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Epidemiological and Environmental Studies on Intestinal Helminthes among Dwellers of Hausari 1 Ward, Michika Local Government Area of Adamawa State, Nigeria

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Abstract:
A total of 356 stool samples were examined for intestinal helminthes. Out of this figure, 122 (34.3%) were infected with six (Ascaris lumbricoides, S. mansoni, H. nana, S. stercoralis, hook worm and Taenia) types of parasites. Males 70(43.2%)were more infected than their female, 52 (26.8%) counterparts However, subjects belonging to 41and above, 25 (47.2%) year age group were the most infected while the least was recorded amongst those within 36-40, 3(11.5%) year age group. Considering occupation, traders (51.9%) had the highest rate of infection closely followed by farmers (46.5%), while the civil servants (29.8%) had the lowest. Chi-square test showed that there was association between occupation and helminth infections (p>0.05). In relation to method of waste disposal, those that were defecating in the bush (61.5%) had the highest rate of infection over those who used pit toilet (33.1%) and water system (40%). Chi-square analysis revealed a significant difference between the rate of infection and method of waste disposal (P<0.05) Also a high rate of infection was observed among those who used well (44.4%) as their source of water while those who used bore hole (26.6%) had the least infection rate, and there was association between the infection rate and source of water (P>0.05)

Keywords: *Intestinal helminthes, Habits, Environment, Michika, Adamawa, Nigeria*

1. Introduction

The burden of intestinal helminthiasis has remained a public health problem worldwide, particularly in the underdeveloped countries (Corry, Garryl, and Bretty, 2004). About 2 billion people worldwide were infected with intestinal parasites (WHO, 2002) out of which 450 million were ill (Anonymous, 2004)

Most of the African continent remains fertile for parasitic infections because of the largely tropical and subtropical climate. Contamination of soil with pathogenic organisms arise from indiscriminate defecation on the ground by people who lack portable water, good hygiene and sanitation as well as those that do not use latrines that are available (Okon and Oku, 2001). In Nigeria, considerable amount of human and animal waste is discharged into the soil (Dada and Bellino, 1979) leading to the seeding of the soil with geohelmith eggs and larvae among others which become the main source of infection in human (Adeyaba and Akinabi, 2002).

Helminth disease whether soil transmitted, vector borne or resulting from particular social habit are serious public health problems to man (Luke *et al*., 2000). Several studies (Ejezie. 1991 and Ugbomoiko, 2000., Alo, Anosike and Danburan, 1993., Pukuma and Sale, 2006., Gundiri and Okwuosa, 2005) have reported the prevalence of Helminth parasites in different parts of Nigeria. This can be particularly higher in rural than in urban communities (Oninla, *et al,* 2007). Study on helminthes has never been conducted in Hausari 1 ward of Michika local government. This study was carried out to determine the prevalence of intestinal helminthes infection in the study area. The outcome of the study would help to provide basic data for the development of control program aimed at improving the health status of Nigerians.

2. Materials and Methods

2.1. The Study Area

The study was carried out in Hausari 1 ward, in Michika local government area of Adamawa State. It has an estimated population of 712 people. The village is about 224km from Yola, the headquarters of the state. The village is located at the northwestern part of

Adamawa State on latitude 10°20' – 10º50', longitude 13°10' - 13°40', and has a tropical climate marked by dry and rainy seasons. The rainy season commences in early May and ends late October. The dry season starts in December and ends in April. The driest months are January, February, March and April when the relative humidity is extremely low (20%-30%) in the month of April. It starts increasing and reaches the peak of about 80% in August and September.

Most inhabitants are civil servants, farmers of crops such as groundnuts, maize, Sorghum and Cowpea (beans) and rearers of pigs, goats and cattle.

There is one primary school, a private clinic, and an abattoir in the ward. Their main sources of water at the time this survey were bore hole and wells.

2.2. Stool Specimen Collection

Prior to the commencement of the actual study, the community head and subsequently the community members were contacted. Details of the research work particularly the aims and objectives of the study were discussed during this contact. This was followed by collection of stool samples from willing members of the community. A total of 365 randomly selected people was used for the study. Each individual was provided container with a lid. They were requested to collect and submit small portion of their first stool specimen the following morning. Samples were collected the same day and taken to the laboratory for both macroscopic and microscopic examination

2.3. Laboratory Examination

Specimens were analyzed in Michika General Hospital using the formal-ether concentration method as previously described (King 1973). About a gram of stool sample from each person was introduced into a test-tube with an applicator stick. About 3mls of normal saline was added and stirred. The suspension was then filtered with a sieve into a centrifuge tube. About 3mls of ether was added and ten stirred and centrifuged for about 3 minutes, after which the supernatant was decanted leaving the deposit which was examined for intestinal helminth eggs and larvae.

