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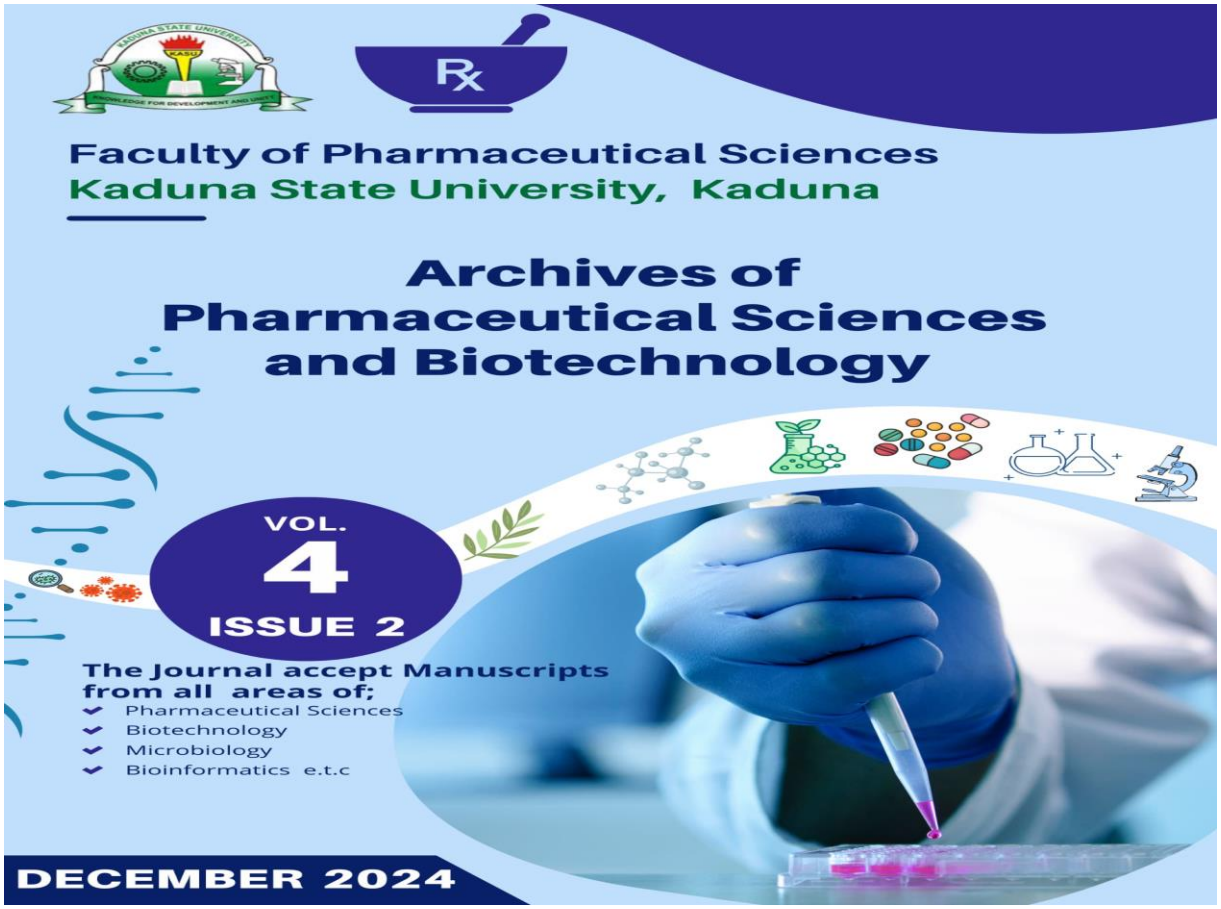

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OCCURRENCE OF GEOHELMINTH EGGS AMONG PRIMARY SCHOOL PUPILS IN UNGUWANKADARA, KADUNA STATE, NIGERIA

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ABSTRACT

Introduction: Geohelminths are parasites whose infections constitute a major health challenge in sub-Saharan Africa. Their life cycle requires soil for incubation before becoming infective.

Aims: This study aimed to investigate the occurrence of Geohelminths among Primary School Pupils, in Unguwan Kadara, Kaduna State.

Methods: Three hundred and fifty (350) stool samples were collected. The formal ethyl acetate concentration Technique was used to analyze the Stool samples.

