

# Incidence of Gastrointestinal Parasites among Workers in Major Abattoirs in Port Harcourt, Rivers State, Nigeria

L. B. Gboeloh, K. Elele

**Abstract**—Gastrointestinal parasitic infections are common health problems in sub-Saharan Africa. A cross-sectional study was carried out to determine the prevalence of gastrointestinal parasites among workers in major abattoirs in Port Harcourt, Nigeria. These abattoirs are located in Trans-Amadi, Rumuodumaya, Mile III and Easter-by-Pass. Formol-ether concentration technique was used to isolate the ova and cysts from faecal samples. Out of 201 workers (herdsmen, butchers, and cleaners) investigated for the presence of these parasites, 89 (44.2%) were infected with one or more parasites. The prevalence of the parasites among herdsmen and cleaners was significantly ( $P < 0.05$ ) higher. However, there was no significant ( $P > 0.05$ ) difference in the prevalence of gastrointestinal parasites in relation to age. Parasites identified included *Ascaris lumbricoide* (33.3%), tapeworm (4.97%), *Entamoeba histolytica* (5.47%), hookworms (13.9%), *Trichuris trichiura* (9.95%), *Giardia lamblia* (3.48%), and *Schistosoma mansoni* (1.9%). The frequency of *A. lumbricoide* was significantly ( $P < 0.05$ ) higher than other parasites. Many workers (65.2%) had single infection than double (23.6%) and triple infection (11.2%). Sanitary improvements, increased level of personal hygiene, routine surveillance by public health practitioners and veterinary experts as well as hygienic operation using modern technologies to process meat at these abattoirs will go a long way to control occupational gastrointestinal parasites among workers.

**Keywords**—Abattoirs, Gastrointestinal parasites, Port Harcourt, Workers.

## I. INTRODUCTION

GASTROINTESTINAL parasitic infections exist throughout the world and remain a serious public health concern especially in Sub-Saharan Africa. These infections are caused by three types of parasites, tapeworms, nematodes and protozoa. Some of these parasites may remain in the intestine while others travel outside the intestines to invade other organs [1]. In develop countries, protozoa parasites caused most gastrointestinal infections compared to tapeworms and nematodes [2]. It is estimated that 3.5 billion people worldwide are infected while 450 million of them are sick as a result of gastrointestinal infections, children being the most frequently infected [1].

Although the prevalence of these infections and degree of factors predisposing to the infection vary from one region to another [3], majority of these infections results from low

standard of living associated with poverty and poor sanitation [4], favourable climate and environmental condition [5], [6], poor healthcare services [7] and lack of adequate and proper awareness of the transmission mechanisms and life cycle patterns of these parasites [8], [9].

These epidemiological factors are readily available in sub-Saharan Africa, specifically in Nigeria where up to 15% of host population harbors 70% of the worm population and serve as major source of environmental contamination [10]. The situation is exacerbated by the unhygienic operation of most abattoirs in Nigeria [11]. Previous studies on the prevalence of intestinal parasites in some Nigerian communities identified hookworms, *Trichuris trichiura*, *Ascaris lumbricoide*, *Giardia lamblia*, *Strongyloides stercoralis*, and *Entamoeba histolytica* as common intestinal parasites prevalence in the country [12]–[14].

Abattoir workers in Nigeria are constantly exposed to this unhygienic working environment and gastrointestinal parasites. The present study therefore sought to assess the prevalence of gastrointestinal parasites among workers in major abattoirs in Port Harcourt, South-South, Nigeria.

## II. MATERIALS AND METHODS

### A. Study Area

The study was conducted in major abattoirs in Port Harcourt, South-South, Nigeria. These abattoirs are located in Trans-Amadi, Rumuodumaya, Mile III and Easter-by-Pass. An average of eighty cattle is slaughtered per day in each of these abattoirs with an average work force of 100 workers per abattoir. The workers included herdsmen, butchers and cleaners. Port Harcourt is the capital of Rivers State, Nigeria.

