



Intestinal helminth infections among the nomadic Fulanis in two localities of Adamawa State, north-east Nigeria

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Abstract

Human intestinal helminthes is a major public health challenge in children, particularly in the tropical and sub-tropical regions of the world. In the course of the survey to determine the prevalence of intestinal helminthes infections among the nomadic Fulanis in Adamawa State, Stool specimens were collected from 229 nomadic Fulanis in Demsa and Mayo-Belwa Local Government Areas of Adamawa State. Members of purposively selected representative from 20 camps participated in the epidemiological survey. About three-quarters (74.20%) were infected with at least one form of intestinal helminth parasite. The prevalence of intestinal parasite infections was similar in Mayo-Belwa (72.72%) and Demsa (75.63%). *Ascaris lumbricoides* (29.70%), hookworm (20.52%), *Schistosoma mansoni* (14.41%), *Strongyloides stercoralis* (5.24%) and *Trichuris trichiura* (4.37%) were observed in order of prevalence. The age-specific prevalence shows decreasing infection with age. An initial increase infection in the 50 > years age-group (80.00%), reaches a peak at 20-29 years age-group (82.90%). Data show that males (79.03%) had a higher infection rate ($p < 0.05$) than females (68.57%).

Keywords: Intestinal helminth; nomadic Fulani; Adamawa State.

Introduction

Human intestinal helminthes is a major public health challenge in children, particularly in the tropical and sub-tropical regions of the world [1, 23]. Most intestinal infections result from ingestion of food or water that has been contaminated with human faeces [1, 2]. High community prevalence and intensity of soil-transmitted parasite usually indicate that ingestion of the infective stages occur regularly and frequently in that particular community [3, 24]. Contamination of soil and water, and contact with such contaminated-environment present a risk to people especially children in communities with poor water supply, and sanitary condition [4]. More than one billion of the world's populations, including children are chronically infected with *A. lumbricoides*, *T. trichiura* and the hookworms [5].

In Nigeria, Akogun *et al* [6] recorded high rates of helminth infections among people without toilet facilities in Adamawa State. Elsewhere in Nigeria infection rates ranged between 15% and 41.90% [7, 8]. These studies indicate a strong association between parasite transmission and sanitary conditions within residential areas but did not investigate the pattern of transmission among the nomadic Fulani who are continuously on the move with their animals in search of food.

Abdikarim *et al* [9] had earlier reported that intestinal parasites and helminthes are less common among nomads than in settled population. Nomads however, play an important role in the economic activities of African countries; they are responsible for the production of milk and animal products which enhance nutrition,

their health is also very vital. A lot of work on intestinal helminthes parasites has been carried out in communities of the settled-population in Nigeria but not much study has been done on intestinal helminthes infections among the nomadic Fulanis in north-east Nigeria. This preliminary study attempts to describe and provide a baseline information on the prevalence of intestinal helminthes' parasites amongst the nomadic Fulanis in north-east Nigeria.

Materials and methods

Study area

The study was conducted in Demsa and Mayo-Belwa Local Government Areas of Adamawa State, Nigeria. Adamawa State is located in the north-eastern Nigeria between Latitude 9° and 11°N of the Equator and between Longitude 11° and 14°E of the Greenwich Meridian. It has an area of 38,741 square kilometres and as a typical tropical African city. The weather conditions are marked by wet and dry seasons. Maximum temperature can reach 40°C while the minimum temperature can reach 18°C (Adamawa State Diary 2015). Demsa LGA lies in the southern part of Adamawa (Latitude 9°11'S and Longitude 12°34' W), the Benue River (also called river Gongola) flows behind the LGA and the Fulanis live in the river bank and use the river as their source of water as observed during the study-period. The predominant occupation of the people in Demsa is fishing and farming. Mayo-Belwa LGA on the other hand lies in the south-east of Adamawa State (Latitude 9°12' N and Longitude 12°36' E) the Fulanis occupy the abundant land surrounding the area. People in Mayo-Belwa are mostly farmers.

