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PREVALENCE OF INTESTINAL PARASITES IN RELATION TO RISK FACTORS AMONG SCHOOL AGED CHILDREN IN GWANDU LOCAL GOVERNMENT AREA OF KEBBI STATE, NIGERIA

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ABSTRACT

Epidemiological information on the prevalence of various intestinal parasitic infections and identification of local risk factors in different region/localities is a prerequisite to develop appropriate control measures. Hence the aim of this study was to determine the prevalence of intestinal parasites in relation to risk factors among school aged children in Gwandu LGA. A cross sectional study involving 331 school pupils was conducted from December 2015 to May 2016. Structured questionnaires were used to identify environmental, socio-demographic and behavioral factors. Stool specimens were collected from the study subjects and examined for parasites using formol-ether concentration technique. An overall prevalence of 26.9% (89 of 331 children) was obtained. The most prevalent intestinal parasites identified were *Ascaris lumbricoides* 74(22.4%), *Trichuris trichiura* 4(1.2%) and mixed infection had the prevalence of 3.3%(11). Intestinal parasites prevalence was higher in children lacking access to safe drinking water as well as those taking fresh/raw vegetables ($p<0.05$). In conclusion, intestinal parasites infection is a health problem among school aged children. Therefore, interventions including improvement of sanitation, provision of safe drinking water, and health education on personal hygiene to the students should be given (Asrat, *et al.,* 2011).

KEYWORDS: Intestinal parasites, Risk factors, School aged children.

INTRODUCTION

Epidemiological studies carried out indifferent countries have shown that the situation of an individual (risk factors) is an important cause in the prevalence of intestinal parasitic infection, having a greater rate in children (Udonsi and Amabibi, 1992; Nokes *et al.,* 1992; Asrat *et al.,* 2011). School aged children carry the heaviest burden of the associated morbidity of the intestinal parasite, due to their dirty habits of playing or handling of infested soils, eating with soiled hands, unhygienic toilet practices, drinking and eating of contaminated water and food (Tadesse, 2005; Udoidung *et al.,* 2012; Desta *et al.,* 2014). Inadequate water, sanitation and hygiene are responsible for a major proportion of the burden of disease and death in developing countries (Merid *et al.,* 2001; Asrat *et al.,* 2011). In addition, intestinal parasitic agents increase in polluted environments such as refuse heaps, gutters and swage units in and around human dwelling and living conditions of the people in crowded or unhealthy situations (Phiri *et al.,* 2000; Asrat *et al.,* 2011).

According to Odimegwu (2013), many diseases prevalent in the Nigeria are generally associated with substandard drinking water supply, poor sanitation conditions and inadequate health education programs leading to water borne diseases such as diarrhea, dysentery, gastro-enteritis, infectious hepatitis, hookworm, guinea worm, scabies, measles and other parasitic infections. Lack of access to safe drinking water leads to a high prevalence of waterborne diseases, and all over the world, approximately three million children under five years old die yearly from illnesses, mostly acquired from contaminated water, 1400 children under five children die every day from diarrhea diseases linked to lack of safe water, adequate sanitation and hygiene (Sola, 2013). In Kebbi State, according to the MDGs report of the National Water Supply and Sanitation Baseline Survey conducted in 2008, only 18.52% (578,128 people) of the State population (3,121,644 people) have access to safe drinking water and only 50.24% have access to improved sanitation (1,568,313 people). 17.64% of the rural population (2,080,288) have access to safe water, 43.85% have access to improved sanitation. In small towns, only 16.46% of their

population (490,033) has access to safe water, 64.28% have access to improved sanitation (MDG, 2008). These reports show that rural localities in Kebbi State were in the risk of intestinal parasitic infections, hence the need for the study.

