

Prevalence of Dermatophytic Fungal Infections among Primary School Children in Aba North, Abia State, Nigeria

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Abstract: - Dermatophyte infection is still prevalent among basic school pupils and has been known to impact negatively on health and well-being of children. This study was undertaken to determine the prevalence as well as the etiologic organisms of dermatophyte infection among primary school children aged 5-13 years in Aba North Local Government Area in Abia state. Five 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 100 pupils examined, 53 pupils were found to have dermatophytic fungal infection giving a prevalence of 53%. Five fungi species belonging to two genera: *Microsporum* and *Trichophyton* were identified. These include: *Microsporum canis* (9.43%), *Microsporum audouinii* (24.53%), *Microsporum gypseum* (16.98%), *Trichophyton mentagrophytes* (43.40%) and *Trichophyton tonsurans* (5.66%). Although there was a statistically insignificant difference between male and female subjects, male pupils were more affected. Infection was insignificantly common in the age group of 8 – 10 years. The study shows that the prevalence of dermatophytic fungal infection among primary school children in Aba North L. G. A is high which needs an intervention.

Keywords: Prevalence, Dermatophytic, Primary, School children, Infection

I. INTRODUCTION

Fungal infections of the skin, hair, and nails due to dermatophytes are worldwide in distribution and dermatophytosis is a common problem in developing countries. It can occur in both sexes and all ages but the diseases are more common in school children. School children, the study subjects, are particularly potential victims of dermatophytic fungal infection either due to age related physiological conditions or due to their level of hygiene practice [1]. Further, they are prone to acquire the infection due to their school setup and hence the conducive situation of passing the disease on to another susceptible hosts. The infections are highly contagious in nature with a high rate of skin-to-skin and fomite transmission and recurrences.

Dermatophytes are divided into three distinct anthropophilic, zoophilic, and geophilic groups. Human infection may be caused by the members of these three groups. Three genera of dermatophytes including *Epidermophyton*, *Trichophyton*, and *Microsporum* with nearly 40 species have

been identified [2]. The causative fungi have the ability to invade the superficial layers of the skin and the high keratin-concentration containing appendages, the hair and nails of the living host [3].

Although dermatophytosis occurs worldwide, individual dermatophyte species may vary in their geographic distribution and self-virulence. These disorders cannot be differentiated by ethnicity or socioeconomic status, but poverty and overcrowded living conditions are important underlying social determinants [4]. Factors such as poor personal hygiene, frequent human contact, poor environmental sanitation, overcrowding, and low socioeconomic status predispose school-age children to fungal infections [5] [6]. The infection is very common among children and people who have pets, have wet skin condition, have skin injuries or abrasions, use public showers, are barefoot, and share hairbrushes or unwashed clothing with other people [1].

Dermatophytic infections have been known to impact negatively on academics, health and well-being of children. Dermatophytoses have been suggested to play a negative role in the academic development and performance of school children. This is because of the attached social disapproval and psychological trauma of tinea infections that may hamper the concentration and performance of the child in the class [7]. These infections may also have economic implications in terms of the time and money spent in treating them [8].

A number of studies on the prevalence of dermatophytoses among school children have been carried out in different part of Nigeria [10 – 15]. The differences in prevalence are greatly attributed to differences in climatic and other geographical conditions in the studied areas.

Knowledge of the predominant causative species provides a clearer understanding of risk factors for superficial fungal infections and future epidemiologic trends. There is no epidemiological data in the literature to ascertain the true prevalence of dermatophytosis in Abia State, Nigeria. Thus, this research was undertaken to determine the prevalence of dermatophytosis among school children in Aba, Abia State.

II. MATERIALS AND METHODS

Study Area

This cross sectional study was carried out in Aba, Abia State, South Eastern Nigeria. Aba is a commercial city. Five randomly selected primary schools were used.

Study Population

This study was conducted on 100 primary school children over 3 months from September to November, 2015. Participants were randomly selected from all the grades (Classes 1 – 6) of the selected primary schools.

Ethical Consideration

Informed consent from parents/guardians of all pupils involved in the study was obtained. Pupils whose parents did not give consent and pupils who did not assent were not included in the study. Permission was taken from Abia State Ministry of Education, local inspectorates of education at the local government levels and school authorities.

Sample Collection

In all suspected cases of dermatophytosis and other superficial mycoses, the affected body parts (skin, hair and nails) were thoroughly cleaned with a methylated spirit swab. Samples were collected by scrapping the affected area with sterile scalpel blades. This was packaged into envelopes. Affected hair and nail fragments were collected with the aid of a sterile scissors. All samples were labeled appropriately and transported to the laboratory within 4 h after sample collection for direct microscopic examination and culture.

Sample Processing

Direct microscopic examination of specimens: Each specimen was placed on a slide and a drop of 10% potassium hydroxide added before covering with a cover slip. The sample was warmed for 5 minutes over a flame as described by Hainer [4]. Each treated slide was then carefully examined under low (X10) and high (X40) power objective for the presence of hyphae and/or arthroconidia. 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: The scrapings and the pieces of hair were plated out separately on Sabouraud's dextrose agar. Cycloheximide was employed because saprophytic fungi and yeasts normally present as contaminants will be inhibited by it. Chloramphenicol and streptomycin were the antibiotics used to inhibit bacterial contaminants. Culture plates were incubated at 27° C for 4 weeks and then examined for the presence of dermatophytes. Macro- and micromorphological studies of cultured colonies were done for the presence of dermatophytes.

