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Dermatophytosis Among School Children: Domestic Animals as Predisposing Factor in Sokoto, Nigeria

Ameh, I.G. and ¹R.U. Okolo

Department of Pathology, ¹Department of Anatomy, College of Health Sciences,
Usmanu DanFodiyo University, Sokoto, Nigeria

Abstract: A total of 1752 pupils of five elementary schools located in various parts of Sokoto town were physically screened for dermatophytosis. Two hundred fifty six (14.6%) of these children were positive for the disease. Two hundred twenty five (87.9%) of those affected had *Tinea capitis*, 27 (10.5%) had *Tinea corporis* while *Tinea unguium* cases were 4 (1.6%). Infection was due mainly to various species of *Trichophyton* and *Microsporum*. Infected domestic animals constituted the apparent source of infection for most pupils. This is because pupils from the home of animal keepers had significantly higher ($P<0.05$) infection rates than those from the home of non-keepers of animals. Playgrounds of children and animal fields were also sources of infection for children and animals. The dominant ethnic residents of study area refer to ringworm as ‘Makenker’ or ‘kureci’ which was locally treated with *Calotropis procera*. This treatment probably contributed to the bearable incidence of Tinea in the study area.

Key words: Dermatophytosis, children, domestic animals

INTRODUCTION

Dermatophytosis, which is commonly referred to as ringworm or simply tinea, is a contagious fungal infection of the stratum corneum of the skin, hair and nail^[1,2]. Although this superficial disease is worldwide in distribution, it is more prevalent in hot humid climate than in cold dry areas^[1-3]. Ringworm is however not reportable or notifiable in Nigeria and other affected tropical countries because the disease is usually self-limiting or produces bearable benign skin lesion^[2,4-6]. As a result, actual prevalence figure for tinea is unknown in many endemic areas^[6,7]. However, zoophilic and anthropophilic strains of the aetiologic agents often cause zoonotic infections^[8-10]. Outbreak of epizootic or epidemic ringworms may also cause symptoms of dermatological significance^[6,11]. Several reports indicated that domestic animals constitute important reservoir of human ringworm epidemics^[5,8,10]. Sokoto in Northwestern Nigeria is one of such areas exposed to zoonotic ringworm because of widespread engagement in household maintenance or stocking of domestic animals. This study is also important because fungal infection is reported to produce one of the commonest lesions in human immuno-deficiency virus (HIV) infections^[1,2]. This investigation is therefore undertaken to determine the incidence of the disease and the predisposing factors of dermatophytosis in study area.

MATERIALS AND METHODS

Sampling: Children constitute the population sample examined in this study because they are most susceptible to ringworm^[6,7]. Similarly, school children presented the population for easier examination^[7]. Pupil in visited schools answered to questionnaire with the assistance and cooperation of their teachers and also their guardians back at home. Questionnaire was administered along with physical examination of volunteers for scalp, body and nail ringworms. All questionnaire issued were retrieved within a month of visitation to five selected elementary schools located in different wards across Sokoto town. The questionnaire was unstructured and simply designed to determine the presence or absence of ringworm lesions on respondent and other members of the family or household. To this effect, ‘ringworm’ was also sought on the type and number of domestic animals, pets or livestock kept by respondent’s family, household or neighborhood, the closeness of animal keepers to these animals and methods of raising the animals. In addition, examiners conducted a general surveillance of nearby residential quarters or wards from which most respondents attended visited schools. This was to determine the manner of housing, family or household size, crowding situation and activities of animal keepers. Information was also sought on local perception and treatment of the disease.

Examination for dermatophytosis: Volunteers were randomly selected in visited schools and examined to confirm the causative agents of the disease. This was carried out by the 'hair brush diagnosis' of scalp ringworm^[4] or microscopic demonstration of fungus in potassium hydroxide mount of the suspect or broken hair strands, or scrapings of nail and skin crust^[1,8]. At the homes of animal keepers, affected animals were also physically examined by the 'hair brush diagnostic method' after Mackenzie^[4]. In addition veterinary workers were interviewed in some clinics in town to ascertain the frequency and general perception of the disease locally.

A correlation coefficient test statistics was computed to compare the proportion of ringworm infection among children who reside at the home of animal keepers and those who live with non-keepers of any animals either as pets or livestock.

RESULTS

Knowledge of the disease: Respondents and other residents were familiar with ringworm, which was known by various local terminologies among the common ethnic groups (Table 1). The commonest local names for the disease are Makenker, Makero or Mujattele which are well known to the dominant indigenous hausa/fulani ethnic group. However most respondents were ignorant of the source of infection and did not know that the disease was contractible from domestic animals.