MATERIALS AND METHODS

Study area and sample size

The study was conducted in six selected primary schools namely Gwabare model primary school, Dalijan model primary school, Sarkin fawa model primary school, Umaru cheberu model primary school, Malisa model primary school and Masama model primary school in Gwandu local government area of Kebbi State, Nigeria. According to Bluman (2004) and Edet (2004), the sample size (n) was determined by the formula z^2pq/d^2, where n = sample size, z = confidence limit (95% or 0.05), p = probability of success (50% or 0.5), q = probability of failure (1 – p, i.e. 1 –0.5 = 0.5), and d = precision (0.05 or 0.01). Substituting into the formula, the sample size n = $(1.96)^2$ x 0.5 x 0.5 / $(0.05)^2$ = 384.16. But 420 questionnaires were used (70 for each primary school) to make up for pupils that might run away with sample containers.

Data collection procedure and specimens analysis

A structured questionnaire based on possible risk factors was developed (the questions are listed on table 3). The questionnaire was administered to the study subject through oral interview. The interview included information on socio-demographic data, environmental, and behavioral actors. After the interview, stool samples were collected from the study subjects in clean, labeled sample containers which were transported to university parasitological laboratories and formol-ether concentration techniques was used to analyze the stool samples.

Data analysis

The data obtained from the 331 primary school children who participated in the study were entered into Microsoft excel 2007 version and validated for double entry errors. The prevalence of parasites was presented as descriptive statistics, using simple percentages. Epidemiological measures of association, relative risk (RR) and population attributable risk (PAR) ware used to determine the type of relationship (positive or negative) that exist between the risk factors examined (access to safe drinking water sources, environmental sanitation, and personal hygiene) and the intestinal parasitic infection in the study area. In addition, Chi-squire was also used in this study. The level of significance used was 0.05.

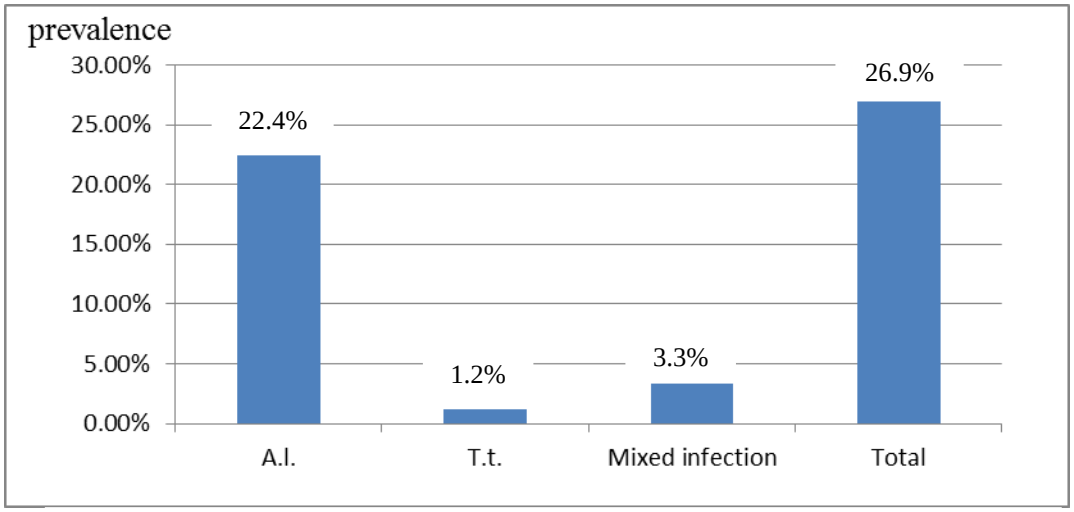
Ethical clearance

The study was approved by the director health services, director school services and community leaders of the selected communities in Gwandu local government area. A written consent letter was obtained from the director health services of the local government. Head teachers were informed in advance about the study and made arrangements for interviews and collection of stool samples. Pupils had the right to accept or refuse to join the study without any consequences. An inclusion criterion for the selection of primary schools was based on the suggestion of villages. All the villages suggested had only one primary school except for Gwandu town which had two and both were selected. Primaries in non suggested villages were not included.

