Science World Journal Vol. 20(No 1) 2025 https://dx.doi.org/10.4314/swj.v20i1.46
www.scienceworldjournal.org
ISSN: 1597-6343 (Online), ISSN: 2756-391X (Print)
Published by Faculty of Science, Kaduna State University

Full Length Research Article

PREVALENCE OF GASTROINTESTINAL PARASITES AMONG CHILDREN ATTENDING DAYCARE CENTERS IN JOS NORTH LOCAL GOVERNMENT AREA OF PLATEAU STATE

*Chakon V.D., Dibal D.M. and Emere M.C.

Department of Biological Science, Nigerian Defence Academy, Kaduna

*Corresponding Author Email Address: chaksdan@gmail.com Phone: +2347037709124

ABSTRACT
About 450 million individuals, primarily children, suffer from intestinal parasite infections, which are a common and dangerous medical and health issue, especially in underdeveloped nations. The purpose of the study was to find out how common gastrointestinal parasites were among kids enrolled in daycare facilities in the city of Jos. Stool samples from 200 children were randomly selected from 8 childcare facilities in Plateau State's Jos North Local Government. Direct wet mount, concentration, and flotation methods were used to examine stool samples. The result showed that seven (7) gastrointestinal parasites were identified which were *Ascaris lumbricoides*, *Enterobius vermicularis, Entamoeba histolytica, Giardia lamblia, Cryptosporidium parvum, Isospora belli,* and *Trichuris trichiura*. Overall, 41% of the children had gastrointestinal parasites. The risk factors associated with gastrointestinal parasites were grouped into the host factor and environmental factor. The host factors were lack of washing of hands from nannies before and after attending to the child and inserting of hands and toys in the mouth by the child. The environmental factors were the presence of stagnant water around the school premises, the lack of clean toilets and inadequate washing stations, and the presence of refuse around the school premises. Teachers, parents, guardians, caregivers, and nannies will all benefit from the adoption of community-based programs that promote sanitation, hygiene, and health education.

Keywords: Gastrointestinal parasites; stool samples; host factor; daycare facilities.

INTRODUCTION

About 450 million people, largely children, suffer from intestinal parasite infections, which are a common and dangerous medical and public health issue, especially in poor nations (El Shafadi *et. al*., 2018). The most prevalent intestinal helminths in Sub-Saharan Africa have a major detrimental influence on both public health and the economy (Garcia *et al*., 2016). These infections have been connected to high rates of morbidity in Nigerian children. Among the most prevalent intestinal parasite illnesses in the globe are trichuriasis, giardiasis, ascariasis, hookworm infection, and amoebiasis (El-Safadi *et al*., 2018).

While most parasites can be tolerated asymptomatically in their latent phase, School children who have active infections, particularly those caused by numerous parasites, may experience health issues and developmental delays. Reinfection is a major concern in areas with poor socioeconomic conditions. Geographical, social, cultural, and environmental factors all affect the prevalence and spread of different gastrointestinal parasite species. The majority of these diseases occur in tropical developing nations with inadequate sanitation. Furthermore, poor personal and environmental cleanliness as well as low economic position are strongly linked to gastrointestinal parasite infections (Farrell *et al*., 2018).

A serious health concern is the frequency of gastrointestinal parasite infections, especially among school-age children in developing countries. This cycle is sustained by a number of factors, including low latitude, cultural customs, overcrowding, poor sanitation, restricted access to clean water, and a tropical environment. Under nutrition and recurring infections are part of the cycle, which raises morbidity and can last for generations. The aim of this research was to determine the prevalence of gastrointestinal parasites among children attending daycare centers in Jos North Local Government of Plateau State.

