

Incidence of Dermatophyte Infections Among Primary School Pupils in Three Selected Primary Schools in Obio-Akpo Local Government Area of Rivers State, Nigeria

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Abstract

Dermatophytes infections have been seen in recent times to be common among children. These infections require keratin to grow as such find the nails, skin and hair, a more ideal site to grow on. This condition can be discomfoting, chronic and can disfigure the aesthetic beautiful appearance of the nails, skin and hair but yet are not life threatening. Hence, the importance of knowing their prevalence among our large population of people under school age in Nigeria for the purpose of planning and research medical mycology and epidemiological studies/surveys. This study assessed children between the ages 5-15years from three primary schools in Obio-Akpo local government area of Rivers state, Nigeria, for dermatophytes infections. The survey showed that age group 8-12 years had the highest prevalence of dermatophytic infections while age group 13 and above had the least. However, the result of this study showed the isolation of *Microsporum audouinii*, *Microsporum canis*, *Trichophyton rubrum*, *Trichophyton tonurans* and *Trichophyton mentagrophytes*. Nevertheless, these findings were attributed mainly to hygiene and play group attitudes of the children. Therefore, improvements in awareness about personal and public hygiene would help in reducing the incidence of dermatopytic infections among primary school children.

Keywords: Dermatophytes, Obio-Akpo, Children, Primary School, Infection, Incidence

Introduction

Dermatophytosis is a disease condition caused by a collection of fungi organisms referred to as dermatophytes (Abbey, 1995). These fungi diseases affect mainly the outermost exposed parts of the human body like the nails, mucous membranes, skin and hair (Okafor and Nworgu, 2002; Ely *et al.*, 2014). However, there preference for affecting the skin, nails and hair, may not be unconnected with the fact that, they require keratin for growth (Okafor and Nworgu, 2002; Ely *et al.*, 2014). Dermato-

phytic infections are caused by organisms within three fungi genera to include *Microsporium*, *Trichophyton* and *Epidermophyton* (Abbey, 1995; Wariso *et al.*, 2015). These fungi can cause superficial infections the skin, hair, and nails only (Abbey, 1995; Wariso, 2012), because they lack sufficient ability to invade deep into tissues of humans and animals alike (Wariso *et al.*, 2012). Infections with dermatophytes are transmitted from person to person by direct contact between infected and uninfected persons either anthropophilic, zoophilic or geophilic as well as indirectly from fomites (Barry, 2003; Ely *et al.*, 2014). There could be out breaks due to indirect contact with inanimate objects as combs, hair dressers equipment, hair plating tools, etc (Barry, 2003).

Nevertheless, Primary school children are the most hit population of people suffering from this type of mycotic infections (Nweze and Okafor, 2005). Dermatophyte infections can be readily diagnosed based on the history, physical examination and laboratory examination of patient specimen (Wariso, 2012). They are mostly chronic infections with discomforting symptoms and could disfigure the natural aesthetic beauty of the skin, nails and hair (Ely *et al.*, 2014). These infections do not cause any life threatening condition (Wariso *et al.*, 2015). However, in most instances, children outgrow the disease since it often heals spontaneously without treatment (Nweze and Okafor, 2005). Nevertheless, the prevalence of dermatophyte infections varies with regions and settings but its largely influenced by the hygienic conditions of homes and individuals themselves (Abbey, 1995). Also, the age of human growth with the presence of keratin could be a key factor (Elly *et al.*, 2014) as the disease is scarcely seen among adults (Ely *et al.*, 2014). However, there had been reported cases of high adult infection rate with Dermatophyte infections as seen in the published review report of Wariso *et al.*,(2015).

Materials and Methods

This study was carried out in semi-urban community primary schools from three different districts within the Obio-Akpo local government area of Rivers State, Nigeria. They included community primary school Rumuokoro, community primary school Rukpokwu, and community primary school Rumuolumini. The affected cornified area of the epidermis, the suprafollicular portions of the hair were collected by scraping the scalp, skin and nails of who consented orally after permission was given by the concerned school authorities to be part of the study. However, each sample was collected by first swabbing the affected area with 70% ethyl alcohol soaked cottonwool swab and allowing in todry. Then, with the aid of a sterile scalpel blade and a clean white plain paper, affected areas were scrapped into the paper placed directly underneath the affected area; the scrapings on the paper were folded, stapled, labeled and transported to the diagnostic laboratory to be cultured on sarrboraud dextrose agar supplemented with Chloramphenicol, under aseptic conditions using the safety cabinet and incubated at room temperature for 7 days. The scrapings were also examined microscopically using X10 and X40 objectives with the 20% KOH preparation for the presence of hyphae and arthrospores. The cultured plates were examined macroscopically (for growth morphology, mycelia color, surface color of the spores and the texture and rate of growth) and microscopically using the needle mount technique with 20% KOH preparation and lactophenol cotton blue as

stain to aid identification of fungal elements. The results of this study were collated and presented in percentages and tables.

