



SJMLS-2(2)-2017-005

## Prevalence and Diversity of Human Intestinal Parasites in Primary School Children in Katsina, Nigeria.

Yusuf, K.M.\*<sup>1</sup> Nwanze, O.E.<sup>2</sup> A. Nuhu <sup>3</sup>

Department of Disease Control and Immunization, National Primary Health Care Development Agency <sup>1</sup>, Department of Planning, Research and Statistics, National Primary Health Care Development Agency <sup>2</sup>, Department of Advocacy and Social Mobilization, National Primary Health Care Development Agency <sup>3</sup>.

**Author for Correspondence\***: ysfmawash@yahoo.co.uk/ +234-806-956-9929

### Abstract

Human intestinal parasites have always been a major health problem in the developing countries. There is paucity of information on the prevalence of intestinal parasitic infections in Katsina City, Katsina State, Nigeria. A cross-sectional survey on intestinal parasitic infection was carried out on 412 primary school pupils of between 6.0-8.5 years old, within Katsina city. A well structured questionnaire was administered to the pupils with the help of their teachers. The aim was to identify the types and distribution of intestinal parasites in school children. Stool specimens were collected from the participants and analysed using a standard technique. The data obtained were analysed using Chi-square ( $\chi^2$ ). The overall prevalence of intestinal parasites found was 34.7%. *Entamoeba coli* (18.6%), *Tricuris trichiuria* (12.1%), *Ascaris lumbricoides* (13.9%), *Taenia saginata* (15.2%) *Giardia intestinalis* (14.3%), *Entamoeba histolytica* (13.1%) and *Enterobius vermicularis* (12.9%). *Entamoeba coli* (18.6%) had the highest prevalence, while *Trichuris trichiura* (12.1%) had the least occurrence. Our findings showed no significant difference in parasitic infections between males and females, the age of these children and their respective classes. In all the subgroupings, there was no statistical significant difference at  $p$ -value  $\leq 0.05$ . The results showed that children are prone to parasitic infection early in life. Need for control is emphasized.

**Keywords:** Children, Intestinal parasites and Prevalence.

### Introduction

Parasitic infections caused by helminths and protozoa are the major causes of human diseases in most countries in the tropical region (Akingbade *et al.*, 2013; Ghiwot *et al.*, 2014). Intestinal parasitic infections are amongst the most common diseases affecting mankind and causing major public health problems to billions of people living in developing countries (Sinniah *et al.*, 2014; Elyana *et al.*, 2016). They affect people of all ages, although school-age children are the most susceptible (Gonçalves *et al.*, 2011; Pereira *et al.*, 2016). Under fives children have been seen to be most vulnerable to heavy helminthic infestation which in turn can give health effects such as anaemia, growth stunting, protein-energy under nutrition and poor cognitive development (Afolaranmi *et al.*, 2015). Disparities which may not be statistically significant in parasitic infection rates, by gender and age have been reported (Umeh *et al.*, 2015).

In several studies, the common parasites encountered include *Trichuris trichiura*, *Ascaris lumbricoides*, *Entamoeba coli*, *Giardia intestinalis*, *Entamoeba histolytica*, and *Blastocystis hominis*, *Enterobius vermicularis*, *Taenia saginata*, (Uwaezuoke *et al.*, 2006;

Menezes *et al.*, 2008; Wani *et al.*, 2008; Mohammed *et al.*, 2015). The pathogenic effects of some intestinal parasites are well established, while others may or may not cause symptoms, depending on the host immune status and other factors. Amongst the protozoa, some have been associated with persistent and acute diarrhoea (Dib *et al.*, 2008).

Single, double and triple infections have been found in children (Zhang *et al.*, 2016). Surveys of the prevalence of intestinal parasites are necessary, so as to suggest appropriate control measures (Wani *et al.*, 2008). Most studies of this nature conducted in Nigeria, were done in other areas particularly in the southern part of the country (Uwaezuoke *et al.*, 2006; Awolaju & Morenikeji, 2009; Akingbade *et al.*, 2013), with little from the northern part of the country (Biu & Dauda, 2008; Damen *et al.*, 2011; Shehu *et al.*, 2013).