Port Harcourt lies between latitude  $4^{\circ}40'$  and latitude  $7^{\circ}10'$  to longitude  $7^{\circ}55'$  of Greenwich meridian. It enjoys the tropical monsoon climate characterized by high temperature, low pressure and high humidity all year round. It has a mean temperature of  $30^{\circ}$  ( $86^{\circ}\text{F}$ ) and a relative humidity of between 80% and 100% and a mean annual rainfall of 2,300mm [15].

### B. Questionnaire

Structure questionnaires were prepared and administered to obtain information on age, sex, level of education and work specialization.

### C. Sampling Technique

Well labeled sterile plastic bottles containing 10% formalin were distributed to workers who consented to the study for

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collection of faecal samples. At the time of collection, date of sampling, the name of the participant, age, sex and consistency of the stool (formed, soft, semi-soft and watery) were recorded for each subject on a recording format. About 1g portion of the preserved stool sample was processed by formol-ether concentration method as described by [16]. About 1g of the faeces was emulsified in 4ml of 10% formol water and mix properly. It was sieved with cotton gauze and transferred to centrifuge tube after the addition of further 4ml of formol water. Then 3ml of diethyl ether was added, mixed properly, corked with cotton wool and centrifuged for 1 min at 3000 rpm. The supernatant was discarded and the sediments were transferred to microscopic slides and observed under light microscope at 100× and 400× magnifications for the presence of cysts and ova of the parasites.

#### D. Data Analysis

Data analysis was performed using SPSS software, version 18.0 and Chi-square used to determine the relationship between prevalence and independent variables at statistical significant of  $p < 0.05$ .

### III. RESULTS

A total of 201 abattoir workers were investigated for the presence of gastrointestinal parasites, out of which 89(44.2%) were infected with one or more of the gastrointestinal parasites (Table I). This result was statistically significant ( $p < 0.05$ ).

A total of 147 worms were recovered from the faecal samples and identified. The parasites identified were *Ascaris lumbricoide* (45.6%), tapeworm (6.87%), *Entamoeba histolytica* (7.5%), hookworms (19.0%), *Trichuris trichiura* (13.6%), *Gardia lamblia* (4.8%), and *Schistosoma mansoni* (2.7%). *A. lumbricoide* was the most prevalent parasite (45.6%) amongst the workers in all the abattoirs, followed by hookworms (*N. americanus* + *A. deudenales*) (19.0%) while *S. mansoni* showed the least prevalence (2.7%) (Table II).

Out of the 89 infected persons, 58 (65.2%), 21 (23.6%), and 10 (11.2%) had single, double and triple infection respectively (Table III).

Table IV indicated that infection rate was highest among herdsmen (47.2%), followed by cleaners (33.3%) while butchers showed the least prevalence (19.1%) of infection with gastrointestinal parasites. The difference in prevalence in relation to work specialization was found to be statistically significant ( $p < 0.05$ ).

### IV. DISCUSSION

Gastrointestinal parasites are common and neglected public health problem in Nigeria. The high prevalence (44.2%) of these parasites recorded among abattoir workers in the study area is slightly lower than the 55.5% reported among abattoir workers in Abeokuta, south-west Nigeria [10] and the 51.7% recorded in a rural district of west China [17]. The 44.2% recorded in the present study is also lower than the 65.2% recorded among primary school children in Khana Local Government Area, Rivers State, Nigeria [13] but higher than

the 38.62% reported in a Nigerian tertiary health institution [18].

TABLE I  
PREVALENCE OF GASTROINTESTINAL PARASITES AMONG WORKERS IN MAJOR ABBATTOIRS IN PORT HARCOURT

Abattoir	No. Examined	No. infected (%)
Trans-Amadi	96	39 (43.8)
Rumuodomaya	42	22(24.7)
Eastern-by-Pass	33	17(19.1)
Mile III	30	11 (12.4)
TOTAL	201	89(44.2)

TABLE II  
PREVALENCE OF GASTROINTESTINAL PARASITES AMONG WORKERS IN MAJOR ABBATTOIRS IN PORT HARCOURT IN RELATION TO TYPES OF PARASITES

Parasites Identified	Prevalence (%)
<i>A. lumbricoide</i>	67 (45.6)
<i>N. americanus</i> + <i>A. deudenale</i> (Hookworms)	28 (19.0)
<i>T. Trichiura</i>	20 (13.6)
<i>Taenia sp.</i>	10 (6.8)
<i>E. histolyti</i>	11 (7.5)
<i>G. lamblia</i>	7 (4.8)
<i>S. mansoni</i>	4 (2.7)

