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INTESTINAL HELMINTHIASIS AMONG CHILDREN AND ADULTS IN SOME HOSPITALS IN KANO METROPOLIS

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ABSTRACT

Infection with parasitic helminthes is often recognized as one of the important public health problems in tropical Africa. The majority of this infection occurs in resource-limited settings like Sub-Saharan Africa including Nigeria. The aim of this study was to determine the prevalence of intestinal helminthes among children and adults in some hospitals in Kano metropolis. The study involved a cross-sectional survey of 134 stool samples where 84 were collected from children and 50 from adults. The samples were examined using direct wet mount and formol-ether concentration technique. The overall prevalence of intestinal helminth infection observed was 11.2%. In the study, three different parasites were identified. These include *Ascaris lumbricoides*, *Trichuristrichura* and *Hookworm*. In terms of isolation rate, Hookworm was the commonest intestinal helminth observed in children 5 (50%) while *Ascarislumbricoides* was the most isolated 3 (60%) in adults. The prevalence of intestinal helminthes infection in children was more in males, 51 (61%), than in females 33 (39%), and also in adults it was more in males, 33 (66%), than in females 17 (34%). But the difference was not statistically significant (P=0.763). Intestinal helminthes infection in children was more in under 1 year with *Ascarislumbricoides* 3 (100%), *Trichuristrichura* 2 (100%) and Hookworm having 2 (40%) and in adults, it was found to be more in age range of 18-39 years with *Trichuristrichura* 1 (100%), *Ascaris lumbricoides* and Hookworm were found to be 0 (0.0%) each.

Keywords:*Intestinal helminth, Parasites, children and adults,*

INTRODUCTION

Helminthiasis is an infestation of the body, by the helminthic worms, which are mostly transmitted via faecal oral route, and comprises of many different groups, like Hookworm*, Ascais lubricoides, trichuris trichiura* among others. According to one World Health Organization report, about 1221-1472 million cases of infestation due to *Ascaris lumbricoides (ascariasis)*, 750-1050 million cases infestation of *Trichuris trichiura* (trichuriasis) and 740-1300 million cases of hookworm infestation are annually reported, across the globe (WHO, 2017). Infestation due to A. lumbricoides or ascariasis, spreads widely due to variety of medical and surgical complications among other factors, which leads to about 1.5 billion cases of the disease, leading to 65,000 deaths world over (Brooker, 2010).

Another important group of helminth (Hookworm) was reported to be responsible for chronic infections leading to, up to 1.3 billion cases worldwide with heavy death casualties annually (Pullan *et al.,* 2014). In this type of infestation, as a result of chronic intestinal blood loss and iron-deficiency anemia, clinical manifestations of disease due to hookworm are easily observable. In the same vein T. trichiura, also affects children both physically and mentally, with about 1.1 billion cases and 70,000 resultant deaths annually (Pullan *et al.,* 2014).

One could be singly infested or come down with multiple infestation of these different groups of parasites and school-age children and immune-deficient individuals are particularly prone to infestation by these parasites, with heavy infestations associated with growth retardation, iron-deficiency anemia, cognitive impairment, malabsorption and malnourishment in the affected host (Teklemariam *et al.,* 2014).

Most children in Africa reside in areas with high transmission rate of the parasites and are in need of effective treatment and preventive interventions (WHO, 2010). All indicators have shown that, this type of disease is poverty related and are found mostly in tropical and subtropical parts of developing countries of the world, where adequate water and sanitation facilities are lacking with general poor standard of hygiene (Cappello *et al.,* 2014). According to report of Partnership for Child Development, number of cases and respective prevalence of these helminth infection in school-aged children was roundworm 320millions (35%); whipworm 233millions (25%); Hookworm 239millions(26%), others 128millions (14%) (Partnership for Child Development, 2014).

Beside the health effect of these intestinal parasites, their infections also impair children's physical and mental growth and also affects their education and at the same time affects economic development of the affected population in all nations (Drake *et al.,* 2000; Guyat, 2000). Due to African economic peculiar problem, intestinal helminth infections affects almost every part, particularly sub-Saharan Africa, and are major health concerns in the affected region (Ijagbone and Olagunju 2006).

Ethical approval

Ethical clearance to conduct the research was sought from ethics committee of the State Ministry of Health, Kano State.