A small drop of the deposit was introduced on the side with an applicator stick and then covered with cover slip. It was then observed under microscope using the x10 and x40 objective lens for clear identification.

3. Results

3.1. Prevalence of Intestinal Helminth Infections

Out people 356 people (162 males and 194 females) examined, 122 (34.3%) were infected with six types of helminthes. Table 1displays the various helminth parasites (*A. lumbricoides, Hookworm, H. nana, S. stercoralis, Taenia species* and *Schistosoma mansoni*) encountered. The highest prevalence recorded was with *Schistosoma mansoni* (16.0%) followed by Hook worm (7.9%) while the least infection of 1.1% was observed with *Ascaris lumbricoides*.

Table 2 shows sex-related prevalence of single and mixed infection. One hundred and eight (30.3%) subjects of the total number ad single infection (males, *62 [*38.3%], females, 46 [3.1%]) while 14 (3.1%) had mixed infection (male, 8 [4.9%], females, 6 [3.1%]). Considering the overall prevalence rate of infection, males, 70 (43.2%) were more infected than their female *52* (26.8%) counterparts. Chi-square analysis revealed that there was no significant difference between the sexes (χ^2 = 3.84, 1df, P<0.05).

Table 3 shows the distribution of helminth infections in relation to occupation. The highest prevalence rate of infection 14 (51.9%) was recorded among the traders closely followed by the farmers 20 (46.5%), while the least prevalence rate of infection was recorded among civil servants 14 (29.8%). Chi-square analysis shows that there was association between occupation and helminth infections (χ^2=11.07, 5df, p>0.05).

Helminth Parasites	**No. infected**	**% Prevalence**
Ascaris lumbricoides	4	1.1
Taenia species	6	1.7
Strongyloides stercoralis	12	33
Schistostosoma mansoni	57	16.0
Hymenolopis nana	5	1.4
Hook worm	28	7.9
Total	122	34.5

Table 1: Distribution of Helminthes parasite among the study subjects (n = 356)

Sex	**No. Examined**	**No. Infected (%)**	**Single Infection No. Infection (%)**	**Mixed Infection No. Infection (%)**
Male	162	70 (43.2)	62 (38.3)	8 (4.9)
Female	194	52 (26.8)	46 (23.7)	6 (3.1)
Total	**356**	**122 (34.3)**	**108 (30.3)**	**14 (3.9)**

Table 2: Sex-related prevalence and types of infection recorded among the subjects

χ^2= 2df (0.05) = 5.99

$$\frac{\Sigma(O-E)^2}{E} = 9.82$$

Occupation	No. Examined	No. Unifected	No. Infected (%)
Civil servants	48	34	14(29.8)
Students	202	140	62(30.7)
Famers	43	23	20(46.5)
House wives	23	15	8(34.8)
Traders	27	13	14(51.9)
Others	13	9	4(30.8)
Total	356	234	122(34.3)

Table 3: Prevalence of helminth infection in relation to occupation

χ^2 =5df (0.05) = 11.07

$$\frac{\Sigma(O-E)^2}{E} = 7.37$$

The distribution of intestinal helminthoses in relation to method of human waste disposal is shown in table 4. Observation showed that, those that were defecating in the bush had the highest prevalence rate of infection 8(61.5%) over those that were using water system toilet 2(40%) and pit toilet 112(33.1%). Statistical analysis showed that, there was no relation between the rate of infection and method of waste disposal ($\chi^{2:}$= 5.99, 2df, P>0.05).

Table 5indicates the distribution of infection according to source of water. The highest prevalence rate of infection was recorded among those who were using well 68(44.4%) as their source of water while the least of infection rate was recorded among those that were using bore-hole 54(26.6%) as their source of water. Statistical analysis revealed that, there was association between the rate of infection and sources of water (χ^2 = 3.84, 1df, P > 0.05).

