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# Prevalence of Tinea Capitis among School Children in Kudan, Kaduna State.

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## ABSTRACT

*The prevalence of Tinea capitis being an infection of the scalp by dermatophytes has increased in children worldwide. A total of 100 children were screened for dermatophytes and 45% were found to be infected with different species of dermatophytes which was achieved by fungal culture and microscopy using Sabouraud Dextrose Agar supplemented with 2% cycloheximide and lactophenol cotton blue solution respectively. The prevalence was found to be higher in children of the age group between 5 and 10 years (42.6%) than among 11- 15 years age group. Trichophyton rubrum (27.27%) and Microsporum canis (24.24%) were the most prevalent species isolated and the least were Trichophyton verrucosum (04.55%) and Trichophyton tonsurans (04.55%). Single dermatophyte infections accounted for 73.3% while mixed dermatophyte infections accounted for 26.7%. The predisposing factors with statistically significant association with tinea capitis were number of persons in the family (p=0.0152), age of children (p=0.0006) and shaving of hair at the barber's shop (p=0.0098). This is an indication that there is high tendency for the spread of the disease through human contact. Community health education on the cause, mode of transmission, prevention as well as treatment of tinea capitis is recommended. This cross-sectional study was carried out to determine the prevalence and associated risk factor of tinea capitis among school children in Kudan, Kaduna State, Nigeria.*

**Keyword:** Dermatophytes, tinea capitis, school children, Kudan, Kaduna State.

## 1.0 INTRODUCTION

Dermatophytes are fungi that require keratin for growth. They cause superficial infections of the skin, hair and nails and are spread by direct contact from other people, animals, soil, as well as indirectly from fomites (Heiner *et al*., 2003). Dermatophytes that are spread directly from one preson to another (anthropophilic), those that live in the soil and are transmitted to humans from soil (geophilic) and others are spread to humans from animal hosts (zoophilic). Transmission of dermatophytes can also occur indirectly from fomites (e.g. upholstery, hair brushes and hats). Apart from climate, the variability in distribution of dermatophytes worldwide is attributed to other factors such as population migration patterns, lifestyle, primary host range, presence of immunodeficiency diseases and patients attitude to prompt treatment following clinical presentation and standard of living (Guerrant *et al*., 2011). Dermatophytosis may result in different clinical syndromes such as tinea capitis (hair shaft and scalp), tinea corporis (body), tinea cruris (groin), tinea pedis (foot), and tinea unguium (hand) depending on the body site affected. Tinea capitis is an infection of the scalp and hair shaft caused by several species of *Trichophyton* and *Microsporum* (Olusola *et al*., 2014). It is the most common

dermatophytosis in children of ages between six months and pre-pubertal age (Mayowa *et al*., 2015). It has been reported more in males than in females within prepubertal age (Balci *et al.,* 2014). Tinea capitis is common in Africa and its prevalence among children is 14–86% (Guerrant *et al*., 2011). Studies carried out in different parts of Nigeria have proven that causative agents of tinea capitis vary from one location to the other. In the study carried out by Ayorinde *et al.,* (2013) in Ogun State, Nigeria, it was reported that *Trichophyton tonsurans* 8(17.8%) is the most prevalent species. Nweze (2001) reported *Trichophyton schoenleinii* as the predominant cause of tinea capitis in Borno. In a similar study carried out by Adeleke *et al*., (2008), they reported *Trichophyton rubrum* as the most prevalent followed by *Microsporum audounii*. Nweze and Okafor (2005) reported *Trichophyton tonsurans* as the most prevalent aetiological agent of tinea capitis in Anambra state, Nigeria. The present study is aimed at determining the prevalence of tinea capitis among school children in Kudan, Kaduna State Nigeria.

## 2.0 MATERIALS AND METHODS

### 2.1 Study Area

Kudan Local Government area has a total land mass of about 829 square kilometre with a total population of 152,476. It shares boundries with Makarfi Local Government Area in the east, Giwa Local Government Area in the west, Danja Local Government Area in Katsina State to the north and Sabon Gari Local Government Area to the south (http://www.population.gov.ng/). The main occupation of the people is agriculture.