Results: The overall prevalence was found to be 22.6%. Hookworm infection was 14.0 %, *Ascaris lumbricoides* and *Taenia* spp were 3.1% each and *Schistosoma mansoni* infection was 2.3 %. The infectivity by age showed that 3-5 years had total infectivity of 14.4%, 6-8 years 26.1%, 9-11 years 28.9%, 12-14 years 18.9% and 15 years and above had 50.0% but the difference was not statistically significant (P>0.05).Infectivity by class showed that primary one (1) had total infectivity of 15.0%, primary two (2) had 23.3%, primary three (3) 23.3%, primary four (4) 33.3%, primary five (5) 20.0% and primary six (6) 20.0% but the difference was not statistically significant (P>0.05).Infectivity by gender showed that Females have a total infectivity of 21.7% while males had an infectivity of 23.4% but the difference was not statistically significant (P>0.05).

Conclusion: The difference in levels of pupils' knowledge of Geohelminths was statistically significant (P<0.05). Intensive health education, provision of pipe-borne water, improved environmental sanitation and continuous deworming campaigns in this community were recommended.

***Keywords*:** Geohelminths, Stool samples, Pupils, Unguwan Kadara, Kaduna

INTRODUCTION

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Geohelminths are soil-transmitted parasites that cause disease in humans. Their ova require a period of incubation in the soil before becoming infective (1, 2). Geohelminth infections constitute a significant public health challenge in developing countries. More than 1.5 billion people worldwide are currently infected with one or more of these Geohelminths (3). Children are at greatest risk of acquiring Geohelminthiasis which is often associated with poor growth, reduced physical activity, anaemia and impaired learning ability (4). Geohelminthiasis is promoted by poor hygiene habits such as continuously deleting human and animal faeces on the soil. This habit supports contact with Geohelminths ova or larvae in the soil with children mostly acquiring the infection either directly or indirectly (5, 6). Geohelminthiasis is more prevalent among Pupils aged 5-14 years and constitutes 12% of the total disease burden in children (7). Many people become infected by consuming the eggs from contaminated food or drink, and some contract them by the larva penetrating their skin. This is a particular issue in poor countries because many people do not always wear shoes and where foods are frequently dirty. Many people go long distances barefooted merely to fetch tainted water for their family as a result they contract illnesses and Geohelminths (4). Due to their immature physical development and increased immunological susceptibility, children may also be more vulnerable to the negative consequences of Geohelminthic infection (4). Geohelminthic infection typically manifests as symptoms in people with high worm burden, intestinal blockage, sleeplessness, vomiting, weakness, and stomach ache are all symptoms of intestinal helminthic infection. Worms' hosts may experience general discomfort as a result of their adhesion to the gut and natural motility (8). Temporary asthma attacks and other respiratory symptoms may also result from *Ascaris* larvae migrating through the respiratory airways. Worms travelling towards the upper digestive tract may cause vomiting (9, 10). It's also important to take into account the possibility that the immunological response brought on by Geohelminths infection may deplete the body's capacity to fight off other illnesses, rendering afflicted people more susceptible to co-infections. Reasonable evidence suggests that Geohelminthiasis is to blame for the persistent occurrence of AIDS and TB in underdeveloped nations, especially in African countries (11). Microscopy, radiology, serology, haematology, and molecular techniques can all be used to diagnose intestinal Geohelminths (12). These helminths include intestinal trematodes (*Schistosoma* species, *Fasciolopsis buski, Fasciola hepatica* etc). Intestinal cestode (*Taenia* species, *Echinococcus granulosus, Diphyllobothrium latum, Hymenolepis nana).*Intestinal nematodes (Hookworm species, *Ascaris lumbricoides, Enterobius vermicularis, Trichuris trichiura, Strongyloides stercoralis*) (4). Despite the health risks associated with Geohelminthiasis infection, to the best of our knowledge data on the prevalence of infection among primary school pupils in this locality has not been investigated. This study aimed to investigate Geohelminthiasis infection among the pupils and their level of knowledge on Geohelminths.

MATERIALAND METHODS

Study Area

The study area was Unguwan Kadara, located in Chikun Local Government Area of Kaduna State. Chikun Local Government is

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located between latitude 10^0 19^1-10^0 29^1 North and longitude $7^0 14^1$-$7^0 25^1$ East (13). The total population of the Local Government Area is 372,272, it has an Area of 4,646 km^2 with a density of 108.2 /km^2 (14). It is a rural area with a rainy season from May to October and a dry season from November to April. The inhabitants are predominately farmers and petty traders with Adara as the major tribe. They have poor sources of water, and many of them resort to the use of water from streams and wells. They also have no access to good toilet facilities thereby defecating indiscriminately around their environment.

Ethical Approval

Before the commencement of this study, permission was sought from Chikun Local Government Education Authority.

