

*Full Length Research Paper*

# ***Tinea capitis*: A tropical disease of hygienic concern among primary school children in an urban community in Nigeria**

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***Tinea capitis* is the most common dermatophyte infection in school age children in developing countries and is known to impact negatively on their health and well-being. This study determined the prevalence of *T. capitis* and its relationship with hygiene among primary school pupils in Ile-Ife. This descriptive cross-sectional study recruited randomly selected pupils from public and private schools in Ile-Ife from March to April 2017. The data was collected with the use of a pre-tested interviewer-administered questionnaire on hygiene followed by physical examination. Children with a clinical diagnosis of tinea capitis had scalp and hair scrapings for microscopy and culture. Data were analyzed using descriptive and inferential statistics. A total of 420 pupils participated, 240 (57.1%) males and 180 (42.9%) females aged between 4 and 16 years. The overall prevalence rate of *T. Capitis* infection was 21.7% with etiological agents consisting of *Epidemophyton floccosum* (12.0%), *Microsporum gypseum* (7.7%) and *Trichophyton mentagrophytes* (7.7%) while 33% grew *Aspergillus niger* (a contaminant) and no organism was isolated in 36 (39.6%) clinically diagnosed cases. The infection was prevalent among pupils sharing combs, had close contact with animals, playing with sand and lower socio-economic status. School type and personal hygiene were the major determinants of tinea capitis infection. Prevalence of *T. capitis* infection among school children was high and the infection is associated with poor level of hygiene and low socio-economic status. Health promotion and health education interventions are needed to promote good hygiene, early identification and treatment of the infection.**

**Key words:** *Tinea capitis*, primary school children, poverty, hygiene.

## **INTRODUCTION**

*Tinea capitis* is a fungal infection of the scalp. It is an important infective superficial dermatological disease of

worldwide distribution among children. The fungus is either within the hair shaft (endothrix) or spread out over

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the hair surface (ectothrix). *Tinea capitis* usually gives dull gray, circular patches of alopecia, scaling, itching, and often with a black dot (Brooks et al., 2010).

*T. capitis* is much common in children, especially those of black African origin, whose scalp and hair seems more susceptible to fungal invasion (Kumar and Clark, 2009).

In the tropics, tinea capitis is usually aesthetically unacceptable, as it "can be unsightly or disfiguring" (Fathi and Al-Samarai, 2000). In Nigeria, its prevalence has been correlated with the warm humid climate, crowded living, poor sanitary condition of majority of the populace, which has been enhancing the spread of the disease (Ayanlowo et al., 2014).

*T. capitis* is a not a notifiable disease in Nigeria but it is a cause for concern due to its contagious nature. It inflicts a lot of psychosocial trauma due to attached social stigma as well as representing a potential source of secondary bacterial infection if not adequately treated. It is endemic in Nigeria and many factors have been attributed to the spread of this condition which includes warm and humid conditions, poor socioeconomic status of the majority of the populace linked to poor environmental sanitary conditions (Anosike et al., 2005).

The aetiological agents vary from one geographical location to another. In Africa, *Microsporum audouinii* and *Trichophyton soudanese* are predominant (Ameen, 2010; Anosike et al., 2005; Ayanbimpe et al., 2003). In the western regions of the world, *Trichophyton tonsurans* has emerged the predominant cause of *T. capitis* (Ameen, 2010). Variations have been observed even within the country (Akinboro et al., 2011; Enendu and Ibe, 2005; Ayanbimpe et al., 2003).

Attention is not drawn to it because of the relatively benign course of the disease and also not being a notifiable disease. Thus, the actual prevalence figures are unknown in many endemic areas (Anosike et al., 2005). Variety of treatments have been formulated by the locals and applied, majority of which are largely ineffective and has contributed to its relative persistence in this community.

Ringworm of the scalp is presently one of the commonest dermatophytoses in Nigeria. Published reports are however very scanty in this area and a major study in Ile-Ife was last conducted in 1985 (Ajao and Akintunde, 1985) which focused mainly on the prevalence of the disease and the aetiological pathogens. Other studies had also looked at prevalence without relating it to hygiene. This study however intends to assess the prevailing situation of *T. capitis* and its relationship with level of hygiene.