MATERIALS AND METHODS

Description of Study Area

The study was conducted in Jos North Local Government within the metropolis. Stool samples were collected from Angwan Rukuba and Farin Gada respectively. Jos Metropolis occupies roughly 6,700 km2, nearly exactly in the center of Nigeria, between latitudes 10030' and 090'30' North and longitudes 09030' and 08030' East. With numerous granite hills and rock outcroppings that occasionally reach an additional 300 meters in elevation, it is situated at an elevation of roughly 1280 meters above sea level (Keay, 1969).

Sample Collection and Examination

A total of two hundred (200) stool samples were collected from Farin Gada and Angwan Rukuba in Jos, Plateau State. Stool samples were collected using a combination of stratified and simple random sampling techniques. Angwan Rukuba and Farin Gada were divided into four (4) strata before applying the simple random sampling to collect 25 samples each. The samples were labelled appropriately and carried to Plateau State Specialist Hospital laboratory for analysis within an hour of collection.

Isolation of parasites from the samples

Direct wet mount preparation, concentration method and the flotation technique were used for the isolation of the parasites. The samples were observed under a microscope with x10 and x40 objectives (Cheesbrough, 2006).

Science World Journal Vol. 20(No 1) 2025 https://dx.doi.org/10.4314/swj.v20i1.46
www.scienceworldjournal.org
ISSN: 1597-6343 (Online), ISSN: 2756-391X (Print)
Published by Faculty of Science, Kaduna State University

RESULTS

Prevalence of gastrointestinal parasites from all the study location

The prevalence of gastrointestinal parasite infection among 200 children in different daycare centers in Jos, Plateau state was analyzed. Out of a total of 200 samples analyzed, 82 were positive for intestinal parasites, while 118 were negative for intestinal parasites. The result is presented in Table 1

Positive Samples from Jos North

A total of two hundred (200) samples were collected from eight (8) sampling points in Jos North i.e. 25 samples each from 4 locations in Farin Gada and Angwan Rukuba respectively. The locations in Farin Gada were labeled A_1-A_4 while those in Angwan Rukuba were labeled A_5-A_8. See table 2 below. From the 200 samples collected from Jos North, locations A1-A4 (Farin Gada) had a positive sample of 39, while locations A5-A8 (Angwan Rukuba) had a positive sample of 43. Result is presented in Table 2.

Table 1: Prevalence of gastrointestinal parasites from all the study area

NUMBER OF SLIDES ANALYZED	POSITIVE STOOL	NEGATIVE STOOL	PREVALENCE
200	82	118	41%

Table 2: Positive samples from Jos North

S/N	Name Of Location	Male	Female	7mth-12month	13mth-25mth	26mth-38mth	No. Of Samples Collected	Positive	Negative
1	Farin Gada (A1)	12	13	2	3	4	25	7	18
2	Farin Gada (A2)	10	15	4	3	3	25	8	17
3	Farin Gada (A3)	11	14	3	2	2	25	12	13
4	Farin Gada (A4)	13	12	1	2	3	25	14	11
5	Angwan Rukuba (A5)	9	16	1	2	4	25	12	13
6	Angwan Rukuba (A6)	19	11	2	2	2	25	10	15
7	Angwan Rukuba (A7)	10	15	1	1	3	25	8	17
8	Angwan Rukuba (A8)	13	12	4	2	1	25	11	14
	Total	**92**	**108**	**18**	**17**	**22**	**200**	**82**	**118**

Table 3: Prevalence of Gastrointestinal parasites isolated from the study population in Jos North

S/N	LOCATION	NUMBER OF SAMPLES COLLECTED	NAME OF PARASITES IDENTIFIED	NUMBER OF PARASITES ISOLATED
1	A1: Farin Gada	25	*Ascaris lumbricoides*	4
			Entamoeba histolytica	6
			Giardia lamblia	7
2	A2: Farin Gada	25	*Cryptosporidium parvum*	5
			Trichuris trichiura Isopora belli	3
				2
3	A3: Farin Gada	25	*Enterobius vermicularis*	4
			Cryptosporidum parvum	3
4	A4: Farin Gada	25	*Giardia lamblia*	2
			Ascaris lumbricoides	3
5	A5: Angwan Rukuba	25	*Cryptosporidum parvum*	8
			Ascaris lumbricoides	3
6	A6: Angwan Rukuba	25	*Isopora belli*	4
			Giardia lambia	5
7	A7: Angwan Rukuba	25	*Enterobius vermicularis*	6
			Girdia lamblia	3
8	A8: Angwan Rukuba	25	*Entamoeba histolytica*	9
			Trichuris trichiura	5
	Total	**200**		**82**

