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RESEARCH ARTICLE

Geohelminths Contamination of Kebbi State University of Science and Technology Aliero's Environment

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Abstract

The investigation was carried out in Kebbi State University of Science and Technology, Aliero. A total of 200 soil samples were collected to determine the presence of geohelminth parasites in the study area. Out of 200 soil samples examined, 122 (61%) were positive and 78 (39%) were negative. The distribution of geohelminths (Soil Transmitted Helminths) parasites from each sampling sites examined are: senior staff quarters with the highest 36/50 (72%) followed by male hostel with 31/50 (62%), classes are with 28/50 (22.95%) and junior staff quarters recorded the least with 27/50 (22.13%). The prevalence of Hookworm is highest with 50/122 (40.98%), followed by Strongyloides with 21/122 (17.21%), Trichuris with 32/122 (26.22%) while Toxocara has the lowest with 19/122 (15.57s%). The high prevalence of soil transmitted helminth parasite in the study area could be attributed to lack of functional toilet facilities, lack of good sanitation and practice of open field defecation leading to indiscriminate defecation in and around the campus yard. Therefore, current control measures should include: Provision of functioning toilet fascilities and public campain on simple health promoting factors.

Keywords: Geohelminthes, Soil, Transmission, Aliero.

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1. Introduction

Geohelminthes (Soil Transmitted Helminthes) are group of intestinal parasites which belongs to the class Nematoda, whose eggs require a period of maturation (2-4 weeks) in the soil to become infective. These worms are; Ascaris lumbricoides, Trichuris trichura, Hookworms (Ancyclostoma duodenale and Necator americanus) and Strongyloides stercoralis.[1]

Soil contamination by infective forms of intestinal parasites is the most important infection risk factor for both humans and animals. These parasites have been recognized as an important public health problem, particularly in developing countries, where adequate water and good sanitation are lacking. The commonest and well known of these parasites are hookworms (Necator and Ancylostoma), whipworm (Trichuris), and the common roundworm. The soil transmitted helminth (STH) eggs normally get to the environment through the faeces of infected persons or animals and are normally contacted through skin contact (hookworm) and oral ingestion (roundworm and whipworm). Poor water and sanitation practices or conditions are a major risk factor for the distribution, infection, and prevalence of STH. Globally, over 1.5 billion people are infected with STH. Collectively, the STH infection is the largest contributor to the disease burden of Neglected Tropical Diseases and rivals that of the main high-mortality conditions such as HIV/AIDS and malaria and accounts for 85% of the Neglected Tropical Disease burden for the poorest 500 million people in Nigeria. Children have the highest prevalence and intensities of infections because of their geophagy behaviour and are particularly vulnerable to STH infections which reduce physical and cognitive development and also contribute to anaemia.[2]

Soil is one of the main reservoirs of helminth eggs. Particularly, in areas with poor environmental sanitation through oral ingestion or direct skin contact. Studies on soil contamination by infective parasites which are the helminth, have largely focused on the prevalence and intensity of STH infections, especially among children. There is little information on STH loads of soils used for domestic landscaping or gardens in jurisdictions with weak growth media

market or industry. In Nigeria, nutrient-rich top soils (popularly known as "black soil") are predominantly used for domestic and urban landscaping and demand is known to exceed supply in the big cities. Mature nematode eggs, cysts, and Oocysts of protozoan parasites can remain viable in the soil for a long time depending on several factors such as climatic conditions, seasonal air temperatures, humidity or desiccation of soil, and exposure to sunlight.[3]

Most families in urban areas now engage in livestock breeding to meet the ever increasing demand for animal protein and to generate additional income. It is important to note that the practice of breeding cows, sheep, poultry and pigs in and around human dwelling has increased man-animal contact with serious zoonotic implications. Omudu observed that this association has made it possible for parasites and pathogens naturally harboured by these livestock are now commonly infecting man. The prevalence and incidence of zoonotic infections has been on the increase especially in developing regions. Zoonotic helminthes affecting humans in Africa are those with domestic and or peridomestic cycle and reservoirs in pigs, dogs, goats and cattle. There are report of serious contamination of urban settlement with animal faeces in Wurukum, Wadata and North bank of Makurdi respectively. Children in developing countries become the most important vulnerable group to these infections since they usually play within the grounds. [4]

Many morbidity surveys including faecal examination for intestinal parasites have been performed among people who live in rural and urban areas in developing countries revealing high infection rates of human intestinal parasites (Sam-wobo et al., 2009). The eggs in soil can be transferred unto vegetables, when the soil becomes contaminated, then onto the hands and transferred directly into the mouth or ingested by eating raw vegetables. Animal breeders, occupants of the residence where animals are being raised and abattoir personnel are most at risk.

