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## Prevalence of Dermatophytosis among Children of Nomadic Herdsmen within Sokoto metropolis, Sokoto State, Nigeria

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### Abstract

Dermatophytic infections are a worldwide public health problem. In Nigeria, children of nomadic herdsmen are thought to be more at risk of this infection because of their early and continuous exposure to different kinds of animals. However, little is known about the level of infection in these children within Sokoto metropolis. This study was designed to investigate the incidence of dermatophytosis among children of nomadic herdsmen within Sokoto metropolis. To investigate the distribution of this infection based on different age groups, gender and sites of the body affected. A total number of thirty (30) children were investigated, aged between 0-20 years and with clinically suggestive lesions. Isolates were identified using microscopy and culture to identify isolates with typical morphology. Three categories of fungi were identified, these include; Yeasts, Moulds and Dermatophytes. The target organisms were dermatophytes and the species identified include; *Trichophyton rubrum*, *Trichophyton schoenleinii* and *Trichophyton verrucosum*. The result indicated that among the target organisms, *Trichophyton rubrum* was the most frequent organism isolated with the percentage frequency of occurrence of 8.16%, followed by *Trichophyton verrucosum* (6.12%) and the least was *Trichophyton schoenleinii* with the percentage frequency of occurrence of 2.04%. *T. rubrum*, *T. verrucosum* and *T. schoenleinii* which were the target organisms were found to be less prevalent species isolated in this study (16.30%), while the non-dermatophyte (yeast and moulds) were the most prevalent species with frequency of occurrence of 83.66%. The result shows that dermatophytic infections are prevalent among the poor than the rich. The results also indicated that dermatophytosis is more prevalent

among children between ages of  $\leq 11$  years. The results of this research show that dermatophytosis is more prevalent among female than male.

**Keywords:** Incidence, Dermatophytosis, Children, Nomadic, Herdsmen

### Introduction

Dermatophytosis is a clinical condition caused by fungal infection of the skin in humans, pets such as dog and domesticated animals such as sheep and cattle. The fungi that cause parasitic infection (dermatophytes) feed on keratin, the material found in the outer layer of skin, hair and nails (Martin and Benzer, 1993).

These fungi thrive on warm and moist skin, but may also survive directly on the outsides of hair shafts or in their interiors. In pets, the fungus responsible for the disease survives in skin and on the outer surface of hairs (Encyclopedia, 2015). Dermatophytosis are mostly caused by group of fungi called “dermatophytes”. And these dermatophytes are grouped into three (3) specific genera, namely: *Epidermophyton*, *Trichophyton* and *Microsporum*.

The dermatophytes more than any other group of fungi, have developed a close host-parasite relationship with animals as well as human.

Many dermatophytes have evolved into obligate parasites. Obligate parasitism has been suggested on the basis of their strict host specificity Demanche *et al.* (2001). According to Hay (2003) and Harvlickova *et al.* (2008), a number of factors including geographic location, prevailing climate (temperature, humidity, wind etcetra), overcrowding, healthcare, immigration, environmental hygiene culture and socio-economic dispositions have great implication for the proliferation of dermatophytosis.

Dermatophytic infections (dermatophytosis), according to Havlickova *et al.* (2008), may be symptomatic or asymptomatic which poses a public health problem in many parts of the world causing cutaneous disfigurement and discomfort in both children and elderly people. Previous reports (Ibrahim and Mohammed, 2004; Nweze, 2001; Nwadiaro and Ogbonna, 1998) observed that nomadic lifestyle and/or constant interactions by human with domestic animals promote the prevalence of dermatophytic infections. Transmission pattern of most dermatophytosis, their causal agents and entry portals are not yet fully understood.

People especially young and old people having low count of lymphocyte (blood) are at risk of dermatophytosis due to the ability of the organism causing disease to spread widely. Also, the organisms causing the disease are ubiquitous because the organisms (dermatophyte) are capable of utilizing keratin present on the epidermis layer of the skin to cause infection (Iikit, 2010). Although dermatophytic infections are worldwide public health problem, its prevalence has significantly reduced in many developed nations of the world compared to the developing countries due to improved social/ economic welfare, healthcare and hygiene practices (Iikit, 2010; Havlickova *et al.*, 2008).