## MATERIALS AND METHODS

Cross-sectional study was conducted at Ife Central local Government Area of Osun State, Nigeria among primary school

pupils during the months of March and April, 2017. The minimum sample size was determined by using the formula for calculating sample size for single proportions (Araoye, 2003).

$$n = \frac{p(1-p)Z^2}{\sigma^2}$$

n – desired sample size

z – confidence level which corresponds to the standard normal deviate usually set at 1.96

p – Prevalence = 45% that is, 0.45 (Dogo et al., 2016)

σ – Error margin i.e. a degree of accuracy required and usually sets at 5% that is, 0.05

$$n = \frac{0.45(1 - 0.45) \times (1.96)^2}{(0.05)^2} = 380.16$$

n = 380 (which was rounded off to 420 to allow for attrition of 10%)

A list of all the private and public primary schools in Ife central area was retrieved from the Local Inspectorate of Education office. It contained a total of 36 public schools and 20 private schools. Multi-stage sampling technique was employed to select the respondents. At the 1st stage, schools were stratified into private and public thereafter at the 2nd stage, 4 schools each were selected from both public and private schools from a list of schools making a total of 8 schools using a simple random sampling technique. At the 3rd stage, 210 pupils each were selected to participate from public and private schools using sampling proportionate to size based on enrolment in each school. In each of the schools, pupils from all levels were selected randomly from class list.

Pupils of public and private primary schools whose head teachers accepted to participate in the study were enrolled in the study while pupils who were ill or not willing to participate in the study were excluded. An interviewer-administered questionnaire was used to assess the pupils' personal and school hygiene. The questionnaire contained 2 sections: biodata and hygiene practices of pupils. Information on the educational status of the mother and the job description of the respondent's father was also collected and used for socioeconomic stratification into social class 1 to 5 (Oyedepi, 1985).

In this study, class 1 and 2 were grouped as upper social class, class 3 as middle social class while class 4 and 5 were grouped as lower social class to aid data analysis. Personal hygiene score was calculated by scoring individual pupil's bathing frequency, frequency of washing hair with soap, comb sharing, frequency of hair-do, playing with sand and playing with domestic animals. The scores were categorized as poor (0 to 2), average (3 to 5), good (6 to 9). The internal consistency was assessed using Cronbach's alpha and split half technique. Cronbach alpha was 0.51 which was fair and split half had equal loading.

A physical examination was also conducted to assess students for *T. capitis* by a public health physician who assessed the following characteristics (scaly patches on the scalp, with or without hair loss; partial hair loss with broken-off hairs, brittle and lusterless hair strands, annular lesions with fairly sharp margins, massive scaling and folliculitis). Skin scrapings from the active edge of the lesion were taken into a sterile blotting paper using the edge of a glass slide from those with features suggestive of *T. capitis*. Samples were thereafter taken for mycological examination. Identification of all specimens taken from the scalp were done by direct microscopy with 10% potassium hydroxide. Specimens were cultured in sabouraud dextrose agar impregnated with chlorhexidine and the samples were then inoculated into separate petri dishes

**Table 1.** Socio-demographic characteristics of respondents.

Variable	Frequency (N=420)	Percentage
<b>Age group</b>		
4-6	145	34.5
7-9	168	40.0
10-12	73	17.4
13-16	34	8.1
<b>Sex</b>		
Male	240	57.1
Female	180	42.9
<b>Ethnicity</b>		
Yoruba	220	52.4
Igbo	100	23.8
Hausa	60	14.3
Others	40	9.5
<b>Religion</b>		
Christianity	200	47.6
Islam	166	39.5
Others	54	12.9
<b>Mothers' highest level of education</b>		
None	70	16.7
Primary	180	42.9
Secondary	120	28.6
Tertiary	50	11.9
<b>Social class</b>		
Upper	76	18.1
Middle	200	47.6
Lower	144	34.3
<b>School type</b>		
Private	210	50.0
Public	210	50.0

and incubated at 37°C for 3 to 4 weeks. Data were analyzed using IBM-SPSS version 20. Univariate analysis was carried out to determine the socio-demographic distribution of study participants through the use of frequency tables and percentages. Chi-square test was carried out to determine significance of association while a binary logistic regression analysis was done to ascertain the determinants of *T. capitis* and p-value was significant at <0.05.

Ethical clearance was obtained from the Ethics committee of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife (HREC number: IPHOAU/12/657). Permission was taken from the Local Inspectorate of Education office and school authorities. Informed consent was obtained from parents while assent was taken from the pupils. All patients with *T. capitis* were treated with topical antifungal agent (Whitfield's ointment, which contains 6% w/w benzoic and 3% w/w salicylic acid).