Soil is known to be a rich source of a variety of microorganisms and the non-pathogenic flora is important for the mineralization of plants and animals after their death in the environment. Pathogenic organisms from the human/ animal reservoir can be found in the soil due to irrigation and fertilization with manure and sludge or due to droppings of animals in the farming area. Tissue degrading properties of this flora contaminating vegetables may cause damage during transport and storage of products thereby exposing them to further microbial attack. Irrigation water is mainly used for irrigation of plants and its quality varies depending on whether it is surface water or potable water. Poor water and sanitation practices or conditions are a major risk factor for the distribution, infection, and prevalence of STH. The parasites that are likely to be found in the soil are: Ascaris lumbricoides, hookworm (Ancylostoma duodenale and Necator americanus), and whipworm (Trichuris trichiura). Parasitic infections represent a major global public health problem. The burden of parasitic infections often affects developing countries, which frequently lack good sanitization and personal hygiene practices. Moreover, environmental factors such as climate, geography, temperature, soil type, and rainfall also play important roles that contribute to the prevalence of parasitic infections. [5]

2. MATERIALS AND METHODS

2.1 Study Area

This study was conducted at Kebbi State University of Science and Technology, Aliero. The University is located in Aliero town of Aliero Local Government Area of Kebbi state, Nigeria. Aliero town is situated at approximately latitudes 11^0 03' S, 12^0 47'N and longitudes 3^0 6'W and 4^0 27'E. It also has a total area of 412 square kilometre and is bordered in the east by Tambuwal Local Government Area of Sokoto State, in the North West by Birnin-Kebbi Local Government Area, and in the South West by Jega Local Government Area. The soil of Kebbi State University area is reddish-brown in colour which is mainly sandy and clay soil type. [6]

2.2 Sample Collection

Soil samples were collected at some sites in the University (female hostel, mini market, classes area, staff quarters around latrines, and behind lecture halls). About 200 grams of soil was randomly collected. The soil samples were collected using a clean spoon and small polythene bags which were labeled with the date, and sample sites. The samples collected were transferred to Biology Laboratory of Kebbi State University of Science and Technology, Aliero for further analysis. [7]

2.3. Materials Used

The glass wares used in this research include; Petri-plates, conical flask (1000ml), measuring cylinder (1000ml), glass slides and cover slips. Chemicals used include; ethanol and zinc sulphate ZnSo4 solution. Other materials used are; microscope, aluminum foil, distilled water, face mask, spatula, weighing balance, hand gloves, net mesh, test tube, cover slip, cotton wool.

2.4. Sterilization of Glass Wares

All the glass wares were first washed with tap water and detergent solution. Also, they were then rinsed with distilled water and air dried. The glass petri-dishes were wrapped with aluminum foil and autoclaved at 160OC for one hour (1hr). After, they were allowed to drop for 30 minutes before usage to avoid cracking. [8,9]

3. Laboratory Analysis of Soil Sample

Direct test tube floatation method was used as adopted 10 grams of the soil was mixed thoroughly with distilled water. The suspension was strained through net mesh to remove coarse particles. The filtrate was centrifuge for three minutes and supernatant decanted. The resultant sediment was further loosen-up by shaking and tapping the tube. The sediment was mixed with zinc sulphate ZnSo4 solution (specific gravity of 1.2). This was added to the sediment in the test tube, covered with a cover slip and allowed to stand for

five minutes. The cover slip containing the floated eggs was then carefully removed, placed onto a glass slide and examined under a compound microscope at X40 magnification. The parasites were identified using the chart of Cheesbrough (2006). [10,11,12,13,14,15]

4. Statistical Analysis

Statistical Package for the Social Science (SPSS) version 20.6 was used for the data analysis. The parasites were recorded as frequency and prevalence. Analysis of variance (ANOVA) was used to compute and arrived at statistical decision and P<0.05 was considered significant. [16,17,18,19,20]

5. RESULTS

A total of 200 soil samples were examined for soil transmitted helminth parasites, 122 of the soil samples (61.0%) were infected with soil helminth parasites. The overall Prevalence of the soil transmitted helminth parasites found in the study area were shown in Table 1. Hookworm had the highest ((50/150) 40.98) prevalence, followed by Trichuris ((32/150) 26.22%), Strongyloides with ((21/150) 17.21%) and Toxocara had the least with ((19/150) 15.57%) prevalence.

