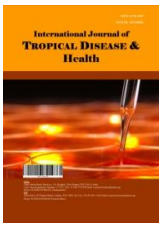

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The Prevalence of Polyparasitism in Oju, Local Government Area of Benue State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors JOA and EAO designed the study. Authors VUO, JOA and GNI performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. All authors managed the analyses of the study. Authors JOA and EAO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Intestinal and urinary parasitic infections remain an important public health problem in the tropics where poor hygiene and sanitation are a norm rather than an exception. This study was designed to determine the prevalence and distribution of polyparasitic infections and to determine the impact of health education and treatments .Stool and urine samples from 350 participants were analyzed using macroscopic and microscopic direct stool examination of wet and Lugol'siodine preparations and Formal-ether concentration techniques and microscopic examination of simple centrifuged samples of urine. Out of the 350 participants, 101were infected with intestinal parasites with the male and female participants having 29 (66.0%), 41 (71.9%) prevalence of *Entamoeba histolytica,* 9 (20.5%), 8(14%) *Eschericia coli,* 2 (4.6), 6(10.5%) *Trichomonas hominis* and4 (9.1%), 2 (3.5%) *Chilomastix mesnilli* respectively. Out of the infected 101 participants, 14 of them had co-infection (polyparasitism). The result of polyparasitism in the Local Government is not significant ($p>0.05$).The overall infection before health education and treatment was high and least after health education and treatment 0(0%) ($p<0.05$). The results of this study indicated improper hygiene and sanitation conditions.

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Keywords: Prevalence; helminthes; analysed; polyparasitism; participant; sanitation; formal-ether.

1. INTRODUCTION

Intestinal and urinary parasitism has been one of the major problems of the developing countries. Most of the developing countries are faced with parasitic diseases which are closely related to poor sanitary behaviours and/ or poor personal hygiene [1]. Infections by intestinal parasites are a major public health problem worldwide, especially among children in developing countries. According to World Health Organization, approximately 3.5 billion people are infected by intestinal parasites and about 450 million children are ill due to these infections [1,2]. Iron deficiency anaemia, growth retardation in children and other physical problems, can be traced to intestinal parasitic infections [3,4].

Often times human and animals are infected with two or more parasite species (polyparasitism) which is on the widespread and its combinatory and complexity are daunting, but for parasite species interconnected through immunity or transmission, likely to confound routine approaches to research. 'Multiple species parasitic infections are the norm rather than the exception,' and therefore that polyparasitism deserves much more attention [5]. Intestinal parasitic infections and urinary schistosomiasis have been described as diseases of poverty and underdevelopment because they have been linked to lack of sanitation, lack of access to safe water and improper hygiene [6]. These parasitic diseases deprive the poorest of the poor of health, contributing to economic instability and social marginalization; and the poor people of under developed nations experience a cycle where under nutrition and repeated infections lead to excess morbidity that can continue from generation to generation [7]. School age children in developing countries are the most severely affected by polyparasitism with intestinal parasites and schistosomiasis and continue to bear the greatest health burden due to the infections [8,9].

2. METHODOLOGY

2.1 Study Areas

Oju local government is located to the Southern part of Benue State, bounded in the North by her immediate neighbour, Obi local government area; Ebonyi State and Cross River State to the East by Vandeikya, Konshsha and Gwer and to the West by Ado Local government area. The local government has eleven council wards.The main topographical feature of Oju local government is the long range of highlands stretching from Oloko River in Amaka-Owo through Andibilla Hills towards Owokwu mountains to Udi Hills in Ebonyi State. This makes the local government area prone to water inferno, which destroys food crops, houses as well as property worth several millions of Naira yearly. Other features include the plain land stretching from Ukpa through Iyeche to Oboro/Oye at the Cross River state border. These areas form the major agricultural areas where food and cash crops are produced at an extensive scale. There are two major rivers namely the Oyongo River in Iwokwu and Onuwu River in Oboro/Oye. Rain season starts in Oju mostly in April and lasts till October each year, though changes in weather affect the commencement and duration in some years. Crops such as yams, cassava, rice, maize, millet, groundnut, beniseed, guinea corn, soybeans etc. are produced in commercial quantity making farming the major means of livelihood. In addition, fishing, basking, carving, hunting, knitting and pottery are practiced at subsidiary levels.

2.2 Sample Size

Samples sizes as determined by the Raosoft online calculator at 95% confidence interval was 314.