RESULTS

Prevalence of the intestinal parasites

A total of 420 school children were interviewed, three hundred and thirty one (331) pupils responded with their stool samples, providing seventy eight percent (78.8%) response rate. There were one hundred and seventy three males 173 (52.3%) and one hundred and fifty eight females 158 (47.7%). Out of the total 331 primary school children examined, two hundred and seventeen 217 (65.6%) were in the age group five to nine (5 – 9), one hundred and fourteen 114 (34.4%) were in the age group of ten to fourteen (10 – 14). Out of the 331 samples examined, five species of intestinal parasites were identified with an overall prevalence of 26.9%(89). The most prevalent intestinal parasites identified were *Ascaris lumbricoides* 74(22.4%), *Trichuris trichiura* 4(1.2%) and mixed infection had the prevalence of 11(3.3%).



A.l. = *Ascaris lumbricoides*, T.t. = *Trichuris trichiura*

Figure 1: Prevalence of intestinal parasite among school aged children in Gwandu LGA.

Table 1: Prevalence of single and mixed intestinal parasite infection among school aged children in Gwandu LGA.

Type of infection	Total frequency n(%)	Species	Specie prevalence n(%)
Single infection	78(23.6%)	A.l.	74(22.4%)
		T.t.	4(1.2%)
Double infection	11(3.3%)	A.l. + T.t.	7(2.1%)
		A.l. + S.m.	2(0.6%)
		A.l. + S.s.	1(0.3%)
		A.l. + Hw	1(0.3%)
Total	89(26.9%)	5 species	89(26.9%)

A.l = *Ascaris lumbricoides*, T.t = *Trichuris trichiura*, S.s. = *Schistosoma mansoni*, S.s. = *Strongiloides stercoralis*, Hw = Hookworm.

Table 2: Prevalence of intestinal parasites among primary schools examined in the study area.

Schools visited	No. examined	No. infected	Prevalence (%)	Mean intensity
Gwabare Model Primary School (GMPS)	64	10	15.6	1.30
Dalijan Model Primary School (DMPS	54	13	24.1	2.15
Sarkin Fawa Model Primary School (SMPS	42	18	42.9	2.83
Umaru Cheberu Nizamiyya Model Primary School (UNMPS)	49	14	28.6	3.07
Masama Model Primary School (MMPS)	61	18	29.5	2.67
Malisa Model Primary School (MLMPS)	61	16	26.2	2.44
Total	331	89	26.9	2.49