Table 6 depicts the prevalence of helminth infection in relation to age group. The highest prevalence rate of infection was observed among subjects belonging to 41 and above 25(47.2%) year age group, while the least infection rate of 3(12%) was recorded among the age group 36-40 years. Chi-square analysis revealed a significant association between the age group and rate of infection (χ^2 = 14.07, 6df, P>0.05).

Plate shows the eggs and larva of the various parasites observed during this study (*Ascaris lumbricoidcs, Taenia, Schistosoma mansoni,* Hook worm*, Hymenolepis nana* and *Strongyloides stercoralis*)

Method of waste Disposal	No. Examined	No. Infected	No. Infected (%)
Pit toilet	338	226	112(33.1)
Water system	5	3	2(40)
Bush	13	5	8(61.5)
Total	356	234	122(34.3)

Table 4: Prevalence of helminth infection in relation to method of waste disposal

χ^2 = 2df (0.05) = 5.99

$$\frac{\Sigma(O-E)^2}{E} = 5.02$$

Source of water	No. Examined	No Uninfected	No. Infected (%)
Bore-hole	203	149	54(26.6)
Well	153	85	68(44.4)
Total	356	234	122(34.3)

Table 5: Prevalence of infection according to source of water

χ^2-2df (0.05) = 3.84

$$\frac{\Sigma(O-E)^2}{E} = 12.34$$

Age (Year)	No. Examined	No. uninfected	No. infected (%)
5-10	78	48	30(38.5)
11 – 15	58	36	22(37.9)
16-20	44	27	17(38.6)
21 -25	39	25	14(36)
26 – 30	33	25	8(24.2)
31 -*35*	26	23	3(11.5)
36-40	25	22	3(12)
4 1 and above	53	28	25(47.2)
Total	356	234	122(34.3)

Table 6: Age-related prevalence of helminth in relation among the subjects

χ^2=7df, (0.05) = 14.07

$$\frac{\Sigma(O-E)^2}{E} = 44.2$$

4. Discussion

The result revealed the existence of intestinal helminth infections (both single and mixed) in the study area. The prevalence rate of infection (34.3%) in the study area appears relatively higher than those reported by Nack and Tanko (2000) (27.21%) and Okpala *et al.* (2000) (2.20%). Prevalence in this study however, appears lower than that reported by Adenusi and Ogunyomi, (2005) (94.18%).

The prevalence rate of infection (46.5%) recorded among the farmers did not agree with the reports of Pukuma and Sale (2006) who recorded 53.2% prevalence rate of infection among farmers in Viniklang, Adamawa State. In the same vein, the prevalence rate of infection recorded among the subjects who were using well as their source of water (44.4%) did not agree with that reported by Murufa *et al*. (2005) who recorded (74.5%) among well water users. The high prevalence rate of infection recorded among the traders and farmers during this study could be due to the nature of their jobs which exposed them to the infection.

In relation to sex, the highest infection rate was observed among males (43.2%) while the least infection rate was recorded among the females (26.8%). Cases of mixed and single infections were observed during this study, whereby one person has one or more parasites. The high infection rate was observed among those who were using pit toilet (33.1%) as their method of waste disposal. The prevalence rate appears to be higher than the report by Uwaezuke *et al* (2005) among pit toilet (9.5%) users in Ihitte Ubama Local Government of Imo State.

Forty-one and above (47.2%) year age group had the highest prevalence rate of infection. This could probably be due to low immunity which could be associated with aging. The lowest infection rate observed among subjects who had *Ascaris lumbricoides* (1.1%) in this study is not in line with the reports by Abdullahi and Abdulaziz, (2001) who recorded (3.33%) *Ascaris lumbricoides* in Zaria, Kaduna State. The intestinal helminth infections recorded in the study area could probably be due to unhealthy socio-cultural and religious practices, lack of public amenities, poverty and inadequate access to health care. Ignorance could also be one of the most important reasons which chances parasite transmission. This is because some people are ignorant of symptoms and mode of transmission of these helminthes. Lack of proper sanitation increases contamination of the environment thereby host parasites contact rise and the environment is further contaminated. Another reason may be the parasite environment in the host which is suitable for other parasites species may be suitable for another parasite. Consequently, there is need for the installation of an efficient waste disposal mechanism, improvement in sanitation and provision of treated water supply to the community. In addition, intensive public health campaign should be embarked upon to educate members of the community with special focus on symptoms, mode of transmission and protective measures against these helminthes.

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