2.3 Collection and Examination of Faecal and Urine Samples

The participants were educated on the causes of intestinal helminthic infections and other parasitic infections. Thereafter, wide mouthed screw-cap sterile sample containers were given to the participants for the collection of their stool/urine samples at home and structured questionnaires were distributed among the participants for the collection of demographic information such as age, sex, source of water and occupation. They were instructed to bring their early morning stool and urine samples the next day. The samples produced by participants were received at designated point. The collected samples were transported to the General hospital laboratories and Primary Heath Care centres in the Local Government Area for examination. The samples were examined by using direct smear, lugol's

iodine and formalin-ether concentration techniques for stool samples [10] and simple centrifugation technique for urine samples [11]. Questionnaires were administered to the participants to determine some socio-environmental factors that can influence parasites distribution.

2.4 Stool Examination

2.4.1 Direct wet mount

Saline or iodine wet mount were made by mixing a small quantity (about 2 mg) of faeces in a drop of saline or iodine placed on a clean glass slide with applicator stick. Gross fibres or particles were removed and covered with cover-slips. Air bubbles were avoided by drawing one edge of cover-slip slightly into the suspension and lowering it almost to the slide before letting it fall. The smear were then examined under the microscope using x 10 objective and confirming any parasite seen with x 40 objective for ova of parasite and motile parasites [10].

2.4.2 Formalin-ether concentration

The formol-ether concentration was used for the preparation of stool for examination [10]. Using the applicator stick, about 1 gm of the stool samples were added to centrifuge tubes to which normal saline were added. They were thoroughly emulsified and filtered through two layers of gauze into another centrifuge tubes. Three milliliters (3 mls) of ether were added and 7mls of formal saline were also added into the faecal sample suspension, and stoppered and shaken vigorously to mix. The stoppers were removed and the tubes were centrifuged at 2000 rpm for 2 minutes.

After the centrifugation, four distinct layers were formed. The layers were; ether at the top-most, second a plug of debris, third a clear layer of formal saline and the fourth sediment. The plugs of debris were detached from the side of the tubes with the aid of applicator sticks and the liquid were poured off leaving a small amount of formal saline for suspension of the sediment.

A drop of the deposit were pipetted onto a clean microscope slides, covered with clean cover-slips avoiding air bubbles and over floating. The sediments were also mixed with iodine where they were need. Examinations were made with x10 and x40 objective lens of light microscope for ova of parasites and other forms of parasites.

2.5 Urine Examination

Simple centrifugation sedimentation method.

The urine samples were processed by ordinary centrifugation sedimentation techniques WHO [11]. The urine samples were thoroughly mixed and 10 mls of each were taken into centrifuge tubes and centrifuged at 2000 rpm. The supernatant were discarded and the deposits were examined with x10 objective and any parasites seen were confirmed with x40 objective.

3. RESULTS AND DISCUSSION

A total of three hundred and fifty (350) Male and Female participants were examined from the Oju Local Government Area. Out of the 350 participants, 101 of them were infected with one or more of the *E. histolytica, E. coli, C. mesnilli, T. hominis* making a total prevalence of 28.9% (Table 1).

The distribution of parasites among the participants sampled in the three local governments shows that out of the total of 350 participants', seventy (70) were found to be infected with; *E. histolytica,* 17 were infected with *E. coli,* 4 participants were infected with *C. mesnilli*, while 10 participants were infected with *T.hominis*, Hookworm, *A. lumbricoides, H. nana, T. solium* and *Trichomonus vaginalis* as shown in Table 2. Of the 86 parasitic infections observed in samples of participants, 14 of them had co-infection (polyparasitism), specifically 14(16.3%) had double There is no significant difference in this observation; $\chi^2 = 3.615$, Df=1, P=0.132, (P>0.05) Table 3.

Table 1. Overall prevalence of parasites infection among participants

Gender	Number examine	Number infected	Prevalence
Male	140	44	31.4
Female	210	57	27.1
Total	350	101	28.9

Table 2. Sex related prevalence of parasites species Oju L.G.A.

Parasite species	Male (prevalence)	Female (prevalence)	Total
E. histolytica	29 (66.0)	41(71.9)	70
E. coli,	9 (20.5)	8 (14.0)	17
C. mesnilli	2 (4.6)	2 (3.5)	4
T.hominis	4 (9.1)	6 (10.5)	10
Total	44 (31.4)	57 (27.1)	101

Table 3. Sex related polyparasitic infection in Oju L.G.A

Parasites	Male	Female	Total
C.m+E.h	2	2	4
T.h+E.h	4	6	10
Total	6	8	14

Prevalence of parasitic infection with respect to socio-environmental factors, shows that with respect to toilet facilities there was a significant difference in parasitic infection based on socio-environmental factors, χ^2= 56.663,Df=3, P=0.005. Bush (Open defecation) 22(52.4%) had the highest infection while water system had the least 24(17.9%). With respect to Source of water there was a significant difference, χ^2=617.826, Df=14, P=0.007. Well/Stream had the highest infection while borehole had the least. With respect to Hand washing there was a significant difference in infection of those who do not wash hands after visiting toilet; they had the highest infection rate of 28(14.7%) while those who wash their hands had the least 33 (4.9%). With respect to having the knowledge of parasite there was no significant difference in infection rate between those who have knowledge and those who do not (Table 4).