The study was carried out among the nomadic Fulani living in the two LGAs. Camp leaders were informed about the purpose and benefit of the study. Information on age and sex were collected. Informed consent was obtained from heads of each of the families sampled in the camps using a translated version from English to Hausa language. Each person was given two pre-labelled vials for stool sample, with name, sex and age of the person.

Ethical clearance for the study

Ethical clearance was obtained from the Adamawa State Ministry of Health and the camp leaders in the study area gave approval for this study.

Collection of stool sample

A total of 229 stool samples were collected from the nomads in clean sterile vials. The nomads were randomly selected from 20 camps of the study-area. The stool samples were preserved with 10% formalin and transferred to the Zoology laboratory of the Modibbo Adama University of Technology, Yola for analysis.

Examination of stool sample: Concentration method

The concentration method was used to concentrate helminthes eggs in 1 g of the faeces. 1 g of stool sample was mixed with 10 ml of normal saline using an applicator stick to form a suspension. The suspension was filtered into a test-tube and centrifuged at 1,000 revolutions per minute for 1 minute (1,000 rpm). The supernatant was discarded. About 3-4 ml of 10% formol solution was added to the deposit to form a homogenous suspension and the mixture was allowed to stand for 5 minutes on the bench. A 3-4 ml of diethyl ether was added and shaken vigorously and allowed to stand for 2 minutes, it was then centrifuged at 1,000 revolutions per minute for 1 minute. The faecal debris from the slide of the tube was detached with the aid of a glass rod (spatula) and the supernatant discarded leaving the deposit at the bottom of the centrifuge tube. The deposit was tapped with finger to mix and using a Pasteur pipette, a drop of the deposit was applied on a microscope slide mixed with Lugol's iodine, covered with a cover slip and examined using x10 objective lens while the x40 objective lens was used for identification of eggs [10, 11].

Data analysis

The data in this study were processed using EPIINFO 2002 (Data base and statistics software for public health professionals, July 2002 developed by Centres for Disease Control and Prevention (CDC) Atlanta, Georgia, United States of America, and Statistical Package for Social Sciences (SPSS 10.1). Associations between demographic attributes and parasite type were tested. The proportions obtained in the study were compared using chi-square test. The confidence level for the analysis was set at 95%, and level of significant difference at $p < 0.05$.

Results

Two hundred and twenty-nine (229) nomads were examined for intestinal helminth. Result revealed that about 74.24% of the population were infected with at least one form of intestinal helminth parasite (Table 1). The pattern of infections with single and double helminthes parasites due to study sites are shown on Table 2. Generally, prevalence of intestinal helminthes infections was similar in Mayo-Belwa and Demsa with values 72.72% and 75.63% respectively. *Chi*-square showed no significant difference at $p < 0.05$. Although, infection with single parasite was more in Mayo-Belwa (65.70%) than in Demsa (56.30%), but there was no significant difference at $p < 0.05$. Conversely, infections with double parasites were more in Demsa (10.00%) than in Mayo-Belwa (05.00%) although there was no significant difference at $p < 0.05$ (Table 2).

Furthermore, considering sex parameter, infection rate

was higher among the males than the females with values 79.03% and 68.57% respectively. However, statistics showed no significant difference at $p < 0.05$ (Table 3).

With the age parameter, result showed highest prevalence (82.93%) helminthes infection among the 20-29 age-group, while among the adult between the

ages of 50 and above the level of infection was 80.00%. But a sudden drop in level of infection was observed among nomads in age-group 40-49 with value 58.30% (Table 4). The difference in the rate of infection with respect to age was statistic significantly different at $p < 0.05$.

Table 1. Prevalence of intestinal helminthes in Demsa and Mayo-Belwa LGAs.

