ORIGINAL ARTICLE

Intestinal parasitic infections among artisans in Benin city, Nigeria

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ABSTRACT

Context: Human intestinal parasites have always been a major health problem in the developing countries. This study was aimed at determining the prevalence of intestinal parasitic infections among artisans and establishes a relationship between the prevalence of intestinal parasitic infections and risk-factors. **Materials and Methods:** A total of 353 participants which consisted of 272 males and 81 females were recruited for this study with age ranging from 18 to 65 years. Stool specimens were collected from the participants and analysed using the standard technique. The data obtained were analysed using Chi-square (χ^2) to compare the frequency data while the odd ratio was calculated for potential risk factors. **Results:** Out of 353 subjects, 118 (33.4%) subjects had intestinal parasitic infections. Age, gender, marital status, occupation, educational status and source of food did not significantly affect (P = 0.219, P = 0.920, P = 0.276, P = 0.087, P = 0.074 and P = 0.442, respectively) the prevalence of intestinal parasitic infections. The use of well/rain water (odds ratio [OR] =2.721; 95% confidence interval [CI] = 1.452, 5.100; P = 0.002) and presence of diarrhoea (OR = 6.169; 95% CI = 3.665, 10.474; P < 0.0001) were significantly associated with intestinal parasitic infections among artisans. Defecating in nearby bushes resulted in a significantly increased prevalence of intestinal parasitic infections among artisans (P < 0.0001). The intestinal parasites recovered were *Ascaris lumbricoides*, hookworm, *Trichuris trichiura* and *Entamoeba histolytica*. *A. lumbricoides* had the highest prevalence (77.8%). The male gender had the highest prevalence in all the four intestinal parasites recovered in this study. **Conclusion:** Overall prevalence of 34.4% of intestinal parasitic infections was observed among artisans in Benin City. The source of water, type of toilet and presence of diarrhoea significantly affected the prevalence of intestinal parasitic infections among artisans. *A. lumbricoides* was the most prevalent parasitic agent recovered in this study.

Key Words: Artisans, Benin City, intestinal parasites

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INTRODUCTION

Human intestinal parasites have always been a major health problem in the developing countries.[1-3] Intestinal parasitic infections caused by pathogenic helminthic and protozoan species are endemic throughout the world.[4] These infections are responsible for misery, starvation and often mortality in man.[5]

Infection 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.[6-8] Parasitic diseases create morbidity and sometimes mortality. Estimates of these parasitic diseases thus become a matter of necessity for the surveillance of public health, proper health-care delivery and people's welfare.[9] In sub-Saharan African Countries, up to 250 million people are estimated to be infected with at least one or more species of intestinal nematodes.[10] Intestinal parasitic infections are common in Nigeria

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as in other developing countries and are responsible for malnutrition, susceptibility to other infections, anaemia and a number of acute complications such as intestinal obstruction, appendicitis and peritonitis.[11,12]

A number of studies have reported on the prevalence of intestinal parasites in human immunodeficiency virus (HIV) infected patients[13] as well as non-HIV infected persons[14,15] in Benin City.

Artisans are skilled manual workers who make items that may be functional or strictly decorative, including furniture, sculpture, clothing, jewellery, workers on building sites, household items and tools or even machines such as car repairer and watchmaker. Artisans are more likely to eat food and drink water from questionable sources as they carry out their work. They are also likely to have poor hygiene standards, which may result in parasitic, bacterial and other infections. There is a dearth of information on the prevalence of intestinal parasitic infections among artisans in Benin City. Against this background, this study aimed at determining the prevalence of intestinal parasitic infections among artisans and establishes a relationship between the prevalence of intestinal parasitic infections and risk factors in this study.

MATERIALS AND METHODS

Study area

The study area was located in the Midwestern part of Nigeria. Benin City is an ancient city and serves as the capital city of Edo State. The City alone is made up of three local government areas (LGA) namely-Oredo, Ikpoba-Okha and Egor LGAs. It is located within the low rain forest zone of Nigeria and has two seasons, dry and wet. The dry season lasts from mid-October to March or April while the raining season lasts from April to September. The study was conducted in the Benin City metropolis. Benin City has a population of about 762,719.[16]

Study population

A total of 353 participants which consisted of 272 males and 81 females were recruited for this study at different locations of the city. The age of the study participants ranged from 10 to 65 years. Informed consent was obtained from each participant or their parents/guardians in case of children prior to specimen collection. The protocol for this study was approved by the Ethical Committee of the College of Medical Sciences, University of Benin, Benin City, Edo State.