This study revealed that *Entamoeba* species was very common in the sampled groups. This indicated very unsanitary habits especially in source of drinking water and the type of toilet system use. This study shows that prevalence of polyparasitism is lower compared to that of in 2014 in Kenya [12,13,14] who reported polyparasitism rate of 71.4%, 22%. The present study is not in agreement with the previous studies.

Table 4. Records of socio-environmental factors in relation to the L.G.A.

Factors	Participants (%)	Infected	p-value	Df	χ^2
Toilet facilities			0.001	3	56.663
Water system	134(38.3)	24(17.9)			
Pit toilet	174(49.7)	55(31.6)			
Bush (Open defecation)	42(12.6)	22(52.4)			
Bush/pit	-	-			
Total	**350**	**101(28.9)**			
Source of water			0.001	7	907.826
Borehole	266(76)	51(19.2)			
Borehole/stream	70(20)	38(54.3)			
Borehole/well	6(1.7)	3(50)			
Stream	8(2.3)	8(100)			
Total	**350**	**101(28.9)**			
Hand washing			0.002	2	823.123
Wash	240(68.6)	33(4.9)			
Do not wash	40(11.4)	28(14.7)			
Do not remember to wash	70(20)	25(13.9)			
Total	**350**	**101(28.9)**			
Knowledge of parasites			0.535	1	1.253
Has knowledge	153(43.7)	41(26.8)			
No knowledge	197(56.3)	60(30.5)			
Total	**350**	**101(28.9)**			

The lower polyparasitism rate recorded in this study than other studies could be that communities in these study areas were better enlightened in the areas of sanitation and hygiene and adhered to them. That is they might have had Knowledge, Attitude and Perception (KAP) regarding parasitic diseases and their mode of transmission before this study was carried out.The presence of amenities such as portable water supplies and health facilities in the study areas might have contributed to the low infection rate, and also the regular deworming activities that are frequently carried outin Health institutions and communities in Benue State could be responsible for this result.

The present study that has a total of 101(28.9%) people infected with intestinal and urinary parasites is not in agreement with a prevalence of 141(36.06%) freported in Porto Novo municipality of Cape Verde [15].

In the present study *Entamoeba histolytica* and *Entamoeba coli* are the common protozoa parasites. This is in agreement with previous report [16] that the most common protozoan parasites were *Entamoeba coli* and *Entamoeba histolytica* (causal agent of amoebiasis), with prevalences of 17% and 13%, respectively. Prevalence of parasitic infection with respect to socio-environmental factors, shows that with respect to toilet facilities there was a significant difference in parasitic infection based on socio-environmental factors at ($p<0.05$). Bush (Open defecation) had the highest infection, while water system had the least. This could be due to the openness of faeces passed and which can be washed to sources of drinking water, parasites in them can be blown onto food or sources of drinking water.

With respect to Source of water there was a significant difference at ($p<0.05$). Well/Stream had the highest infection while borehole had the .The participants that used streams and wells as sources of water supply had higher prevalence compared to those that uses borehole and other sources. There was significant association between the infection and use of streams/well as sources of drinking water. The result of this study is in agreement with the study carried out [17] on Evaluation of parasitic contamination from local sources of drinking water in Abakaliki. The public health implication of the findings in this study and earlier study [17] is that the pathogenic parasites may pose serious hazard to the health of rural dwellers such as farmers due to their occupation and children due to poor sanitary habits. This might be the reason for the level of infection recorded in the present study; because humans and domestic and wild animals use these (stream) as sources of drinking water especially during the dry season in local communities. A situation that could lead to contamination with faeces and subsequent infection of exposed individuals.

With respect to Hand washing there was a significant differencein infection at $p<0.05$ of those who do not wash hands; they had the highest infection rate, those who do not remember to wash their hands while those who wash their hands had the least. Those that do not wash hands after visiting toilets can have their hands contaminated with faeces or flies and still went ahead to eat with the same hands. In this way such individual can easily get infected with any of the parasites present in the faeces.

With respect to having the knowledge of parasite there was no significant difference in infection rate between those who have knowledge and those who do not.