TABLE III  
PREVALENCE OF GASTROINTESTINAL PARASITES AMONG WORKERS IN MAJOR ABBATTOIRS IN PORT HARCOURT IN RELATION TO FREQUENCY OF INFECTION

Single infection (%)	Double infection (%)	Triple (%)
58(65.2)	21(23.6)	10(11.2)

TABLE IV  
PREVALENCE OF GASTROINTESTINAL PARASITES AMONG WORKERS IN MAJOR ABBATTOIRS IN PORT HARCOURT IN RELATION TO WORK SPECIALIZATION

Work specialization	No. Examined	No. infected (%)
Butchers	98	42 (47.2)
Herbsmen	58	30 (33.7)
Cleaners	45	17(19.1)
	201	98(44.2)

TABLE V  
PREVALENCE OF GASTROINTESTINAL PARASITES AMONG WORKERS IN MAJOR ABBATTOIRS IN PORT HARCOURT IN RELATION TO AGE OF WORKERS

Age(yr)	No. Examined	No. infected (%)
15-25	68	32 (36.0)
26-35	52	42 (28.1)
36-45	47	26 (23.6)
46-Above	40	18 (12.3)
	201	98(44.2)

The statistically significant ( $P < 0.05$ ) prevalence of gastrointestinal parasites among abattoir workers recorded in the present study could be attributed to their frequent contact with cattle (products and waste) and poor sanitary condition of the abattoirs [10].

Although several gastrointestinal parasites were identified in the faecal samples of the abattoir workers, the frequency of *Ascaris lumbricoide* was significantly higher ( $P < 0.05$ ) compared to other gastrointestinal parasites. This observation differed from previous studies in which *Entamoeba histolytica* was the most prevalent parasite [14], [18]. The result however

agreed with other studies in which *A. lumbricoide* had the highest prevalence [5], [7], [10], [13], [19]. This could be attributed to the adherent and protective nature of the eggs of *A. lumbricoide*. The eggs are coated with a mucopolysaccharide that makes them to be adhesive to a wide range of surfaces [6]. The well protected eggs can withstand desiccation and survive for a long period in the soil in extreme environment [10], [20].

The mix infection observed in the present study could be as a result of unhygienic operation in abattoirs in Nigeria [11], poor personal hygiene and low sanitary standard [13] and other epidemiological factors such as high humidity that encourage the striving and transmission of the parasites.

The study also indicated a statistical significant ( $P < 0.05$ ) prevalence of gastrointestinal parasites among herdsmen (47.2%) and cleaners (33.7%). This trend could be attributed to the long period of contact between cattle (product and waste) and these categories of workers.

There was however no significant difference in the prevalence of gastrointestinal parasites among the workers in relation to age. This could be attributed to the fact that members of the study population were all adult. According to [21], intestinal parasites are dependent on age and severity of the infection is found in the younger children aged >10 years.

#### V. CONCLUSION

The study revealed that gastrointestinal parasites remain a major public health problem in the study area. Abattoir workers exposed to regular contact with animal products and waste such as faeces and urine including vomit is at risk of gastrointestinal parasitic infection. The study demonstrated that the high prevalence of gastrointestinal parasites observed among the study population is related to their occupation.

Sanitary improvements, increased level of personal hygiene, routine surveillance by public health practitioners and veterinary experts as well as hygienic operation using modern technologies to process meat at these abattoirs will go a long way to control occupational gastrointestinal parasites among workers.