In Nigeria, the incidence of dermatophytosis has been increasing in the last decade. The spectrum of the species and their frequency are known to vary from one geographical area of the country

to another, based on several factors (Nweze, 2001). In addition to geography, other possible factors such as socio-economic status, age, gender, animal contact and communal lifestyle are also important factors for the transmission of dermatophytes (Nweze and Okafor, 2005).

In Sokoto metropolis particularly, children of nomadic herdsmen are thought to be more at risk because of their early and continuous exposure to different kinds of animals. However, little is known about the level of infection in these children.

Fulanis, on the other hand, are quite known to live an isolated life along with their animals and interact with them. Since they rear animals such as cows, camels, sheep and goats, they usually move from place to place according to the availability of pasture or food supplies required by the animals under their care. This work is aimed at identifying the fungal skin basically caused by dermatophytes affecting children of Nomadic Fulanis within Sokoto metropolis in order to understand how they spread and to be able to determine the frequencies of occurrence of dermatophytes based on the host's age and gender.

## Materials and methods

### Study Area

The study area was Sokoto metropolis. In this area, Fulani/Hausas are the predominant people. They rear domestic animals such as goats, sheep, cattle's and camels among others. Most of the children sampled in this study, particularly the males, rarely attend school as they follow their fathers in herding (Nweze, 2010).

### Pre-Survey Contact and Mobilization

A preliminary survey was conducted and verbal informed consent approvals sought in the camps/bush in order to ensure maximum cooperation of the herdsmen. A questionnaire was administered to each child and included in the questions were: age, gender, address, animal contact and socio-economic status of parents and other questions relevant to the study. Each



child with clinically suggested lesions was examined for any superficial fungal infection and samples were taken.

### Sample collection

A total of thirty (30) samples were collected from children of different age groups and of different gender. Samples from the skin were collected by first sterilizing the area with 70% alcohol or ethanol to clean the surface of the skin. Scrapings from the skin were aseptically taken from the edge of the lesion using sterile razor blade. Samples collected were placed on a clean dry sterilized paper envelopes and each envelope was labeled with the name, age, gender and date of collection. All the samples were transferred to Microbiology laboratory Usmanu Danfodiyo University Sokoto for analysis (Sanuth and Efuntoye, 2010).

### Laboratory Analysis

The collected samples (skin) were observed under microscope. Portion of each sample collected was treated with 10% KOH on a glass slide covered with a cover slip and then subjected to a slight heat for one (1) minute to aid rapid penetration and complete tissue maceration. Each prepared slide was later examined under low (x10) and high (x40) magnification of a simple light microscope for fungal structure (hyphae and arthroconidia) respectively using lactophenol blue stain (Ndako, 2012). The isolates were identified based on morphological characteristics in accordance with previous reports (Alexopoulos *et al.*, 2002; Barnet and Hunter, 1999).

### Growth and culture of associated dermatophytes

For the culture, the other portion of each of the samples was cultured on Sabouraud Dextrose Agar (SDA) medium supplemented with 0.16mg/ml streptomycin was used as a standard substrate. The samples were picked with sterilized forceps and aseptically placed at the centre of the agar. The inoculated plates were incubated at 30°C for 21 days and examined daily for growth, mycelia characteristics and changes in the medium of growth (Sanuth and Efuntoye, 2010).

### Preparation of Pure-Culture

For pure culture, distinct colonies were aseptically transferred into newly prepared sterile SDA and incubate for 30°C for 21 days (Ndako, 2012).

