogi State, Nigeria. Of the 2184 pupils sampled randomly from four schools, 144 (6.6%) had lesions suggestive of superficial mycoses. In a total of 155 samples collected, 108 (69.67%) yielded significant growth by culture. The distribution of superficial mycoses is dependent on age and sex. Eight species of fungi belonging to two genera were isolated, including: *Microsporum gypseum* (13.5%). *M canis* (12.4%), *M. ferrugineum* (3.4%), *Trichophyton rubrum* (30.3%), *T. tonsurans* (12.4%), *T. soudanense* (5.6%), *T. verrucosum* (11.2%) and *T. schoenleinii* (11.2%). Poor infrastructure (residential house and classrooms), contact with soil during outdoor activities (especially in children), intimate association with pet animals and poor personal hygiene may contribute to the spread of these infections among children.

Key words: Superficial mycoses, dermatophytosis, *Microsporum*, *Trichophyton,* Nigeria.

INTRODUCTION

Superficial fungal infections or superficial mycoses affect skin, hair and nails. On the skin and scalp, the lesions are often roughly circular with a raised border, but may coalesce to form confluent areas of dry, scaling skin, itching and scratching, which in severe cases may ulcerate. Superficial fungal infections include dermatophytosis, cutaneous candidiasis, pityriasis versicolor, tinea nigra, white piedra and black piedra.

Many epidemiological studies have investigated the prevalence of etiologic agents of superficial mycoses in different parts of the world (Ellabib and Khalifa, 2001; Staats and Korstanje, 1995; Ayadi et al., 1993; Anosike et al., 2005; Venugopal and Venugopal, 1993). Host susceptibility may be enhanced by moisture, warmth, specific skin chemistry, composition of sebum and perspiration, age, heavy exposure and genetic predisposition (Brooks et al., 2004). The incidence is higher in hot humid climates and crowded living conditions. Dermatophytosis is highly contagious and represents a significant public health problem in Nigeria and Africa at large, particularly among school children (Fathi and Al-Samaria, 2000; Omar, 2000; Higgins et al., 2000; Anosike et al., 2005). Although not life-threatening, superficial mycoses can be persistent and symptomatic, with millions of dollars spent annually in their treatment (Brooks et al., 2004).

A number of studies on the prevalence and etiological aspects of superficial mycoses have been carried out in different parts of Nigeria (Ogbonna et al., 1985; Anosike et al., 2005; Ive, 1996; Obasi and Clayton, 1989; Egere and Gugnani, 1980). Kogi State did not form part of these studies. There are no epidemiological data in the literature to ascertain the true prevalence of superficial mycoses in Anyigba, a university town in Dekina Local Government Area of Kogi State, Nigeria. The aim of the present study was to estimate the prevalence of these infections in children of school age who are more susceptible and exposed to these infections because of their play habits.

MATERIALS AND METHODS

Study area

Four mixed primary schools were randomly selected in Anyigba Town in Dekina Local Government Area of Kogi State, Nigeria for this study. Dekina local government area is situated in the north-eastern part of Kogi State and occupies the area lying between the coordinates 8^0 43' and 9^0 15'S and 6^0 06' and 7^0 45' W.

Sample survey

A total of 2184 school children randomly selected from four mixed

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primary schools in Anyigba town were screened for any infection on their skin, hair and nails, which may be suggestive of mycotic aetiology. In each clinically diagnosed case of superficial mycoses, a questionnaire was completed for the pupil by asking him/her the questions.

Sample collection

In all suspected cases of dermatophytoses and other superficial mycoses, the diseased area of the skin or head or nails were thoroughly cleaned with a methylated spirit swab. Then, skin scale was collected into white envelopes with the aid of a sterile razor blade. Affected hair and nail fragments were collected with the aid of a sterile scissors. All samples were labelled appropriately and transported to the laboratory within 4 h after sample collection for direct microscopic examination and culture.

Direct microscopic examination of specimens

A wet mount of each specimen was prepared in one or two drops of a 20% potassium hydroxide (KOH) solution on a clean slide. The specimen was placed on a drop of 20% KOH by using a sterile forceps. This allowed the clearing of keratin surrounding the fungi so that the hyphae and arthrospores could be seen. A cover slip was placed on the slide and it was then viewed under the microscope. In the case of hair specimens, presence of hyphae, anthrospore or conidia were looked for to evaluate for either ectothrix or endothrix infection.