Domestic animal-reservoir of ringworm: Most households or families visited freely engaged in domestic livestocking, animal farming, local husbandry or pet maintenance. Figure 1 shows the infection index of domestic animals and their keepers. Dogs (30.5%) and their keepers had the highest infection rates while lower infection rates of goats (15%), donkeys and horses (14.5%) corresponded with a low infection of their keepers (Fig. 1). It was observed that domestic animals, especially goats, sheep and dogs strayed or foraged freely and mix up with other animals in the vicinity during the day before retiring to the family homes towards nightfall to either sleep or keep watch under the same roof with their owners.

Prevalence: It was observed that ringworm affected 256 or 14.6% (n = 1752) of sample population of children (Table 2). 225 (87.9%) of infected pupil had *Tinea capitis*, 27 (10.5%) had *Tinea corporis* while 4 (1.6%) had *Tinea unguium*. Most cases of tinea were found among pupil at the Sultan Ward Model Primary School, Sabon-Birni area, where 82 (21.9%) of 375 sampled children had ringworms on the scalp (*Tinea capitis*) or body (*Tinea corporis*).

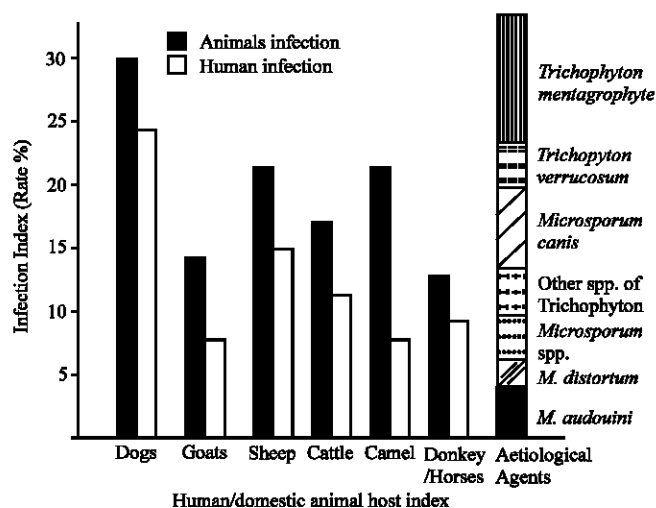


Fig. 1: Distribution of ring worm agent among human and animal hosts

Table 1: Common ethnic names of ringworm in Sokoto

Ethnic group	Ethnic name for ringworm
Hausa	Makenker, Makero or Kureci
Fulani/Fulfude	Mujattele
Ibo	Okpuiis eriego
Yoruba	Lapalapa
Ebira	Uhi
Zuru	Kyokso
Nupe	Eka

Table 2: Prevalence rates of ringworm infection among school children

School investigated	Sample examined	No. infected	Percentage infection	Percentage ±SD
Tafida Aminu Model Primary School, Mabera	330	47	14.2	1.37
Mohammed Zako Model Primary School Runjin Sambo	370	36	9.7	0.06
Sultan Ward Model Primary School, Sabon Birni	375	82	21.9	3.81
Model Primary School, Secretariat Road	327	32	9.8	0.03
Ibrahim Gusau Model Primary School, Angwan Rogo	350	59	16.9	2.22
Total	1752	255	14.6	

However, ringworm infection was lowest at Moh'd Zako Model Primary School, Runjin Sambo where 36 (9.7%) of pupil had *Tinea capitis*, *Tinea corporis* or ring worm of the nail (*Tinea unguium*). There were however other encountered cases of nail damages in form of onychia or paronychia, psoriasis and congenital damages of the nail, but these were clearly distinguished from tinea^[2]. Generally more males (18.5%) than females (7.8%) were infected, and the result (Table 3) also shows that the rate (26.7%) of ringworm cases was highest among male pupil of 6-8 years of age. Incidence of ringworm was least (2.5%) among the oldest age grade, that is, those of 15 years and above. Indeed, no females in that group were seen with ringworm lesion. All infected children admitted

Table 3: Age and sex-related distribution of ringworm among school children in sokoto town

