

Profile of mycological agents of *Tinea capitis* among apparently healthy persons attending hairdressing saloons at Maiduguri metropolis, Nigeria

Mohammed Umoru Askira¹, Fatima Sangari¹, Ibrahim Hamidu Musa², Idris Abdullahi Nasir³, Zanna Gujja Arjinoma²,

¹ Department of Medical Laboratory Science, University of Maiduguri, Borno state, Nigeria

² Department of Clinical Immunology and Infectious Diseases, University of Maiduguri Teaching Hospital, Maiduguri, Nigeria

³ Department of Medical Laboratory Services, University of Abuja Teaching Hospital, Gwagwalada, FCT Abuja Nigeria

Corresponding address: eedris888@yahoo.com

Abstract: *Tinea capitis* (Ringworm) is becoming a social and health concern due to its persistence in affected individuals. Several dermatophytes are involved in the etiology of *tinea capitis*. In view of this, the present study was carried out to isolate and identify fungal etiologies of *Tinea Capitis* infection and to identify associated sociodemographic risk factors. Hair samples from 100 apparently healthy individuals at various hair saloons at Maiduguri metropolis, Borno state, Nigeria were individually collected and inoculated onto supplemented sabourand dextrose agar for 7 days. Isolates were identified using standard mycology reagents. Of the 100 apparently healthy individuals, 16 (16%) were affected by *Tinea capitis*. Twelve (12%) were *Trichophyton spp* and 4 (4%) *Microsporum spp*, whereas (84) 84% were mixed growth of *Aspergillus spp* and *Penicillium spp*. There was significant association between *Tinea capitis* with age but not gender of subjects, and presence of domestic animals. The level of awareness of *Tinea capitis* among the subjects reveals that 45 (45%) were aware of this condition, whereas 55 (55%) were unaware. Findings from this study revealed that *Tinea capitis* is 12% prevalent in apparently healthy persons at metropolitan areas of Maiduguri. This warrants the need for community sensitization on *Tinea* infection and consistent preventive measures through appropriate training of hairdressers on how to sterilize their work equipment.

[Mohammed Umoru Askira, Fatima Sangari, Ibrahim Hamidu Musa, Idris Abdullahi Nasir, Zanna Gujja Arjinoma. **Profile of mycological agents of *Tinea capitis* among apparently healthy persons attending hairdressing saloons at Maiduguri metropolis, Nigeria.** *N Y Sci J* 2017;10(3):55-59]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 7. doi:[10.7537/marsnys100317.07](https://doi.org/10.7537/marsnys100317.07).

Keywords: Dermatophytes, Mycology, Ringworm

Introduction

Dermatophytes are a unique group of fungi that infect keratinous tissues of lower animals and human (Weltzman *et al.*, 1995). They are characterized by their ability to invade superficial layers of the epidermis, particularly the stratum corneum and high keratin concentration containing appendages, hair and nails of host tissues. In some exceptional circumstances they survive or proliferate in deep tissues of the body (Fernandes *et al.*, 2010).

Tinea capitis also known as “Herpes tonsurans”, “Ringworm of the hair”, “Ringworm of the scalp”, “scalp ringworm and *Tinea tonsurans*” (Rapini *et al.*, 2007) is a cutaneous fungal infection (dermatophytosis) of the scalp (Freedberg *et al.*, 2003). The disease is primarily caused by dermatophytes in the genera *Trichophyton* and *Microsporum*, which invade the hair shaft (Freedberg *et al.*, 2003). The clinical presentation is typically single or multiple patches of hair loss, sometimes with black dots, pattern inflammation, scaling, pustules and itching, uncommon in adults but predominantly seen

in pre-pubertal children more often in boys than girls (Menan *et al.*, 2002).

Tinea capitis is an infectious disease that can be transmitted from human-to- humans, animals-to-human (zoonosis) or objects that harbor the fungus to humans (Kundu *et al.*, 2012). The fungus can also exist in a carrier state on the scalp without clinical symptomatology (Prescott *et al.*, 1993). The distribution, frequency and etiological agents of dermatophytosis vary according to the geographical location, the climate variations, the socio-economic status of the population, the time of the study, the presence of domestic animals and age of affected individual (Al -Rubiay *et al.*, 2006).

Tinea Capitis may last into adult life since the organisms usually remain superficial with little potential for mortality (Ilkit, 2010). Disseminated systemic disease has been reported in patients who are severely immune compromised (Ilkit, 2010). The incidence of *Tinea capitis* may vary by sex, depending on the causative fungal organism, *Tinea capitis* has been reported to be five-folds more common in males

than females after puberty. For example, Trichophyton infection of the scalp in adults in more in women than in Men (Ilkit, 2010). Age plays a predisposing factor of Tinea infection which occurs primarily in children and occasionally in adults, seen most commonly in children younger than 10 years peak age and patient aged 3-7 years (Ilkit, 2010).