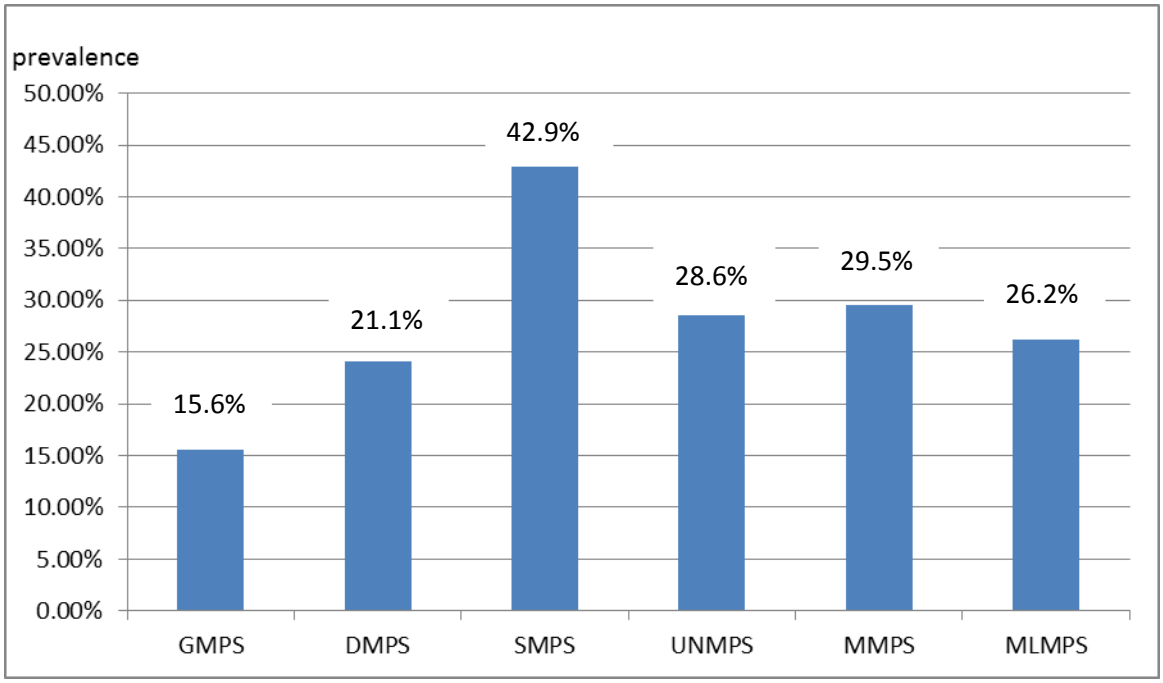


Figure 2: Prevalence of intestinal parasites among primary schools examined in the study area.

Analysis of risk factors

Among the potential risk factors explored using epidemiological measures of association, sanitary facilities, source of drinking water, hand washing practice before meal, walking with bare foot, covering food, habit of eating raw/unwashed vegetables, open field defecation had statistically significant association to any intestinal parasites infections identified in the study. The relative risk (RR) calculated was greater than one in all the predicted risk factors, which indicate a significant association. The RR for unsafe drinking water sources was 1.5 with population attributable risk PAR of 26%, unimproved sanitation had the RR of 1.3 with PAR of 16%, poor personal hygiene had an RR of 1.22 with PAR of 15% and raw vegetables was with RR of 3.44 and PAR of 66%, table 3.

Table 3: Showing Calculated Relative Risk (RR) and Population Attributable Risk (PAR) for Association with Some Predicted Risk Factors.

Risk factors	**Intestinal parasites Measures of association**					
	Positive n(%)	**Negative n(%)**	**No. examined**	**RR**	**PAR**	***P*-value**
Sex						
Male	40(23.1)	133(76.9)	173			0.068
Female	49(31.0)	109(69.0)	158			
Age group						
5 – 9	61(28.1)	156(71.9)	217			0.289
10 – 14	28(24.6)	86(75.4)	114			
Unimproved water sources						
Yes	71(29.8)	167(70.2)	238	1.5	0.26(26%)	0.034*
No	18(19.4)	75(80.6)	93			
Unimproved sanitation						
Yes	60(29.4)	144(70.6)	204	1.3	0.16(16%)	0.118
No	29(22.8)	98(77.2)	127			
Unhygienic practices						
Yes	75(27.7)	196(72.3)	271	1.22	0.15(15%)	0.304
No	14(23.3)	46(76.7)	60			
Eating raw/unwashed vegetables						
Yes	83(31.2)	183(68.8)	266	3.44	0.66(66%)	0.000*
No	6(9.2)	59(90.8)	65			

RR>1: indicates positive association (Abraham and David, 1980).

PAR: indicates the amount of the infections in a population that can be attributed to the risk factor (Abraham and David, 1980), *P<0.05, statistically significant association.

DISCUSSION

Epidemiological studies carried out in different countries have shown that the situation of an individual (risk factors) is an important cause in the prevalence of intestinal parasitic infection, having a greater rate in children (Asrat *et al.,* 2011). In line with this view, the present study attempted to assess the prevalence of different intestinal parasitic infections and associated risk factors in some selected primary schools in Gwandu local government, Kebbi State, Nigeria. Out of the total 331 pupils, only 93 (28.1%) respondents had access to drinking water, 127 (38.4%) had access to an improved sanitation and 60 (18.1%) were practicing good hygiene (table 3). These findings were in line with the reports by MDG (2008) that in Kebbi State only 18.52% of the State population has access to drinking water and 50.24% has access to improved sanitation. The unhygienic practices found in the area were not unexpected as the area was mostly rural and unhygienic practices are mostly found in the rural areas (Ukoli, 1992; Shehu *et al.,* 2013).