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#### REFERENCES

- [1] WHO, Public health significance of intestinal parasitic infections. *WHO Bulletin*, Volume 65(5), 1987
- [2] H. Rahidul, Human intestinal parasites. *Journal of Health Population and Nutrition*, 25 (4), 2007, 387-391.
- [3] L. Adekunle, Intestinal Parasites and Nutritional Status of Nigerian Children. *African Journal of Biomedical Research*, 5, 2002, 115-119.
- [4] V. Oguama and C. Ekwunife, The need for a better method: Comparison of Direct and Formol-ether concentration techniques in diagnosis of intestinal parasites. *The Internet Journal of Tropical Medicine*, 3(2), 2006
- [5] A. Alli, A.F. Kolade, I.O. Okonko, J.C. Nwanze, V.K. Dada, M. Ogundele and A.J. Oyewo, Prevalence of intestinal nematode infection among pregnant women attending antenatal clinic at the University College Hospital, Ibadan, Nigeria. *Advances in Applied Science*, 2(4), 2011, 1-13.
- [6] B.A. Awolaju and O.A. Morenikeji, Prevalence and intensity of intestinal parasites in five communities in South-western Nigeria. *African Journal of Biotechnology*, 8(18), 2009, 4542-4546.
- [7] O.A. Adeyeba and A. M. Akinlabi, Intestinal parasitic infections among school children in a rural community, South West Nigeria. *Nigeria Journal of Parasitology*, 23, 2002, 11-18.
- [8] A. Monstessor, D.W.T. Crumpton, D.A. Dundy, P. Hall and C. Saviola, Guidelines for the evaluation of soil transmitted Hemithiasis and Schistosiasis at Community Level. A guide for managers of control programmes, *World Health Organization*, Geneva. 1998.
- [9] J. I. Mbanugo, and C.J. Onyebuchi, Prevalence of Intestinal Parasites in Ezinifite Community in Aguata LGA of Anambra State. *Nigerian Journal of Parasitology*, 23, 2002, 27-34.
- [10] T.A. Banjo, A.O.J. Amoo, A. Busari, A.C. Kama, I.A. Lawal, O.A. Ogundahunsi, W.E. Olooto, O.B. Familoni, A.A. Onilude, W.B. Mutiu, K.A. Oyeleere, and G. kama, Intestinal parasites among abattoir workers in Abeokuta. *American Journal of Research Communication*, 1(10), 2013, 84-96.
- [11] O.K. Adeyemo, Unhygienic operation of a city abattoir in South western Nigeria: Environmental implication, *AJEAM*, 4(1), 2002, 23-28.
- [12] P.I. Agi, Comparative infections in two rural communities in then Niger Delta, Nigeria. *West African Journal of Medicine*, 16(4), 1997. 232-236.
- [13] L.B. Gboeloh and O.A. Wokoma, Prevalence of intestinal helminths among primary school children in Khana Local Government Area of Rivers State, Nigeria. *Journal of Nigerian Environmental Society*, 5(2), 2009, 66-75.
- [14] N. Ogbuagu, C.I. Eneanya, C. Chukwuma, E. N. Obuagu and V.M. Oguama, High Prevalence of Intestinal parasites in a Nigerian Tertiary Health Institution. *The Internet Journal of Parasitic Diseases*, 4(2), 2009.
- [15] P. C. Mmom, *The Niger Delta: A Spatial Perspective to its Development*. (Port Harcourt: Zelon Enterprises, 2003, 23-45.
- [16] M. Cheesbrough, (). *District Laboratory Practice in Tropical Countries*, Second Edition, (London: Cambridge University Press, 2005), 198-199.
- [17] N. Tang and N.J. Luo, A cross-sectional study of intestinal parasitic infections in a rural district of West China. *Canadian Journal of Infectious Disease*, 14(3), 2003, 159-162.
- [18] V. M. Oguama, A. E. Anyasodor, and T.I. Mbata, Prevalence of protozoa parasites among children aged 5-12 years in Owerri Metropolis South Eastern Nigeria. *Tropical Journal of Health Science*, 15(2), 2008, 43-48.
- [19] O.M. Agbolade, D.O. Akinboye, and A. Awolaja, Intestinal helminthiasis and urinary schistosomiasis in some villages of Ijebu North, Ogun State, Nigeria. *African journal of Biotechnology*, 3(3), 2004, 206-209.
- [20] R.M. Mordi and P.O.A. Ngwodo, A study of blood and gastro-intestinal parasites in Edo State. *African Journal of Biotechnology*, 6(19), 2007, 2201-2207.
- [21] WHO, Prevalence and control of intestinal parasitic infections. *WHO Technical Report Series Number 749-783*, 1987.