### 2.2 Study Population and Study Design

Descriptive cross-sectional study was conducted among children of primary school age in Kudan, Kaduna State.

### 2.3 Ethical considerations/ Consent

Approval was sought and obtained from the Ethical Committee of Kaduna State Ministry of Health for this research. Permissions were obtained from the Head-teachers, class teachers and the pupils of the surveyed schools. Informed verbal and written consents were obtained from the parents/guardians for participation of their children/wards in the study.

### 2.4 Collection of Sample

The scalp of each child was examined for scaly grey patches, lusterless hair strands and prudent lesions (Akinboro *et al.,* 2011). Infections site were cleaned with 70% alcohol and scrapings from actively growing margins of the lesions were collected using sterile scalpel (Olusola *et al.,* 2014).

### 2.5 Administration of Questionnaires

Structured questionnaires were administered at the point of sample collection to obtain socio-demographic data and information on associated risk factors to this study.

### 2.6 Identification and Characterization of Dermatophyte Culture

Samples collected were cultured on Sabouraud Dextrose Agar supplemented with 2% cyclohexamide prepared according to manufacturer's instruction [DebenDiagnostics, U.K]. The samples were inoculated onto the prepared media and incubated at room temperature for 4 weeks. They were examined daily for growth (Ahmed *et al.,* 2006). One hundred (100) mg of the fungal culture was prepared on a glass slide and stained with a drop of lactophenol cotton blue solution, covered with a cover slip and observed under a microscope. Dermatophytes were identified based on macroscopic (growth characteristics and pigmentation) and microscopic morphology (formation of macroconidia and

microconidia) as described by Refai *et al.*, (2013).

### 2.7 Data Analysis

Data were analysed using Chi square ($\chi^2$) test for association with $p < 0.05$ defined as the minimum level of significance to test factors associated with tinea capitis. Results were presented in charts and tables.

## 3.0 RESULTS

### 3.1 Socio-demographic Characteristics of Study Population

A total of 100 scalp scrapings were collected and analysed for dermatophytes. Table 1 shows the socio-demographic characteristics of the participants. The ages of participants ranged from 5 to 15 years. Male participants comprised of 65% (65/100) while 35% (35/100) were females hence giving males: females ratio of 1.86:1 (Figure I). Children of the age group 5-10years constituted 68% of the study population while 11-15 years age group constituted 32%.

### 3.2 Prevalence of Tinea capitis

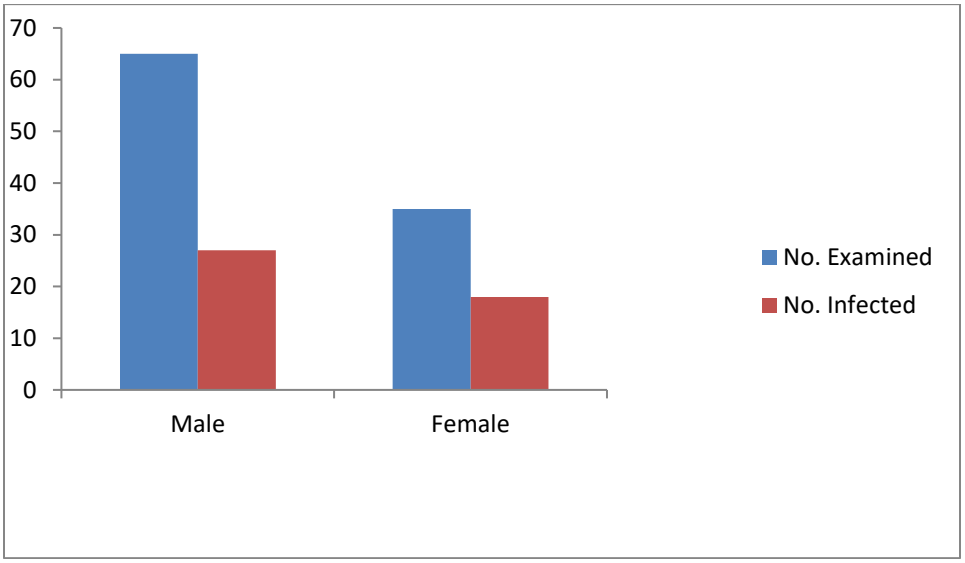
The overall prevalence of tinea capitis in the study population is 45% and infection was found to be more prevalent among females 18/35(51.4%) than males 27/65(41.5%) although not statistically significant (p =0.343023). Prevalence of tinea capitis with respect to age was found to be lower among the 5-10 year age group 45.32%(29/64) than those in the age group of 11-15 years 80.60%(29/36) and the difference was statistically significant (p= 0.0006). Those that cut their hair at the barber's shop had higher prevalence of 46.30%(19/41) while those that do not cut their hair at the barber's shop had the prevalence of 24.30%(9/37). Participants that had contact with pets and livestock had the prevalence of 44.70%(42/94) while those that had no contact with pets and livestock had the prevalence of 50.00%(3/6) (Figure II). Families that comprised 1-5 members had prevalence of 37.80% (28/74) while those that comprised more than 5 members had higher prevalence of 65.40%(17/26).

