Journal of Mycology Research. Vol 2, No 1, March 2015, Page 15-22

Prevalence of superficial fungal infections among primary school pupils in Awka South Local Government Area of Anambra State

Celestine Chukwudi Ogbu[1*], Izunna Somadina Okwelogu[1], and Anthonia Chinwe Umeh[2]

[1]Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, Nigeria
[2]Department of Medical Microbiology, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria

*** Corresponding Author: E-mail: scientistsomadina@yahoo.com, Tel: +23 48068655164**

(Received: 5 Febuary 2015, Accepted: 7 April 2015)

Abstract:

Skin fungal infections are common global problems with attendant morbidity among affected individuals. Children are mostly affected because of predisposing factors such as poverty, overcrowding, and lack of guidance. Investigation on the prevalence of superficial fungal infections among primary school pupils was carried out in Awka South Local Government Area of Anambra State, Nigeria. Six public primary schools were selected for this study. The samples were collected by scrapping and use of a sterile swab. Microscopy and culturing methods were used to identify the infections. Of the 870 pupils examined, 353 (40.57%) had various skin fungal infections; *Tinea capitis* 229 (64.87%), *Tinea corporis* 96 (27.20%), *Tinea faciei* 25 (7.08%), and *Tinea pedis* 3 (0.85%). Sixty-five (18.41%) had multiple skin fungal infections; 21 (31.34%) pupils from Obiora Primary School, Mbaukwu, recorded the highest, while Community Primary School, Amawbia 3 (7.32%) recorded the least infection ($P > 0.05$). Two hundred and twenty-nine pupils (64.87%) had the highest prevalence of *Tinea capitis*, while 3 (0.85%) pupils had the least infection recorded for *Tinea pedis*. Pupils from Central Primary School, Nibo, 82 (56.55%), had the highest prevalence, while 39 (26.90%) pupils from the Central Primary School, Umuawulu had the least infection. The age group of five to nine years was more infected than the 10–14-year age group. More male (199 (56.37%)) than females pupils were infected with skin fungal infections; this difference was not statistically significant. Poor personal hygiene and intimate association with household pets among the children were the suspected sources of infection. Therefore, there was an urgent need for mass treatment of superficial fungal infections in all the primary schools examined.

Keywords: Awka-South L.G.A, prevalence, public primary schools, superficial fungal infections.

Introduction

Skin fungal infections known as dermatophytosis includes several distinct clinical entities, depending on the anatomic site and etiologic agent involved. Clinically, the conditions include ringworm of the scalp (*Tinea capitis*), ringworm of the body (*Tinea corporis*), ringworm of the beard (*Tinea barbae*), ringworm of the groin (*Tinea cruris*), ringworm of the foot (*Tinea pedis*), ringworm of the hand (*Tinea manuum*), ringworm of the nail (*Tinea unguium*), and ringworm of the face (*Tinea faciei*) (Degreef,

2008). Tinea infections vary from a scaly non-inflamed dermatosis resembling dermatitis to inflammatory diseases with scaly erythematous lesions and hair loss or alopecia, which may progress to severely inflamed deep abscesses. Dermatophytosis can be unsightly or disfiguring; they can impede mobility and performance, cause disability or pain, and when contagious, spread from one part of the body to another or from person to person (James, 2006). Fungal infections of the skin and scalp represent a relatively common problem, especially in the tropical and subtropical regions of the world, where warm and humid climates provide a favorable environment for the organism, causing superficial mycoses (Shrum *et al.,* 1994). Dermatological problems manifesting as primary and secondary cutaneous complaints, which constitute at least 30% of all outpatient visits to the pediatrician and 30% of all visits to the dermatologists involve pediatric patients between the ages of 4 and 14 years (Thappa, 2002).

Skin fungal infection is not a reportable disease, but it is a cause for concern because of its contagious nature (Anosike *et al.,* 2005). The variation in the epidemiology of the infection is dependent on the people's habits, standards of hygiene, climatic conditions, and levels of education. Uncommon in adults, *Tinea capitis*, one of the skin's fungal infections, predominantly occurs in pre-pubertal children, seen more often in boys than girls. Children are particularly susceptible to *Tinea capitis*, as contact among children is more frequent between the school ages of 6 and 14 years than in early childhood (Kundu *et al.,* 2012). For this reason, school surveys are good at measuring the prevalence of the problem. The objective of this study was to determine the prevalence of superficial fungal infections among primary school pupils in Awka South Local Government Area of Anambra State.

