

# Intestinal Parasites Distribution Among Inmates Of Owerri Prison

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## Abstract

Stool specimens from 260 inmates of Owerri prison were investigated for prevalence of intestinal parasites using direct wet preparation method and the formal–ether concentration technique. Of the 260 inmates examined, 200 (77.0%) were infected with the following intestinal parasites (in ascending order): Strongyloides stercoralis (0.4%), Taenia spp (0.8%), Schistosoma mansoni (0.8%), Trichuris trichiura (6.5%), Ascaris lumbricoides (10.8%), Entamoeba coli (11.9%), Hookworm (13.1%), Entamoeba histolytica (15.0%), Giardia lamblia (17.7%). The combination of Hookworms / Entamoeba histolytica (3.8%) and Ascaris lumbricoides / Entamoeba histolytica (2.3%) dominated the cases of multiple infections. Inmates who were farmers and artisans had the highest infection rates (43.1% and 21.5% respectively) while those that were civil servants were the least infected (12.3%). The result was attributable to inadequate water supply, unsanitary defaecation methods and poor personal hygiene among the inmates. Periodic medical examination of the inmates and dramatic beef-up of sanitary facilities in Owerri prison is recommended.

## INTRODUCTION

The term intestinal parasites refer to the parasitic worms found in intestine of man or animals. They are among the most common and widely distributed animal parasites of man 1. Infection of intestinal parasites rank among the most important persistent public health problem of the present dispensation across the globe and their importance in African children is particularly significant 2. In Nigeria, as in most parts of the developing world, the dominant pathogens are parasitic and infections in nature 3. The helminthes usually encountered include Ascaris lumbricoides, Hookworms and Trichuris trichiura all of which have their adult stages found mainly in the intestinal lumen of man 4.

The prevalence of intestinal parasites is promoted by several epidemiological factors such as poor sanitation, environmental degradation, ignorance, poor personal and community hygiene, climate condition and other socio-cultural practices such as the use of night soil for fertilizer 5. They are easily contracted through drinking of unboiled faecally contaminated water and through eating raw or undercooked, faecally contaminated vegetables as well as other foods 6.

Medical personnel, especially parasitologists are uncovering

what appears to be a wide spread national phenomenon concerning the prevalence or distribution of intestinal parasites in their host population. Anderson and May 7 showed in his study on intestinal parasites in Northern Nigeria, that 89% of the 55 cases he examined excreted hookworms and that Hookworm and Tapeworm infestation are common among the prison inmates. Meerovitch and Eaten 8 studied the prevalence of intestinal parasites among prison inmates in Canada in which they showed that out of the 243 individual they examined 27.16% were infected with Entamoeba histolytica. Marson 9 discovered the prevalence rates of some groups of intestinal parasites to be in the following descending order; Trichuris trichiura; Ascaris lumbricoides; Endolimax nana; Hookworm, Entamoeba coli; and Entamoeba histolytica among the hundred and fifty inmates he examined in Yobe State, Nigeria.

Bello et al 10 reported a higher prevalence for Ancylostoma duodenale than Ascaris lumbricoides. At Zaria prison, Yakubu and Belo 11 found the most prevalence intestinal parasites to be Ancylostoma duodenale; Ascaris lumbricoides and Trichuris trichiura. In their study on the prevalence of intestinal parasites among inmates of Keffi prison, Amuga et al 3 reported that 20.96% of the 167 inmates they examined were infected with Ascaris lumbricoides (the highest recorded prevalence rates) while

*Strongyloides stercoralis* was found in only 1.19% of the study population (the least prevalent)

The above review had undoubtedly established the existence of different intestinal parasites among inmates of many prisons in Nigeria. However, the author is not aware of any documented evidence of the prevalence of intestinal parasites among the inmates of Owerri prison, Nigeria. Hence, the present work was undertaken to determine the intestinal parasite distribution among inmates of Owerri prison.

