

INTESTINAL PARASITES AMONG ABATTOIR WORKERS IN ABEOKUTA

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ABSTRACT

Intestinal parasitic infections among abattoir workers (AWs), particularly in the developing countries, are under reported despite the possible occupationally-acquired health risks, hence this study investigates the distributions of intestinal parasites with respect to age, gender, job specializations, human-animal and working environmental-contact-hours of abattoir workers.

Stool samples obtained from 122 abattoir workers and 98 control populations in Abeokuta, whose age ranged between 17 and 81 years, were investigated for intestinal parasitism. A structured questionnaire was administered to obtain demographic data. Standard laboratory procedures for parasitological diagnosis of intestinal helminthes and protozoa were carried out using direct normal saline and formo-ether methods. Statistical analysis of data obtained was processed using (Chi-square) SPSS – version 15.

Cysts of *E. histolytica* & *B. Coli*; Ova of *Ascaris lumbricodes* (41.7%); Hookworm, *Trichurus trichuria*, Tapeworm (4.5%) and the Ova of *Schistosoma mansoni* (11%) were isolated in the stool samples of abattoir workers while Ovas of three helminthes (*Ascaris lumbricodes*, Hookworm, and *Trichurus*

trichuria) were isolated from the control population. Intestinal parasites were significantly higher in abattoir workers compared to the control ($\chi^2=4.23$; $p<0.05$) and more in the males than the females. Helminthiasis increased with job specializations and exposure of abattoir workers to unhygienic working environment ($X^2= 7.95$; $p<0.05$).

Occupationally acquired intestinal parasitic infections/hazards could be averted by possible combination of good environmental design and hygiene. And observation of personal hygiene as well as routine medical examination and treatment are strongly recommended in the abattoir.

Keywords: abattoir, Intestinal parasites, workers, hygiene

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1. INTRODUCTION

Intestinal parasitic diseases remain a stern public health problem in many developing countries particularly due to fecal contamination of water and food (Jimenez-Gonzalez et al., 2009; Odu et al., 2011), favourable climatic, environmental and sociocultural factors enhancing parasitic transmissions (Obiamiwe and Nmorsi, 1990; Mordi and Ngwodo, 2007; Alli et al., 2011)

Intestinal parasites continued to pose more public health problems in resource poor countries including Nigeria compared to developed countries where there is superior technological edge; increased personal hygiene and improved medical facilities according to Olasupo *et al* 1999; Moro *et al* 2000 and Iwalokun *et al* 2001. This is typical of most tropical and subtropical regions of the world where up to 15% of host population harbor approximately 70% of the worm population and serve as major source of environmental contamination.

The common parasites encountered in most of the previous scientific investigations include *Ascaris lumbricoides*, hookworms (*Necator americanus* and *Acyostoma deodenale*), *Trichuris trichiura*, *Strongyloides stercoralis*, *Entamoeba histolytica*, and *Giardia lamblia* (Agi, 1997; Nikolic et al., 1998) and these are dependent on poverty, poor personal hygiene, poor environmental care, poor health services, and lack of adequate and proper awareness of the transmission mechanisms and life-cycle patterns of these parasites (Montessor et al., 1998; Adeyeba and Akinlabi, 2002; Mbanugo, 2002). In a setting where comprehensive laboratory diagnostic facilities are lacking and/or in short supply, this present study seeks to assess the burden and types of intestinal parasites among abattoir workers in relation to the associated risk factors.

2. MATERIALS AND METHODS

The abattoir located in Lafenwa, Abeokuta edges a major river which supports various activities of 122 abattoir workers (AWs) engaged as herdsmen, butchers (slaughtering, processing animals & meat sellers) and cleaners with 98 residents in the neighborhoods (control). All of them had their informed consents sought, obtained and participated in the study which spanned through May, 2009 to July, 2010. This followed ethical approval obtained from the state hospital management ethical committee. The participants' ages ranged between 14 and 81 years. Structures questionnaires in language(s) each individual best understood were administered in order to obtain leading demographic data; stool samples were obtained from each of the study participants in appropriate code-labeled sterile plastic universal specimen containers, followed by standard laboratory procedures for parasitic isolation, morphological analysis, formal-ether concentration method for qualitative parasite detection (Cheesborough, 2006). Statistical analysis of data obtained were processed using (Chi-square) SPSS – version 15 software.

2.1 PARASITOLOGICAL PROCEDURE

Parasitological diagnosis of the intestinal helminthes and protozoa were carried out using direct normal saline method and formol-ether concentration techniques on the stool samples collected from each of the studied participants.

2.2 DIRECT NORMAL SALINE METHOD

Physiological saline was placed on dew end of a slide unto which a small amount of faeces was mixed with the aid of a sterile wire loop. The smooth thin preparation was covered using a cover-slip glass and examined systematically for larva, helminth eggs, cyst and the oocysts at magnification x 10 and x 40 objectives.