Materials and Methods

Study Area: This study was conducted in Ezinator, Mbaukwu, Nibo, Okpuno, Umuawulu, and Amawbia communities in the Awka South Local Government Area, Anambra State, Nigeria. These six communities were randomly selected out of the nine communities in Awka South. The Awka South Local Government Area has the coordinates of approximately 6°10′N 7°04′E. It is bordered in the North by Awka North Local Government Area (L.G.A), in the East by Oji–River L.G.A, Enugu State, in the South by Anaocha L.G.A, and in the West by Njikoka L.G.A. There are two distinct seasons, the wet and dry seasons. The wet season occurs between April and October, while the dry season occurs between November and March. The temperature is generally hot, and humidity is in the range of 27 and 28°C, from July through December, but rises to 35°C between February and April. The people of the area are mostly blacksmiths, farmers, and businessmen.

Study population: After successful advocacy visits to the study area, informed consent was obtained from parents and guardians to enlist their wards/children in the study. Six primary schools were randomly selected from 42 public primary schools in Awka South Local Government Area. The schools include Oraebeke Memorial Primary School Ndiora, Ezinator, Obiora Primary School, Mbaukwu, Central Primary School, Nibo, Udodimma Primary School, Okpuno, Central Primary School, Umuawulu, and Community Primary School, Amawbia.

Pupils from primary grades one to six in each school were selected to a total of 145 pupils. A total of 870 pupils were examined for various skin fungal infections. Personal data of the pupils such as sex, age, and class were collected from each pupil or from their teacher.

Sample collection and methods: In all the suspected cases of skin fungal infections, the areas of the head or skin were thoroughly cleaned with alcohol; the hair and scales were collected for mycological examination, using techniques by Fathi and Al-Samarai, (2000). Hair from the suspected areas were examined with the aid of Wood's light for a positive examination. Where negative results were obtained, dull gray hair were collected. The pieces of hair were also collected in a sterilized container and cultured evenly on cycloheximide and Sabourand dextrose agar plate. This was incubated at 30^{o}C for four to five days to confirm if the isolates were dermatophytes. The identification was made possible by using Mycology Online Atlas 2000.

Data Analysis: Chi-square analysis was used to test for significant differences in the prevalence of skin fungal infections in relation to sex, age groups (5–9 and 10–14 year-olds), schools and multiple skin fungal infections. The statistical confidence interval was set at 95%. Results were presented in both descriptive and tabular forms.

Results

A total of 870 pupils were examined for the presence of skin fungal infections in six public primary schools in the Awka South Local Government Area of Anambra State. Using microscopy and culturing methods it was found that 353 (40.57%) pupils had various skin fungal infections (Table 1); 229 (64.87%) had *Tinea capitis*, 96 (27.20%) had *Tinea corporis*, 25 (7.08%) had *Tinea faciei*, and 3 (0.85%) had *Tinea pedis*. Of the four skin fungal infections, *Tinea capitis* 229 (64.87%) had the highest prevalence, while *Tinea pedis* 3(0.85%) had the least. Among the six primary schools examined, the Central Primary School, Nibo, recorded the highest prevalence (82 (56.55%)), while the Central Primary School, Umuawulu, had the least prevalence (39 (26.90%)), and this was independent on schools.

Table 2 depicts the prevalence of skin fungal infections by age and sex. The overall age prevalence showed that infection decreased with increase in age. Infection was higher in the five to nine year-old group (198 (46.26%)) and the least in the 10–14 year-old group (155 (35.07%)).

Sex distribution of skin fungal infection among primary school pupils showed that although more males 199 (56.37%) than females 154 (43.63%) were infected, the difference was not statistically significant ($P>$ 0.05).

Out of the 353 pupils infected, 65 (18.41%) had multiple skin fungal infections (Table 3). Mbaukwu Primary School recorded the highest number of pupils with multiple skin fungal infections — 21 (31.34%), followed by Okpuno Primary School — 14 (18.92%), Nibo Primary School — 15 (18.29%), Ezinator Primary School — 7 (14.00%), and Umuawulu Primary School — 5 (12.82%), while Amawbia Primary School recorded the least infection — 3 (7.32%).