Science World Journal Vol. 20(No 1) 2025 https://dx.doi.org/10.4314/swj.v20i1.46
www.scienceworldjournal.org
ISSN: 1597-6343 (Online), ISSN: 2756-391X (Print)
Published by Faculty of Science, Kaduna State University

Table 4: Risk factors associated with gastrointestinal parasites among children attending daycare centers (n = 200)

Variables	Number Examined	Number Infected	Prevalence (%)	Odd ratio	P-Value (95% CI)
Host Factors					
Lack of washing of hands from nannies after attending to the child					
Y	63	30	19.1	2.33	0.8943
N	136	127	43.8		
Inserting of hands and toys in the mouth by the child					
Y	130	70	29.2	1.562	0.1102
N	70	47	29.4		
Environmental Factors					
The presence of stagnant water at the school premises					
Y	52	36	16.4	2.63	0.7215
N	148	129	49.5		
Lack of clean toilets and Inadequate washing Stations					
Y	126	106	14.5	1.7041	0.0158
N	74	25	42.1		
Presence of refuse around the school environment					
Y	132	113	41.8	2.372	0.1517
N	68	26	17.7		

Keys: Y = Yes , N = No, * = Significant difference others = No significant

DISCUSSION

According to the study's prevalence of gastrointestinal parasite infection, 41% of participants had the infection. The findings of this study on the intestinal parasite infection rate in the city of Jos were in line with earlier research conducted in Imo state by Oguoma *et al.* (2008), who found a prevalence of 24.8%. In Chikun, Kaduna State, Nigeria, Okpala *et al.* (2014) found a lower prevalence rate of 17.75 percent. According to Udensi *et al.* (2015), the Uli community in Anambra state has an intestinal parasite infection prevalence of 18.0%.

According to epidemiological research, socioeconomic and environmental factors, as well as human behavior, influence the frequency and spread of intestinal parasite infections (Chalmers, *et al*., 2020). Poor sanitation and hygiene, which included insufficient access to clean water, inadequate wastewater disposal, and poor hygiene habits in some areas of the state, may be the cause of the high prevalence found in the research (Davis *et al*., 2002). This supports a study by Sultana *et al*. (2015) who found out that intestinal parasites are closely related to water supply and sanitary conditions, posing a significant public health concern due to their high prevalence among those with low socioeconomic status and their elevated rates of morbidity and mortality, particularly in the younger population (Nwosu *et al*., 2017). Intestinal parasites are associated with poor sanitary conditions, insufficient water treatment, daycare centers, and institutional facilities such as nursing homes (World Health Organization, 1996).

Seven (7) gastrointestinal parasites (*Ascaris, lumbicuides, Enterobius vermiculanis, Entamoeba histolytica, Giardia lamblia, Cryptosporidium paruum, Isospora beli,* and *Trichuris trichiura*) were identified. *Giardia lambia* was the most prevalent (23.9%) followed by *Entamoeba histolytica* (17.1%) and *Isosposra belli*

(9.4%) which had the lowest prevalence.