Age Grade (Yr)	Male			Female			Both sexes		
	No. Examined	No. Infected	Infection Rate(%)	No. Examined	No. Infected	Infection Rate(%)	No. Examined	No. Infected	Infection Rate (%)
≤5	194	35	18.0	107	12	11.2	301	47	15.6
6-8	333	89	26.7	112	15	13.4	445	104	23.4
9-11	238	52	21.8	160	20	12.5	398	72	18.1
12-14	191	23	12.0	132	3	2.3	323	26	8.4
≥15	156	7	3.8	129	0	0.0	285	7	2.5
Total	1112	206	18.5	640	50	7.8	1752	256	14.6

Table 4: A correlation of ringworm infection among animal keepers and non-keepers of animals

Age Grade (Years)	No. Examined	No. Infected	Animals Keepers Infected		Non-Animal Keepers Infected	
			(X)	(Y)	(XY)	(XY)
≤5	301	47	32	15	480	
6-8	445	104	66	38	2508	
9-11	398	72	40	32	1280	
12-14	323	26	12	14	168	
≥15	285	7	4	3	12	
	1752	256	154	102	4448	

rca= 0.93; rtab= 0.8783; i.e. Correlation Coefficient is significant (P<0.05)

to living in either household or neighborhood of pet or livestock keepers. The correlation coefficient test statistics shows (Table 4) that ringworm infection among children of animal keepers is significantly higher (P<0.05) than the infection among children from homes of families who kept no animals. The result (Fig. 1) also shows that the commonest of the causative agents were mainly species of *Trichophyton mentagrophytes* (29.75%), *T. verrucosum* (26.25%) and *Microsporum canis* (21.25%).

Traditional treatment of tinea: Ringworm was easily treated among infected children with topical application of a local herb. Affected children use the juice of the Dead Sea Apple, *Calotropis procera*, which grow as weeds in most areas of the town. Any part of the plant is simply broken and the creamy white juice is directly applied to the skin or scalp lesion of ringworm which healed completely. Usually, healing occurred only after repeated application of juice in one or two weeks before the lesion clears and the skin becomes normal.

DISCUSSION

The incidence of dermatophytosis was comparatively low in study population and this is attributed to the prevailing dry climate in Sokoto^[1,2]. Cases were also kept low because of the wide spread herbal treatment which easily eliminated ringworm lesions at no financial cost. Elsewhere in more humid parts of Nigeria, infection rates may be as high as 26% of the population^[5,6]. In general, infection among those affected is commonest during the wet season when the skin remains wet for long^[3,4,5]. Lower

rates of infection among pupils of oldest age grade and from schools of higher socioeconomic wards suggest the importance good personal hygiene and well being in protection against tinea. This study also suggested the importance of domestic animals as reservoir of human ringworm in Sokoto where livestock and pet domestication is common in most households. According to Scott^[1] and Macura^[2] animal type ringworm in particular is an occupational hazard for farmers, livestock keepers or herdsmen and individuals who are closely associated with animals including pet keepers. It had been confirmed that in Nigeria, enzootic ringworm of horses, dogs and livestock commonly cause sporadic disease among owners or caretakers of these animals or their children^[14]. Majority of cases are usually due to contact with dogs, which are closer to their owners and maintained in many households^[6,7]. Direct or indirect contact with fungus contaminated objects of livestock rearing such as dung, fencing or grooming brushes, harness, halters or ropes used in restraining animals are extremely important in natural dissemination of the disease^[1,3,8-10]. In endemic areas, the predisposing or exposure related factors of dermatophytosis include age (Children and young animals are more susceptible), immunity (prior exposure where adults are less affected, except for immunosuppression), environment (contamination, crowding, high humidity, poor ventilation or darkness, stress) and poor nutrition^[1,2,8,11,15]. However, dermatophytosis is commonly a self-limiting disease in larger or older animals and adult humans, with spontaneous remission occurring in 1-4 months while re-infection are uncommon^[1,2]. Often ringworm is of little pathogenic significance but serious tinea inflammation may form access route for secondary bacterial infection, septicemia, alopecia, deformed digits, whitlow and recurrent chronic hair scarring in animals^[7,2]. Hair loss in older animals may not be significant enough to threaten the hides and skin industry^[10,15] but hair loss in human may lead to obnoxious scarring and alopecia^[4,5]. Although most cases of ringworm are unapparent, its incidence usually points to underlying factors of poor human and animal environment. It is possible that soil fungi that were common in children playgrounds and the fungi of mice, which infest most homes of volunteers in

this study, also constituted a source of endemic dermatophytosis^[1,11]. Other studies have confirmed that the aetiological agents of most endemic or household ringworm include mainly zoophilic species of *Trichophyton* and *Microsporum*^[10,15].

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