## RESULTS

Table 1 showed that two-fifth of the respondents (40%) were within the age group of 7 to 9 years. Majorities were of the Yoruba ethnicity (52.4%) and were in the middle social class (47.6%) while mother's highest level of education was primary school (42.9%). Table 2 showed the prevalence of *T. capitis* was 21.7%. *Aspergillus brasiliensis* a contaminant was the highest fungal isolate (33%) while *Epidermophyton floccosum* (12.0%) was the commonest dermatophyte isolated followed by *Microsporum gypseum* and *Trichophyton metangrophytes* (7.7%) each.

Regarding the result of Table 3, present study showed that less than half of the respondents (47.0%) had their bath twice daily, while 52.4% shared their combs with others. Majority of the respondents (51.3%) washed their hair with soap daily. Most of the female respondents had their hair done once in a month (50.0%) while 44.2% of the boys shaved with their personal clipper. About 14% of the respondents played with sand and 42.8% played with domestic pets. Overall about half of the respondents (48.6%) have poor level of hygiene. This study revealed that there was a statistically significant association between social class and presence of *T. capitis* with 13% of pupils from upper social class having *T. capitis* compared to 42% of those from lower social class ( $p < 0.001$ ) and a statistically significantly higher proportion of pupils from public school having *T. capitis* (25.7%) compared to 17.6% of pupils from private school ( $p = 0.04$ ). There was no statistically significant association between sex and presence of *T. capitis* ( $p = 0.34$ ) as shown in Table 4.

According to Table 5 there was a statistically significant relationship between frequency of bath and presence of *T. capitis* with over a third of the respondents (36.8%) who had their bath daily having *T. capitis* compared to 6.7% of their counterpart who had their bath more than once daily ( $p < 0.001$ ). 33% of respondents who shared combs had *T. capitis* compared to 10% of their counterparts who do not share comb ( $p < 0.001$ ). 28% of the respondents who played with domestic animals/pets had *T. capitis* compared to 17% of those who do not ( $p < 0.001$ ) while 92% of those that played with sand had *T. capitis* compared to 10% of those that do not play with sand ( $p < 0.001$ ). There was a statistically significant relationship between upkeep of the hair in both sexes and presence of *T. capitis* ( $p < 0.001$ ). Use of personal clippers was also associated with *T. capitis* with *T. capitis* occurring in 11% of those who use personal clippers compared to 27% of those who do not use ( $p = 0.003$ ).

The principal determinants of *T. capitis* were school type and personal hygiene status. Pupils in a public school were four times more likely to have *T. capitis* than those in private schools. Pupils with good hygiene were four times less likely to have *T. capitis* than those with

**Table 2.** Frequency of culture isolates of *T. capitis* in studied group.

Variable	Frequency	Percentage
<b>Tinea capitis (N=420)</b>		
Present	91	21.7
Absent	329	78.3
<b>Culture isolates (N=91)</b>		
<i>Microsporiumgypseum</i>	7	7.7
<i>Trichophyton metangrophytes</i>	7	7.7
<i>Epidermophyton floccosum</i>	11	12.0
<i>Aspergillus brasiliensis</i>	30	33.0
No organism isolated	36	39.6

poor personal hygiene (Table 6).

## DISCUSSION

*T. capitis* has been shown to be a major public health challenge in primary school pupils in Nigeria and all over the world and this has again been demonstrated in this study where the prevalence of *T. capitis* among primary school pupils is 21.7%. This was found to be higher when compared to a similar study done in Ile Ife by Ajao et al. (1985) with a prevalence of 14.0%, which might be suggestive of an increase in the prevalence of the disease over the years. It is also higher compared to studies by Emele and Oyeka, (2008) and Enendu and Ibe (2005) in eastern Nigeria who found a prevalence of 9.4% and 13.9% respectively which could probably be due to difference in geographical location for the study. The prevalence of *T. capitis* from our study was found to be lower than that by Akinboro et al. (2011) in a community in Oshogbo among children aged 5 to 16 years with a reported prevalence at 43.5% which may not be unconnected with the fact that their study was done in the community as opposed to school based in our own study.