MATERIALS AND METHODS

The study was conducted at Hasiya Bayero Pediatric Hospital and Murtala Muhammad Specialist Hospital, situated within Kano metropolis. Kano lies between latitude $11^0 30'$N and longitude $8^0 30'$E. Kano state borders Katsina state to the North−West, Jigawa state to the North−East, Bauchi state to the South−East and Kaduna state to the South−West.The total land area of Kano state is 20,760 square kilometers with a population of 9,401,288 based on the official 2006 National population and Housing census (Ado, 2009). The study was prospective cross sectional study with populations of patients suspected of intestinal worm infestation attending the two selected hospitals in Kano metropolis (Hasiya Bayero Pediatric Hospital and Murtala Muhammad Specialist Hospital, Kano). The sample size of this study was determined using the formula as follows;

$$n = \frac{Z^2 P(1-P)}{d^2}$$ (Cochran, 1977).

Where;
n= sample size
z=statistic for level of confidence at 95%=1.96
p=prevalence of intestinal helminthes (8.7%) = 0.087 (Abonico *et al.,* 2009).
d=allowable error of 5% (0.05)
q=1-p= (1-0.087) = 0.913
n= 3.8416×0.087×0.913/0.0025=122
n=122
Attrition rate=10%(n)
10/100 (122)= 0.1 (122)= 12.2
122+12.2= 134

Patients suspected of intestinal worm infestation that were sent to the laboratory were recruited in the study provided they were not on any antihelminths drugs. Patients attending the selected hospitals that were not suspected of any worm infestation and those suspected but on antihelminths drugs were excluded from the study. Stool specimens were collected in a clean, dry, wide mouthed and leak-proof, containers. The participants were instructed to

produce adequate sample, usually a tea spoonful. The stool specimens were fixed in 10% formal saline (in order to preserve eggs and larvae of the parasites). The specimens were processed using Saline/Iodine and Formal-Ether concentration technique method.

Macroscopic examination was done to check the color of the specimens (brown, green or yellow), consistency (semi, soft, hard formed, watery) appearance of blood, mucous and presence of cestodes segments and/or adult worm. Microscopic examination was carried out by saline mount. The wet mount was made by mixing a pea size of stool in a drop of normal saline placed on a clean glass slide, and then covered with cover slip avoiding air bubbles. The preparation was examined under microscope using 10x (low power) and 40x (high power) objectives (Arora and Arora, 2014).

Iodine wet mount was made by emulsifying a small portion of the stool sample in a drop of Lugol's iodine on a clean glass slide and then covered with a coverslip. The preparation was examined under microscope using 10x and 40x objectives for the presence of parasitic ova or larva (Arora and Arora, 2014). About 0.5g of stool was thoroughly mixed in 10ml of water and strained through two layers of gauze in a funnel. The filtrate was centrifuged at 2000rpm for 2 minutes. The supernatant was discarded and the sediment was resuspended in 10ml of physiological saline and centrifuged. The sediment was resuspended in 7ml of formal saline and allowed to stand for 10 minutes or longer for fixation. To this was added 3ml of ether. The tube was covered and shaken vigorously to mix. Then the cover was removed and the tube was centrifuged at 2000rpm for 2 minutes (Arora and Arora, 2014). Data analysis was done usi g statistical package for social science (SPSS) version 20.0 software application and presented in tables.

RESULTS AND DISCUSSION

In the study, 134 samples were used and a total prevalence of 15 (11.2%) was obtained. Out of the total subjects, 84 were children while 50 were adult. Fifty one (51) of the children (61%) were males while 33(39%) were females. Among the adults, 33 (66%) were males and 17 (34%) were females. Most of the children (64.3%) fall within the age range of < 1year, followed by 1-6 years with (26.2%), 7-12years with (7.1%) and 13-18years with (2.4%). Most of the adults (44%) fall within the age limit of 18-38 years, followed by 39-59 years comprising of 38%, and 60-80 years comprising of 18%, table 1. The most prevalent specie of the parasite in children was Hookworm (50%), followed by *Ascaris lumbricoides* (30%) and *Trichuris trichiura* (20%) while *Ascaris lumbricoides* had the highest frequency in adults (60%) followed by *hookworm* and *Trichuris trichuria* with 20% prevalence rate each respectively, table 2. In children, the age group distribution of the parasites was highest in under 1 year with all the 3 species been harbored, age range of 1- 6years had 2 hookworm while 1 hookworm was found in 7 -12 years of age. However, there is no statistically significant difference in the parasite distribution (P = 0.660). While age limit of 13 – 18 years had no parasite identified. Distribution of the parasites in adults showed that only 1 *Trichuris trichiura* was found in the age group of 18- 38 years while in the age limit of 39- 59 years, 3 *Ascaris lumbricoides* and 1 *hookworm* was identified, with no statistically significant difference (P = 0.223%). While 60-80 age range had no parasites identified.