2.3 FORMOL-ETHER CONCENTRATION METHOD

Stool samples were analysed by formol-ether concentration technique as described by Cheesbrough (2006) was employed in this study. The process involved emulsifying about one gram (1g) of faeces with an applicator stick in each test tube containing 7ml of formalin solution (it was well mixed). And 3ml of ether was then added and mixed properly after which the tubes were corked with cotton wool and shook vigorously in an inverted position and the stopper is removed with care. Each prepared sample in test tubes were balanced in the centrifuge and centrifuged at 1500 r.p.m for 5 minutes. At the end of centrifugation, the next layer were observed in the test tube: ether at the top (colourless clear liquid); a plug of debris (dark coloured thick); formal solution (a colourful liquid with suspended debris) and a sediment (solid deposit at the bottom of tubes). The plug of debris was then removed from sides of the tube with an applicator stick. The first three layers were decanted down the sediment with a few drops allowed to drain back from the sides of the tube. A cotton swab was used to remove any debris adhering to the sides of the tube. The remaining sediments and the fluid that drained back were mixed properly by flicking the test tube subsequent to which a smear preparation was made using a drop of iodine solution on a slide.

3. RESULTS

122 abattoir workers out of the 220 studied individuals (averagely educated) were engaged in various daily activities categorized as herdsmen, butchers, and cleaners. There were 33 (27%) females and 89 (73%) male abattoir workers in all; out of which 41(33.6%) claimed to attend routine medi-care while 81(66.4%) hardly visited any health facility. Cysts of *E. histolytica* & *B. Coli*; Ova of *Ascaris lumbricodes*, Hookworm, *Trichurus trichuria*, Tapeworm and the Ova of *Schistosoma mansoni* were isolated in the stool samples of abattoir workers while Ovas of three helminthes (*Ascaris lumbricodes*, Hookworm, and *Trichurus trichuria*) were isolated from the control population.

There was a remarkable difference in the intestinal helminthes isolated from the stool samples of abattoir workers and control($\chi^2=4.23$; $p<0.05$) as shown in table 1. However, among the abattoir workers, there was no significant difference in gender distributions of helminthes as 34.8% males and 39.4% females were positive ($X^2=0.22$; $p>0.05$). Also, there was no significant difference in the age distribution ($X^2=0.58$; $p>0.05$) as about 37.7% of infection was recorded in age group 21 – 40 years; 35.9% in ages 21 – 60 years and 20% distribution in 61 – 80 years; but the patterns of helminthiasis and job specializations among abattoir workers($X^2= 7.95$; $p<0.05$)was significant. It was highest (64.7%) among Herdsmen, moderate in 41.6% cleaners and least (29.6%) among the butchers (least) (table 2).

Furthermore, a significant difference in the distribution of helminthes with respect to daily working hours ($X^2= 11.39$; $P <0.05$) was recorded in table 3. It was 46.3% in “less than one to six hours” and 15% in “over seven hours”. Although intestinal parasites were higher among (30.4%) workers living in a room apartment as compared to 29.3% residing in flats but there was no significant difference ($X^2 = 0.11$; $P >0.05$)in parasitism and types of residence.

Table 1: Intestinal Parasites from Stool samples of Abattoir workers & Controls

Intestinal Parasites	Abattoir workers	Controls
	n (%)	n (%)
Cyst of <i>E. histolytica</i>	4 (9.1%)	0 (0%)
Cyst of <i>B. Coli</i>	4 (9.1%)	0 (0%)
Ova of <i>Ascaris lumbricodes</i>	21(41.7%)	8 (8.2%)
Ova of Hookworm	4 (9.1%)	1 (1.0%)
Ova of <i>Trichurus tridusira</i>	7 (15.9%)	3 (3.1%)
Ova of Tapeworm	2 (4.5%)	0 (0%)
Ova of <i>schistosoma mansoni</i>	2 (4.5%)	0 (%)
Negatives	78 (63.9%)	86 (87%)
Total	122(100%)	98(100%)

($X^2=4.23$; $p<0.05$)

Table 2: Distribution of intestinal parasites and job specialization

Intestinal parasites	<u>Type of occupation</u>			Total
	Butchers	Cleaners	Herdsman	
	n (%)	n (%)	n (%)	
Positive	26 (29.6)	7(41.2)	11(64.7)	44
Negative	62 (70.4)	10(58.8)	17(35.3)	78
Total	88(100.0)	17 (100.0)	27(100)	122

($X^2= 7.95$; $p<0.05$)

TABLE 3: Distribution of intestinal parasites by the working period (Day/Week)

Intestinal parasites	<u>Working period (days/week)</u>		Total
	1 – 6 n (%)	≥ 7 n (%)	
Positive	38(46.3)	6(15.0)	44
Negative	44(53.7)	34(85.0)	78
Total	82(100.0)	40 (100.0)	122

