Intestinal parasitic infections in Okada rural community, Edo State, Nigeria: a four year retrospective study

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Abstract

Intestinal parasitic infections are associated with morbidity and mortality worldwide. Data on prevalence of intestinal parasitic infection is sparse in rural Nigeria. Against this background, this study aimed at determining the prevalence of intestinal parasitic infections within a four year period in the rural community of Okada, Edo State, Nigeria. Fecal samples obtained from 1528 patients (consisting of 740 males and 788 females) presenting with signs and symptoms of gastroenteritis at the Igbinedion University Teaching Hospital, Okada were examined for presence of ova, cyst and trophozoites of parasites using standard methods. Patient's age ranged from 6 months to 73 years. Study was conducted between 2007 and 2010. The prevalence of intestinal parasitic infections increased significantly (P=0.003) from 14.7% in 2007 to 22.5% in 2010. In the study period, gender did not affect the prevalence of intestinal parasitic infection (P>0.05). Patients within <1-10 years had significantly higher prevalence of intestinal parasitic infection. *Ascaris lumbricoides* was the most predominant parasitic agent, while *Schistosoma japonicum* was the least prevalent. With respect to parasite, males were observed to have consistently higher prevalence of *Entamoeba histolytica* infection. The prevalence of intestinal parasitic infection was observed to significantly increase from 2007 to 2010. Age was a risk factor for acquiring intestinal parasitic infection. *Ascaris lumbricoides* was the most predominant parasitic agent in all years of study. Control and prevention measures are advocated.

Introduction

Intestinal parasitic infections are among the most common infections worldwide and about 3.5 billion persons, mostly children, are estimated to be infected.[1] Intestinal parasitic infections affect nutritional status, physical development, mental function and alertness, verbal ability, and inhibition control aspects of cognitive behaviour in children.[2] Intestinal parasitic infections deprive the poorest of health, contributing to economic instability and social marginalization.[3] Death and other serious complications can occur if cases of intestinal parasitosis are left untreated especially in children.[1]

In Nigeria, intestinal parasitic infection constitutes a major public health challenge.[4] Poorly planned housing, improper waste disposal, gross environmental pollution and poor environmental situations among others are driving forces for this observation.[5] Illiteracy, absence of clean drinking water, and poverty has been shown to promote infection with intestinal parasites[3] and these factors are rife in most rural communities in Nigeria.[6,7] Although data on prevalence of human intestinal parasitic infection in Nigeria is common, there is no published data from Okada community, Edo State, Nigeria. Monitoring of disease and assessment of effectiveness of intervention effort in any community is largely enhanced by the availability of local prevalence statistics over a period of time. This type of data is missing in Okada community, and very sparse in many rural communities of Nigeria. Against this background, this study aimed at determining the prevalence of intestinal parasitic infection in Okada (a rural community in Edo State, Nigeria) within a 4 year period.

Materials and Methods

Study area

Okada, a rural community, is the headquarters of Ovia North East Local Government Area of Edo-state, Nigeria. The Local Government has an estimated population of 155,344 people.[8] Majority of the residents of Okada are farmers with few civil servants, lecturers and students making less than 5% of the community. The study was carried out at Igbinedion University Teaching Hospital, Okada, Edo State, Nigeria, from January 2007 to December 2010. Some neighboring rural communities (villages) also attend the Hospital.

Study population

This is a laboratory retrospective study. A total of 1528 patients aged 6 months to 73 years with signs and symptoms of gastroenteritis were included in this study. They consisted of 740 males and 788 females. Informed consent was obtained from all patients or their parents/guardian in case of children prior to specimen collection. The study was approved by the Ethical committee of the Igbinedion University Teaching Hospital, Okada, Edo State, Nigeria.

Collection and processing of specimens

Stool specimens were collected from each patient in wide mouthed containers and examined microscopically for ova, cysts or protozoa using saline and iodine mount as previously described.[9]

Statistical analysis

The data obtained were analyzed using Chi square (χ^2) test and odds ratio analysis using the statistical software INSTAT® (Graphpad software Inc., La Jolla, CA, USA). Statistical significance was set at P<0.05.

Results

A total of 278 (18.2%) of the 1528 patients

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Key words: intestinal parasite, rural community, Nigeria.

Contributions: BHO, MO and AJA took part in study design, generated and analysed data, and substantively drafted the article. RO and IO took part in study design, analysed data and substantively drafted the article.

Conflict of interests: the authors declare no potential conflict of interests.

Acknowledgements: the authors acknowledge all members of the ethical committee of Igbinedion University Teaching Hospital for giving their approval for this study.

Received for publication: 18 August 2013.
Revision received: 13 September 2013.
Accepted for publication: 25 September 2013.