Collection and Examination of Stool Samples

Wide-mouthed transparent plastic containers were given to 350 primary school pupils to provide their early morning stool. The containers were labelled with each pupil's name, age, gender, class, and research number. Questionnaires were given to pupils in primary 4-6 to obtain socio-demographic information and knowledge on Geohelminths. The stool samples were transported to the Public Health Laboratory Department of Community Medicine, Kaduna State University for analysis. The stools were examined for ova of Geohelminths using the Formol ethyl acetate concentration Technique as described by CDC, (15). The data obtained were analysed using Chi-square to determine the level of association or difference, and the result was considered significant ($P<0.05$).

RESULTS

The overall prevalence was found to be 22.6%. Hookworm infection was 14.0 %, *Ascaris lumbricoides* and *Taenia* spp. were 3.1% each and *Schistosoma mansoni* infection was 2.3 % (Table 1).The infectivity by age showed that 3-5 years have total infectivity of 14.4%, 6-8 years have infectivity of 26.1%, 9-11 years have infectivity of 28.9%, 12-14 years have infectivity of 18.9% and 15 years and above have 50.0% infectivity, but the difference was not statistically significant (χ^2=18.920, P=0.090) P>0.05 (Table 2).Infectivity by class showed that primary one (1) had total infectivity of 15.0%, primary two (2) had 23.3%, primary three (3) had infectivity of 23.3%, primary four (4) had 33.3%, primary five (5) had 20.0% and primary six (6) had 20.0% but the difference was not statistically significant (χ^2=21.296, P=0.128) P>0.05 (Table 3).Infectivity by gender showed that Females have a total infectivity of 21.7% while males have an infectivity of 23.4% but the difference was not statistically significant (χ^2=2.820, P=0.420) P>0.05 (Table 4).The difference in the level of pupils' knowledge of Geohelminths was statistically significant P<0.05 (Table 5).One hundred and seventy (170) questionnaires were given to pupils in primary four (4) to six (6) to assess knowledge of Geohelminths among the pupils. Pupils from one (1) to three (3) were exempted from filling the questionnaire due to difficulty that may be encountered in understanding and filling the questionnaire, as such they are exempted. Forty-two (42) 24.7 % out of the one hundred and seventy (170) pupils who filled out the questionnaire were infected. In assessing their knowledge of geohelminthiasis, 49 (28.8%) said they had not heard of the word geohelminths while 121 (71.2%) said they had heard of it. In assessing the cause of helminthiasis, the majority of the pupils 77 (45.3%) said is

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caused by bacteria, 24 (14.1%) said is caused by a parasite, 12 (7.1%) said is caused by a virus, 6 (3.5%) said is cause fungi, 2(1.2%) said they don't know and 49 (28.8%) gave no response. In assessing their knowledge of transmission, 98 (57.6%) said the transmission was through faecal-oral, 21% (12.4%) said it was through the contaminated needle, 33 (19.4%) said it through insect bite and 18 (10.6%) said it's through skin penetration. In assessing their knowledge of prevention, 32 pupils (18.8%) said intestinal helminthiasis can be prevented through vaccination, 15 (8.8 %) said through bathing with soap and water, 115 (67.6%) said through personal hygiene/environmental sanitation, 5(2.9%) said through the washing of clothes and 3(1.8%) said they don't know. In assessing their knowledge of treatment, 49 (28.8%) said flagyl is used for the treatment of intestinal helminthiasis, 1 (0.6 %) said paracetamol/Panadol is used for the treatment, 112 (65.9%) said the use of antihelminthic drug, 2 (1.2 %) said by the use of herbicides, 4 (2.4 %) said by the use of pepper and 2 (1.2 %) said they don't know (Table 5).

Table 1: Prevalence of Geohelminths among Primary Pupils

Intestinal helminthes	No. examined	No. infected (%)
Hookworm	350	49 (14.0)
A. lumbriciodes	350	11 (3.1)
Taenia spp.	350	11 (3.1)
S. mansoni	350	8 (2.3)
Total	**350**	**79 (22.6)**

Table 2: Distribution of Geohelminths among Different Age Groups of the Pupils

Age (Years)	N	AL	HK	Teania	SM	Total
3-5	90	3(3.3)	6(6.7)	2(2.2)	2(2.2)	13(14.4)
6-8	92	5(5.4)	12(13.0)	6(6.5)	1(1.1)	24(26.1)
9-11	90	0(0.0)	22(24.4)	0(0.0)	4(4.4)	26(28.9)
12-14	74	3(4.1)	7(9.5)	3(4.1)	1(1.4)	14(18.9)
15 & Above	4	0(0.0)	2(50.0)	0(0.0)	0(0.0)	2(50.0)
Total	**350**	**11(3.1)**	**49(14.0)**	**11(3.1)**	**8(2.3)**	**79(22.6)**