Specimen collection and processing

Stool specimen was obtained from each participant. The stool specimen was collected in clean wide-mouthed universal container. Direct examination of stool specimen in saline and iodine was carried out for motile parasites. Following this, the stool specimens were processed using the formol-ether concentration method and examined microscopically for intestinal parasites as previously described.[14] Briefly, about 1 g of faeces was emulsified in 4 ml of formol saline and mixed. The mixture was sieved and to the filtrate, 4 ml of diethyl ether was added and mixed. The mixture was centrifuged at 3,000 rpm for 1 min. The faecal debris on the side of the tube was detached using an applicator and the supernatant discarded. From the deposit, saline and iodine mounts were prepared and examined for the presence of parasites.

Data analysis

The data obtained were analysed using Chi-square (χ^2) to compare the frequency data while odd ratio was calculated for potential risk factors. The software INSTAT (GraphPad Software Inc., La Jolla, CA, USA) was used for all statistical analyses.

RESULTS

A total of 118 (33.4%) out of 353 subjects had intestinal parasitic infections. Age and gender did not significantly affect the prevalence of parasitic infections among artisans (P = 0.219 and P = 0.920 respectively). Similarly, marital status (P = 0.276), occupation (P = 0.087), educational status (P = 0.074) and source of food (P = 0.442) did not significantly affect the prevalence of intestinal parasitic infections. However, the use of well/rain water (Odds ratio [OR] = 2.721 95% confidence interval [CI] = 1.452, 5.100; P = 0.002) and presence of diarrhoea (OR = 6.169 95% CI = 3.665, 10.474; P < 0.0001) were significantly associated with intestinal parasitic infections among artisans. Defecating in nearby bushes resulted in a significantly increased prevalence of intestinal parasitic infections among artisans [P < 0.0001; Table 1].

In this study, the intestinal parasites recovered were *Ascaris lumbricoides*, hookworm, *Trichuris trichiura* and *Entamoeba histolytica*. *A. lumbricoides* had the highest prevalence (77.8%), followed by hookworm (15.1%), *T. trichiura* (5.6%) and *E. histolytica* (1.6%) [Table 2].

DISCUSSION

Intestinal parasites constitute some of the most common and important parasites of man and they are regarded as an important public health problem in tropical Africa.[17] In spite of the prevalence of many risk factors predisposing people to

Table 1: Effects of risk factors on the prevalence of intestinal parasitic infections in artisans

Characteristic	No. tested	No. with infection (%)	OR	95% CI	*P* value
Sex					
Male	272	96 (35.3)	1.463	0.845, 2.534	0.2195
Female	81	22 (27.2)			
Age (years)					
10-20	40	13 (30.5)			0.9209
21-30	157	54 (34.4)			
31-40	85	26 (30.6)			
41-above	71	25 (35.1)			
Marital status					
Single	126	37 (29.4)	0.749	0.4684, 1.199	0.2767
Married	227	81 (35.7)			
Occupation					
Welder	25	10 (40.0)			0.0878
Tailor	47	10 (21.3)			
Carpenter	48	12 (25.0)			
Bricklayer	59	28 (47.5)			
Vulcaniser	29	11 (19.6)			
Saloonisit	56	17 (30.4)			
Automobile repairer	57	19 (33.3)			
Electrician	32	11 (34.4)			
Educational status					
None	15	9 (60.0)			0.0741
Primary	81	30 (3.7)			
Secondary	238	75 (31.5)			
Tertiary	19	4 (21.1)			
Source of food					
Food vendor	268	93 (34.7)	1.275	0.751, 2.167	0.4420
Homemade food	85	25 (29.4)			
Source of water					
Well/rain water	276	104 (37.7)	2.721	1.452, 5.100	0.0021*
Borehole	77	14 (18.2)			
Type of toilet					
Water cistern	146	30 (20.6)			<0.0001*
Pit	201	85 (42.3)			
Bush	6	3 (50.0)			
Diarrhoea					
Diarrhoea	189	95 (50.3)	6.196	3.665, 10.474	<0.0001*
Without diarrhoea	164	23 (14.0)			