Studies have revealed that poor hygienic practices and unsanitary conditions were responsible for high prevalence of parasitic infections (Usip & Matthew, 2015). Health education on personal and environmental hygiene have been recommended to be intensified and avenues to improve literacy levels pursued while mass chemotherapy with antihelminths be seriously considered (Jombo *et al.*, 2011). The objective of this study is to determine the prevalence and diversity of intestinal parasites amongst school children in Katsina city.

## Method and Materials

### Study area

The study was carried out in Katsina, one of the seven Hausa states in Northern Nigeria. It is the administrative headquarters of Katsina state. The city is approximately located between 12.5139° N and 7.6114° E. The main inhabitants are Hausa and Fulani who are mostly farmers. There are two distinct seasons the wet and dry seasons. The former lasts between June and September, while the latter from October to May.

### Study design

A cross-sectional study was conducted from January to February, 2015. Children between six and eight and a half years of age in primary schools during the study period were included. Data relating to demography and risk factors associated with intestinal parasitic infections (IPIs) were gathered using a structured questionnaire. Verbal informed consent was obtained from the school authorities after explaining the purpose and procedure. Data collected were analysed using Epi- info 3.5.4 version. In all statistical analysis, significance was set at  $p \leq 0.05$ .

At each of the designated recruiting primary school simple random sampling method was used to enrol eligible participants. A questionnaire was used to capture basic information about the participants. Stool samples were collected from each respondent using a special labelled bottle and processed immediately at the laboratory. Formol saline (10%) was used to preserve the specimens that could not be examined on the day of collection. The faecal samples were processed using direct wet preparations in normal saline with Lugol's iodine, further examination was done by the Formol-ether concentration method as described by Mohammed *et al.* (2015).

### Inclusion and exclusion criteria

Children living in Katsina, who were within 6 to 8 years old and whose School Authorities gave consent for participation were included in the study. All children outside the specified age range or who reside outside the specified area, and whose School Authorities did not provide consent for their participation in the study were excluded.

### Results

The result of our findings revealed that from a total of 412 participants selected for this study, 143 (34.7%) were found to be positive for intestinal parasitic infections. Table I shows the distribution of the different intestinal parasites



amongst age groups, gender and classes. In all the subgroupings, there was no statistical significant difference at  $p$ - value  $< 0.05$ .

In this study, younger children had more parasitic load (37.1%) than older ones (34.4%). Male subjects were seen to have higher parasitic count (36.4%) than their female counterparts (31.1%). More parasites were observed in class six pupils (34.7%) than in other classes.

*Entamoeba coli* was seen to be the most prevalent parasite encountered in the survey (18.6%), while *Trichuris trichuria* had the least occurrence (12.1%). Males had higher prevalence of *Entrobium vermicularis* (76.9%) and least occurrence of *Entamoeba coli* (58.5%). On the other hand females had the highest load of *Entamoeba coli* (41.5%) and least load of *Entrobium vermicularis* (23.1%).

**Table 1. Distribution of intestinal parasites by Age, Gender and Class amongst Primary School Children in Katsina.**

Parameter	No. Tested	No. & (% positive)	F-value	p- value
<b>Age (Years)</b>				
6.0	116	43 (37.1)	0.0000	0.9963
6.5	85	28 (32.9)		
7.0	82	26 (31.7)		
7.5	51	16 (31.4)		
8.0	46	19 (41.3)		
8.5	32	11 (34.4)		
<b>Total</b>	<b>412</b>	<b>143 (34.7)</b>		
<b>Gender</b>				
Male	280	102 (36.4)	1.1383	0.2866
Female	132	41 (31.1)		
<b>Total</b>	<b>412</b>	<b>143(34.7)</b>		
<b>Class</b>				
1	65	23 (35.4)	3.1242	0.0779
2	73	18 (24.7)		
3	67	22 (32.8)		
4	68	23 (33.8)		
5	69	27 (39.1)		
6	70	30 (42.9)		
<b>Total</b>	<b>412</b>	<b>143 (34.7)</b>		