Table 1. Distribution of skin fungal infections among the schools

Schools			**Number infected and skin fungal infections**				
Parameter		**No. examined**	***Tinea.capitis(%)***	***Tinea.corporis(%)***	***Tinea.faciei(%)***	***Tinea pedis(%)***	**Total(%)**
Oraebeke Mem. Prim.Sch., Ezinator		145	31(62.00%)	9(18.00%)	9(18.00)	1(2.00%)	50(34.4)
Obiora Prim. Sch., Mbaukwu	250	145	33(49.25)	22(32.84)	11(16.4)	1(1.49)	67(46.2)
Central Prim.Sch.Nibo	437	145	61(74.39)	19(23.17)	1(1.22)	1(1.22)	82(56.5)
Udodimma Prim. Sch. Okpuno	380	145	46(62.16)	26(35.14)	2(2.70)	-	74(51.0)
Central Prim. Sch, Umuawulu	206	145	28(71.80)	9(23.08%)	2(5.13)	-	39(26.9)
Community Pim.Sch, Amawbia	500	145	30(73.17)	11(26.83)	-	-	41(28.2)
Total	**1943**	**870**	**229 (64.87)**	**96 (27.20)**	**25 (7.08)**	**3 (0.85)**	**353 (40.57)**

Table 2. Prevalence of skin fungal infections by sex and age

Age(yrs)	**No examined**	**No infected (%)**	**No of males Infected (%)**	**No of females Infected (%)**
5-9	428 (49.20)	198 (46.26)	104 (52.53)	94 (47.47)
10-14	442 (50.80)	155 (35.07)	95 (61.29)	60 (38.71)
Total	**870**	**353(40.57)**	**199 (56.37)**	**154(43.63)**

Table 3. Distribution of pupils with multiple skin fungal infections among the schools

Name of school	**No examined**	**No infected (%)**	**No with multiple infections(%)**
Orebete Memorial. Primary School, Ezinator	145	50(34.48%)	7(14.00%)
Obiora Prim. Sch., Mbaukwu	145	67(46.21%)	21(31.34%)
Central primary school, Nibo	145	82(56.55%)	15(18.29%)
Udoimma Prim. Sch. Okpuno	145	74(51.03%)	14(18.92%)
Central Prim. Sch, Umuawulu	145	39(26.90%)	5(12.82%)
Community prim.sch, Amawbia	145	4128.28%)	3(7.32%)
Total	**870**	**353(40.57%)**	**65(18.41%)**

Table 4 also showed a different combination of multiple skin fungal infections among the pupils examined. Of the 65 pupils with multiple infections, 30 (46.15%) had a combination of *Tinea faciei*, *Tinea capitis*, and *Tinea corporis*, 16 (24.62%) had a combination of *Tinea faciei* and *Tinea* corporis, 16 (24.62%) had a combination of *Tinea capitis* and *Tinea faciei*, and 3 (4.62%) had a combination of *Tinea capitis* and *Tinea pedis*. *Tinea capitis*, *Tinea faciei*, and *Tinea corporis* were recorded in 30 (46.15%) pupils, and was the highest number for having more than one skin fungal infections, while *Tinea capitis* and *Tinea pedis* were found in 3 (4.62%), which was the least recorded. This was independent of the schools ($P > 0.05$).

Table 4. Distribution of different combinations of multiple skin fungal infections among the schools

No infected with multiple skin fungal infections

Schools	No examined	*T. faciei, T. corporis & T. capitis*	*T. faciei & T. corporis*	*T. capitis & T. faciei*	*T. capitis & T. pedis*	Total
Oraebeke Mem. Prim. Sch, Ezinator	145	3(42.86%)	2(28.57%)	1(14.29%)	1(14.29%)	**7**
Obiora Prim. Sch, Mbaukwu	145	12(57.14%)	5(23.81%)	3(14.29%)	1(4.76%)	**21**
Central Prim. Sch, Nibo	145	6(40.00%)	3(20.00%)	5(33.33%)	1(6.67%)	**15**
Udodimma Prim. Sch, Okpuno	145	6(42.86%)	5(35.71%)	3(21.43%)	_	**14**
Central Prim. Sch. Umuawulu	145	2(40.00%)	1(20.00%)	2(40.00%)	_	**5**
Com. Prim. Sch, Amawbia	145	1(33.33%)	_	2(66.67%)	_	**3**
Total	**870**	**30(46.15%)**	**16(24.62%)**	**16(24.62%)**	**3(4.62%)**	**65**

