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INTESTINAL PARASITES AMONG PRIMARY AND SECONDARY SCHOOL CHILDREN OF EGOR LOCAL GOVERNMENT AREA, EDO STATE

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ABSTRACT

*The study was carried out to determine the prevalence of gastrointestinal parasites among school children of Egor Local Government Area, Edo State. The correlation between their various activities like source of water, type of toilet, method of washing hands with the infection were examined. 250 stool samples of participants consisting of 111 males and 139 females were examined using the formol-ether concentration method. Questionnaires were administered to the children to collect information on Sociodemographic activities. The overall prevalence rate of the various parasitic infections was 16(6.4%), with 6(5.4%) prevalence rate of infection among males and 10(7.2%) among the females. From the study, the age group of 10-13 years old have high rate of infection 13(9.8%) followed by 6-9years old 3(4.4%). Sex did not significantly affect the pattern of infection ($P>0.05$) but age affected it significantly ($P<0.05$). The children with *Ascaris lumbricoides* recorded the highest prevalence rate of 6(2.4%), followed by Hookworm (*Ancylostoma duodenale*) infection 3(1.2%); *Enterobius vermicularis* 2(0.8%); *Entamoeba coli* 2(0.8%); *Schistosoma japonicum* 1(0.4%); *Strongyloides stercoralis* 1(0.4%) and Round worm 1(0.4%). The results further support public education on good personal hygiene and the dangers of open defecation in fields and water ways.*

Keywords: Children, Gastrointestinal, Helminth parasites, School, Socio-economic factors

INTRODUCTION

Intestinal parasitic infections are among the most common infections world-wide (Kang *et al.*, 1998). Gastrointestinal infections impose a great and often silent burden of both morbidity and mortality rate on some populations in mostly developing countries (Saboya *et al.*, 2013). Intestinal parasitic infection varies considerably from place to place in relation to the disease (Luka *et al.*, 2000). Gastrointestinal infections are caused by helminths and protozoans which are mostly prevalent in developing countries, particularly in sub-Sahara, Africa (Hardhay *et al.*, 2010). The public health importance of intestinal helminth infections continues due to their effects on both the nutritional and the immune status of infected Subsequently individuals, particularly those living in the tropical and subtropical areas (Hardhay *et al.*, 2010)., Intestinal helminthic infections mainly affect the physical and mental development of children who are the most vulnerable. Overcrowding in most rural homes with infected persons and the change of environment from one locality acquiring the infection to a new area can lead to different routes of transmission. Transmission routes are more complex as some species are acquired through food or water contaminated with

infective eggs or larvae, or are picked up directly via contaminated fingers while some have larvae that can actively penetrate through the skin, migrating eventually to the intestine and others are acquired by eating animals or animal products containing infective stages (Arora *et al.*, 2011). Intestinal parasitic infections are amongst the most common infections worldwide (WHO, 2012). It is estimated that 3.5 billion people are infected with intestinal parasites of which 450 million are ill and the numbers of people infected is increasing in all WHO regions. Globally, it is estimated that all intestinal parasitic infections affect more than one third of the World's population with the highest rates of infection in school-age Children (Hotez, 2008). However, the objective of this study is to determine the prevalence of gastrointestinal parasites among school children of Egor Local Government Area, Edo State, Nigeria.

MATERIALS AND METHODS

Study Area

Egor is a city situated in Ovia North of Edo State, Nigeria. Egor geographical coordinates are 6° 23' 0" North, 5° 34' 0" East and the headquarter is in the town of Uselu.

It has an area of 93km² and a population of 339,899 at the 2006 census. Egor Local Government Area is one of the eighteen local government areas in Benin City, Edo State. Benin City, the capital of Edo has an estimated population of 1,147,188 (National Population Commission, 2008) and lies between longitude 50°38'49.42"E and latitude 6°20'95.09"N.

Study Population

Prior to the commencement of the research work, Ethical clearance was obtained from Ministry of Health Benin City, Edo State. The participants were informed on the causes of intestinal helminthiasis and the importance of living free from such infections. Informed consent was received from each participant. A total of 250 participants that consist of 111 males and 139 females were randomly selected for this study. Structured questionnaires were administered to the participants to obtain their demographic data.

Sample collection and microscopic analysis

Stool samples were collected from 250 participants (130 Samples from Primary Schools, 60 samples each from Junior and Senior Secondary schools), in labelled universal containers and taken to the laboratory for analyses. The samples were analyzed using a previously described method by Cheesbrough, 2006. About 1 g of faecal sample was mixed in 4 mL 10% formal saline and sieved. To the filtrate, 3 mL of diethyl ether was added, mixed and spun at 3000rpm sediment was examined in both saline and iodine preparations using x10 and x40 objectives. Eggs were identified on the basis of their morphological features as described by (Soulsby,1982).

Statistical Analysis

Data obtained were analysed using Microsoft Excel for windows (2010 version) and SPSS version 17 as described by Ogbeibu (2005). Data was expressed in percentage when necessary and Chi-square statistics was to test the goodness of fit.