*P<0.05, OR: Odds ratio, CI: Confidence interval

Table 2: Prevalence of intestinal parasitic infections among artisans in Benin City

Parasite	No. of infected	Percentage
Ascaris lumbricoides	98	77.8
Hookworm	19	15.1
Trichuris trichiura	7	5.6
Entamoeba histolytica	2	1.6
Total	126	

intestinal parasitic agents, unfortunately, there is paucity of data on intestinal parasitic infections among artisans hence, the reason for comparing with other population. To the best of our knowledge, this is the first study to report intestinal parasitic infections among artisans in Benin City. An overall prevalence of 33.4% of intestinal parasitic infections in artisans was observed in our study. This prevalence is similar to previous reports that observed 30.6%[18] and 41.0%[14] in a mining area in Ishiagu, Abia State and tertiary hospital in Benin City. The prevalence in this study is however, higher than that previously reported 3.9% among patients of a tertiary hospital in Benin City, Nigeria.[15] The difference in the prevalence may be due to the type of subjects used. In this study, apparently healthy individuals were used while other studies used in and out patients in a tertiary hospital[15] or location with varied sanitary habits.[19]

Gender did not significantly associate with the prevalence of intestinal parasitic infections among artisans. This finding is consistent with previous studies in a tertiary hospital in Benin City, Nigeria.[15] In our study, age did not show any correlation with the prevalence of intestinal parasitic infections. This finding is inconsistent with previous report of Nwaneri and Omuemu[13] in Benin City, Nigeria. The reason for the difference in this finding may be due to the type of subjects used, where children from orphanage homes were used by Nwaneri and Omuemu[13] while our subjects were both children and adults. Despite the fact that married subjects had a prevalence of 35.7%, this did not significantly affect the prevalence of intestinal parasitic infections among artisans. In this study, the prevalence of intestinal parasitic infections was not associated with marital status.

Type of Artisans and educational status did not significantly affect the prevalence of intestinal parasitic infections among artisans in our study.

Artisans are known to eat food and drink water from questionable sources as they carry out their work. In this study, source of food did not significantly associate with the prevalence of intestinal parasitic infections. The reason behind this finding is unclear.

The prevalence of intestinal parasitic infections was associated with source of water and artisans that use well/rain water as source of water appear to have 2-5-fold increased risk of acquiring intestinal parasitic infections. This finding is consistent with previous report by Ogbuagu *et al*.[20] that observed high prevalence of intestinal parasitic infections among subjects that use well/rain water (41.3%, 38.2%) as source of water in Nnewi, Nigeria. Poor hygiene practices amongst the people such as dropping the bucket which is used in taking water from the well on the floor, where it may get contaminated thus, helping in getting the water from the well contaminated. This may explain the findings in this present study.

Type of toilet significantly affected the prevalence of intestinal parasitic infections with subject's defaecating in bushes having the highest prevalence of 50%.

Diarrhoea was observed to be significantly associated with the prevalence of intestinal parasitic infections among artisans in our study. The type of fruits consumed did not significantly affect the prevalence of intestinal parasitic infections. This may be due to the fact that the processes of cultivation, processing to consumption of the different fruits are basically the same.

The intestinal parasites recovered from artisans in our study were *A. lumbricoides*, hookworm, *T. trichiura* and *E. histolytica*. Similar parasites were reported in previous study among patients in a tertiary hospital in Benin City.[15] *A. lumbricoides* was the most prevalent (77.8%) of all the intestinal parasites recovered. The finding of *A. lumbricoides* as the most prevalent parasite in our study is consistent with previous reports in a mining area and tertiary hospitals in Nigeria.[15,17,18]

In this study, the male gender had the highest prevalence in all the four intestinal parasites recovered. The finding that *E. histolytica* and *T. trichiura* were not recovered from our female subjects is surprising as a previous study from Benin City (though among patients in a tertiary hospital) observed both parasites in female gender.[15]

CONCLUSION

An overall prevalence of 34.4% of intestinal parasitic infections was observed among artisans in Benin City. The source of water, type of toilet and presence of diarrhoea significantly affected the prevalence of intestinal parasitic infections among artisans. *A. lumbricoides* was the most prevalent parasitic agent. Measures to reduce the prevalence of parasitic infections among artisans are advocated.

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