Discussion and Conclusion

Superficial fungal infection was recorded in children examined in six primary schools, which indicated that the infection is common in Awka South Local Government Area of Anambra State. A total of 870 pupils were recruited for the study. The study confirmed a number of previous findings, which showed that superficial fungal infections were endemic in Nigeria, where school-aged children were at greater risk of infection (Enemuor and Amedu (2009), Chukwu *et al.,* 2011). Ogunbiyi *et al.,* (2005) had also reported a similar finding on superficial mycoses in Ibadan, Nigeria, in Ibadan, Nigeria. These further confirmed the report that adequate attention was not given to the disease in many parts of Nigeria. The specific prevalence (40.57%), recorded in

this study, suggested that superficial fungal infection may be a public health problem in Awka South Local Government Area of Anambra State. This study is similar to those recorded among school children in some parts of the world (Saudi Arabia 47.7% (Venugopal and Venugopal, 1992), Palestine 1.0% (Ali-Shtayeh *et al.,* 1998), Tikrit, Iraq 2.7% (Fathi and Al-Samarai, 2000), Spain 0.23% (Trivino-Duran *et al.,* 2005), Antsirabe, Madagascar 20.5% (Contet-Audonneau *et al.,* 2006). However, *Tinea capitis* (64.87%) was the most prevalent infection recorded among school pupils in this present study. *Tinea capitis* has been described as the most common pediatric dermatophyte infection worldwide (Gupta *et al.,* 1999; Enedu and Ibe, 2005), and this explains the high prevalence of the infection observed in this study. This indicates the need for early diagnosis, because it may result in destruction of hair, with severe hair loss and scarring alopecia if left untreated. A lower rate of infection (28.28%) was observed among pupils in Community Primary School, Amawbia, which has the highest population. This could be probably because of the good hygienic condition in the schools. The school is located a few kilometers from the governor's lodge. It may be that the pupils in the school are children of highly educated parents, who observe the conditions of their children, in contrast to other schools with a very low level of hygienic environment, where the children of poor masses go.

The prevalence of skin fungal infection was observed most in the age group between five and nine years, 155 (36.21%), than among the other age groups examined; although, the difference was not statistically significant ($P > 0.05$) (Table 2). This was consistent with the previous reports that fungal infection was usually higher in pupils with age lower than 10 years than in older pupils (Oyeka, 1990, Ayorinde *et al.,* 2013). This could be because most children in the five to nine year age group are left to cater to themselves in some communities, in terms of personal hygiene, and some pupils are completely ignorant about the methods of prevention and control of skin fungal infections.

However, sex distribution of skin fungal infection among primary school pupils showed that more males 199 (56.37%) than females 154 (43.63%) were infected. This result correlates with the previous studies conducted by Ali-Shtayeh *et al.,* 1998, Timen *et al.,* 1999, Fathi and Al-Samarai, 2000, and Olaide *et al.,* 2014. Tinea *capitis* infection may vary by sex, depending on the causative fungal organism; males are generally more infected than females (Kao, 2005; Enemuor and Amedu, 2009). The high infection rate among males in this study may be because of their short hair, their habit of frequent visits to the local barber shops where the barbing instrument are not properly disinfected before use, and there is a lack of consistent hygienic attention to the scalp. These are some of the factors that could be associated with high infection rates in males compared to females (Terragni *et al.,* 1991; Ezeronye, 2005; Enedu and Ibe, 2005). Also, low prevalence in girls could be associated with the fact that most of the females, especially the older ones, practice general personal and hair hygiene management. However, the difference was not statistically significant ($P > 0.05$).

This study has revealed age group, sex, and school prevalence of skin fungal infection in Awka South Local Government Area of Anambra State, Nigeria. Therefore, the researchers have recommended that

constant monitoring; treatment, and evaluation of the infection in the area and in other primary school children in the country should be encouraged. Sharing of unhygienic personal belongings with the infected patients and intimate association with pet animals could increase the mode of transmission.

Acknowledgment

The authors wish to thank all the principals, teachers, and pupils in Awka South, who were very kind and helped by participating in this study.

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