The present study assessed primary school pupils who were within the age range of 4 to 16 with the most being between 4 and 12 years old which is the age range purported to have the highest prevalence as reported by Akinboro et al. (2011). *T. capitis* is the most common type of dermatophytosis among children and most commonly spread by close contact, especially in schools and households from human carriers, pets and via inanimate objects like combs, clippers and hairdresser equipments (Akinboro et al., 2011; Chepchirchir et al., 2009). There is no demonstrable sex predilection for *T. capitis* in this study which is at variance with other studies (Dogo et al., 2016; David et al., 2010; Emele and Oyeka, (2008); Enendu and Ibe, 2005; Nweze, 2001). Various conflicting views exist regarding the sexual predominance of *T. capitis* which may be attributed to hairdressing and styling practices such as tight hair braiding, shaving of

the scalp, plaiting, and the use of hair oils which may promote disease transmission. However, the precise role of such practices remains a subject for another study.

In this study, majority of respondents from lower social economic class had *T. capitis*. This is in keeping with findings of other studies that revealed the link between lower socio-economic status and prevalence of *T. Capitis* (Ayanlowo et al., 2014; Akinboro et al., 2011; Ajao et al., 1985). The findings in our study might be due to the fact that parents of children from lower socio economic status may not have enough funds to provide personal clippers, individual combs, bedding materials, and toiletries for their children and this can result in easy spread of infection among such children once one of them is infected from school or in the neighbourhood. Such children may also live in slums with poor environmental hygiene and overcrowding which facilitate growth of the organism.

Children from low socio-economic class may not access care on time due to lack of funds or ignorance on the part of their parents. This study showed that there was higher prevalence of *T. capitis* in the public schools compared to the private schools. This was similar to finding from a comparative study of *T. capitis* in children of public and private schools in Rivers state, Nigeria (Wokoma, 2009). This may be due to the fact that children of lower social class are more likely to attend public schools where little or no school fees is paid and lower social socio-economic status have been found to be responsible for higher prevalence of the disease in this study and also buttresses the influence of seasonality and geography on skin diseases.

The predominant fungal isolate in this study was *Aspergillus niger* (33%) which was contrary to the findings of other studies (Akinboro et al., 2011; Enendu and Ibe, 2005; Ayanbimpe et al., 2003; Ajao and Akintunde, 1985) and this could be as a result of climatic influence on aetiology of mycoses. *Epidermophyton floccosum* (12.2%), *M. gypseum* and *T. metangrophytes* (7.7%) were the least isolated organisms. The findings from this study revealed that *T. capitis* was more among those that bath daily compared to those who bath more than once daily. This may be because most houses do not have pipe-borne water therefore some children have to trek some distance to access water, some of whom on their way to get water play with sand, carry buckets on their heads and may have contact with the infectious agents. This lack of easy access to water may reduce frequency of bathing and allow colonization of the skin by the fungi agents following contact with the infectious agents. There was higher prevalence of *T. capitis* in those who had close contact with pets or domestic animal compared to their counterparts in this study. This was similar to findings from a study from Sokoto state of Nigeria where livestock and pet domestication was found as a common practice in households. That study

**Table 3.** Hygiene practices among respondents.

Variable	Frequency (N=420)	Percentage
Frequency of bathing		
Once daily	193	46.1
Twice daily	197	47.0
More than twice daily	30	6.9
Sharing of comb		
Yes	220	52.4
No	200	47.6
Frequency of washing hair with soap (boys) N=240		
Once in a week	34	14.2
Once in two days	21	8.8
Once daily	123	51.3
More than once daily	62	25.7
Frequency of hair-do (for girls) N=180		
Once weekly	45	25.0
Two to three times a month	40	22.2
Once in a month	90	50.0
Once in two months	5	3.8
Play with sand	60	14.4
Play with domestic animals/pets	180	42.8
Shave with personal clipper (boys) N=240	106	44.2
Personal hygiene		
Poor	204	48.6
Average	158	37.6
Good	58	13.8

**Table 4.** Association of *T. capitis* with some socio-demographic characteristics.

Variable	<i>T. capitis</i> present (N=91)	<i>T. capitis</i> absent (N=329)	Statistic
<b>Social class</b>			
Upper	10 (13.1)	66 (86.9)	$\chi^2=55.6$ ; $P<0.001$
Middle	20 (10.0)	180 (90.0)	
Lower	61 (42.4)	83 (57.6)	
<b>Sex</b>			
Male	48 (20.0)	196 (80.0)	$\chi^2=0.92$ ; $P=0.34$
Female	43 (23.9)	137(76.1)	
<b>Type of school</b>			
Public	54 (25.7)	156 (74.3)	$\chi^2=4.05$ ; $P=0.04$
Private	37 (17.6)	173 (82.4)	

established the fact that domestic animals are important reservoir of tinea (Ameh and Okolo, 2004). Other studies have also shown that children having close contact with

animals or pets had *T. capitis* compared to their counterparts who do not (Ayanlowo et al., 2014; Ginter-Hanselmayer et al., 2007).