**Table 2. Prevalence and distribution of intestinal parasites by Gender amongst Primary School Children in Katsina.**

Parasite	No. of children infected	Percentage
<b>Prevalence</b>		
<i>Entamoeba coli</i>	94	18.6
<i>Taenia saginata</i>	77	15.2
<i>Giardia intestinalis</i>	72	14.3
<i>Ascaris lumbricoides</i>	70	13.9
<i>Entamoeba histolytica</i>	66	13.1
<i>Enterovious vermicularis</i>	65	12.9
<i>Trichuris trichiuria</i>	61	12.1
<b>Gender</b>		
	<b>Male N (%)</b>	<b>Female N (%)</b>
<i>Entamoeba coli</i>	55 (58.5)	39 (41.5)
<i>Taenia saginata</i>	55 (71.4)	22 (28.6)
<i>Giardia intestinalis</i>	51 (70.8)	21 (29.2)
<i>Ascaris lumbricoides</i>	47 (67.1)	23 (32.9)
<i>Entamoeba histolytica</i>	45 (68.2)	21 (31.8)
<i>Enterovious vermicularis</i>	50 (76.9)	15 (23.1)
<i>Trichuris trichiuria</i>	39 (63.9)	22 (36.1)

## Discussion

Epidemiological studies on the prevalence with infection of intestinal parasites have a primary objective in identifying high-risk communities and formulating appropriate interventions. In line with this view, the present study attempted to assess the prevalence of different intestinal parasitic infections in school children in primary schools in Katsina city, Northwest Nigeria. The results of the study showed the

occurrence of several intestinal parasites of public health importance among school children. The overall prevalence of intestinal parasites was 34.7% (143/412). Our findings showed no significant difference in parasitic infections between gender, the age of these children and their respective classes; however, males had higher prevalence than females. Our finding is consistent with previous report in West Bank- Palestine (Hussein, 2011) and North-Western, Nigeria (Mohammed *et al.*, 2015). Our

finding in this study was found to be lower than what was reported in another work conducted in Eastern Cape Province, South Africa (Nxasana *et al.*, 2013). However, our observed prevalence was similar to that observed at the University of Gondar Community School, Northwest Ethiopia (Gelaw *et al.*, 2013). The low prevalence of parasites in this study might be connected with the harsh and dry environment associated with the area studied when compared with results obtained elsewhere (Ghiwot *et al.*, 2014). Studies indicate that most parasites are particularly more prevalent in warm and moist climates (Haque, 2007). Such exposure to parasitism in tropical environment is not unexpected (Mohammed *et al.*, 2015) giving the prevailing conditions. Altogether, seven types of parasites were recovered.

*Entamoeba coli* was the most common parasite, followed by *Taenia saginata*, *Giardia intestinalis* and others. Our finding is consistent with the findings of Somphou *et al.* (2009).

The results show that children are prone to parasitic infection early in life. Multiple parasitic infections have been observed in this study as was seen to be a common feature in most developing countries including Nigeria (Ghiwot *et al.*, 2014; Okpala *et al.*, 2014). Many of the children were infected with more than one parasite, which indicates low level of personal and environmental hygiene (Gelaw *et al.*, 2013). Their distribution has been associated with poor personal hygiene, environmental sanitation and limited access to clean water. Indeed, epidemiological information on the prevalence of various intestinal parasitic infections in different localities is a prerequisite to develop appropriate control measures. In this study polyparasitic infection had been found to be highly prevalent in Katsina hence requires urgent attention may be needed as previously reported by Somphou *et al.* (2009). Children harbouring more than three parasites have observed here, however Houmsou *et al.* (2009) did not report occurrence of such. The prevalence of intestinal parasites seen here, cannot be generalized to other parts of the State, because prevalence has been seen

to vary from different sampling sites (Ameen *et al.*, 2013; Sinniah *et al.*, 2014; Mulatu *et al.*, 2015).