However, all the urine samples examine were negative to *Schistoama haematobium.*

4. CONCLUSION

Prevalence of polyparasitism was very low in Oju local government area of Benue State. Community education improved the knowledge and hygienic attitudes of the people because they were able to demonstrate some hygienic practices taught them and were using them and that resulted reduction of re-infection of those treated.

CONSENT AND ETHICAL APPROVAL

A letter of introduction was obtained from the Department of Biological Sciences, Benue State University, Makurdi for the purpose of the research. Letter seeking for permission to carry out the study was also written to the Chairman of Oju Local Governmen Area (LGA) and the objectives of the study were discussed.

After approval from the LGA, contacts were made with the Village heads and objectives of the study were also discussed with them. Following the discussion, permission was given from the community leaders and the heads of households were met and the objectives of the research were also discussed. After approval, the study participants were randomly selected from each household. Then the randomly selected participants were informed of the

objectives of the study and their consents were sorted.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Warunee N, Choomanee L, Sataporn P, Rapeeporn Y, Nuttapong W. Intestinal parasitic infection among school children in Thailand. Trop. Biomed. J. 2007;24:83-88.
2. WHO. World Health Report Conquering Suffering Enriching Humanity. World Health Organization, Geneva; 2000.
3. Scolari C, Torti C, Beltrame A, Matteelli A, Castelli F. Prevalence and distribution of Soil-Transmitted Helminth (STH) infections in urban and indigenous schoolchildren in Ortigueira, State of Parana, Brasil: Implications for control. Trop. Med. Int. Health. 2000;5:302-307.
4. Nasiri V, Esmailian K, Karim G, Nasir M, Akhavan O. Intestinal parasitic infections among inhabitants of Karaj city, Tehran province, Iran in 2006-2008. Korean J. Parasitol. 2009;47:265-268.
5. Raso G, Luginbühl A, Adjoua CA. Multiple parasite infections and their relationship to self-reported morbidity in a community of rural Côte d'Ivoire. Int J Epidemiol. 2004;33:1092–102.
6. WHO (World Health Organization). Prevention and control of Schistosomiasis and soil-transmitted helminthiasis. WHO Technical Series Report 912.Geneva: WHO; 2002.
7. Mehraj V, Hatcher J, Akhtar S, Rafique G, Beg MA. Prevalence and factors associated with intestinal parasitic infection among children in an urban slum of Karachi. PLoS ONE. 2008;3(11):e3680.
8. Drake LJ, Bundy DA. Multiple helminth infections in children: Impact and control. Parasitol. 2001;122(Suppl):S73–S81.
9. Tchuente LA, Behnke JM, Gilbert FS, Southgate VR, Vercruysse J. Polyparasitism with *Schistosoma haematobium* and soil-transmitted helminth infections among school children in Loum, Cameroon. Trop Med Int Health. 2003;8:975–986.
10. Arora DR, Briji BA. Medical parasitology (3rd edition); CBS Publishers and Distributors PVT Limited, New Delhi, India. 2010;235:237.
11. WHO. Sedimentation method in basic Laboratory methods in medical parasitology, Geneva. 1991;33-35.
12. Al-Delaimy AK, Al-Mekhlafi HM, Nasr NA, Sady H, Atroosh WM, Nashiry M, Anuar TS, Moktar N, Lim YA, Mahmud R. Epidemiology of Intestinal Polyparasitism among Orang Asli School Children in Rural Malaysia. PLoSNegl Trop Dis. 2014;8(8).
13. Mokua DO, Shivairo RS, Muleke CI, Mukabane DK, Oswe MO, Kumba JK. Soil transmitted helminthes prevalence among pre-school age children in Elburgon Municipality, Kenya. Journal of Biology, Agriculture and Healthcare. 2014;4(21).
14. Nguhiu PN, Kariuki HC, Magambo JK, Kimani G, Mwatha JK, Muchiri E, Dunne DW, Vennervald BJ, Mkoji GM. Intestinal polyparasitism in a rural Kenyan community. East African Med. Jour. 2009;86(6):272-8.
15. Okeke Peter Ubah. Distribution of intestinal parasitic infections among the residence of Porto Novo municipality of Cape Verde. *Porto Novo*; 2011.
16. Nguhiu Purity Nyambura. Intestinal parasites in a rural community in the Kibwezi area of Makueni District, Kenya. Jomo Kenyatta University of Agriculture and Technology, Kenya; 2007.
17. Ani OC, Itiba OL. Evaluation of parasitic contamination from local sources of drinking-water in Abakaliki, Ebonyi State, Nigeria. Nigerian Journal of Parasitology. 2015;36(2):153-158.

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