χ^2=18.920, P-value=0.090, P-value >0.05 is not statistically significant

N = Number examined, AL = *Ascaris lumbricoides*, HK = Hookworm, SM = *Schistosoma mansoni*

Table 3: Distribution of Geohelminths with the Classes of the pupils

Class	N	AL	HK	Teania	Sm	Total
1	60	2(3.3)	5(8.3)	1(1.7)	1(1.7)	9(15.0)
2	60	5(8.3)	4(6.7)	4(6.7)	1(1.7)	14(23.3)
3	60	1(1.7)	9(15.0)	3(5.0)	1(1.7)	14(23.3)
4	60	1(1.7)	15(25.0)	0(0.0)	4(6.7)	20(33.3)

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5	60	0(0.0)	9(15.0)	2(3.3)	1(1.7)	12(20.0)
6	50	2(4.0)	7(14.0)	1(2.0)	0(0.0)	10(20.0)
Total	**350**	**11(3.1)**	**49(14.0)**	**11(3.1)**	**8(2.3)**	**79(22.6)**

χ^2 = 21.296, P-value = 0.128, P-value >0.05 is not statistically significant

Table 4: Distribution of Geohelminths with Gender of the pupils

Gender	N	AL	HK	Taenia	SM	Total
Female	175	7(4.0)	24(13.7)	5(2.9)	2(1.1)	38(21.7)
Male	175	4(2.3)	25(14.3)	6(3.4)	6(3.4)	41(23.4)
Total	**350**	**11(3.1)**	**49(14.0)**	**11(3.1)**	**8(2.3)**	**79(22.6)**

χ^2=2.820, P-Value= 0.420, P-value >0.05 is not statistically significant

Table 5: Pupil's Knowledge of Geohelminths

Characteristics	Response (%)	χ^2-value	p-value
Have you heard of Geohelminths?			
No	49(28.8)		
Yes	121(71.2)		
Causes?			
Virus	12(7.1)		
Parasite	24(14.1)		
Bacteria	77(45.3)		
Fungi	6(3.5)		
Don't know	2(1.2)		
No answer	49(28.8)	155.405	0.000*
Mode of Transmission of Geohelminthiasis?			
Faeco-oral	98(57.6)		
Contaminated needle	21(12.4)		
Insect bite	33(19.4)		
Skin penetration	18(10.6)	99.600	0.000*
Prevention			
Vaccination	32(18.8)		
Soap and water	15(8.8)		
Personal hygiene/ Environmental Sanitation	115(67.6)		
Washing of clothes	5(2.9)		
Don't know	3(1.8)	256.706	0.000*
Treatment			
Use of flagyl	49(28.8)		
Use of Paracetamol/Panadol	1(0.6)		
Use of anti-helminthic drugs	112(65.9)		
Use of herbicides	2(1.2)		

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Use of pepper	4(2.4)		
Don't know	2(1.2)	358.353	0.000*
Have you taken Anti-malemonic drugs before?			
No	0(0.0)		
Yes	170(100.0)		
If yes when?			
5years ago	0(0.00)		
2 years ago	0(0.00)		
1 year ago	170(100.0)		
A few months ago	0(0.00)		

P<0.05 (*) is statistically significant

DISCUSSION

Occurrence of 22.6% of intestinal helminthic infections was reported in this study as overall prevalence, the ova of hookworm, *Ascaris lumbricoides*, *Taenia* spp. and *Schistosoma mansoni* were recovered among the infected pupils. The overall prevalence was higher than 6.67% obtained by Kuboye *et al.,* (16). The high prevalence reported by Kuboye *et al.,* (16) may be due to indiscriminate defecation, walking barefooted and improper refuse disposal observed in the study area. The study also showed that hookworm has the highest occurrence followed by *Ascaris lumbricoides* and *Taenia* spp. while*Schistosoma mansoni* had the least prevalence. The highest Occurrence of hookworm in the study area agrees with the findings of Anosike *et al.,* (17).The finding disagreed with the work of Olusola *et al.,* (18). Their work in a Tertiary Institution in Western Nigeria reported *Ascaris lumbricoides* to have the highest prevalence of 12.7%, this may be due to location differences. The presence of four (4) intestinal helminths namely; Hookworm, *Ascaris lumbricoides, Taenia* spp. and *Schistosoma mansoni* in the study area conform to the finding of Kuboye *et al.,* (16) in Zaria, this may be due to same environmental condition. The prevalence according to age indicated that pupils of 3-5 years had the lowest prevalence while 15 years and above had the highest prevalence. The highest prevalence seen among pupils of the age range 15 years and above disagreed with the findings of Ezeagwuna *et al*., (19).Who reported a high prevalence among pupils of age 9-13 years. The lowest infectivity rate reported among pupils of age 3-5 disagreed with the findings of James *et al*., (20).Who reported the lowest prevalence rate among pupils aged 13-15 years. The lowest prevalence reported among pupils of 3-5 years may be due to good care from parents and nannies who prevent them from getting infected by contaminated materials like soil and fruits/vegetables. The study also disagreed with the findings of Chigozie *et al.,* (21).Where the highest infectivity was reported among pupils of age 4-6 years. The prevalence of geohelminths about class showed that pupils in primary four (4) have the highest infection, followed by those in primary two (2) and three (3) with equal prevalence rates and primary one (1)