Highly-effective, safe single-dose drugs, such as albendazole, can be dispensed through healthcare services, school health programmes, and community interventions directed at vulnerable groups. As these infections are endemic in poor communities, more permanent control will only be feasible where chemotherapy is supplemented by improved water supplies and sanitation, strengthened by sanitation education. In the longterm, this type of permanent transmission control will only be possible with improved living conditions through economic development (Haque, 2007).

From the result of this study, there is the need for early diagnosis and therapy of parasitic infection in children. If the adoption of the culture of regular hand washing is entrenched in our communities along with improvement in the quality of water supply and methods of sewage disposal facilities; the level of intestinal parasites and other diseases with similar modes of transmission will fall drastically (Jombo *et al.*, 2007).

### Conclusion

Despite the fact that the prevalence rates of intestinal parasites in this study were considerably lower than prevalence rates observed in similar studies conducted in other regions, the rates of the infections are however of public health significance. The findings may be due to the poor sanitary conditions, socioeconomic status, education level, the age and hygienic habits of the children. The study also provides data for understanding the epidemiological status of the human gastrointestinal parasites in Katsina, Katsina state, Nigeria. Therefore, there is need for regular awareness programs on sanitary and good hygiene among children. For control, there is need for mass de-worming of all school children in the area and also the need for other public health interventions like health education programs, sanitary policies, occasional check of



intestinal parasites amongst children and improvement of sanitation in the area.

### Author contributions

Yusuf KM and Nwaze OE initiated the article, Yusuf KM and Nuhu A drafted the manuscript. All of us revised the manuscript and gave final approval for the version to be published.

### Acknowledgments

### Reference

Afolaranmi, T. O., Hassan, I. Z., Bello, D. A., Tagurum, Y. O., Augustine, D.P. Joro, S. M. and Zoakah, A. I. (2015). Pattern of intestinal helminthiasis among under five in a rural community of Plateau State, Nigeria. *Journal of Scientific Research*; **3(1)**: 15-20.

Akingbade, O.A., Akinjinmi, A.A., Ezechukwu, U.S., Okerentugba, P.O., Okonko, I.O. (2013). Prevalence of Intestinal Parasites among Children with Diarrhea in Abeokuta, Ogun State, Nigeria. *Researcher*; **5(9)**: 66-73.

Ameen, N., Sunday, O., Babatunde, S.K., Ajiboye, A.E. and Adedayo, M.R. (2013). Intestinal amoebiasis and other intestinal parasitoses among schoolchildren in rural communities of Moro LGA, Kwara State, Nigeria. *Erudite Journal of Microbiology and Biodiversity*; **2(1)**: 1-7.

Awolaju, B. A. and Morenikeji, O. A. (2009). Prevalence and intensity of intestinal parasites in five communities in south-west Nigeria. *African Journal of Biotechnology*; **8 (18)**: 4542-4546.

Biu, A. A. and Dauda, M. (2008). Prevalence study on enteric protozoans responsible for diarrhoea in patients attending Local Health Centres in Maiduguri, Nigeria.

We thank all those that examined the stool samples. Our warmest gratitude also goes to the Headmasters of the various Schools for their participation, assistance and cooperation in doing this research. We are also indebted to the study participants and data collectors.

### Conflict of Interest

I declare that we have no conflict of interest.

*International Journal of Biomedical and Health Sciences*; **4(1)**: 29 - 32.

Damen, J. G., Luka, J., Biwan, E. I. and Lugos, M. (2011). Prevalence of intestinal parasites among pupils in rural North Eastern, Nigeria. *Nigerian Medical Journal*; **52**: 4-6.

Dib, H.H., Lu, S.O. and Wen, S.F. (2008). Prevalence of *Giardia lamblia* with or without diarrhea in South East, South East Asia and the Far East. *Parasitology Research*; **103(2)**: 239-251.