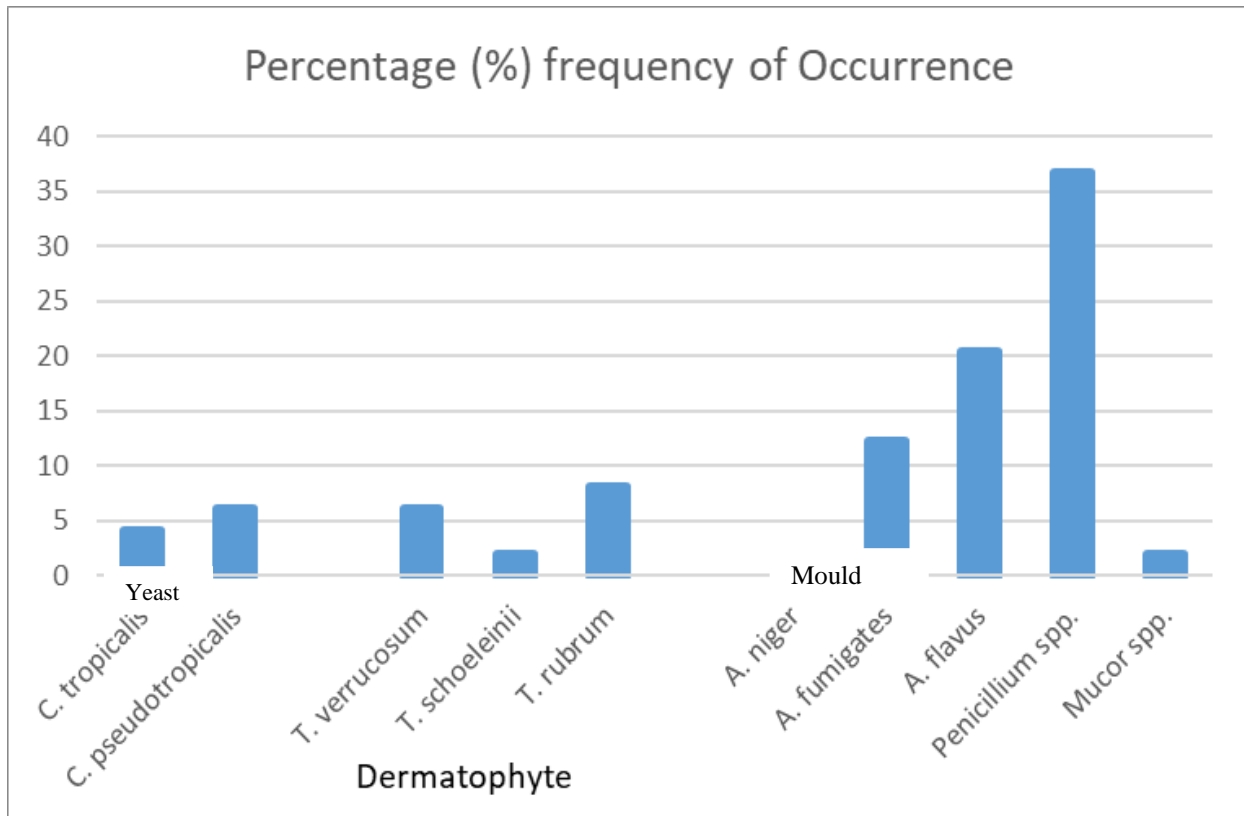
### Results

From the results obtained in this work, a total number of ten (10) fungal species were isolated, eight (8) were identified to specie level while, two of the organisms were identified to genus level. From the results obtained only three (3) organisms were isolated as the target organisms (Dermatophytes). The isolated organisms include; *Trichophyton rubrum*, *Trichophyton verrucosum*, *Trichophyton schoeleinii*, *Aspergillus fumigatus*, *Aspergillus flavus*, *Aspergillus niger*, *Penicillium Spp.*, *Mucor Spp.*, *Candida tropicalis* and *Candida Pseudotropicalis*.

The result of the distribution of isolates based on categories is shown in figure 1. The result indicated that among the target organisms, *Trichophyton rubrum* was the most frequent organism isolated with the percentage frequency of occurrence of 8.16%, followed by *Trichophyton verrucosum* (6.12%) and the least was *Trichophyton schoeleinii* with the percentage frequency of occurrence of 2.04%. *T. rubrum*, *T. verrucosum* and *T. schoeleinii* which were the target organisms were found to be less prevalent species isolated in this study (16.30%), while the non-dermatophyte (yeast and moulds) were the most prevalence species with frequency of occurrence of 83.66% (Figure 1). Table 1 shows the morphological characteristics of the isolated Dermatophytes.

Table 2 shows the distribution of the dermatophytes based on the gender of children. The results indicated that the frequency of occurrence of isolated dermatophytes occurs most in female (55.10%) than male (44.85%). Table 3 showed the distribution of isolated dermatophytes with regard to the age groups of the children. The results indicated that the target organisms (Dermatophytes) were isolated more among children of age groups between  $\leq 11$

years compared to those in the age group of between 18 – 23 years.