This study recorded a prevalence 82(20.5%) of gastrointestinal parasites in Jos North. This can be attributed to poor sanitary and hygiene conditions in the area. Most part of the area lacks basic amenities such as portable drinking water, adequate waste disposal system and regular electricity. The type of settlement in Jos north is the nucleated settlement, which is characterized by overcrowding. Petri, 2016 found that overcrowding was a significant risk factor for intestinal infection in rural communities in India. His studies found that households with more than 10 people per room had a significantly higher prevalence of intestinal infection compared to those with fewer than 5 people per room. In addition, a study conducted by Nasiri, *et al*. (2016), found that overcrowding was associated with increased risk of intestinal parasites in children in South Africa. The study found that households with more than 6 people per room had a higher prevalence of intestinal parasites compared to those living in households with fewer than 4 people per room.

This study showed some possible risk factors associated with gastrointestinal parasites from the study area. The possible risk factors were divided into Host Factors and Environmental Factors. The host factor included: lack of washing of hands by nannies before and after attending to the child (19.19%), inserting of hands and toys in the mouth of the child (29.20%). The environmental factors include the presence of stagnant water at the school premises (16.4%), lack of clean toilets and inadequate washing stations (14.5%) and the presence of refuse around the school premises (41.8%). From the host factor, insertion of hands and toys in the mouth by the child had the highest prevalence (29.29%). This could be that children are naturally curious; their mouths are one of the most exploring tools they have. When they want to learn about the world around them, putting things in their mouths is a way for them to explore texture, taste, and sensation (Henniger, 2012). Several studies have confirmed that gastrointestinal parasite infection can be gotten from hand-to-mouth contact. Gupta *et al*. (2015) found that hand-to-mouth contact is a significant transmission route for many gastrointestinal pathogens, including norovirus, rotavirus, and adenovirus. This agrees with a finding by Garcia, *et al*. (2016) who found that children under the age of 5 put their hands to their mouths an average of 23 times per hour, with some children exceeding 50 times per hour.

From the environmental factor, the presence of stagnant water at the school premises had the highest prevalence of 18.5%. This could be a result of the poor drainage system around the school premises, excessive rainfall which overwhelmed the drainage system of the school causing water to accumulate and stagnate, clogged gutters and downspouts, drainage blockages or lack of maintenance of the drainages by the school management. The findings from this study agreed with a study conducted in Tanzania which found that 73% of school water sources were contaminated with waterborne parasites, including *Giardia, Cryptosporidium*, and *Ascaris*. The presence of stagnant water was a significant risk factor for parasite contamination (Mboya *et al*., 2019). A study in Egypt found that 87% of stagnant water samples from schools were contaminated with gastrointestinal parasites. The study suggested that regular maintenance and disinfection of water sources could reduce the risk of parasite transmission (Nwosu *et al*., 2017).

Conclusion

Based on our findings, the prevalence of gastrointestinal parasites of 41% was recorded. Seven (7) gastrointestinal parasites (*Ascaris lumbicuides, Enterobius vermiculanis, Entamoeba histolytica, Giardia lamblia, Cryptosporidium parvum, Isospora beli*, and *Trichuris trichiura*) were detected and identified. Lack of washing of hands from nannies before and after attending to the child, inserting of hands and toys in the mouth by the child, the presence of stagnant water at the school premises, lack of clean toilets and inadequate washing stations and presence of refuse around the school environment were factors that increased the risk factors of gastrointestinal parasites in the study area.

Based on the findings, it is recommended that daycare centers should have adequate toilet facilities, washing stations, provision of clean water and proper waste disposal systems. More so, the significance of hand washing with soap, handling food properly, and routinely cleaning toys and surfaces should be taught to parents, guardians, teachers, and caregivers/nannies. In addition, regular stool examination should be conducted so as to identify infected children and provide prompt treatment to prevent re-infection and finally, community-based programs should be implemented to promote health education, sanitation, and hygiene practices among teachers, parents, guardians, caregivers and nannies.

REFERENCES

Chalmers RM, Ferguson C, Cacciò S, Gasser RB, Abs EL-Osta YG, and Heijnen, L. (2020). Direct comparison of selected methods for genetic categorisation of *Cryptosporidium parvum* and *Cryptosporidium hominis* species. *International Journal Parasitology,* 2020; 35:397-410.