### **MATERIAL AND METHODS**

The study population comprised 260 (234 male and 26 female) inmates of Owerri prison, aged 15 – 55 years. Majority of the subjects were young males who were being fed from the prison kitchen except on special occasions when some of their relations or some non-governmental organizations feed them. The subjects involved were given a clean but non – sterile wide mouthed specimen bottles. They were instructed on how to collect their stool samples and the specimen bottles were adequately labeled according to their names, age sex and occupation. The stool samples were collected and examined macroscopically for the presence of mucus, blood, adult worms, colour and their consistency was noted. The samples were investigated for intestinal parasites using direct wet film, (with normal saline and lugol's iodine) methods 12 as follows. A small portion of faeces were emulsified with a drop of physiological saline (0.85 percent) on a grease free slide, cover – slipped and first examined unstained. In the same vein, an iodine stain was prepared and examined under 10x and 40x objectives.

In addition to direct wet film method, the following formal – either concentration method was used. About one gram of faeces was equally emulsified in 4ml of 10% formal water contained in a centrifuge tube. After sieving the suspension, about 3 – 4ml of diethyl – ether was added and the preparation was centrifuged for one minute, at approximately 300 rpm. Following centrifugation, the sediment was placed on grease – free slide, cover slipped and first examined unstained. A drop of iodine was added under the cover slip to assist in the identification of cyst in a subsequent examination. 12

STATISTICAL ANALYSIS: Percentage/ chi-square

### **RESULTS**

The result obtained showed that 200 of 260 subjects (77.0%) examined were infected with various forms of intestinal

parasites. One subject (0.4%) had *Strongyloides stercoralis*; 2 (0.8%) had *Taenia* species and *Schistosoma mansoni* separately; 17 (6.5%) had *Trichuris trichiura*; 28 (10.8%) had *Ascaris lumbricoides*; 31 (11.9%) had *Entamoeba coli*; 34 (13.1%) had Hookworm, 39 (15.0%) had *Entamoeba histolytica*; while 46 (17.7%) had *Giardia lamblia* (Table 1). Sixteen (6.1%) inmates had mixed infections. The combination of Hookworm / *Entamoeba histolytica* and *Ascaris lumbricoides* / *Entamoeba histolytica* dominated the cases of multiple infections (3.8% and 2.3% respectively).

Sex-linked prevalence rate of the parasites is shown in table 2. Males were significantly more infected with intestinal parasites than females ( $P > 0.05$ ,  $X^2 \text{ Cal} = 17.0$ ,  $X^2 \text{ Critical}$ , (d.f. 8) = 15.507). A greater proportion of males (10.8% and 10.0%) had *Entamoeba histolytica* and Hookworm respectively while only 1 male (0.4%) was infected with *Strongyloides stercoralis*. In contrast, *Giardia lamblia*, *Entamoeba histolytica*, and Hookworm were the most prevalent (7.3%, 4.2%, and 3.1% respectively) and *Taenia* species was the least (0.4%) prevalent intestinal parasites among the females.

Observations on the distribution of intestinal parasites in relation to the occupation of the inmates revealed that farmers had the highest infection rate (40.4%) while the civil servants were the least infected (14.0%, table 3). Inmates under 35 years of age had higher infection rate of Hookworm (8.9%), *Ascaris lumbricoides* (6.6%) and *Entamoeba histolytica* (9.6%) than those who were 35 years and above (4.2%, 4.2% and 5.4%, table 4).

**Figure 1**

Table 1: Prevalence rate of intestinal parasites among the inmates of Owerri Prison

| Intestinal parasite                    | No. of Inmates examined | No./ Percentage of Inmates infected (%) |
|--|-------------------------|---|
| Hookworm (H)                           | 260                     | 34 (13.1)                               |
| <i>Strongyloides stercoralis</i> (S.s) | 260                     | 1(0.4)                                  |
| <i>Ascaris lumbricoides</i> (A.l)      | 260                     | 28(10.8)                                |
| <i>Trichuris trichiura</i> (T.t)       | 260                     | 17(6.5)                                 |
| <i>Taenia</i> spp (T.s)                | 260                     | 2(0.8)                                  |
| <i>Entamoeba histolytica</i> (E.h)     | 260                     | 39(15.0)                                |
| <i>Entamoeba coli</i> (E.c)            | 260                     | 31(11.9)                                |
| <i>Schistosoma mansoni</i> (S.m)       | 260                     | 29(0.8)                                 |
| <i>Giardia lamblia</i> (G.l)           | 260                     | 46(17.7)                                |
| <b>Total</b>                           | <b>260</b>              | <b>200(77.0)</b>                        |