Tinea capitis infections can also be common infections in men. It has remained a recurrent problem in both developed and developing countries in which many people are prone to infection where hair combs and Hair Clippers are shared (David, et al., 2010). In view of this, the present study was carried out to isolate and identify fungal etiologies of *Tinea Capitis* infection and to identify associated sociodemographic risk factors at Maiduguri metropolis, Borno state, Nigeria.

Materials And Methods

Study area and population

This is a descriptive cross-sectional study that was carried out in the mycology laboratory, University Of Maiduguri Teaching Hospital, Bomo State, Nigeria. The study was carried out within Maiduguri metropolis, the capital city of Bomo state, Nigeria; it is situated in Northeastern Nigeria. It shares borders with neighboring countries such as Niger Republic, Chad and Cameroon. Within Nigeria, Maiduguri shares borders with other states which include Adamawa, Yobe and Gombe. Maiduguri has Sahel savannah vegetation. The temperature of Maiduguri ranges from 82°F to 111°F and average precipitation of 1.81 inch. The study population comprised of men and women of all age groups who go to salon during the period of study. A total of Twenty five (25) hairdressing saloons at Maiduguri Metropolis were used for this study.

Ethical approval: Ethical clearance was obtained from the ethical research committee of the UMTH before commencement of the study. This study was conducted according to standard of human experimentation as contained on the declaration of Helsinki declaration. Informed consent was obtained from every subject before taking their specimen.

Inclusion criteria

All samples were collected from apparently healthy and consented persons attending either male or female saloons within the study period.

Exclusion criteria

All persons who declined to participate in the study were excluded.

Data collection

Questionnaires were used to collect data on demographic risk factor such as age, sex, location, awareness of *Tinea capitis* (ringworm), and presence of domestic animals

Sample collection and preparation

Samples were collected between May 2015 and June 2015. On a clean white sheet of paper, hair samples were collected, wrapped and fastened with a paper clip stored at room temperature before analysis. The samples were inoculated onto petri dishes container Saboroud Dextrose Agar (SDA) using streaking method with a disposable applicator stick. The inoculated plated were incubated at room temperature for four weeks. Each different appearing culture was transferred with a sterile needle to a slide, teased apart and stained with lactophenol cotton blue and examined microscopically. All observed colonies were subcultured to obtain pure cultures which were subsequently isolated and identified using morphological characteristics, spore formation, the production of fruiting bodies and biochemical reactions. More so, colony identification was made easier by the use of mycology atlas.

Procedure for fungal identification

KOH Wet Mount: A clean grease – free glass slide was taken and a large drop of KOH solution was placed on the slide with a Pasteur pipette. Small quantity of the specimen was transferred with a loop into the KOH drop. A clean coverslip was then placed over the preparation gently to avoid air bubble. The slide was kept in a moist chamber at room temperature for 15 minutes and then observed under X10 and X40 objectives.

Lactophenol cotton blue staining (Needle mounts preparation)

A drop of Lactophenol cotton blue stain was placed on a clean grease-free glass slide. A small fragment of cottony, woolly or powdery colony was picked at mid-point of culture using a sterile straight wire and of stain and culture was obtained. A clean cover slip was applied avoiding air bubbles. Excess stain was removed with blotting paper and the preparation was examined using x10 and x40 objectives of the microscope respectively. Microconidia, macroconidia, chlamydiospores and hyphae which appeared spiral, pertinate, antler-like structures were investigated. Features seen in stained slide were compared with established characteristic fungal features using mycology atlases.

Statistical analysis

The data obtained from the questionnaire and the result of laboratory analysis were entered into Microsoft excel and analyzed using SPSS (statistical package for social science version 20). The results obtained were reduced to percentage, tables and figures. The Pearson chi square test at 95% confidence interval and 0.05 level of significance was used to determine the relationship between the demographic data and prevalence rates. P values less than 0.05 was considered significant.

Results

Hundred (100) apparently healthy individuals participated in this study comprising of 50(50%) males and 50(50%) females. The fungi associated with *Tinea capitis* was isolated in 16 (16%) of subjects, viz; 12(12%) were *Trichophyton spp* and 4(4%) were *Microsporum spp*. Sex distribution of *Tinea Capitis* showed relatively higher prevalence of *T capitis* in males than females with 9 (9%) and 7(7%) respectively (Table 1). However, there was no statistical association between the prevalence of *T. capitis* and gender of subjects ($p>0.005$).