Results

A total of 100 pupils between the ages of 5-13years participated in this study including 66 samples from community primary school Rumuolumini, 18 samples from community primary school, Rumuokoro and 16 samples from community primary school Rukpokwu. Out of the total samples collected, 90% were suspected *Taenia capitis*, while 3% of the total samples were suspected *Taenia unguium* and 7% were suspected *Tinea coporis*. Similarly, out of the total samples collected, 32% were from females while 68% were from males. Among the male participants of this study, there was recorded a 70.6%(48) prevalence of dermatophytes infections while among the female subjects, a prevalence of 43.6%(14) was observed. Nevertheless, this study showed the isolation of five species of dermatophytes to include *Microsporum audouinii*, *Microsporum canis*, *Trichophyton rubrum*, *Trichophyton mentagrophytes* and *Trichophyton tonsurans*. These isolate were distributed along age divides as follows; age group 8-12 had the highest percentage prevalence of dermatophytic infections at 79%(49) while age group 13 and above had 0% which was the least, whereas, age group 5-7years showed apercentage infection rate of 21.1% (13). Therefore, this study generated a study prevalence rate of Dermatophyte isolation of 62%. The prevalence of the varius species isolated were 10%, 5%, 4%, 20%, and 23% for *Microsporum audouinii*, *Microsporum canis*, *Tinea rubrum*, *Tinea mentagrophytes* and *Trichophyton tonsurans* respectively.

Discussion

This study has shown a high incidence rate of dermatophytic infection with a70.6% (48/68) prevalence among males of primary school age in Obio-Akpo local government Area of Rivers state, Nigeria. Also, it showed a percentage dermatophyte infection rate among male to be 48%(48/100) as against 14% (14/100) (table 1) for female pupils that participated in this study. This was contrary to the report of Wariso *et al.*, (2015) which reported a higher incidence of dermatophyte infections among females than males. Therefore, it is certain that derrmatophyte infection is a public health challenge in this part of the world. However, a quick look at the various public health policies in Nigeria and Rivers state, will show an absolute neglect of dermatophytic infections as they are neither included in the Nigerian Ministry of health public health campagne policies nor that of most non-governmental organizations in the country, especially in Rivers state, where there are scarce data on the prevalence fungi infections. This could also be because dermatophyte infections are not listed among the notifiable diseases in Nigeria, hence, the neglect, even though it it is one of the sources of economic and health burdens experienced by low income earners in Nigeria. This was part of the reasons why Gunani (1982) suggested that any attempt to quantify the public health impact of mycosis would fail, because of the lack of interest on the part of government and the scarce data available at our disposal as researchers. This is especially pathetic in the case of Nigeria where, adequate laboratory facilities for diagnosis of Mycosis are not available. In fact, the Rivers state

situation is even more worrisome, as the entire state cannot boast of a standard medical mycology laboratory or a certified mycology microscopist (Aaron *et al.*, 2016). There is need for a change in policy directions to include these seemingly unimportant but economically burdensome and public health risk diseases that affect mostly the poorest of persons in the society.

Table 1: Distribution of Dermatophyte Infection among Female Pupils

S/N	Age	Number Sampled	Positive Cases	Age Group Percentage (%)	Female Incidence (%)	Study prevalence (%)
1	5-7	10	4	40	12.5	
2	8-12	22	10	45.5	31.3	
3	13 and above	0	0	0	0	
Total		32	14	-	43.6	

Table 2: Distribution of Dermatophyte Infection among Male Pupils

S/N	Age	Number Sampled	Positive Cases	Age Group Percentage (%)	Male Incidence (%)	Study prevalence (%)
1	5-7	17	9	52.9	13.2	
2	8-12	49	39	79.6	57.4	
3	13 and above	2	0	0	0	
Total		68	48	-	70.6	

Table 3: Cummulative Distribution of Dermatophyte Infection in this Study

S/N	Age	Number Sampled	Positive Cases	Age Group Percentage (%)	Study Incidence (%)	prevalence (%)
1	5-7	27	13	48.1	13	
2	8-12	71	49	69	49	
3	13 and above	2	0	0	0	
Total		100	62	-	62	

Table 4: Physical Observations of Dermatophyte Infection among the Studied Population

Site of Infection	Type of Infection	Number of Cases	Percentage Prevalence	N
				=
				1
				0
				0
Nail	<i>Tinea unguium</i>	3	3	
Skin	<i>Tinea corporis</i>	7	7	
Scalp	<i>Tinea capitis</i>	90	90	