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had the least prevalence. There was the highest occurrence of *Ascaris lumbricoides* among pupils of primary 2 while no report of Ascaris infectivity among pupils in primary 5. There was the highest occurrence of hookworm infection among pupils of primary 4 while the lowest hookworm infection was reported among pupils of primary 2, the highest infection with *Taenia* was reported among pupils of primary 2 while no *Taenia* infectivity was found among primary 4 pupils. The highest infectivity with *Schistosoma mansoni* was reported among pupils of primary 4 while no infectivity was reported among pupils of primary 6. The lowest infectivity rate reported among those in primary one (1) pupils may be due to good care from parents and nannies thereby reducing their contact with contaminated objects like soil, unlike others moving around with little or no restriction and exposing themselves to contaminated environment. The high infectivity rate reported among the pupils in primary four (4) may be due to a high level of soil contact activity and a lack of practice of proper personal hygiene among the pupils. Infectivity based on gender showed male pupils were more infected than female pupils. Females have a higher infectivity of *Ascaris lumbricoides* than males. While males have a higher infectivity of Hookworm, *Taenia* and *Schistosoma mansoni* than females. Higher infectivity reported among males may be because, male pupils are mostly active and engaged in many activities such as farming, swimming and other outdoor activities than the females thereby exposing them to these parasites. The finding agreed with that of James *et al.*, 2010, who in their research in Jos reported high prevalence among male pupils (13.6%) than females (11.9%). The finding also agreed with the findings of Ugbomoiko *et al.*, (22).Whom in their work reported a higher prevalence among males (5.4%) than females (3.0%). However, the work disagreed with that of Kuboye *et al.*, (16), who reported a higher prevalence in females (8.56%) than males (4.62%) and Anosike *et al.*,(2006), who reported a high prevalence among females (39.3%) than males (34.5%). The difference in the level of knowledge on the cause of Geohelminthiasis was statically significant ($P<0.05$). Indicating bacteria as the cause of Geohelminthiasis may be because, bacteria is the most pronounced organism in our community today, and every ailment people always thought is caused by bacteria, this could be the reason why majority of the children thought intestinal helminthiasis is caused by bacteria.The difference in the level of knowledge on transmission of Geohelminths was statistically significant ($P<0.05$). The difference in the level of knowledge on the prevention of Geohelminthiasis was statistically significant ($P<0.05$). The majority of them got it right, this may be due to health education as a subject being taught in the school which helps them to know preventive measures against diseases. The difference in the level of knowledge on the treatment of Geohelminths was statistically significant ($P<0.05$). The majority of the pupils got it right that antihelminthic drugs are used for the treatment of Geohelminthic infection, this may be due to mass deworming campaigns by non-governmental organizations such as Sight savers, UNICEF, WHO and the Ministry of Health. The fact is not far fetch when some said flagyl is used, this is simply because helminthiasis is associated with

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stomach pain and our common drug for treating stomach pain is Flagyl. Some chosen peppers may be due to the belief in our communities that, pepper can be used for deworming. Some choosing herbicides may be due to frequent usage of this chemical for weeding by their parents who are mostly farmers and thought it can also be used to treat geohelminthes. All the pupils said they had taken antihelminthic drugs about a year ago (Table 5), this is due to a massive campaign by non-governmental organizations and the Ministry of Health to deworm children from time to time.

CONCLUSION

The study revealed that Geohelminthiasis is still prevalent among pupils of different ages and genders in the study area despite the efforts of the Ministry of Health and Non-Governmental Organizations to deworm children from time to time. Intensive health education, provision of pipe-borne water, improved environmental sanitation and continuous deworming campaigns in this community were recommended.

Conflict of Interest: Authors do not have any conflict to declare

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