Table 1: Distribution of participants according to socio-demographic data (Children = 84, Adult = 50)

Variables	Children (n, %)	Adult (n, %)	χ^2	P value
Gender			0.238	0.763
Male	51(61)	33 (66)		
Female	33(39)	17 (34)		
Total	84 (100)	50 (100)		
Age group			*5.902	*0.415
<1year	54 (64.3)	-		
1 year -6years	22 (26.2)	-		
7years – 12years	6 (7.1)	-		
13years – 18years	2 (2.4)	-		
Total	84 (100)	-		
18-38	-	22 (44)		
39-59	-	19 (38)		
60-80	-	9 (18)		
Total	-	50 (100)		

*Fisher exact test, χ2= Chi square test, n = frequency, % = percentage

Table 2: Prevalence of Intestinal Helminthes among Children and Adult

Species	Children n(%)	Adult n(%)
Ascaris lumbricoides	3 (30)	3 (60)
Trichuris trichiura	2 (20)	1 (20)
Hook worm	5 (50)	1 (20)
Total	10 (100)	5(100)

Table 3: Age group distribution of the parasites

Age groups	*Ascarislumbricides*	*Trichuristrichiura*	*Hookworm*	*Fisher exact test*	P value
Children				7.921	0.660
< 1year	3 (100%)	2 (100%)	2 (40%)		
1-6	0 (0.0%)	0 (0.0%)	2 (40%)		
7-12	0 (0.0%)	0 (0.0%)	1 (20%)		
13-17	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Total	3 (100%)	2 (100%)	5 (100%)		
Adult				7.141	0.223
18-38	0 (0.0%)	1 (100%)	0 (0.0%)		
39-59	3 (100%)	0 (0.0%)	1 (100%)		
60-80	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Total	3 (100%)	1 (100%)	1 (100%)		

Intestinal helminth is a parasitic disease that mostly affects people in the developing nation that mostly have poverty and poor standard of hygiene. In the study, three different parasites were identified, these includes; *Ascaris lumbricoides, Trichuris trichiua and hookworm* with *Ascaris lumbricoides* and hook worm been the most abundant parasite identified in the study. The frequency of the parasites identified were *Ascaris lumbricoides* 6, Hook worm 6 and *Trichuris trichiura* 3. Ilechukwu *et al.,* (2020), also had the same types parasite identified in Enugu but with higher rate of infestation than found in our study; *Ascaris lumbricoides* 67, *Hook worm* 59 and *Trichuris trichiura* 24, which may be due to the fact that their area has more rivers and other water bodies while our area is drier and at the same toime, the research was done during the dry season. However, Pisit, *et al*. (2018), was able to identify 15 Strongiloides stacoralis, 3 *Ascais lumbricoides*, 32 Hookworm and 3 *Trichuris trichiura* during their research.

With respect to gender, males had 61% and 66% in children and adults respectively while in females the detection rate was 39% and 34% in children and adults respectively. In one study, Ruto *et al.,* (2016), had separate identification frequencies for gender for the different parasites as follows; *Ascaris lumbricoides* 43.1% and 41.5% in male and females respectively, while 15.5% and 17%, and 15.5% and 61% were T*richuris trichiura* and Hook worm found in males and females respectively.