Ascaris lumbricoides, *Trichuris trichiura*, *Strogyloides stercoralis*, and *Schistosoma mansoni* were seen in the present study to be the prevalent intestinal parasites encountered (figure 1). These worms were isolated from 89 (26.9%) of the examined samples showing that these were the prevalent intestinal parasites in Gwandu local government area, Kebbi State, Nigeria. Reports by Ekundayo *et al.* (2007) as cited by Lorina (2013) indicated that since 1970s, the triad of *Ascaris lumbricoides*, *Trichuris trichiura* and hookworm species are common in Nigeria. In the present investigation, the overall prevalence was 26.9% with *Ascaris lumbricoides* having the highest prevalence 22.4%, *Trichuris trichiura* 1.2% and poly-parasitism 3.3%. With these results, it can be said that helminthiasis remains a problem in Nigeria. The result was similar to 25.33% of Shehu (2010) reported elsewhere in the country. The high prevalence of *Ascaris lumbricoides* infection may be due to the fact that *Ascaris lumbricoides* may lay over 200,000 eggs in a day and this may facilitates the endemicity. The prevalence of *Trichuris trichiura* infections in the study area was not unexpected since it is known that similar conditions which influence the endemicity of *Ascaris lumbricoides* also influence its endemcity (O'Larcain and Holland, 2000). The occurrence of intestinal helminth infections in the area was not unusual because the area is mostly rural and parasitic diseases are to be common in rural areas because of poverty, ignorance, unhygienic practices and low sanitary conditions (Ukoli, 1992; Shehu *et al.,* 2013).

The result shows that there was significant association between access to drinking water and intestinal parasitic infections ($P<0.05$). Pupils exposed to unimproved sanitation and poor personal hygiene were found to be more infected with 29.4% and 27.7% prevalence respectively, even though the association was not statistically significant ($P>0.05$), with $RR>1$ (table 3), it indicated that there was a positive association between the intestinal parasitic infections found in the area and risk factors such as lack of access to drinking water, unimproved sanitation and lack of personal hygiene (Abraham and David, 1980). This is in line with the report by Brooker (2010), that infections with soil transmitted helminths is intimately connected with poverty, with the highest prevalence rates observed in low and middle-income countries where hygiene is poor, access to safe, clean water is lacking and sanitation is absent or inadequate. Another factor that exposed children to intestinal parasitic infections identified in this study was eating of raw /uncooked vegetables and the association was statistically significant with the infections ($P<0.05$, $RR>1$). The reason might be due to the contamination of vegetables with faecal materials in the farm. Similar findings also found in other studies, growing of vegetables in faecally-polluted gardens were all found to be conducive for transmission of geo-helminthes and intestinal protozoa (Erko *et al.,* 1995; Asrat *et al.,* 2011). Females harbored more parasites than the males, this might be due to the fact that in rural areas females also engaged in farm activities, they also visit farm to obtain edible plants and grasses for their domestic animals which make them exposed to the contaminated soils. Age group 5 – 9 had higher prevalence than 10 – 14, though the association was not significant statistically ($P>0.05$), might be due to difference in the number examined or due to the fact that age group 5 – 9 were more likely to engage in unhygienic practices than 10 – 14 (table 3). This is similar to the observations made by Biu and Harry (2001), Biu and Muhammad (2013).

CONCLUSION

The study revealed that intestinal parasites infection was moderately prevalent among school aged children in Gwandu LGA, and the use of safe drinking water and improved sanitary facilities were minimal among the study subjects. Provision of improved sources of drinking water, improved sanitation, health education and chemotherapeutic control of the infections were recommended.

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