### 3.3 Frequency of Dermatophytes Isolated

A total of 66 dermatophyte species were isolated belonging to the genus *Microsporum* and *Trichophyton* from the 45 cases (Table 2). *Trichophyton rubrum* 27.27% (18/66) was found to be the most frequently isolated dermatophyte followed by *Microsporum canis* 24.24% (16/60), *Microsporum gypseum* 12.12%(8/66), *Trichophyton schoenleinii* 10.61% (7/66), *Microsporum audouinii* 10.61% (7/66), *Trichophyton mentagrophytes* 6.06% (4/66) while *Trichophyton verrucosum* 4.55%(3/66) and *Trichophyton tonsurans* 4.55% (3/66) were the least identified. Mixed infections of 2 or more different dermatophytes species were observed in 12 cases (26.7%) and are shown in Table 3.

**Table 1:** Demographic data and other factors in relation to Tinea capitis among school children in Kudan, Kaduna state.

| Variable | Subcategory | Number examined | Number infected (%) | Chi-square | P-value |
|---|---|---|---|---|---|
| Age group (years) | 5-10 | 64 | 29(45.31) | 11.7477 | 0.0006* |
| | 11-15 | 36 | 29(80.56) | | |
| Number of persons living in the house | 1-5 | 74 | 28(37.80) | 5.8989 | 0.0152* |
| | 5-10 | 26 | 17(65.40) | | |
| Hair cut at hair at barber's shop | Yes | 58 | 27(46.55) | 6.6733 | 0.0098* |
| | No | 42 | 9(21.43) | | |