Table 5: Percentage Distribution of Dermatophyte Species Isolated from this Study

S/N	Dermatophyte species	Positive Cases	Female Study prevalence (%)	Age Group Prevalence (%), 5-7years	Age Group Prevalence (%), 8-12years	Age Group Prevalence (%), 13 and above years
1	<i>Microsporum audouinii</i>	10	10	7.4	11.3	0
2	<i>Microsporum canis</i>	5	5	3.7	5.6	0
3	<i>Trichophyton rubrum</i>	4	4	3.7	4.2	0
4	<i>Trichophyton mentagrophytes</i>	20	20	14.8	22.5	0
5	<i>Trichophyton tonsurans</i>	23	23	18.5	25.4	0
	Total	62 (N=100)	62	48.1	69	0

However, from table 1, 2 and 3, it was observed that the incidence of dermatophyte infection was highest among primary school pupils within the age group of 8-12 years for both male and female categories; which may be due to the high presence of keratin on their nails and skin of this age group as a result of the pre-puberty hormonal peak responses taking place within their body system as at this age against those of age groups 5-7years and 13 and above. However, this study also recorded a high

percentage of dermatophyte infections among pupils within the ages 8-12 years with a female prevalence of 31.3% although less than the male prevalence of 54.7%. This agreed with the published work of Wariso *et al.*, (2015), which reported a higher male prevalence among males than females below the second decade of life. Nevertheless, the trend of infection with dermatophytes can also be attributed to the growing rate of unhygienic play activities carried out by this explorative age group and their propensity to have person to person contact as well as contacts with soil and inanimate objects without any aseptic consideration. A position supported by Ely *et al.*, (2003) and Wariso *et al.*, (2015).

However, this study showed in table 4 that *Tinea capitis* had the highest prevalence (90%) of dermatophytes infections which conforms to the research of Wariso *et al.*, (2015) that reported it as the most common presumptive clinical diagnosis with a prevalence of 36%. *Tinea unguium* had the least prevalence (3%) of Dermatophyte infections observed among the studied population of primary school pupils in Obio-Akpo local government area; this agrees with the published report of Wariso *et al.*, (2015).

Nevertheless, this study also showed that, *Trichophyton tonsurans* was the a major cause of *Tinea capitis* while *Trichophyton mentagrophytes* and *Microsporum audouinii* were also significantly important aetiologic agent of *Tinea capitis* infections in children. Besides, *Trichophyton tonsurans* was the most prevalent (25.4%) dermatophyte specie isolated among age group 8-12years in this study. This was in consonance with the research carried out by Ndunge *et al.*, (2014) in primary schools situated around slums in Nairobi, the Kenyan capital; which reported *Trichophyton tonsurans* as the predominant etiologic agent of dermatophytosis among the pupils studied. In that study, out of the total one hundred and fifty (150) pupils recruited, an overall prevalence rate of dermatophytes infection of 81.3% was recorded, consisting of *Trichophyton* spp. (61.3%), *Microsporum* spp. (13.3%) and *Epidermophyton* spp. (7.3%). These prevalence rates reported for *Microsporum* species and *Trichophyton* species were similar to the findings of this present study, except for the absence of *Epidermophyton* species. However, we observed that the overall study prevalence of dermatophytes infection reported by Ndunge *et al.*, (2014) in Nairobi, Kenya, was slightly higher than the 62% recorded for our present study. Nevertheless, the male and female prevalence rates recorded for this study were in conformity with that reported by Ndunge *et al.*, (2014). Therefore, with similar terrain, environmental conditions and economic development evident in most African nations, it is counted among the settings mostly affected by dermatophytes infections in the world with estimated infection rates of between 10% and 30% among children who are going to school (Chepchirchir *et al.*, 2009) and a public health challenge in many endemic areas like African rural and semi-urban areas; a position supported by Ayaya *et al.*, (2000)

Similarly, *Trichophyton mengrophytes* was the aetiologic agent responsible for 22.5% of the total dermatophyte infection recorded while *Microsporum canis* and *Microsporum rubrum* had 5.6% and 4.2% prevalence within the age group with the highest incidence of dermatophyte infections. This implied that, since pupils of the most prevalent age group of dermatophyte infection may have more contact with animal pets like dogs which are the zoophilic agents of transmission of *Trichophyton mengrophytes* and *Microsporum canis* (Ely *et al.*, 2014).