Healthcare in Low-resource Settings 2014; 2:1891
doi:10.4081/hls.2014.1891

were infected with at least one intestinal parasite. The prevalence of intestinal parasitic infections was observed to significantly (P=0.003) increase from 2007 to 2010. Among patients with intestinal parasitic infection, 30 (10.8%) had more than one parasite in their stool. No statistically significant difference (P=0.733) was observed over the years with respect to the prevalence of mixed intestinal parasitic infection (Table 1). Gender was not significantly associated with intestinal parasitic infection in all the study period (Table 2). The prevalence of intestinal parasitic infections was significantly higher in the age group <1-10 years from 2007 to 2010. Among participants aged <1-10 years, the prevalence of intestinal parasitic infection was observed to significantly increase from 2006 to 2010 (Table 3). A total of 308 intestinal parasites were identified in 278 patients. Generally, and in all the years of study, *Ascaris lumbricoides* was the most predominant parasitic agent identified in patients stool, followed by *Entamoeba Histolytica. Schistosama. japonicum* was the least prevalent intestinal parasitic agent (Table 4). The prevalence of *Entamoeba histolytica* infection was observed to be higher among male participants in all years of study (Table 5).

Discussion

Intestinal parasitic infections are globally endemic and have been described as constituting the greatest single cause of illness and disease worldwide.[3] Factors that promote intestinal parasitic infections, *i.e.* illiteracy, poverty, absence of clean drinking water,[3] are rife in rural communities in Nigeria. Against this background and the paucity of reports on intestinal parasitic infections in rural communities of Edo State, Nigeria, this study was conducted. The overall prevalence of intestinal parasitic infection in this study was 18.2%. This is lower than reported figures in other Nigerian studies.[5,10,11] The prevalence of intestinal parasitic infections varies with different geographical regions.[12] The variation could be due to differences in geographical location: in Ikeh *et al.*,[5] Nduka *et al.*,[10] and Awolaju and Morenikeji,[11] studies were conducted in north central, south eastern, and south western Nigeria respectively, in contrast to our study which was conducted in Mid Western Nigeria.

The prevalence of intestinal parasitic infection was observed to significantly increase from 14.7% in 2007 to 22.5% in 2010. Igbinedion University, Nigeria's first private University in Okada, has witnessed an unprecedented influx of persons into the community, without corresponding increases in social amenities, like portable drinking water amongst others. This is likely to result in more people sharing limited social amenities such as portable drinking water, and housing which in turn could precipitate the spread of intestinal parasitic infections observed over the years in this study. Thirty patients representing 10.8% of the total number of patients with intestinal parasitic infection in this study had more than one parasite recovered from their stool. However, the prevalence of mixed infection did not differ significantly from 2007 to 2010. Irrespective of year of study, gender did not significantly affect the prevalence of intestinal parasitic infection. This is consistent with other reports.[5,10] Age was found to significantly affect the prevalence of intestinal parasitic infection with participants within the age group of <1-10 years consistently observed to have the highest prevalence within each year of study. Similar findings have been reported elsewhere.[13] Among patients within the age group of <1-10 years, the prevalence of intestinal parasitic infection was observed to significantly (P=0.001) increase from 21.2% in 2007

Table 1. Four year prevalence of intestinal parasitic infection in Okada.

Year	No. of tested patients	No. of infected patients (%)	Mixed infection (%)	P
2007	218	32 (14.7)	5 (15.6)	0.003
2008	454	72 (15.9)	7 (9.7)	-
2009	350	60 (17.1)	5 (8.3)	-
2010	506	114 (22.5)	13 (11.4)	-
Total	1528	278 (18.2)	30 (10.8)	-

Table 2. Effect of gender on prevalence of intestinal parasitic infection in Okada.

Year	Gender	No. of tested patients	No. of infected patients (%)	OR	95% CI	P
2007	Female	113	21 (18.6)	1.951	0.890, 4.273	0.134
	Male	105	11 (10.5)	0.513	0.234, 1.123	
2008	Female	265	43 (16.2)	1.069	0.639, 1.785	0.902
	Male	189	29 (15.3)	0.936	0.560, 1.563	
2009	Female	186	33 (17.7)	1.094	0.626, 1.913	0.861
	Male	164	27 (16.5)	0.913	0.523, 1.597	
2010	Female	282	65 (23.0)	1.070	0.702, 1.630	0.836
	Male	224	49 (21.3)	0.935	0.614, 1.424	

OR, odds ratio; CI, confidence interval.

Table 3. Effect of age on prevalence of intestinal parasitic infection in Okada.