Gender

**Figure I:** Gender of participan

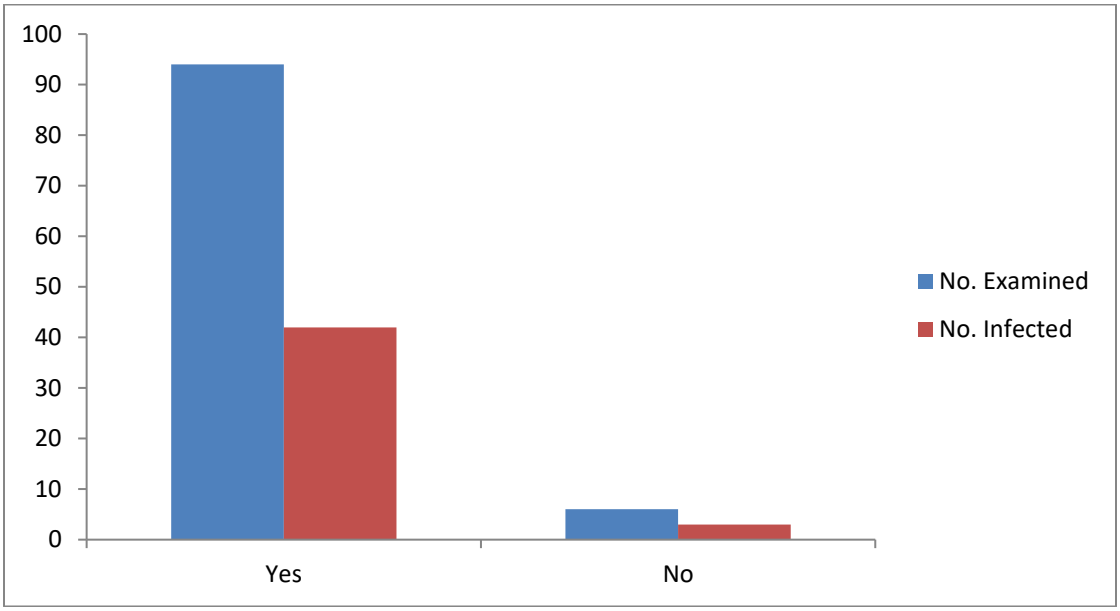



**Figure II:** Participants contact with animals

**Table 2:** Frequency of isolated dermatophytes from school children in Kudan, Kaduna State.

| Dermatophyte isolated | Frequency | Percent (%) |
|---|---|---|
| *Trichophyton rubrum* | 18 | 27.27 |
| *Microsporum canis* | 16 | 24.24 |
| *Microsporum gypseum* | 8 | 12.12 |
| *Trichophyton schoenleinii* | 7 | 10.61 |
| *Microsporum audouinii* | 7 | 10.61 |
| *Trichophyton mentagrophytes* | 4 | 06.06 |
| *Trichophyton tonsurans* | 3 | 04.55 |
| *Trichophyton verrucosum* | 3 | 04.55 |

**Table 3:** Mixed dermatophyte infection among school children in Kudan, Kaduna state with respect to age and gender**.**

| Frequency of Mixed Dermatophyte Infection | Sex | Age group (Years) | Dermatophytes isolated |
|---|---|---|---|
| 4 | M | 5-10 | *M. canis, T. rubrum* |
| | F | 5-10 | *M. gypseum, T. rubrum* |
| 4 | M | 5-10 | *T. schoenleinii, T. rubrum, M. canis, M. gypseum* |
| 4 | F | 5-10 | *T. schoenleinii, T. rubrum, M. canis, M. gypseum* |
| 3 | M | 5-10 | *T. tonsurans, T. schoenleinii, T. rubrum* |
| 3 | M | 5-10 | *T. schoenleinii, M. canis, M. gypseum* |
| 3 | M | 11-15 | *M. audouinii, T. rubrum, T. tonsurans* |
| 3 | M | 11-15 | *T. schoenleinii, T. rubrum, M. canis* |
| 2 | M | 11-15 | *M. canis, M. audouinii* |
| 2 | F | 5-10 | *M. canis, M. audouinii* |
| 2 | M | 11-15 | *T. verrucosum, M. canis* |
| 2 | F | 5-10 | *T. rubrum, M. canis* |

## 4.0 DISCUSSION

The prevalence of tinea capitis for this study was found to be 45%. This is similar to prevalence of 43.53% obtained in a study carried out by Akinboro *et al.* (2011) in Osogbo, South-Western Nigeria. It was found to be higher than the 31.1% in Libya, Ellabib and Khalifa, (2001); 31.6% in Jos, Nigeria, Chukwu, *et al.,* (2011) but lower than 58.2% prevalence obtained by Ndako *et al.,* (2012) in Nassarawa Local Government Area of Kano State; and 57.7% in Mowe, Ogun State, Nigeria by Ayorinde *et al*., (2013). A number of factors may be attributed to the varying prevalence and frequency of tinea capitis in different parts of Nigeria and worldwide (Ahmed *et al.,* 2006). These factors include population growth, close contact with infected children, poor personal hygiene Chepchirchir *et al.*, (2009) as well as contact with pets and domestic animals. More so, Akinboro (2013) suggested that the difference in prevalence could be due to variation in climatic and environmental conditions. The highest infection occurred among the 11-15 age bracket (80.56%) (p=0.0006) compared with ages 5-10 (45.31%) which had the lower number of infections. This is similar to the findings of Adeleke *et al*., (2008) in their study of 2150 Quranic school children examined in Kano State. They discovered that the age groups mostly affected were children between 10-14 years which contradicted to the findings of Chepchirchir *et al*., (2009) who in their research observed highest infection among the age group 6-8