($X^2=11.39$; $p<0.05$)

4. DISCUSSION

The prevalence of helminthes isolated from the stool samples of abattoir workers and the control population clearly indicated the acquisition of these parasites among abattoir workers from the frequent human/animal contacts; peculiar conditions of the working environments, as highly pronounced among the herdsmen and cleaners. Increased prevalence of helminthiasis among abattoir workers compared to the control population could be attributed to their low attendance to routine health-care facilities, increased contact-hour with animal products/wastes and polluted environments, hence the faeco-oral route of infection which had no effect on age and the type of accommodation. However, more males were affected with intestinal parasites than females. The results reported by Adeyeba and Akinlabi (2002) and Baldo et al. (2004) also showed that infection rates for intestinal parasites were higher in males than females. This is also in agreement with the findings of Okonko et al. (2009) who reported that gastro-intestinal parasite infections from 2002 to 2004 were significantly higher in males than females ($p <$

0.05). But, Agbolade et al. (2004), Mafiana et al. (1998) and Taiwo and Agbolade (2000) showed from their results that helminthic infections were not sex dependent. However, the incidence and severity of intestinal parasitism may vary depending on the location and period of time (Sethi et al., 2000).

The Ova of *Ascaris lumbricoides* (41.7%) were highly prevalent while Tapeworm (4.5%), and *Schistosoma haematobium* (4.5%) were least among the abattoir workers but all these were most common among the herdsmen and cleaners. Workers who engaged in at least six hours/day were highly exposed to helminthes load compared to those that offers to work over seven hours daily.

The highest prevalence of (41.7%) *Ascaris lumbricoides* reported in this study established previous reports of Adeyeba and Akinlabi (2002), Agbolade et al. (2004) and Alli et al. (2011) Also, according to Okolie et al. (2008); Okonko et al.(2009) and Alli et al.(2011). *A. lumbricoides* were reported to be mostly predominant in their studies. Infection by *Ascaris lumbricoides* spreads through eggs, which are swallowed as a result of ingestion of contaminated soil or contact between the mouth and the various objects carrying the adherent eggs. These eggs are passed unaltered through the intestine of coprophagous animals. The well-protected eggs can easily withstand drying and can also survive for very lengthy periods. Soil pollution is thus a major factor in the epidemiology of human ascariasis (Mordi and Ngwodo, 2007).

The infective stages of *A. lumbricoides*' embryonated eggs have enormous capacity for withstanding the environmental extremes of urban environments. The eggs are also coated with a mucopolysaccharide that renders them adhesive to a wide variety of environmental surfaces (Awolaju and Morenikeji, 2009).

Contamination of food or drink by dust or handling is another source of infection. The parasites' ova are spread through the agents of flood and coprophagous animals, and can thus be transported to locations far from the defecation sites (Obiamiwe and Nmorsi, 1990; Mordi and Ngwodo, 2007).

By and large, helminth infections of modest and high intensity in the gastrointestinal tract produce clinical manifestations (Chan, 1994). The occurrence of great numbers of adult *Ascaris* worms in the small

intestine can lead to abdominal distension and pain (Bethony, 2006). Lactose intolerance, mal-absorption of vitamin A and possibly other nutrients are inevitable aetiologies of nutritional and growth failure (Taren, 1987). The most important pathology of hookworm infection results from intestinal blood loss owing to adult parasite incursion and attachment to the mucosa and submucosa of the small intestine. Heavy hookworm infection can also lead to chronic protein loss which could result in hypoproteinemia and anasarca (Hotez, 2004).

5. CONCLUSIONS & RECOMMENDATION

Many occupationally acquired infections by abattoir workers are promoted by human behavior such as close and repeated contact with infected animals, human or animal waste products such as faeces, urine and vomit; respiratory discharges such as coughs and sneezes; and skin – direct contact , hence more parasites in AW as compared to the control. Contrary to the few parasitic infections on the control population, most of the differential intestinal parasites found in the AWs were occupationally acquired from an unhygienic working environment, job specialization, working hours of engagement on the job and poor attitude of AWs to routine Medicare.

However, the control of helminth infections may merge good occupational and environmental hygiene and design; identification of oro-faecal contaminations by breaking its association (portal(s) of entry) to various infections they bring forth. Also, taking meal breaks/lunch away from the main work area to avoid contaminating their meals; wearing appropriate protective clothing and safe disposal of all contaminated waste. Environmental hygiene and work place design should entail the use equipment that is easy to clean and decontaminate; cleaning all work surfaces/work areas regularly; ensuring slaughter slab are designed to be safe to use and easy to clean and decontaminate. And Surveillance by routine medical check-ups/laboratory investigations on possible exposure to helminthes infection should be carried out on individuals at risk.

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