**Figure 2**

Table 2: Distribution of parasites according to sex

| Sex          | No. of Inmates Examined | No./ Percentage of Inmates infected with various parasitic spp |                    |                      |                     |                    |                    |                      |                    |                      |  |
|--------------|-------------------------|--|--------------------|----------------------|---------------------|--------------------|--------------------|----------------------|--------------------|----------------------|--|
|              |                         | H  | S.s                | A.l                  | T.t                 | T.s                | E.h                | E.c                  | S.m                | G.l                  |  |
| Males        | 234                     | 26<br>(10.0)   | 1<br>(0.4)         | 21<br>(8.1)          | 12<br>(4.4)         | 1<br>(0.4)         | 28<br>(10.8)       | 22<br>(8.5)          | 2<br>(0.8)         | 27<br>(10.4)         |  |
| Females      | 26                      | 8<br>(3.1)   | 0<br>(0)           | 7<br>(2.7)           | 5<br>(2.1)          | 1<br>(0.4)         | 11<br>(4.2)        | 9<br>(3.4)           | 0<br>(0)           | 19<br>(7.3)          |  |
| <b>Total</b> | <b>260</b>              | <b>34<br/>(13.1)</b>   | <b>1<br/>(0.4)</b> | <b>28<br/>(10.8)</b> | <b>17<br/>(6.5)</b> | <b>2<br/>(0.8)</b> | <b>39<br/>(15)</b> | <b>31<br/>(11.9)</b> | <b>2<br/>(0.8)</b> | <b>46<br/>(17.7)</b> |  |

**Figure 3**

Table 3: Prevalence rates of Intestinal Parasites in relation to occupation of the inmates

| Parasites              | Farmers (% Prev.) | Artisans(% Prev.) | Civil Servants(% Prev.) |
|------------------------|-------------------|-------------------|-------------------------|
| Hookworm               | 7.6               | 4.8               | 2.2                     |
| <i>S. stercoralis</i>  | 0.4               | 0                 | 0                       |
| <i>A. lumbricoides</i> | 3.3               | 2.3               | 1.7                     |
| <i>T. trichiura</i>    | 4.6               | 1.9               | 0                       |
| <i>Taenia</i> spp.     | 0.8               | 0                 | 0                       |
| <i>E. histolytica</i>  | 8.4               | 3.9               | 3.5                     |
| <i>E. coli</i>         | 6.1               | 3.5               | 2.6                     |
| <i>S. mansoni</i>      | 0.8               | 0                 | 0                       |
| <i>G. lamblia</i>      | 8.4               | 6.2               | 4.0                     |
| <b>Total</b>           | <b>40.4</b>       | <b>22.6</b>       | <b>14.0</b>             |

**Figure 4**

Table 4: Distribution of Parasites according to age

| Percentage Prevalence of various Parasites (%) |             |            |             |            |            |             |             |            |             |             |
|--|-------------|------------|-------------|------------|------------|-------------|-------------|------------|-------------|-------------|
| Age(years)                                     | Hookworm    | S. s       | A. l        | T. t       | T          | E. h        | E. c        | S. m       | G. l        | Total       |
| 15-24  | 2.7         | 0          | 4.6         | 1.2        | 0          | 5.0         | 3.4         | 0          | 2.7         | 19.6        |
| 25-34  | 6.2         | 0.4        | 2.0         | 2.3        | 0.8        | 4.6         | 2.7         | 0.4        | 4.6         | 24.0        |
| 35-44  | 2.7         | 0          | 2.7         | 1.5        | 0          | 3.1         | 3.1         | 0          | 6.5         | 19.6        |
| 45-54  | 1.5         | 0          | 1.5         | 1.5        | 0          | 2.3         | 2.7         | 0.4        | 3.9         | 13.8        |
| <b>Total</b>                                   | <b>13.1</b> | <b>0.4</b> | <b>10.8</b> | <b>6.5</b> | <b>0.8</b> | <b>15.0</b> | <b>11.9</b> | <b>0.8</b> | <b>17.7</b> | <b>77.0</b> |