years. The difference in infection among the various age groups could be due to poor hygiene. Higher prevalence of the infection in older children could be attributed to the active sebaceous glands associated with the post-pubertal age (Schmidt, 1997). Prevalence was found to be higher in females (51.40%) than males (41.50%) but not statistically significant (p= 0.34302). This supports the findings of Kalu *et al.,* (2015) carried out among primary school children in a rural South-Eastern Nigerian community. Omar (2000) carried out similar work among primary school children in Alexandria but contrary to the findings of Balci *et al.* (2014). It could be attributed to the fact that scalp infection in females is less common as a result of steroid-mediated inhibition of dermatophyte growth by progesterone and the males may be predisposed to scalp infection due to prepubertal factors such as level of fungistatic fatty acids (Emele and Oyeka 2008). *Trichophyton rubrum*(27.27%) was the most prevalent dermatophyte species isolated. Domination of anthropophilic dermatophytes is an indication of important risk factors that are involved in the spread of tinea capitis in the study area such as direct person to person contact, contact with animals, family size and sharing beds or by indirect contact with infected fomites (Johnson, 2003). It agrees with the findings of (Ayorinde *et al*., 2013; Chukwu *et al.,* 2011) and also with other studies done in Africa and other parts of the world (Chepchirchir *et al.,* 2009; Banerjee *al*., 2015). However, interaction with domestic animals such as cat, goat and sheep could be the source of zoophilic organisms such as *M. canis*(24.24%), *T. mentagrophytes*(06.06%) and *T. verrucosum*(04.55%). The occurrence of *T. verrucossum* in this study could be as a result of direct interaction with soil on farms, on play grounds or as a result of walking without shoes which has been implicated in the report of Aliero *et al.,* (2013). Intimate association with pet and domestic animals could increase the mode of transmission although significant association with the tinea capitis among children that had pets or live stock at home was not recorded(P=0.7996). This agrees with the findings of Chukwu *et al.,* (2011) in their study on dermatophytoses in rural school children associated with livestock keeping in Plateau State, Nigeria, Sanuth and Efuntoye (2010) observed that sharing of residential houses with domestic animals such as cat, dog, goat and sheep could be the source of infection. Shaving of hair at barber's shop was a common phenomenon and found to be a significant risk factor in the study (P=0.0098). The barbers' instruments may play a role in the spread of infection among males. David *et al*., (2010) demonstrated evidence of fungal element in barbing equipment in their study in Mubi, Adamawa state of Nigeria and suggested sensitization of barbers and patronisers on the need for sterilization of barbing equipment. Ayanbimpe *et al*., (2008) also attributed high incidence of T. capitis to continuous contact in barber's shop hence the need for concerted effort to control the infection at the barber's shop. Prevalence of Tinea capitis was significantly higher among families that constitute of five (5) or more members and it is associated with low socioeconomic profile, poor hygiene and overcrowded living conditions which could facilitate the transmission of Tinea capitis This agrees with the findings of (Uneke *et al.,* 2005; Fathi *et al.* 2000; Akinboro *et al.* 2011). Dermatophyte co-infections were found among 26.7% of the pupils which is comparably higher than the 13.8% reported in Shagamu, Nigeria (Emele and Oyeka, 2008). Cases of mixed infections were also reported by Bhatia and Sharma (2014). The prevalence of multiple infections indicate high transmission rate due to poor hygiene,

suboptimal treatment, poor drug adherence or abject poverty. There was an association between tinea capitis and sharing of bed/beddings. This was reported in similar study carried out by Chepchirchir *et al.*, (2009) but no association was observed between tinea capitis and sharing of combs.