**Figure 1: The distribution of isolates based on categories**

**Table 1: The morphological characteristics of the isolated Dermatophytes**

Isolates	Colonial and Morphological Characteristics
<i>Trichophyton rubrum</i>	Grew moderately quick, after 7 days, radiating mycelium with elevated centre; after 2 weeks velocity to fluffy surface, central hat-shaped elevation was noticed. Upper side was white to light yellow, rarely
<i>Trichophyton verrucosum</i>	They are very slow and appear upper side grey-white-yellow to ocre under side brownish yellow with smooth, waxy, tortuous, windings in older cultures which also grow upwards, also disc-shaped velvety.
<i>Trichophyton schoenleinii</i>	Fairly slow, after two weeks colony of about 1cm in diameter, upper side initially yellowish, later whitish to orange, underside white-yellow to apricot. Figured, button-like center, wrinkled surface and numerous radiating extensions.

**Table 2: Distribution of isolated dermatophytes based on gender of the children**

Isolated Dermatophytes	Female	Female
	N (%)	N (%)
<i>T. rubrum</i>	0 (--)	4 (--)
<i>T. verrucosum</i>	2 (--)	1 (--)
<i>T. schoeleinii</i>	0 (--)	1 (--)

**Table 3: Distribution of isolated (Dermatophytes) based on age groups of the children**

Isolated Dermatophytes	N (%)	Age Groups			
		0 – 5 years	6 – 11 years	12 – 17 years	18 – 23 years
<i>T. rubrum</i>	4 (--)	2	2	0	0
<i>T. verrucosum</i>	3 (--)	1	1	1	0
<i>T. schoeleinii</i>	1 (--)	0	1	0	0

### Discussion

Studies on human skin infections has shown that dermatophytosis and other superficial fungal infections constitute a major public health problem in Nigeria (Adeleke *et al.*, 2008). The dermatophytes recovered were anthropophilic, geophilic or zoophilic species. However, the recovery of two isolates of anthropophilic species (*T. rubrum* and *T. schoeleinii*) and one zoophilic isolate (*T. verrucosum*). The finding of this study indicates that *T. rubrum* was the most occurring specie and *T. verrucosum* was the second most occurring species and the least occurring species is the *T. schoeleinii*. These are typically animal acquired dermatophytes and it is possible that those children acquired them from these animals. This finding is corroborated by previous findings (Shams-Gahfarokhi *et al.*, 2009; Cam *et al.*, 2007), that young animals are particularly susceptible to infection by ringworm fungi possibly due to poorly developed immunity. Animals have been implicated in the transmission of these species and secondly, rearing of animals is the major occupation of the parents of the children included in this study. In addition, some of the male and few of the female children of nomads participate in rearing of the animals. Our

finding in this study is similar to a previous epidemiological study (Nweze, 2010) which showed that ten different species of dermatophytes were recovered with *Trichophyton mentagrophytes* showing the highest incidence among children of nomadic herdsman living in isolated camps in Southeastern Nigeria. The ranking of *T. rubrum* and *T. verrucosum* as the first and second most frequent in this study, respectively is not surprising. *T. verrucosum* has been predominantly recovered from cattle by previous investigators as reported in a survey of bovine dermatophytoses in major dairy farms of Mashhad City, Eastern Iran with *T. verrucosum* as the predominant dermatophyte isolated (Shams-Gahfarokhi *et al.*, 2009). *T. verrucosum* from infected skin and hair, remaining viable and infective as it persists in the environment for 5-7 years and had been isolated from the soil (Singh and Kushwaha, 2010; Mahmoudabadi and Zarrin, 2008). The same author also observed in a different study that children get *T. verrucosum* infection from debris on clothing worn by others in a dairy barn (Ogbonna *et al.*, 1986). Furthermore, it is normal to suspect that the origin of the recovered dermatophytes is from the animals, but it may be difficult to suggest where the animals got them.

## Conclusion

The result of this study indicated that Dermatophytes infections are prevalent among children of Nomadic Herdsmen in Sokoto State. The results also showed that dermatophytosis is more prevalent among children between ages of ≤11 years. In previous studies conducted by other researchers, dermatophytosis is more prevalent among male than female, but in the present study it was found to be more among female children.

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