Culture method

Samples were cultured in test tube slants or Malt Extract Agar (MEA) plates containing 0.05 mg/ml of chloramphenicol for primary isolation of the fungi. Inoculation was done by using a sterile wire loop or forceps to transfer the specimen onto the surface of the agar slants or plates. Then, the cultures were incubated at room temperature for 1 – 3 weeks and regularly checked for growth. The growth was sub-cultured on Sabouraud Dextrose Agar (SDA) containing 0.05 mg/ml of chloramphenicol and 0.5 mg/ml of cycloheximide. The plates were incubated at room temperature for 1 – 3 weeks.

Identification of isolates

The cultural characteristics of the isolates were noted, including: the colour of the colonies, the texture, whether fluffy, powdery, cottony or floccose, buff, whether the hyphae is radiating at the margins or whether their colony were folded. The reverse appearance of the colonies was also noted. The microscopic characteristics of their hyphae were also noted. A small portion of the culture was transferred to a drop of ethanol on a clean slide with the aid of a sterile needle and a drop of lactophenol cotton blue was added after the ethanol had evaporated. The slide was then covered with a cover slip and viewed under the microscope. The cultural features observed were compared with those contained in the Fungal Colour Atlas (Wolf et al., 1975; Evans and Richardson, 1989; Baron et al., 2003).

Statistical analysis

The results obtained in this study are presented using descriptive statistics. In order to establish association or absence thereof of gender and age group with prevalence rates of mycoses among the pupils, the chi square statistical test was used at a 5% level of significance. SPSS 16.0 for windows was used for the statistical analyses.

RESULTS

Of the 2184 pupils examined, only 144 (6.6%) presented with lesions suggestive of superficial mycosis by direct microscopic examination. The total number of samples collected was 155 and comprised of scalp lesions (131), nail lesions (1) and skin lesions (23). Of the 155 samples, only 108 (69.67%) yielded significant fungal growth by culture. Eight species of the fungi belonging to the genera *Microsporum* and *Trichophyton* were isolated. These included: *T. rubrum* (27), *T. soudanense* (5), *T. schoenleinii* (10), *M. ferrugineum* (3), *T. verrucosum* (10), *T. tonsurans* (11), *M. canis* (11) and *M. gypseum* (12). Among all the isolates, the scalp lesions (85.4%) had the most, followed by skin lesions (14.6%), while none was isolated from nail specimens. *T. rubrum* was most frequently encountered and as well as in distribution followed *M. gypseum, T. tonsurans, M. canis, T. schoenleinii, T. verrucosum, T. soudanense* and *T. ferrugineum* (Table 3).

Table 1 shows the prevalence of clinically suggestive superficial mycoses according to the schools examined, distribution in both sexes and educational status of parents of the infected pupils. The prevalence and distribution of the disease varied among the various schools. Table 2 shows the prevalence of superficial mycoses with respect to risk factors (gender and age group). Table 3 shows the distribution of the various etiologic agents according to age groups, sex and body sites from which they were isolated. The overall prevalence was 6.6% (n = 2184) . The populations of female and male pupils in the study were 969 and 1215, respectively. Their respective prevalence rates were 1.5% and 10.6%, respectively. Comparison of the prevalence rates of superficial mycoses of females and males showed that male pupils had a significantly higher (P = 0.0005) prevalence rate. Statistical analyses also revealed that no significant difference (P = 0.757) between prevalence rates of pupils in all age groups.

DISCUSSION

Dermatophytosis constitutes an important public health problem among children worldwide, including Nigeria. These diseases remain endemic in Nigeria, largely because of lack of information on its prevalence and absence of control measures (Anosike et al., 2005). The present study revealed that 6.6% of pupils in a random population of 2184 pupils of four primary schools in Anyigba town were infected by various species of dermatophytes. This number is lower than the figure recorded in other parts of Nigeria, that is, Ebonyi (21.1%) (Anosike et al., 2005) and Ile-Ife (14.0%) (Ajao and Akintunde, 1985). It is also lower than the figures recorded in Alexandria

Table 1. Prevalence of clinically suggestive superficial mycoses according to schools distribution in both sexes and educational status of parents of the infected pupils.