However, the frequency of *Tinea capitis* among males in this study may be as a result of the ease of implantation of spores and the ease at which small lesions could be detected on examination of scalp because of their low hair cut due compared to that of the females whose pose difficulty in sampling scalp with long and bushy hairs. This was contrary to the report of Wariso *et al.*, (2015) which reported that among the 70 patients from which Dermatophytes were isolated in their study, 42 (67%) were female while the remaining 28 (33%) were male (male to female to male ratio=1.7:1).

Also, this trend of male predominant dermatophyte infection rate of 70.6% as against 43.6% for females may be as a result of frequent comb and hair brush sharing among males compared to females of same age groups. Similarly, it can be attributed to the frequent sharing of caps and barbing implements without proper sterilization. In the same vain, poor standard of living, overcrowding and poor hygiene could be predisposing factors encouraging the high rate of dermatophyte infections among the studied population.

On the other hand, the low incidence of dermatophyte infections observed among the age group 13 and above could be attributed to the increased level of awareness on personal hygiene and self consciousness as well as the reduced propensity to play dirty with soil materials and dirty inanimate objects. Similarly, the low prevalence of *Tinea corporis* and *Tinea unguium* as observed in this study which conformed with the result of the research reported by Wariso *et al.*,(2015), could be a resultant effect of frequent hand washing observable among children and the presence of saturated fatty acids on the skin to prevent the establishment of the dermatophytes.

Conclusion and Recommendations

This study has shown the high incidence of dermatophyte infections among primary school pupils in Obio-Akpo local government area and as well as among male pupils compared to females. Secondly, it was able to show that the high prevalence of *Tinea capitis* among primary school children and established the presence of *Trichophyton tonsurans* among other dermatophyte species isolated like *Trichophyton mentagrophytes*, *Microsporum audouinii*, *Trichophyton rubrum*, *Microsporum canis*, as the commonest agent causing dermatophytes infections in primary school children. Therefore, adequate awareness should be carried out on how this public health problem could be curbed with greater emphasis on proper hygiene and general public awareness about the disease and measures to take to avoid such infection. Also, it is our humble recommendation that relevant government agencies should consider the establishment of a standard reference mycology laboratory in Rivers state as against the current situation and there should be concerted policy efforts at training interested mycology biased scholars is specialized medical mycology microscopy, molecular diagnosis and biochnology to enhance the expertise and research for optimum utilization for the good of the society.

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Ajao, A. O., Akintunde, C. A (2005). Studies on the prevalence of *Tinea capitis* in Ile-Ife. *Mycopathologia*, 89, 43–48.

References

Ayaya, S. O., Kamar, K. K. & Kakai, R.(2000). Aetiology of *Tinea capitis*. *East African Medical Journal*, 78, 531–535.

Barry, L. H (2003). Dermatophytes Infections. *American Family Physicians*. 67, 101-177.

Cheesbrough, M. (2000). *District Laboratory Practice In Tropical Countries (Part 2)*. Cambridge Press, Cambridge, United Kingdom.

Chepchirchir, A., Bii, C., Ndinya-achola, J. O. (2009). Dermatophyte infections in primary school children in Kibera slums of Nairobi Correlation. *International Journal of Dermatology*, 24(2), 116–119.

Ely, J., Rosenfeld, S., Seabury, S. M (2014) Diagnosis and Management of *Tinea* Infections. *American Family Physician*, 90(10), 702-711.

Gugnanio, H. C. (1982) Mycoses as a Public Health Problem in Nigeria. *Nigerian Journal of Microbiology*, 2(1), 47- 48.

Ndunge M. J., Muthini M., & Anthony K (2015). Prevalence of *Tinea capitis* in school going children from Mathare, informal settlement in Nairobi, Kenya. *BMC Research Notes*, 8, 274.

Nweze, E.I. and Okafor, J. I. (2005). Prevalence of dermatophytic fungal infections in children: A Recent Study in Anambra State, Nigeria. *Mycopathologia*, 160, 239-243.

Okafor, J.I. & Ngwogu A. (2002). Keratinolytic activities of five Human isolates of the dermatophytes. *Journal of Communicable Diseases*, 32: 300-30

Omar, A. A. (2000). Ringworm of the scalp in primary school children in Alexandria: infections and carriage. *East African Mediterranean Health Journal*, 6(5):961–967.

Wariso, K. T. (2012). *Lecture Notes in Medical Mycology*. Anco Press, Port Harcourt.

Wariso, K. T., Igunma, J. A. & Oboro, I. L. (2015). Pattern of Dermatophytes Isolated in the Medical Microbiology Laboratory of the University of Port Harcourt Teaching Hospital, Rivers State, Nigeria. *Advances in Microbiology*, 5, 346-350.

WHO (2005) Epidemiology and management of common skin diseases in children in developing countries. WHO/FCH/CAH/05.12WHO/FCH/CAH/05.12, p 6.