## 5.0 CONCLUSION

The prevalence of Tinea capitis among school children in Kudan, Kaduna State was found to be 45%. It was observed that *Trichophyton rubrum* (27.27%) was the most prevalent cause of tinea capitis infection closely followed by *Microsporum canis* (24.24%). *Microsporum gypseum*(12.12%), *Trichophyton schoenleinii*(10.61%), *Microsporum audouinii*(10.61%), *Trichophyton mentagrophytes*(6.06%), *Trichophyton tonsurans*(4.55%), and *Trichophyton verrucosum*(4.55%) were also isolated. Single dermatophyte infections accounted 73.3% while 2-4 mixed dermatophyte infections accounted for 26.7%. There was an association between tinea capitis and the number of family members, age of participants as well as place of shaving hair which may be attributed to the socioeconomic status and hygiene.

## 6.0 RECOMMENDATION

It is recommended that there should be public enlightenment on tinea infections, preventive measures (such as good personal hygiene and sanitary practice) as well as prompt treatment.

## 7.0 ACKNOWLEDGEMENTS

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## 8.0 REFERENCES

Adeleke, S, I, Usman, B, Ihesiulor, G (2008) Dermatophytosis among itinerant quranic scholars in Kano (North West) Nigeria. *Nigerian Medical Practitioner*, 53:33-35.

Ahmed, I, Zaffar, A, Sarwat, N (2006) Prevalence of tinea capitis and asymptomatic carriage amongst school going children. *Journal of Pakistan Association of Dermatologists*, 293 (16):215-219.

Ajao, AO, Akintunde, CA (2005) Studies on the prevalence of tinea capitis in Ile-Ife. *Mycopathologia*, 89:43-48

Akinboro, O, Olayinka, A, Olasode, A, Onayemi, O (2011) The pattern, Risk factors and clinico-aetiological correlate of tinea capitis among the children in a tropical community setting of Osogbo, South-Western Nigeria. *Afro-Egypt Journal of Endemic Diseases*, 1(2): 53-64.

Anosike, JC, Keke, IR, Uwaezuoke, JC, Anozie, JC, Obiukwu, BE, Nwoke, BEB, Amajuoyi, OU (2005) Prevalence and distribution of ringworm infection in primary schools in parts of Eastern Nigeria. *Journal of Applied Science and Environmental Management*, 9:21-25.

Ayanbimpe, GM, Taghir, H, Diya, A, Wapwera, S (2008) Tinea capitis among primary school children in some parts of central Nigeria. *Mycoses*, 51(4):336-340.

Ayorinde, AF, Adesanya, OO, Alaran, OA (2013) A Microbiological Study of Dermatophyte Infection among Primary School Children in Mowe, Ogun State, Nigeria. *Current Research Journal of Biological Sciences*, 5(**5**): 205-209.

Balci, E, Gulgun, M, Babacan, O, Karaoglu, A, Kesik, V, Yesilkaya, S, Turker, T,

Tok, D, Koc, AN (2014) Prevalence of risk factors of tinea capitis and tinea pedis in school children in Turkey. *Journal of Pakistan medical association*, 64:514-518.

Bhatia, VK, Sharma, PC ( 2014) Epidemiological studies on Dermatophytosis in human patients in Himachal Pradesh, India. *SpringerPlus*; 3:134-149.

Chepchirchir, A, Bii, C, Ndinya-achola, JO (2009) Dermatophyte infections in primary school children in Kibera slums of Nairobi. *East African Medical Journal*, 86(2):59-68.

Chukwu, D, Chukwu, OOC, Chuku, A, Israel, BI, Enweani, BI (2011) Dermatophytoses in rural school children associated with livestock keeping in Plateau State, Nigeria. *Journal of Yeast and Fungal Research*, 2(1):13-18.

David, DL, Edward, A, Zaruwa, MZ, Addass, PA (2010) Barbing Saloon Associated Fungal Disease Infection in Mubi, Adamawa State -Nigeria. *World Journal of Medical Sci*ences, 5(1): 17- 21.

Ellabib, MS, Khalifa, ZM (2001) Dermatophytes and other fungi associated with skin mycoses in Tripoli Libya. *Annals of Saudi Medicine*. 21:3-4.

Emele, FE, Oyeka, CA (2008) Tinea capitis among primary school children in Anambra State of Nigeria. *Mycoses*, 51:536-541.