RESULTS

A total of 250 participants from Primary and Secondary schools in Egor, made up of 111 males and 139 females had their stool samples examined for the presence of gastrointestinal parasites. Of this number, 16(6.4%) participants were infected and more females 10(7.2%) than males 6(5.4%) were infected (Table 1). The highest prevalence occurred in participants aged 10-13 years 13(9.8%) and 6-9 years 3(4.4%), Table 2.

Ascaris lumbricoides has the highest prevalence 6(2.4%); followed by *Ancylostoma duodenale*, 3(1.2%); *Enterobius vermicularis*, 2(0.8%); *Schistosoma mansoni*, 1(0.4%); *Entamoeba histolytica*, 2(0.8%); *Strongyloides stercoralis*, 1(0.4%) and Round worm, 1(0.4%); Table 3.

There was statistically significant association between the Socio-economic factors and the infection (P< 0.05). Participants who used the bush as toilet had the highest rate of infection 7(2.8%) and those who used River water as their source of water had the highest prevalence of 9(3.6%). Also, the washing of hands after toilet use and the various method of washing hands were significantly (P < 0.05) associated with the prevalence (Table 4).

Table 1: Prevalence of intestinal parasites according to sex among the study subjects

SEX	No Examined	No Infected (%)	OR	95% CI	P-Value
MALE	111	6 (5.4)	1.357	0.477 – 3.855	0.566
FEMALE	139	10 (7.2)			
TOTAL	250	16 (6.4)			

Table 2: Prevalence of intestinal parasites according to age group among the study subjects

AGE-GROUP (Yrs)	No Examined	No Infected (%)	P-Value
6-9	68	3(4.4)	0.039
10-13	132	13(9.8)	
14-17	50	0.00	
TOTAL	250	16(6.4)	

Table 3: Prevalence of gastrointestinal parasites among study subjects.

PARASITES	FREQUENCY (%)
<i>Ascaris lumbricoides</i>	6(1.2)
<i>Ancylostoma duodenale</i>	3(1.2)
<i>Enterobius vermicularis</i>	2(0.8)
<i>Schistosoma mansoni</i>	1(0.4)
<i>Entamoeba histolytica</i>	2(0.8)
<i>Strongyloides stecoralis</i>	1(0.4)
Round worm	1(0.4)
TOTAL	16(100)

Table 4: Prevalence of gastrointestinal parasites in schools according to their various activities

Variable	No. examined	No. infected (%)	OR	95% CI	P-Value
Toilet Type					
Water cistern	164	3(1.2)			0.000
Pit	46	5(2.0)			
Bucket	12	1(0.4)			
Nearby bush	28	7(2.8)			
Source of water					
Bore hole	150	2(0.8)			0.000
Portable	29	5(2.0)			
River	71	9(3.6)			
Hand washing after toilet use					
Yes	195	2(0.8)	32.951	7.211 – 150.577	0.000
No	55	14(5.6)			
Method of Washing					
Water only	94	10(4.0)			0.061
Detergent	67	1(0.4)			
Bar soap	89	5(2.0)			

DISCUSSION

Many studies have been done on the prevalence of intestinal helminth infection all over the world including West Africa and Nigeria in particular. Gastro-intestinal parasites are identified as a cause of morbidity and mortality throughout the world particularly in the under developed countries (Odu *et al.*, 2011a; Odu *et al.*, 2013). The results from this study showed an overall prevalence of intestinal parasites 16(6.4%) in Egor. This differed from the 50.4% reported by Adeyeba and Akinlabi (2002) in Oyo and Edogiawerie *et al.*, (2016) that reported (18.7%) in Edo State, but compare with 11.4% reported by Mordi and Okaka (2009) also in Edo state, Nigeria. The result is higher than 1.8% reported by Omudu *et al.*, (2004); in Nigeria. The high prevalence recorded could be as a result of poor personal and environmental hygiene practices among the school children and in the study area. Prevalence in relation to sex showed that female participants 10(7.2%) had a relatively high prevalence rate than males 6(5.4%). This study agrees with findings by Brelet (2000), who reported higher prevalence of (42.5%) in females than males (41.6%). This was attributed to socio-cultural life style in this part of the State that involves females in more domestic activities

that may expose them to contaminated water, food or disposing of waste; but contrary to the studies reported by (Ukpai *et al.*, 2003) in Ikwuano, Abia State and (Ijagbone *et al.*, 2006) in Borimope, Osun State, male having higher prevalence than female. There was no significant correlation in prevalence of gastrointestinal parasites with sex ($P = 0.566$). Previous studies by Ono *et al.* (2001) and Tohon *et al.* (2008) reported no significant difference in the prevalence of intestinal parasites in the two sexes. Awolaju and Morenikeji (2009) reported no significant among primary and post-primary schools children in Ilesa West, Osun State, Nigeria. These findings indicated that both sexes were equally exposed to enteric parasites. This Study showed that age specific prevalence rate was greater for age 10-13 years old (9.8%), followed by 6-9 years (4.4%). However, the association is statistically significant ($P = 0.039$). The result agrees with (Houmsou *et al.*, 2010), who reported that younger children below 14 years had high prevalence (54.5%) of intestinal parasite than older ones carried out in Markudi, Benue State, Nigeria and (Reuben *et al.*, 2013) reported age was significantly associated with the infection. This may be attributed to the fact that persons of the age group are often