## DISCUSSION

The result of the present examination of intestinal parasite showed a high prevalence rate of 77.0% among the inmates of Owerri prison. The high prevalence rate recorded was partly and probably due to the combined method of examination namely direct wet film (using both normal saline and lugol's iodine) technique and concentration method (using the modified Ridley formal – ether, 12.

The prevalence of protozoal infestation (44.6%) was higher than that of helminthic infestation (32.4%). Among the protozoal infection recorded in this study, *Giardia lamblia* has the highest prevalence rate of 17.7%. This may be due to oral-genital sex normally practice among the prisoners 13. A number of studies on the prevalence of intestinal parasites among prison inmates in other parts of Nigeria have been documented. For instance, in Northern Nigeria, Roche 14 recorded 89% prevalence rate in a total of 550 cases he examined using the direct centrifugal floatation method. Also, Amuga et al 3 recorded 78.85% prevalence rate in a total of 125 inmates of Keffi prison examined using the direct wet mount and formal ether concentration technique. These earlier reports are similar the present record of 77%.

A combination of factors might have been responsible for the observed high prevalence rate in the study. For example, although 80.8% of the inmates interviewed disclosed that they use water cistern method of faecal disposal adjudged to be one of the best, it could contribute widely to the transmission of intestinal parasites among the inmates when there is long accumulation of faces, shortage of water or when the cistern is not flushable. This is particularly the case with the Owerri prisons as the cisterns used by the inmates have poor flushing facility.

15.4% of the inmates admitted using pit toilet while 3.8% of them accepted passing stool in the bush. This is a worrisome development since the later method of faecal disposal is very

primitive and could contribute immensely to the transmission of the parasites among the inmates. Personal hygiene such as washing of hands immediately after defecation or before meals was scarcely practiced by the inmates. At the period of study, there was a serious shortage of water in the prison and none of the prisoners had the facility for boiling water.

The living condition and habits of the prisoners prior to getting imprisoned could also be responsible for the observed high prevalence rate in the study. For instance, only 17.3% of the inmates disclosed that they were using tap water as the source of drinking water. The majority used either bore-hole (78.8%) or stream water (5.8%) as sources of drinking water.

Other contributing factors which might have led to the high prevalence rate in this study include lack of education, over crowding (average of 65 inmates per cell for males and 14 inmates per cell for females), lack of maintenance or treatment of the borehole water normally consumed by the inmates, eating and defecating in the same cell. Unlike other prisons in advanced and developing economies, the cells in Owerri prisons have been stripped of their furnishings. Also, majority of the cooks in the prison kitchen were not subjected to medical fitness before employment.

Eating of raw or undercooked vegetables or unwashed fruits among the inmates might also be regarded as a probable source of intestinal parasitic infection among them. Person to person transfer of these parasites among the inmates constitutes another likely source of infection. For instance, an infected inmate in a particular cell is a potential source of parasites to other members of the cell.

It is advocated that the following corrective measures be adopted in order to reduce the parasitic load of the inmates: organizing of monthly health programme among inmates and staff, protection and adequate cooking of food and prevention of food from contact with flies, cockroaches etc. Cooking utensils especially washed ones should be kept away from flies. All inmates and food handlers in Owerri prison should be medically examined from time to time by health authority concerned and treatment of infected persons vigorously pursued. Drinking water should be treated or boiled and provision of more cells be ensured in order to reduce the problem of overcrowding. Refurbishing of toilet

facilities, adequate supply of water and periodic treatment of the inmates and staff should be carried out.

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