Elyana, F.N., Al-Mekhlafi, H.M., Ithoi, I., Abdulsalam, A.M., Dawaki, S., Nasr, N.A., Atroosh, W.M., Abd-Basher, M.H., Al-Areeqi, M.A., Sady, H., Subramaniam, L.R., Anuar, T.S., Lau, Y.L., Moktar, N. and Surin, J. (2016). A tale of two communities: intestinal polyparasitism among Orang Asli and Malay communities in rural Terengganu, Malaysia. *Parasites and Vectors*; **9(1)**: 398.

Ghiwot, Y., Degarege, A. and Erko, B. (2014). Prevalence of Intestinal Parasitic Infections among Children under Five Years of Age with Emphasis on *Schistosoma mansoni* in Wonji Shoa Sugar Estate, Ethiopia. *PLoS One*; **9(10)**: e109793.

Gelaw, A., Anagaw, B., Nigussie, B., Silesh, B., Yirga, A. Alem, M., Endris, M. and Gelaw, B. (2013). Prevalence of

- intestinal parasitic infections and risk factors among schoolchildren at the University of Gondar Community School, Northwest Ethiopia: a cross-sectional study. *BMC Public Health*;304.
- Gonçalves, A.L., Belizário, T.L., Pimentel Jde, B., Penatti, M.P. and Pedrosa Rdos, S. (2011). Prevalence of intestinal parasites in preschool children in the region of Uberlândia, State of Minas Gerais, Brazil. *Revista da Sociedade Brasileira de Medicina Tropical*; **44(2)**: 191-193.
- Haque, R. (2007). Human Intestinal Parasites. *Journal of Health, Population and Nutrition*; **25(4)**: 387–391.
- Houmsou, R., Amuta, E. and Olusi, T. (2009). Prevalence of intestinal parasites among primary school children in Makurdi, Benue State- Nigeria. *The Internet Journal of Infectious Diseases*; **8(1)**: 1 - 5.
- Hussein, A. S. (2011). Prevalence of intestinal parasites among school children in northern districts of West Bank- Palestine. *Tropical Medicine and International Health*; **16(2)**: 240–244.
- Jacobsen, K.H., Ribeiro, P.S., Quist, B.K. and Rydbeck, B.V. (2007). Prevalence of intestinal parasites in young Quichua children in the highlands of rural Ecuador. *Journal of Health Population and Nutrition*; **25**: 399–405.
- Jombo, G. T. A., Egah, D. Z. and Akosu, J. T. (2007). Intestinal Parasitism, Potable Water Availability and Methods of Sewage Disposal in Three Communities in Benue State, Nigeria: A Survey. *Annals of African Medicine*; **6(1)**: 17
- Jombo, G.T.A., Damen, J.G., Amechi, I., Etukudo, N.S. and Dabit, O. (2011). Intestinal parasitosis among undernourished children of an urban settlement in West Africa: pattern and types. *International Infectious Diseases*; **1(1)**: eMed Publications & Research ISSN 2231-6019.
- Menezes, A. L., Lima, V.M., Freitas, M.T., Rocha, M.O., Silva, E.F. and Dolabella, S.S. (2008). Prevalence of intestinal parasites in children from public daycare centers in the city of Belo Horizonte, Minas Gerais. Brazil. *Revista do Instituto de Medicina Tropical de São Paulo*; **50(1)**: 57-59.
- Mohammed, K., Abdullah, M. R., Eugene, E. Ismail, I. A. and Omar, J. (2015). Intestinal Parasitic Infection and Assessment of Intestinal Parasitic Infection and Assessment of Risk Factors in North-Western, Nigeria: A Community Based Study. *International Journal of Pharma Medicine and Biological Sciences*; **4(2)**: 141-145.
- Mulatu, G., Zeynudin, A., Zemene, E. Debalke, S. and Beyene, G. (2015). Intestinal parasitic infections among children under five years of age presenting with diarrhoeal diseases to two public health facilities in Hawassa, South Ethiopia. *Infectious Disease and Poverty*; **4**:49.
- Nxasana, N., Baba, K., Bhat, V.G. and Vasaikar, S.D. (2013). Prevalence of Intestinal Parasites in Primary School Children of Mthatha, Eastern Cape Province, South Africa. *Annals of Medicine and Health Sciences Research*; **3(4)**: 511–516.
- Okpala, H.O., Josiah, S.J., Oranekwulu, M.U. and Ovie, E.G. (2014). Prevalence of Intestinal Parasites among Children in Day Care Centres in Esan West Local Government Area, Edo State, Nigeria. *Asian Journal of Medical Sciences*; **6(4)**: 34-39
- Pereira, E.B., Rodrigues, S.L., Bahia-DE-Oliveira, G.H., Coelho, S.V. and Barata,