Guerrant, RL, Walker, DH, Weller, PF (2011) Tropical infectious diseases: principles, pathogens and practice. 3rd Ed Philadelphia (PA): Elsevier Churchill, Livingstone. Pp. 559-564.

Hainer, BL (2003) Dermatophyte Infections. *American Family Physician*, 67(**1**):101-108.

Johnson, L (2003) Dermatophytes - the skin eaters. *Mycologist*, 17(4):147-149.

Kalu, EI, Wagbatsoma, V, Ogbaini-Emovon, E, Nwadike, VU, Ojide, CK (2015) Age and sex prevalence of infectious dermatoses among primary school children in a rural South-Eastern Nigerian community. *The Pan African Medical Journal,* 20:182-193.

Magill, SS, Manfredi, L, Swidersli, A, Cohen, B, Merz, WG (2007) Isolation of *Trichophyton violaceum* and *Trichophyton soudanense* in Baltimore, Maryland. *Journal of Clinical Microbiology*, 45(2):461-465.

Mayowa, M, Godson, RA, Sridhar, MK (2015) Use of *Azadirachta indica* derived germicidal in the management of tinea capitis among pupils in selected public primary schools in Ibadan, Nigeria. *Peak Journal of Medicinal Plant Research*, 3(1):9-15.

Ndako, JA, Osemwegie, OO, Spencer, TH, Olopade, BK, Yunusa, GA, Banda, J (2012) Prevalence of Dermatophytes and other associated Fungi among school children. *Global Advanced Research Journal of Medicine and Medical Sciences*, 1(3) 049-056.

Nweze, EI (2001) Etiology of dermatophytoses amongst children in northeastern Nigeria. *Medical Mycology*, 39:181-184.

Nweze, EI, Okafor, JI (2005) Prevalence of dermatophytic fungal infections in children: A recent study in Anambra State, Nigeria. *Mycopathologia*, 160:239-243.

Olusola, A, 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,* 5:14-18.

Olusola, E, Stephen, D, Alexiou, H, Handke, R, Bartley, R (2007) Description of medical fungi. Adelaide Publishers. 2nd Edition. Pp 84-186.

Omar, AA (2000) Ringworm of the scalp in primary school children in Alexandria: infections and carriage. *East Africa Mediterranean Health Journal*, 6:961-967.

Panackal, AA, Halpern, E, Watson, AJ (2009) Cutaneous fungal infections in the United States. *International Journal Dermatology*, 48(7):704-712.

Refai, M, El-Yazid, HA, El-Hariri, M **(**2013**)** Monograph On Dermatophytes: A guide for isolation and identification of dermatophytes, diseases and treatment. Department of Microbiology, Faculty of Veterinary Medicine, Cairo University.

Sanuth, HA, Efuntoye, MO (2010) Distribution and Microbiological Characterization of Dermatophytes Infection among Primary School Children in Ago Iwoye, Ogun State, Nigeria. *Researcher*, 2(6):95-99.

Schmidt, A (1997) Malassezia furfur: A fungus belonging to the physiological skin flora and its relevance in skin disorders. *Cutis*, 59:21-24.

Shrum, JP, Millikan, LE, Bataineh, O (1994) Superficial fungal infections in the tropics. *Dermatology Clinic*, 12:687-693.

Uneke, C, Ngwu, B, Egemba, O (2005) Tinea Capitis And Pityriasis Versicolor Infections Among School Children In The South- Eastern Nigeria: The Public Health Implications. *The Internet Journal of Dermatology*, 4(2):1-7.

Omoruyi, MI, Idemudia, MI (2011) Comparative Analysis Of The Antiseptic Properties Of Some Disinfectants On Bacteria And Fungi Of Public Health Importance Isolated From Barbing Clippers. *Journal of Asian Scientific Research*, 1(2):65-68.

Fathi, HI, Al-Samarai AG (2000) Prevalence of tinea capitis among school children in Iraq. *Eastern Mediterranean Health Journal*, 6:128-37.

http://www.population.gov.ng/. Accessed on 3RD June, 2015.