LGA	Total No. exam.	Total No. +ve and %	<i>Ascaris</i> No. and % +ve	<i>Hookworm</i> No. and % +ve	<i>S. mansoni</i> and % +ve	<i>S. stercoralis</i> and % +ve	<i>T. trichura</i> No. and % +ve
Demsa	119	90 (75.63)	38 (31.93)	20 (16.81)	15 (12.61)	7 (5.88)	6 (5.04)
M/Belwa	110	80 (72.72)	30 (27.27)	27 (24.54)	18 (16.36)	5 (4.54)	4 (3.63)
Total	229	170 (74.24)	68 (29.70)	47 (20.52)	33 (14.41)	12 (5.24)	10 (4.37)

Numbers in parenthesis indicate percentages.

Key: *Ascaris* = *Ascaris lumbricoides*, *S. mansoni* = *Schistosoma mansoni*, *S. stercoralis* = *Strongyloides stercoralis*, *T. trichura* = *Trichiuris trichura*.

Table 2. Patterns of infection with single and double parasites in Demsa and Mayo-Belwa LGAs of Adamawa State.

LGA	Number examined	Prevalence (%)	Prevalence of infection types	
			Single	Double
Demsa	119	75.63	56.30	10.00
Mayo-Belwa	110	72.72	65.70	05.00
Total	229	74.24	60.10	07.00

Table 3. Sex-Related Prevalence of intestinal Parasites encountered during the study.

Sex	Number examined	Number infected	Infection (%) rate
Male	124	98	79.03
Female	105	72	68.57
Total	229	170	

$p < 0.05$ $\chi^2 = 3.253$ $df = 1$.

Table 4. Age-Specific prevalence of parasites in Adamawa State Nigeria.

Age	Total exam. +ve	No. Total +ve and %	No. <i>Ascaris</i> and % +ve	No. <i>Hookworm</i> and % +ve	No. <i>S. mansoni</i> and % +ve	No. <i>S. stercoralis</i> and % +ve	No. <i>T. trichura</i> and % +ve
0-9	92	70 (76.09)	34 (37.00)	10 (11.00)	8 (8.70)	6 (6.52)	0
10-19	57	38 (66.67)	18 (31.60)	7 (12.28)	8 (14.04)	3 (5.30)	4 (7.01)
20-29	41	34 (82.93)	10 (24.40)	16 (39.02)	13 (31.71)	3 (7.32)	6 (14.63)
30-39	17	13 (76.47)	3 (17.65)	6 (35.30)	4 (23.53)	0	0
40-49	12	7 (58.33)	2 (16.70)	5 (41.70)	0	0	0
50-59	10	8 (80.00)	1 (10.00)	3 (30.00)	0	0	0
Total	229	170 (74.24)	68 (29.70)	47 (20.52)	33 (14.41)	12 (5.24)	10 (4.37)

Numbers in parenthesis indicate percentages. $p < 0.05$ $\chi^2 = 41.36$ $df = 30$.

Key: *Ascaris* = *Ascaris lumbricoides*, *S. mansoni* = *Schistosoma mansoni*, *S. stercoralis* = *Strongyloides stercoralis*, *T. trichura* = *Trichiuris trichura*.

In order of prevalence of the helminthes infection, result showed that *A. lumbricoides* (29.70%) is the most common, followed by hookworm (20.52%), next is *S. mansoni* (14.41%), then *S. stercoralis* (5.24%) and *T. trichiura* (4.37%) (Table 4).