- R.A. (2016). Detection of intestinal parasites in the environments of a public school in the town of diamantina , minas gerais state, Brazil. *Revista do Instituto de Medicina Tropical de São Paulo*; **11**:58.
- Shehu, M. M., Kabiru, A., Abubakar, U. and Muhammad, K. (2013). Prevalence of Intestinal Helminth Infections among School Children in Relation to Occupation of Parents and Toilets Facilities in Maru L. G. A. Zamfara State. *Journal of Biology, Agriculture and Healthcare*; **3**(19): 87-90.
- Sinniah, B., Hassan, A. K.R., Sabaridah, I., Soe, M.M., Ibrahim, Z. and Ali, O. (2014). Prevalence of intestinal parasitic infections among communities living in different habitats and its comparison with one hundred and one studies conducted over the past 42 years (1970 to 2013) in Malaysia. *Tropical Biomedicine*; **31**(2):190-206.
- Somphou, S., Youthanavane, V., Monely, V., Oroth, R., Smarn, T., Jürg, U., Kongsap, A. and Peter, O. (2009). Diversity of human intestinal helminthiasis in Lao PDR. *Translation of Royal Society of Tropical Medicine and Hygiene*; **103** (3): 247-254.
- Umeh, C., Mbanugo, J. I. and Ezeugoigwe N. (2015). Prevalence of intestinal helminthes parasite in stools of nursery and primary schools pupils in Uga, Anambra State, Nigeria. *Sky Journal of Microbiology Research*; **3**(1): 6 - 10.
- Usip, L. P. E. and Matthew, E. E. (2015). The prevalence of intestinal helminthes and efficacy of anthelmintic (pyrantel) drugs among primary school children in Obot Akara Local Government Area, Akwa Ibom State, Nigeria. *Peak Journal of Public Health and Management*; **3**(3): 46-55.
- Uwaezuoke, J.C., Udujih, O.S. and Onyeka, P.I.K. (2016). Prevalence of intestinal parasites among school children in Owerri municipality, Imo state, Nigeria. *International Journal of Natural and Applied Sciences*; **2** (3): 201-204.
- Wani, S. A., Ahmad, F., Zargar, S.A., Dar, P.A., Dar, Z.A. and Jan, T.R. (2008). Intestinal helminths in a population of children from the Kashmir valley. *Indian Journal of Helminthology*; **82**(4): 313-317.
- Zhang, S.X., Zhou, Y.M., Xu, W., Tian, L.G., Chen, J.X., Chen, S.H., Dang, Z.S., Gu, W.P., Yin, J.W., Serrano, E. and Zhou, X. N. (2016). Impact of co-infections with enteric pathogens on children suffering from acute diarrhea in Southwest China. *Infectious Diseases and Poverty*; **27**:5(1):64.

**Citation:** Yusuf, K.M., Nwanze, O.E. and Nuhu, A. (2017). Prevalence and Diversity of Human Intestinal Parasites in Primary School Children in Katsina, Nigeria. *Sokoto Journal of Medical Laboratory Science*; 2(3): 35 – 43.

**Copyright.** This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.