Soil samples were collected from four different sampling sites/ locations; senior staff quarters, junior staff quarters, male hostel and classes area and examined for distribution of soil transmitted helminthes in Kebbi State University of Science and Technology, Aliero. The highest prevalence 36/50 (72.0%) was recorded in senior staff quarters, followed by male hostel with 31/50 (62.0%), classes area with 28/50 (56.0%) and the least 27/50 (54%) was recorded in junior staff quarters (Table 2). [21.22]

Prevalence of the soil transmitted helminth parasites in relation to locations examined were shown in Tables 3. The highest soil transmitted helminthes, 36/50 (72%) was recorded in senior staff quarter, followed by male hostel with 31/50 (62%), classes area with 28/50(56%). and the least soil transmitted helminths, 27/50 (54%) was recorded in junior staff quarters. Statistical analysis shows the significant relationship between the highest and lowest infections at 95% confidence limit.

Table 1: Prevalence of Soil Transmitted Helminthes Parasite in the Study Area

Parasite species	No. of soil infected	% infected	P-value
Hookworm	50	40.98	0.300
Strongyloides	21	17.21	
Trichuris	32	26.22	
Toxocara	19	15.57	
Total	122	61	

Table 2: Distribution of Soil Transmitted Helminths According to Parasites in the Study Area

Locations	No. of soil infected	% infected	P-value
Senior Staff Quarters	36	72	0.490
Classes Area	28	56	
Male Hostel	31	62	
Junior Staff Quarters	27	54	
Total	122	61	

Table 3: Distribution of Soil Transmitted Helminths According to the Sampling Sites in the Study Area

Sites		Parasites			Total(%)	Mean±Sd.E	P-value
N = 50	Hook.	Strongy.	Trichuris	Toxocara			
S. Staff Q.	12(24%)	7(14%)	11(22%)	6(12%)	36(72%)	9±1.14	0.413
C. Areas	10(20%)	5(10%)	10(20%)	3(6%)	28(56)	7±1.19	
M. Hostel	13(26%)	5(10%)	7(14%)	6(12%)	31(62%)	7.8±1.21	
J. Staff Q.	15(30%)	4(8%)	4(8%)	4(8%)	27(54%)	6.8±0.93	
Total	50(25%)	21(10.5%)	32(16%)	19(9.5%)	122(61%)	30.6±4.47	

6. Discussion

The 61% contamination recorded in the study area is high and this is an indication that the area could serve as a source of contaminant to human and other livestock in the surrounding. The result obtain in the present study has also shown that geohelminth ova and larvae are commonly found on the soil or in the surroundings of Kebbi State University of Science and Technology, Aliero. The detection of helminthic ova/ larvae on the four studied sites has a significant public health implication to many who have close contact with the soil.

This study has shown the potential risk of contracting helminthic ova and larvae through ingestion of unwashed, raw /uncooked fruits and vegetables obtained from these area. The high prevalence of geohelminths contamination in the study area could be attributed to the lack of good sanitation, lack of good fuctioning toilet facilities in some part of the study area, especially in the hostel, hence, most student practice open defecation in the bush, leading to indiscriminate defecation in and around the school yard.

The 61% prevalence recorded in the study area is inline with the result obtained from the study carried out by Awosol, who also reported 61% contamination in their study carried out to investigate the distribution pattern of soil-transmitted helminths and common practices enhancing transmission in Owena, Southwestern Nigeria. On the contrary, the prevalence in this study is higher when compared to the work of Amudatu, where they recorded 12.2% in their work on the Prevalence of Geohelminths in Garden Soil in Emohua Local Governmrnt Area in Nigeria. The result of this work also contradict, the work of Nwoke, where he recorded 30.7% on the "Examination of soil samples for the incidence of geohelminths parasites in Ebonyi north-central area of Ebonyi State, south-east of Nigeria ". The higher prevalence obtained in this work could be attributed to the differences in the study sites.

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