Discussion

Intestinal helminth parasites especially soil-transmitted helminthes' are widespread and highly prevalent but also relatively easy to control. The results of this study showed a relatively high prevalence of 74.24% intestinal helminthes' infection among nomads. The findings are consistent with studies done elsewhere in Nigeria [1, 3, 15, 19, 22, 23]. The helminth infection in the study-area poses serious threats to the hopes and aspirations of the nomadic Fulanis for healthy living which would enable them take proper care of their animals in order to keep producing milk and beef to the Nigerian populace and Africa as a whole. The environment of the nomads and socio-cultural habits of the people (these include: lack of sanitary facilities and indiscriminate defecation) could be attributable for the prevalence of intestinal parasite infections in their camps. The presence of the five species of intestinal parasites in this study sites suggest that the prevailing environmental conditions support the transmission of a wide range of parasites. In this study *A. lumbricoides* hookworm and *S. mansoni* were the commonest intestinal parasite observed, this is not surprising as it is a parasite that is common with settled populations in the tropics as well as the nomadic Fulani who are always on the move in search of greener pasture for their animals. The absence of *Taenia* sp. could be related to dietary habit. Beef and pork rarely feature in the diet of the nomadic Fulani hence they have lesser chance of being infected. Most of the camps sampled for the study had no toilet facilities; they therefore engage in indiscriminate defecation in bushes and farms, hence the prevalence of these helminthes. This is in keeping with the studies by Gundiri *et al*, WHO, Ailou, Agi, Etim *et al* and Shitta [3, 10, 12-15] who also reported prevalence of *A. lumbricoides*.

The prevalence of hookworm and *S. stercoralis* were very low among the nomads however, *E. histolytica* was not found at all. This could be as a result of milk consumption which is a staple food to the nomads. Studies have shown that milk as a staple diet helps to protect nomads against certain helminthes infections particularly against *E. histolytica* most likely due to the low iron content of milk and the competition for iron in the milk by lactoferrin and transferrin (iron binding proteins) and the amoebas [16, 17].

The highest prevalence observed among the age-group 20-29 may be because of lack of toilet facilities in the camps, so both the young and the old are exposed to the infection. It was observed in the camp that this

age-group go out with the animals except if sick; by so doing an infective stage of intestinal helminthes parasite may be picked in unwashed fruits eaten during the search for food to the animals in the bush as reported by Akogun, Onwuliri and Shitta *et al* [1, 8, 18].

A combination of factors such as poor defecation habits, playing in dirty or filthy environment and the geophagus habit of children could be responsible for the prevalence among the children and the young, this agrees with the works of Fashuyi and Adeyeba [4, 19]. The second highest prevalence was observed in the 50 and above age-group. These could be attributed to exposure of that age-group to sources of infection through their herding activities where the adult also follow the young to the bush with the animals.

The prevalence of intestinal parasite infection in the two study-sites, that is Demsa and Mayo-Belwa LGAs, was generally similar. This similarity could be attributed to poor sanitary conditions of these areas. This unhygienic environment leads to high parasitic infection as reported by Gundiri and Oomen [3, 20].

The overall infection rate for males and females (all age-groups) were different. However, of those infected, 98 (79.03%) and 72 (68.57%) were males and females, respectively. Therefore, infection rate among the males was higher than the females, although not statistically significantly different at $p < 0.05$. Variations in the frequency and intensity of occupational exposures to the contaminated environment could be responsible for the higher infection rates in males than females. The male nomads are always moving out with their animals where they may come in contact with the infective stages of these parasites and probably eating unwashed fruits in the bush, which could be the reason for the higher prevalence of intestinal parasitic infections.

The study provides a baseline data on the prevalence of intestinal helminthes infection among the Nomads living in some parts of Adamawa State. Control of these parasite infections is essential, not only among children as suggested by Ogbe *et al* and Badaki *et al* [21, 22] but, also amongst the entire Nomadic Fulani community.

Acknowledgment

The authors are grateful to the camp leaders of the sampled camps in Demsa and Mayo-Belwa LGAs of Adamawa State, for their support during the study and the Zoology Department Modibbo Adama University of Technology Yola for allowing us access to some of their laboratory facilities. We also appreciate Mrs. Abu Adamu Yahaya for assisting in communicating with some of the Nomads. The study was supported by Common Heritage Foundation (CHF) Yola, Nigeria.

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Citation

Shitta, K. B. and Akogun, O. B.
Intestinal helminth infections among the nomadic Fulanis
in two localities of Adamawa State, north-east Nigeria,
pages 69-73.

Nigerian Journal of Parasitology
ISSN 1117 4145, Volume 38[1] March 2017