Tinea Capitis infection in relation to keeping of domesticated animals showed equal distribution and prevalence of *T. capitis* in subjects who keep domesticated animals and those who do not keep

domesticated animals. Out of this, 8% of *Tinea capitis* was isolated from both respectively. There was no statistical significance association between keeping domesticated animal and *Tinea capitis* infection ($P >0.05$) (Table 2).

The prevalence of isolates according to age group showed that subjects within 6-10 years had the highest prevalence of *T capitis*, followed by those within 11-15 years 7 (, 21-25 years and none in those between 26-30and 36-40years. There was statistical association between the prevalence of *T capitis* and age of subjects ($P<0.05$) (Table 3). The level of awareness of *Tinea capitis* among the 100 subject that subjects was 45(45%) were aware of this condition and 55 (55%) were unaware (Table 4).

Table 1: Distribution of isolates according to sex

Isolate	Male	Female	Total
Mixed growth	41	43	84
<i>Trichophyton spp</i>	6	6	12
<i>Microsporum spp</i>	3	1	4
Total	50	50	100

Note: Isolates classified as mixed growth are not considered etiologic of *Tinea capitis*

$P = 0.125$; Chi-square = 2.333

Table 2: Distribution of Isolate based on presence of domestic animals at subjects' home

Group	Isolate		Total	
	Mixed growth	<i>Trichophyton spp</i>	<i>Microsporum spp</i>	
Yes	42	6	2	50
No	42	6	2	50
Total	84	12	4	100

$P=0.093$; Chi-square = 1.25

Table 3: Distribution of Isolates according to age groups

Age group	Isolate		Total	
	Mixed growth	<i>Trichophyton spp</i>	<i>Microsporum spp</i>	
0-5	16	0	0	16
6-10	4	4	3	11
11-15	13	2	1	16
16-20	11	3	0	14
21-25	10	2	0	12
26-30	9	0	0	9
31-35	11	1	0	12
36-40	10	0	0	10
Total	84	12	4	100

$P < 0.001$; Chi square =13.45

Table 4: level of level awareness of subjects on *Tinea capitis*

Level of Awareness	Frequency	Percentage
Aware	45	45.0
Not Aware	55	55.0
Total	100	100.0

Discussion

Dermatophytes (e.g. *Tinea Capitis*) represent the prevailing type of fungi that cause infection worldwide but little attention has been given to it due to asymptomatic nature. In this study the fungi etiology of *Tinea capitis* was isolated in 16% of the subjects. The prevalence of this present study was closely related to those obtained in other studies such as the 9.5% for study carried out in Kano State (Adeleke *et al.*, 2008), 15.4% for a study on 604 children in a rural settlement in southwestern Nigeria (Ayanlowo *et al.*, 2014), and 9.4% for a study in Anambra State (Emele *et al.*, 2003). Ghannoum *et al* (2003) in Cleveland estimated a prevalence of 13%, and found that all the affected were African American. In another study in London, Hay *et al* (1996) observed that the prevalence ranged between 0 and 12%. Another study carried out in Ivory Coast reported a prevalence rate of 11.3% (Menan *et al.*, 2002). However, our prevalence data was lower than 43.53% reported in a study in Osogbo Nigeria (Akinboro *et al.*, 2011). A number of factors may be attributed to the varying prevalence and frequency of tinea capitis in different parts of Nigeria as well as other countries (Ahmed *et al.*, 2006). These include population growth, close contact among infected children at home and school, and poor personal hygiene (Moto *et al.*, 2005).

In this study the fungus *Tinea capitis* was isolated more in males than in females. Even though the difference is not statistically significant this contradicts the findings of Menan *et al* (2002), Al-Rubiay *et al* (2006) and Ilkit (2010) who reported significant association between *T. capitis* and gender of affected persons. However, it was contrary to the study of Dogo *et al* (2016) who reported the prevalence of *Tinea capitis* among girls was higher (51.4%) than that among boys (41.5%) but not significantly different. The reasons for this disparity could be due to difference in hygienic practices in both genders from these studies.

There was no statistical significance between keeping domesticated animal and *Tinea capitis* this contradicts the research carried out by Al-Rubiay *et al* (2006), Prescott *et al* (1993), who reported significant difference between prevalence of *T. capitis* and keeping domesticated animals. The disparity in these results could be that the domestic animals kept by subjects in this study were not harboring *T. capitis*.

There was significant difference in the prevalence rate of *Tinea capitis* between different age groups in subjects in this study. This findings in consonance with the report of Menan *et al* (2002) who observed a higher incidence among the children in the age group of 8–11 years, and Ayaya *et al* (2001) have reported a significantly higher number of affected

children of around the age of 10 years. Similar reports were obtained from the findings of Menan *et al* (2002), Al-Rubiay *et al* (2006) and Gupta *et al* (2000) but contradicts the findings of Okafor and AgbubaerUlche (1998).