**Table 5.** *T. capitis* and hygiene practices.

Variable	<i>T. capitis</i> present (N=91)	<i>T. capitis</i> absent (N=329)	Statistic
<b>Frequency of bathing</b>			
Once daily	71 (36.8)	122 (63.2)	$\chi^2=48.19$ ; P< 0.001
Twice daily	18 (10.1)	179 (89.9)	
More than twice daily	2 (6.7)	28 (93.3)	
<b>Sharing of comb</b>			
Yes	72 (32.7)	148 (67.3)	$\chi^2=33.30$ ; P <0.001
No	19 (9.5)	181 (90.5)	
<b>Frequency of washing hair with soap (boys)</b>			
Once a week	23 (67.6)	11 (33.4)	$\chi^2=75.2$ ; P <0.001
Once in two days	10 (47.6)	11 (52.4)	
Daily	8 (6.5)	115 (93.5)	
More than once daily	7 (11.3)	55 (88.7)	
<b>Playing with sand</b>			
Yes	55 (91.7)	5 (8.3)	$\chi^2=188.5$ ; P<0.001
No	36 (10.7)	300 (89.3)	
<b>Playing with domestic animal/pet</b>			
Yes	50 (27.8)	130 (72.2)	$\chi^2=6.93$ ; P =0.01
No	41 (17.1)	199 (82.9)	
<b>Frequency of hair-do (girls)</b>			
Once a week	3 (6.7)	42 (93.3)	$\chi^2=16.24$ ; P =0.001
Twice a month	7 (17.5)	33 (82.5)	
Monthly	30 (33.3)	60 (66.7)	
Every two months	3 (60.0)	2 (40.0)	
<b>Shaving with personal clipper (boys)</b>			
Yes	12 (11.3)	94 (88.7)	$\chi^2=8.94$ ; P =0.003
No	36 (26.9)	98 (73.1)	
<b>Level of personal hygiene</b>			
Good	5 (8.6)	53 (91.4)	$\chi^2=6.77$ ; P =0.03
Average	37 (23.4)	121 (76.6)	
Poor	49 (24.0)	155 (76.0)	

It is culturally believed in this environment that rearing animal can prevent evil from occurring in a household, households also rear animals for sale and personal consumption. Some of these animals harbour fungi infections and children have close contacts with such animals which might explain the reasons for more *T. Capitis* infection among those in close contact with pets and animals compared to those who are not. This study revealed that children with proper upkeep of their hair and those who possess personal clippers had less

prevalence of *T. capitis* compared to their counterparts who do not. This is in line with findings gotten by Akinboro et al. (2011) at Osogbo and David et al. (2010) in Adamawa state that showed that barbing equipment can harbour fungi infections and thereby transmitting it. The findings in this study might be due to the fact that regular hair upkeep and possession of personal clippers and combs reduces exposure to the barbing and hairdresser equipments which may harbor the tinea infection.

**Table 6.** Determinants of *T. capitis*.

Variable	$\beta$	OR	95% CI	P value
School type (Public)	1.51	4.55	2.59-7.98	<0.001
Poor personal hygiene (Ref)	-	-	-	0.03
Fair personal hygiene	-0.99	0.38	0.10-1.37	0.13
Good personal hygiene	-1.49	0.24	0.06-0.82	0.24
Constant	-1.07	0.34	-	0.11

Nagelkerke  $R^2=15\%$ .

Hygiene status of an individual's skin has been cited as one of the risk factors associated with the acquisition of dermatophyte infections. The poorer the hygiene, the higher the chances of acquiring infection. This assertion is corroborated by our study which reported a statistically significant relationship between level of hygiene and presence of *T. capitis*. This finding is in keeping with findings of other previous study in Nigeria and other African countries (Amaran et al, 2011; Ali et al., 2009; Menan et al., 2002).