School	No. examined	No. with clinically suggestive lesion (%)	Distribution in both sexes		Educational status of parents of the infected pupils.		
			Male (%)	Female (%)	Primary/No education (%)	Secondary education (%)	Post Secondary education (%)
I	146	14 (9.6)	12 (85.7)	2 (14.3)	10 (71.4)	3 (21.4)	1 (7.1)
II	783	31 (4.0)	29 (93.5)	2(6.5)	27 (87.1)	3 (9.8)	1 (3.2)
III	576	72 (12.5)	63 (87.5)	9 (12.5)	64 (88.9)	6 (8.3)	2 (2.8)
IV	679	27 (4.0)	25 (92.6)	2(7.4)	24 (88.9)	2 (7.4)	1 (3.7)
Total	2184	144 (6.6)	129 (89.6)	15(10.4)	125 (86.8)	14 (9.7)	5 (3.5)

Table 2. The prevalence rates of superficial mycoses in pupils with respect to risk factors.

Risk factor	Total No. examined	No. positive (%)	P value
Gender:			
Male	1215	129 (10.6)	
Female	969	15 (1.5)	0.0005
Age group:			
4-7	760	46 (6.1)	
8-10	859	59 (6.9)	
11-15	558	58 (6.8)	
>15	7	1 (14.3)	0.757

Table 3. Distribution of the various etiologic agents according to age, sex and body site (site of lesion).

Etiologic agents	Number of isolates (%)	Age				Sex		Site of lesion		
		4 - 7	8 - 10	11 - 15	> 15	Male	Female	Scalp	Skin	Nail
T. rubrum	27 (30.3)	4	14	8	1	24	3	22	5	-
M. gypseum	12 (13.5)	1	6	5	-	12	-	10	2	-
M. canis	11 (12.4)	5	5	1	-	11	-	11	-	-
T. tonsorans	11 (12.4)	5	4	2	-	9	2	9	2	-
T. scholeinii	10 (11.2)	4	22	4	-	9	1	10	-	-
T. verrucosum	10 (11.2)	4	5	1	-	8	2	7	3	-
T. soudanense	5 (5.6)	1	3	1	-	5	-	5	-	-
M. ferrugenium	3 (3.4)	2	0	1	-	2	1	2	1	-
Total number (%)	89 (100)	26 (29.2)	39 (43.8)	23 (25.8)	1(1.1)	80 (89.9)	9 (10.1)	76 (85.4)	13 (14.6)	0

(7.4%) (Omar, 2000) and in Libya (31.1%) (Ellabib and Khalifa, 2001), but higher than the figure recorded in Iraq (2.7%) (Fathi and Al-Samaria, 2000). The differences may be due to variation in environmental and climatic conditions of the areas studied.

The present survey revealed a significantly higher prevalence in boys (P = 0.0005) than in girls (Table 2). Similar work reported in Cross River showed a higher prevalence in boys (73%) compared to girls (27%) (Ezeronye, 2005) and in Iraq (boys, 68.3% and girls, 31.7%) (Fathi and Al-Samarai, 2000). This is in contrast with the reports in Ebonyi (Anosike et al., 2005) and Alexandria (Omar, 2000), indicating that females were more frequently infected than males, but it was not statistically significant. The higher prevalence in boys than in girls may be attributable in part to the play-habits in this region of boys compared to girls where boys are more frequently exposed to these pathogens. The fact that boys visit barbers often can also contribute to this higher prevalence, since barbers' instruments have been noted to play a role in the spread of these infections (Soyinka, 1978).

This study also showed that scalp infection (85.4%) is more frequent than glabrous skin (14.6%) and nail infections (Table 3). Therefore, it can be deduced that the prevalence of scalp lesions (tinea capitis) is much higher compared to other superficial mycoses in the study population. Of the dermatophytes isolated (Table 3), *T. rubrum* was isolated at the highest frequency (30.3%; n = 89), which is an anthropophilic species. It can be deduced that *T. rubrum* is the major aetiologic agent of superficial mycosis amongst pupils in this area.

The present study showed a relationship between level of parental education and the prevalence of superficial mycoses in the population studied. The frequency of superficial mycoses was more in children whose parents had primary or no education (86.8%, n = 144) when compared with the frequency in children whose parents attained secondary and post secondary school education (13.2%) (Table 1). A similar study in Iraq revealed that 67.5% (n = 120) of school children came from families where the father had a low level of education and 18.5% had illiterate fathers. In nearly all the cases (96.7%) the children had mothers with low levels of education (Fathi and Al-Samarai, 2000). This points to the importance of enlightenment programmes or health education in control of infections. Inadequate and poor infrastructures as was observed in all the four schools could be adduced as one of the major factors influencing transmission of infection amongst the pupils. Fathi and Al- Samarai (2000) also reported that 55.8% of the positive cases were found in children living in crowded conditions.

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