With respect to age, <1 had 0, 0, 2 for *Ascaris lubricoides, Trichuris trichiura* and *hook worm* respectively. While 1-6, 7-12 and 13-17 had 0, 0, 2; 0, 0, 1 and 0, 0, 0 isolates for *Ascaris lubricoides, Trichuris trichiura* and *Hook worm* respectively. In the same vein, A*scaris lubricoides, Trichuris trichiura* and Hook worm had isolation frequencies of 0, 1, 0; 3, 0, 1 and 0, 0, 0 against age ranges of 18-38, 39-59 and 60-80respectively. Ekpenyong *et al.,* (2008), in their study, categorized the participants in to age ranges of: 4-6, 7-9, 10-12 and 13-15 and were able to identify 7.0% for *Ascaris lumbricoides,* 2.2% for *hookworm* and 0.0% for *Trichuris trichiura* for age ranges of: 4-6 while 5.7%, 3.0%, 1.2% ; 3.1%, 2.1% 0.6% and 4.9%, 3.7% and 0.0% for the remaining age groups respectively. Joy *et al.,* (2018), had four age categorizations: 0-4, 5-18, 19-45 and >45 and were able to get: 18.6, 36.3%, 30.1 and 14.9% as infection rates for the various age ranges respectively.

Conflict of interest

We declare that, there is no conflict of interest in which ever form in this research

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CONCLUSION

The results therefore indicated that, *Ascaris lumbricoides, Trichuris trichiura* and Hook worm, are the common parasites associated with children and adults in the study area and *Ascaris lumbricoides* is the most prevalent among them.

REFERENCES

Ado, K. (2009). Geographical and history of Kano in three year of of good governance Shekarau stewardship in Kano State.Research and Docmentation Directorate, Government House Kano.

Albonico, M., Crompton, D.W. and Savioli, L. (2009). Control strategies for human intestinal nematode infections. *Advanced Parasitology,42:277–341.*

Arora, D.R., and Arora, B. B. (2014). Medical Parasitology, CBS publisher & Distributors, DaryGanj, new Delhi, fourth edition.244.

Brooker, S. (2010). Estimating the global distribution and disease burden of intestinal nematode infections: Adding up the numbers - A review," *International Journal for Parasitology, 40(10):1137– 1144*

Cappello, M. (2004). Global health impact of soil-transmitted nematodes. Pediatr Infect Dis J. 23(7):663-4.

Ekpenyong, E. A. and Eyo, J. E. (2008). Prevalence of intestinal helminths infections among schooling children in tropical semi urban communities; Animal Research International 5(1): 804-810

Ijagbone, I. F. and Olagunju, T. F. (2006). Intestinal Helminths Parasites in School Children in Iragbiji, Boripe Local Government, Osun State, Nigeria. *Afr. J Biomed Res. 2006; 9(1):63-65*

Ilechukwu, G. C., Ilechukwu, C. G. A., Ubesie, A. C., Onyire, N. B., Emechebe, G. and Eze, J. C. (2020). Relationship Between Nutritional Status and Intensity of Common Intestinal Helminths Among Children in Enugu, South-East Nigeria. Annal of medical and health science research 2020

Joy, T. A., Ikem, C. O., Ifeanyi, O. A., Yvonne, E. Ndukwe, O. J., Okpasuo, J. (2018). Risk of Soil-Transmitted Helminthiasis among Agrarian Communities of Kogi State, Nigeria; Annal of global heath 54:19-25

Partnership for Child Development (1999). A situation analysis: a participatory approach to building programs that promote health, nutrition and leaning in school. 1999 pcd, oxford, uk.

Pisit, S. and Amornrat, D. (2018). Prevalence of Intestinal Parasites and Associated Risk Factors for Infection among Rural Communities of Chachoengsao Province, Thailand; *The Korean Journal of Parasitology 56(1):33-39*

Pullan, R.L., Smith, J.L., Jasrasaria, R., and Brooker, S. J. (2014).Global numbers of Infection and disease burden of soil transmitted helminth infections in 2010. ParasiticVectors,7: 37-56.

Ruto J, Mulambalah CS. Epidemiology of parasitism and poly-parasitism involving intestinal helminths among school children from different residential settings in Nandi County, Kenya. *CHRISMED J Health Res 2016;3:168-72*

Teklemariam, A. Dejenie, T. and T. Tomass, Z. (2014). Infection prevalence of intestinal helminths and associated risk factors among schoolchildren in selected kebeles of Enderta district, Tigray, Northern Ethiopia," *Journal of Parasitology and Vector Biology, 6(11):166-173*

World Health Organization.(2017). WHO Technical Series Report, 912. Prevention and control of Schistosomiasis and soil transmitted Helminthiasis. Geneva: World Health Organization.

WHO. (2010). Neglected Tropical Diseases - PCT Databank. 2010.