## Conclusion

Prevalence of *T. capitis* is still high in this environment, personal hygiene and socio-economic status are important predictors of *T. capitis* infection. Thus, more attention needs to be paid to personal hygiene through health promotion and education interventions to reduce the scourge of *T. capitis*.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

## REFERENCES

- Ajao A, Akintunde C (1985). Studies on the prevalence of tinea capitis infection in Ile-Ife, Nigeria. *Mycopathologia* 89(1):43-48.
- Akinboro AO, Olasode OA, Onayemi O (2011). The pattern, risk factors and clinic-aetiological correlate of Tinea capitis among the children in a tropical community setting of Osogbo, South-Western Nigeria. *Afro-Egyptian Journal of Infectious and Endemic Diseases* 1(2):53-64.
- Ali J, Yifru S, Woldeamanuel Y (2009). Prevalence of tinea capitis and the causative agent among school children in Gondar, North West Ethiopia. *Ethiopian Medical Journal* 47(4):261-269.
- Ameen M (2010). Epidemiology of Superficial Fungal Infections. *Clinical Dermatology* 28:197- 201.
- Ameh I, Okolo R (2004). Dermatophytosis among school children: Domestic animals as predisposing factor in Sokoto, Nigeria Pakistan. *Journal of Biological Sciences* 7:1109-1112.
- Amaran O, Runsewe-Abiodun O, Mautin A, Amaran I (2011). Determinants of dermatological disorders among school children in Sagamu, Nigeria. *Educational Research* 2(12):1743-1748.
- Anosike J, Keke I, Uwaezuoke J, Anozie J, Obiukwu C, Nwoke B, Amajuoyi O (2005). Prevalence and distribution of ringworm infections in Primary school children in parts of Eastern, Nigeria. *Journal of Applied Sciences and Environmental Management* 9(3):21-26.
- Araoye MO (2003). Research methodology with statistics for health and social sciences. Ilorin: Nathadex Publisher 115(9).
- Ayanbimpe G, Enweani I, Solomon E (2003). Fungal infections in Jos: a 9-year study. *African Journal of Clinical and Experimental Microbiology* 4(2):2-10.
- Ayanlowo O, Akinkugbe A, Oladele R, Balogun M (2014) Prevalence of Tinea capitis infection among primary school children in a rural setting in south-west Nigeria. *Journal of Public Health in Africa* 5:349
- Brooks GF, Carroll KC, Butel JS, Morse SA, Mietzner TA (2010) Jawetz, Melnick, & Adelberg's Medical Microbiology, The McGraw-Hill Companies.
- Chepchirchir A, Bii C, Ndinya-Achola J (2009). Dermatophyte infections in primary school children in Kibera slums of Nairobi. *East African Medical Journal* 86(2).
- David D, Edward A, Zaruwa M, Addass P (2010). Barbing Saloon Associated Fungal Disease Infection in Mubi, Adamawa State-Nigeria. *World Journal of Medical Science* 5(1):17-21.
- Dogo J, Afegbua S, Dung E (2016). Prevalence of Tinea Capitis among School Children in Nok Community of Kaduna State, Nigeria. *Journal of Pathogens*.
- Enendu N, Ibe S (2005). Prevalence of Tinea capitis among primary school pupils In uli, anambra state, Nigeria. *African Journal of Applied Zoology and Environmental Biology* 7(1):1-4.
- Fathi H, Samarai A (2000). Prevalence of tinea capitis among schoolchildren in Iraq. *East Mediterranean Health Journal* 6:128-137.
- Ginter-Hanselmayer G, Weger W, Smolle J (2007). Epidemiology of tinea capitis in Europe: Current state and changing pattern. *Mycoses* 50:6-13.
- Kumar P, Clark MK (2009). *Clark's Clinical Medicine*, 7th Edition ed. Edinburgh: Saunders Elsevier, Edinburgh, UK, 7th edition; 2009. [https://archive.org/details/md\\_4\\_arab](https://archive.org/details/md_4_arab)
- Ménan E, Zongo-Bonou O, Rouet F, Kiki-Barro P, Yavo W, Névabi F, Koné M (2002). Tinea capitis in schoolchildren from Ivory Coast (western Africa). A 1998–1999 cross-sectional study. *International Journal of Dermatology* 41(4):204-207.
- Nweze EI (2001). Etiology of dermatophytoses amongst children in northeastern Nigeria. *Medical Mycology* 39:181-184.
- Oyedéji GA (1985). Socioeconomic and cultural background of hospitalised children in Ilesha. *Nigerian Journal of Paediatrics* 12(4):111-117.
- Wokoma EC (2009). Comparative study of Tineacapitis in children of public and private schools in Rivers state, Nigeria. *Asian Journal of Microbiology, Biotechnology and Environmental Sciences* 11(3):507-512.