Age (year)	2007		2008		2009		2010		P
	No. of tested patients	No. of infected patients (%)	No. of tested patients	No. of infected patients (%)	No. of tested patients	No. of infected patients (%)	No. of tested patients	No. of infected patients (%)	
≤1-10	80	17 (21.2)	155	38 (24.5)	115	29 (25.2)	168	68 (40.4)	0.001
11-20	47	8 (17.0)	80	15 (18.8)	58	13 (22.4)	77	18 (23.4)	0.326
21-30	19	2 (10.5)	44	5 (10.6)	30	2 (6.6)	65	6 (24.6)	0.727
31-40	23	1 (4.3)	41	4 (9.7)	39	4 (10.2)	48	5 (10.4)	0.490
41-50	14	1 (7.1)	47	3 (6.3)	41	3 (7.3)	60	4 (6.7)	0.995
51-60	18	0 (0.0)	33	4 (12.1)	25	3 (12.0)	44	6 (13.6)	0.207
≥60	17	3 (17.6)	54	3 (5.6)	42	6 (14.3)	44	7 (15.9)	0.411

P=0.036 (2007); P<0.0001 (2008); P=0.007 (2009); P<0.0001 (2010).

Table 4. Yearly distribution of intestinal parasites in Okada.

Parasite	No. of infected patients (%)				
	2007	2008	2008	2009	2010
A. lumbricoides	21 (56.7)	46 (58.2)	33 (50.8)	62 (48.8)	162 (52.6)
Hookworm	5 (13.5)	10 (12.7)	11 (16.9)	22 (17.3)	48 (15.6)
E. vermicularis	2 (5.4)	3 (3.8)	1 (1.5)	3 (2.3)	9 (2.9)
S. stercoralis	0 (0.0)	2 (2.5)	1 (1.5)	3 (2.3)	6 (1.9)
S. japonicum	0 (0.0)	1 (1.3)	0 (0.0)	1(0.8)	2 (0.6)
E. histolytica	8 (21.6)	15 (18.9)	18 (27.7)	34 (26.8)	75 (24.4)
G. lamblia	1 (2.7)	2 (2.5)	1 (1.5)	2 (1.5)	6 (1.9)
Total	37 (12.0)	79 (25.6)	65 (21.1)	127 (41.2)	308 (0.1)

Table 5. Gender distribution of intestinal parasites in Okada.

Parasite	No. of infected patients (%)							
	2007		2008		2009		2010	
	M	F	M	F	M	F	M	F
A. lumbricoides	7 (58.3)	14 (56.0)	15 (48.4)	31 (64.6)	12 (37.5)	21 (63.6)	35 (49.3)	27 (48.2)
Hookworm	1 (8.3)	4 (16.0)	3 (9.6)	7 (14.5)	9 (28.1)	2 (6.1)	10 (14.1)	12 (21.9)
E. vermicularis	1 (8.3)	1 (4.0)	2 (6.5)	1 (2.1)	0 (0.0)	2 (6.1)	2 (2.8)	1 (1.8)
S. stercoralis	0 (0.0)	0 (0.0)	1 (3.2)	1 (2.1)	1 (3.1)	1 (3.0)	3 (4.2)	0 (0.0)
S. japonicum	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.8)
E. histolytica	3 (25.0)	5 (20.0)	8 (25.8)	7 (14.6)	9 (28.1)	9 (27.2)	21 (29.6)	13 (23.2)
G. lamblia	0 (0.0)	1 (4.0)	2 (6.5)	0 (0.0)	1 (3.1)	0 (0.0)	0 (0.0)	2 (3.6)

M, male; F, female.

to 40.4% in 2010. This represents increasing risk of acquiring intestinal parasitic infection for children of this age group living in study location. Children within this age group are likely to be involved in domestic chores of getting water for household use, and this increases exposure to water borne diseases. Also infants may consume food and water of poor hygienic quality, thus increasing their susceptibility to infection. These may explain the high prevalence of intestinal parasitic infections in the age group of <1-10 years. However this observation is not consistent with reports elsewhere.[5,10]

Ascaris lumbricoides was the most predominant parasitic agent generally and in all the years of study, followed by *Entamoeba histolytica*. This finding agrees with a previous report.[14] Poor socio-economic conditions are among the key factors linked with higher prevalence of ascariasis, as are poor defaecation practices, agricultural factors, housing style, and social class.[15] Residents of Okada and neighboring villages are mostly farmers, who may engage in agricultural practices that fuel the spread of *Ascaris lumbricoides* among the population. The finding that *Entamoeba histolytica* was higher among male participants, have been reported in an earlier study.[16] The reason for this however is unclear.

Conclusions

This study reports a high prevalence of intestinal parasitic infection in Okada rural community, which was observed to increase steadily from 2007 to 2010. Children between 1-10 years had the highest risk of being infected with intestinal parasites. Provision of essential social amenities such as housing and portable drinking water for the teeming population of Okada community by relevant agencies will help in curbing the spate of the disease. Regular screening and treatment of persons infected with intestinal parasites by local health authorities and other intervention agencies are also advocated. Increased public enlightenment on the need for the development of a culture of general environmental cleanliness and personal hygiene among residents of Okada community and environs will also help in stemming intestinal parasitic infections in the bud.

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