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 Color Atlas [10].

Statistical Analysis

Data obtained was analyzed using chi-square test ($P < 0.05$) to determine the significant differences on the prevalence of dermatophytosis among school children considering their age and gender.

III. RESULTS

A total of 100 pupils were recruited for the study. Males made up 33% (33 pupils) of the study while the females were 67% (67 pupils). Out of the 100 pupils, 53 pupils were found to have superficial fungal infection (SFI) giving a prevalence of 53%.

Five fungi species belonging to two genera: *Microsporum* and *Trichophyton* were identified. These include: *Microsporum canis* (9.43%), *Microsporum audouinii* (24.53%), *Microsporum gypseum* (16.98%), *Trichophyton mentagrophytes* (43.40%) and *Trichophyton tonsurans* (5.66%). This is shown in table 1.

Table 2 depicts the prevalence of skin fungal infections by age. More than half of the isolates of the dermatophytes were from pupils aged 5–7 years and 8–10 years (56.90% and 60 % respectively) while 16.67% were from the age group 11–13 years. Infection was higher in the 8-10 years age group and the least in the 11–13 years age group which was statistically insignificant ($P > 0.05$).

Sex distribution of skin fungal infection among primary school pupils showed that although more males (54.5%) than females (52.2%) were infected; the difference was not statistically significant ($P > 0.05$) (Table 3).

Table 1: Frequency of dermatophytes in school pupils

Isolates	Frequency
<i>Microsporum canis</i>	5(9.43%)
<i>Microsporum audouinii</i>	13(24.53%)
<i>Microsporum gypseum</i>	9(16.98%)
<i>Trichophyton mentagrophytes</i>	23(43.40%)
<i>Trichophyton tonsurans</i>	3(5.66%)
Total	53

Table 2: The prevalence rates of superficial mycoses in pupils with respect to age

Age group	Number tested	Number positive	Number negative
5-7 years	58	33(56.9%)	25(43.1%)
8-10 years	30	18(60%)	12(40%)
11-13 years	12	2(16.7%)	10(83.3%)
Total	100	53(53%)	47(47%)

Table 3: Prevalence of dermatophytosis in pupils with respect to gender

Gender	Number tested	Number positive	Number negative
Male	33	18(54.5%)	15(45.5%)
Female	67	35(52.2%)	32(47.8%)
Total	100	53(53%)	47(47%)

IV. DISCUSSION

Superficial fungal infections are common and remain a public health problem among children worldwide and particularly in Nigeria [13]. The present study revealed that prevalence of superficial fungal infection is 53% which suggests that superficial fungal infection may be a public health problem in Aba North Local Government Area of Abia State. The prevalence is comparably slightly higher than 40.57% recorded in Awka south, Anambra State [14] and lower than 72.2% observed among school children in Kebbi State, Nigeria [11].

Similar studies have reported lower prevalence of 35%, 31.6%, 23.4%, 9.6%, 6.6%, 5.0% respectively [13], [12], [1], [15], [10], [16]. It has been suggested that differences in the prevalence of superficial fungal infection in different regions may be due to variation in climatic, socioeconomic status, time, lifestyle and environmental conditions of the areas being studied [1], [13].

The study revealed a higher prevalence in boys than in girls which was statistically insignificant. This is comparable with similar studies which showed that prevalence of dermatophytosis was higher in males than in females [10], [12], [15], [17], [18]. The higher prevalence in boys than in girls may be attributed to the playing habits 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 [11]. As dermatophytic infection relate to personal hygiene cleanliness, females appear to be neater than males as they pay more attention to their outlook, especially, as they approach teenage age [16].

The dermatophyte species isolated in this study belonged to two genera: Trichophyton and Microsporum. These include: *Microsporum canis*, *Microsporum audouinii*, *Microsporum gypseum*, *Trichophyton mentagrophytes* and *Trichophyton tonsurans*. Among the isolates, *Trichophyton mentagrophytes*

was isolated at the highest frequency of 43.4%. It can be deduced that *T. mentagrophytes* is the major aetiologic agent of superficial mycosis amongst pupils in this area. Studies have established variability in the species of dermatophytes isolated from one geographical region to the other and also per time [19].

M. audouinii and *T. mentagrophytes* are anthropophilic species which occur in pre pubertal children. *T. tonsurans* is an endothrix specie believed to be prevalent in rural communities in Eastern Nigeria [20]. *Microsporum canis*, which is a zoophilic specie possibly originated from cats, dogs, cow and other animals which these children come in contact with while *M. gypseum* is a geophilic dermatophyte [21] and could be contacted from playgrounds.

In the present study, persons of all age groups were susceptible to dermatophytosis but it appeared to be more common in school children of age group 5–7 and 8–10 years. 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 [14], [22].

Presence of superficial fungal infection in younger age group observed in this study supports the suggestion that infection is related to the poor hygiene at the younger age and absence of saturated fatty acids that provide a natural protective mechanism against fungal infections [13]. Furthermore, Ayanbimpe *et al.* [19] attributed the highest rate of infection amongst them to the fact that they are the group active at playgrounds and will thus have closer contact with sources of pathogens.

V. CONCLUSION

This study has revealed that the prevalence of dermatophytic infections in the study subjects was high. *T. mentagrophytes* was the commonest dermatophyte isolated. Regular health education about fungal infections that highlights their morbidities and modes of spread, should be given to school children, their parents and teachers, in order to truly reduce the prevalence. To obtain a true representation of the overall disease pattern of the country more such types of studies should be conducted.

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