Conclusion

Findings from this study revealed that *Tinea capitis* was 12% prevalent in apparently healthy persons attending hairdressing saloons in metropolitan areas of Maiduguri, Nigeria. This warrants the need for community information and consistent preventive measures through appropriate training of hairdressers on how to sterilize their work equipment.

Conflict of interest

None

Acknowledgement

We wish to show our profound appreciation to staff of medical microbiology laboratory, University of Maiduguri Teaching Hospital, Nigeria for their technical input in this study.

Corresponding author

Idris Abdullahi Nasir, MSc
Department of Medical Laboratory Services
University of Abuja Teaching Hospital
Gwagwalada, FCT Abuja Nigeria
Email: eedris888@yahoo.com
Tel.: +2348022851352

References

1. Adeleke S, Usman B, Ihesiulor G. Dermatophytosis among itinerant quranic scholars in Kano (Northwest) Nigeria. *Nigerian Medical Practitioner*. 2008;53(3):33–35.
2. Ahmed I, Zaffar A, Sarwat N. Prevalence of tinea capitis and asymptomatic carriage amongst school going children. *Journal of Pakistan Association of Dermatologists*. 2006;16:215–219.
3. Al-Rubiy KK, Al-Rubly LK. Dermatoepidemiology. A household survey among two urban areas in Basra city, Iraq. *Int. Dermatol*. 2006;2(4):1-4.
4. Akinboro O, Olayinka A, Olasode A, Onayemi O. 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-Egypt Journal of Endemic Diseases*. 2011;1(2):53–64.
5. Ayanlowo O, Akinkugbe A, Oladele R, Balogun M. Prevalence of *Tinea capitis* infection among primary school children in a rural setting in

- south-west Nigeria. *Journal of Public Health in Africa*. 2014;5(1) doi: 10.4081/jphia.2014.349.
6. Ayaya SO, Kamar KK, Kakai R. Aetiology of *Tinea capitis* in school children. *East Afr Med J*. 2001;78:531–5.
 7. David DL, Edward A, Zaruwa MZ, Addass PA. Barbing Saloon Associated Fungal Disease Infection in Mubi, Adamawa State-Nigeria. *World J Med Sci*. 2010; 5 (1): 17-21.
 8. Emele FE, Oyeka CA. *Tinea capitis* among primary school children in Anambra state of Nigeria. *Mycoses*. 2008;51(6):536–541.
 9. Freedberg ML, FHpatrick TB. Fitz Patrick Dermatology in General medicine. New York: Mc Graw - Hill, Medical Pub.2013.
 10. Ghannoum M, Isham N, Hajjeh R, Cano M, Al-Hasawi F, Yearick D, et al. *Tinea capitis* in Cleveland: Survey of elementary school students. *J Am Acad Dermatol*. 2003;48:189–93.
 11. Gupta AK, Ryder JE, Nicol FK. Superficial fungal infections an update on pityriasis versicolor, seborrheic dermatitis, tinea capitis, and onychomycosis. *Clin Dermatol*. 2010; 2(1):4 17-425.
 12. Hay RJ, Clayton YM, De Silva N, Midgley G, Rossor E. *Tinea capitis* in South-east London a new pattern of infection with public health implications. *Br J Dermatol*. 1996;135:955–8.
 13. Ilkit M. Fauves of the scalp: an overview and update mycopathologia. 2010; 170:143.
 14. Kundu D, Mandal L, Sen G. Prevalence of *Tinea capitis* in school going children in Kolkata, West Bengal. *J Nat Sci Biol Med*. 2012 Jul-Dec; 3(2): 152–155.
 15. Menan El, Zongo Bonou O, Rouet F, Kiki-barro PC. *Tinea capitis* in school children from Ivory Coast (western Africa) A 1998-1999 cross sectional study. *Int J Dermatol*. 2002;41:204–7.
 16. Moto JN, Maingi JM, Nyamache AK. Prevalence of *Tinea capitis* in school going children from Mathare, informal settlement in Nairobi, Kenya. *BMC Research Notes*. 2015;8, article 274.
 17. Okafor JI, Agbubaekulche AK. Dermatophyte among school children in Aba, Abia state Nigeria and some physiological studies on isolated aetiological agents. *J Common Dis*. 2008; 30(2), 44 - 49.
 18. Prescott LM, Harley JP, Klein DA. Microbiology second edition, USA WNC: Brown Publishers. 2010.
 19. Weitzmari L, Summebell RC. The dermatophytes. *CM microbiology Rey*. 1995; 8:240-259.

2/25/2017