inquisitive, carefree and are more likely to get involved in activities involving contaminants. This study concurs with the findings of Adeyeba and Akinlabi (2002) and Mamadou et al., (2010), that the incidence is more in paediatric age groups and reaches highest in young adults, but may be related to the factors of poverty, poor personal hygiene and inadequate health services. Also it could be as a result of their low immunity, social and sanitary habits since they spend most of their time outdoors playing in areas where the sand may be contaminated with infected faecal sample or contaminated water.

The prevalence of each parasite encountered from the schools showed that infection with *Ascaris lumbricoides* recorded the highest prevalence 6(1.2%) followed by *Ancylostoma duodenale* 3(1.2%), *Enterobius vermicularis* 2(0.8%), *Entamoeba histolytica* 2(0.8%) while *Schistosoma mansoni*, *Strongyloides stercoralis* and Round worm had 1(0.4%) respectively. The high prevalence of *Ascaris lumbricoides* could be due to lack of proper sanitation and clean drinking water, poor standards of public and personal hygiene and inadequate health education promote the spread of such parasites. Some of the parasites have high fecundity rate which may last long in many places where sanitation and safe garbage disposal are non-existence and the environment becomes thoroughly contaminated and infection is difficult to avoid (Crompton et al., 1993). While the prevalence of *Ancylostoma duodenale* is associated with open defaecation practices in fields mostly in this high agricultural community where humans' faeces are used as fertilizers and also where people go about bare footed (Crompton et al., 1993). This study was in line with similar studies in Nigeria by Luka et al., (2000) in Lere, Kaduna State, Damen et al., (2010) in Doi village, Plateau State and Egbuobi et al., (2013) in Akokwo Imo State. *Enterobius vermicularis* with 0.8% prevalence is in close relation to the 1% prevalence by Mordi et al., (2007) in Aniocha South, Delta State, Nigeria. The prevalence rate of *Entamoeba histolytica* (0.8%) among the children is in accordance with the report of (Nematian et al., 2012) that *Entamoeba histolytica* is higher in children of school age in developing countries. *Schistosoma mansoni* and *Strongyloides stercoralis* (0.4%) recorded the least prevalence and is in agreement with Mordi and Ngwodo (2007).

The risk factors examined such as sources of water supply was statistically associated with the prevalence of gastrointestinal infection in this study ($P < 0.05$). This might be because humans and domestic/wild animals use these sources of water for drinking that could lead to

contamination with faeces and subsequent infection of exposed individuals. Also some wells in the towns are dug close to pit latrine and poor sanitation around the well enhances transmission. (Absar et al., 2010). Similarly, significant association was found among participants in relation to toilet types ($P < 0.05$). The participants that use nearby bush (open field defaecation) and pit latrines in their homes had higher prevalence 7(2.8%) and 5(2%) respectively, showed association between the disease and the toilet system. Similar observations were made among those that use open field defaecation toilet system by Uneke et al. (2006). This could be due to poor sanitation which might encourage flies and cockroaches to spread cysts and eggs of intestinal parasites (Absar et al., 2010). Erosion may wash away the faecal contaminant into the village water source, such as River in open field defaecation toilet system during rainy season. This practice could also enhance the transmission of cysts and eggs of parasites.

Those that indicated hand washing after using the toilet had high prevalence 14(5.6%). But there was no significant association (OR =32.951, 95% CL =7.211 – 150.577 $P = 0.000$) between the parasite and the infection. This outcome may be due to improper washing of hands (soaking of hands) especially when they are hungry or exposure to other risk factors. It has been reported that the hands readily become contaminated after defaecation even with the use of tissue paper. The human hands act as a common denominator in the transmission of intestinal parasites regardless of route of transmission (Absar et al., 2010). Hands can act as conduits to transfer parasites from surfaces in or outside the home, currency, food and animals (pets or wild).

CONCLUSION

The overall prevalence of these parasites in this study is a function of some risk factors of gastrointestinal parasites through unprotected water supply, improper sewage disposal and open defecation practices by the populace that lead to the exposure of faeces to scavenging animals and the drying effects of the sun and wind. In addition, it could be finger sucking and nail biting which had been found to encourage contamination by gastrointestinal parasites and transmission from one individual to another especially among children who live in closed communities, traditional houses, shared toilets and classrooms.

RECOMMENDATIONS

To curb the extent of these practices, public education on the dangers of open defaecation practices in fields and waterways as well as behavioural modification and improved personal hygiene (such as nail trimming, hand washing before and after using of toilet, etc) should be integral part of control program for intestinal helminthiasis especially in school children. Also,

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