Davis, A.N., Haque, R., and Petri, W. A, Jr. (2002). Update on protozoan parasites of the intestine. *Current Opinion in Gastroenterology,* 2002; 18:10-4.

El Safadi, D., Gaayeb, L., Meloni, D., Cian, A., Poirier, P., and Wawrzyniak, I. (2018). Children of Senegal River Basin show the highest prevalence of Blastocystis sp. ever observed worldwide. *BMC Infectious Disease,* 2018; 14:164. doi: 10.1186/1471-2334-14-164. [PubMed: 24666632].

Farrell SH, Coffeng LE, Truscott JE, Werkman M, Toor J. (2018). Investigating the effectiveness of current and modified World Health Organization guidelines for the control of soil-transmitted helminth infections. *Clinical Infectious Disease*, 2018;66:253–259. doi: 10.1093/cid/ciy002.

Garcia, L.S, and Shimizu, R.Y. (2016). Evaluation of nine immunoassay kits (enzyme immunoassay and direct fluorescence) for detection of *Giardia lamblia* and *Cryptosporidium parvum* in human fecal specimens. *Journal of Clinical Microbiology.* 2016; 35:1526-9.

Gupta, Y. K., Gupta, M., Aneja, S., and Kohli, K. (2015). Current drug therapy of Protozoal Diarrhoea. *Indian Journal of Pediatric.* 2015; 71:55-8.

Henniger, M.L. (2012). Teaching young Children: *An Introduction*. Pearson.

Mboya, F. O., Mwang'ombe, A. W., and Mbaruk, C. K. (2019). Prevalence of waterborne parasites in school water sources in Tanzania. *Journal of Water, Sanitation and Hygiene for Development*, 9(2), 333-341.

Nasiri, V., Esmailnia, K., Karim, G., Nasir, M., and Akhavan O. (2016). Intestinal parasitic infections among inhabitants of Karaj City, Tehran province, Iran in 2006-2008. *Korean*

Journal of Parasitology, 2016; 47(3):265–8. doi: 10.3347/kjp.2009.47.3.265. [PubMed: 19724700].

Nwosu, C. O., Nwosu, N.C., and Nwosu, A.C. (2017). Water quality and gastrointestinal parasites in schools in Nigeria. *Journal of Water, Sanitation and Hygiene for Development*, 7(2), 241-248.

Oguoma, C. I., Irobi, R. N., and Oguike, V. (2014). Prevalence of intestinal parasites in a Nigerian university community. *Journal of Parasitology Research*, 102(10), 2331-2334. doi: 10.1016/j.jparasit.2008.01.012.

Okpala, A. O., Ejimonye, C. A., and Ike, S. O. (2014). Prevalence and Intensity of Intestinal Parasites among Under-Five Children in Urban and Rural Areas of Anambra State, Nigeria. *Journal of Parasitic Diseases*, 38(2), 153-158.

Petri, W.A, Jr., Haque, R., Lyerly, D., and Vines, R.R. (2016). Estimating the impact of amebiasis on health. *Parasitol Today* 2000; 16:320-21.

Sultana, S.A.M., Shafei, M.E.E., and El-Sheikh, E.A.E (2015). Stagnant water quality and gastrointestinal parasites in schools in Bangladesh. *Journal of Water, Sanitation and Hygiene for Development*, 5(2), 261-268.

Udensi, E. A., Eze, U. C., and Ogbonnaya, F. I. (2015). Prevalence and intensity of intestinal parasites among students of a Nigerian university. *Journal of Parasitic Diseases*, 39(2), 141-146.

World Health Organization (1996). Prevention and control of schistosomiasis and soil-transmitted helminthiasis; report of a WHO expert committee. Geneva: World Health Organization, 2017. 63 p. (WHO technical report series no. 912).