

Full Length Research Paper

Prevalence of intestinal helminthiasis among prison inmates in Jos, Nigeria

Ughava J. Robinson^{1*} and Okon P. Edet²

¹Department of Zoology, University of Jos, Plateau State, Nigeria.

²Department of Science Laboratory Technology, Nasarawa State Polytechnic, Nigeria.

Accepted 05 April 2016

Prison inmates are among the high risk population for dangerous helminthes infections and other contagious diseases. This study was undertaken to determine the prevalence of intestinal helminthiasis among prison inmates in Jos, Plateau State, Nigeria. Fresh stool samples from 300 inmates in Jos central prison were screened for helminthes infections using Formal-ether concentration and Kato-Katz techniques. Of the 300 inmates examined, 27(9.00%) were infected with at least one of the four species of intestinal helminthes isolated: *Ascaris lumbricoides* (1.91%), *Ancylostoma duodenale* (2.21%), *Schistosoma mansoni* (4.18%) and *Strongyloides stercoralis* (0.33%). Helminthes infection was highest among inmates within age group <20 (16.10%). The prevalence of helminthes infection with respect to various prison units showed that inmates serving jail terms were most parasitized (14.00%). In relation to gender, male had the prevalence of 9.25% while no female inmate was infected with intestinal helminthes. There was no statistical relationship between the prevalence of intestinal helminthiasis ($P > 0.05$) with respect to age groups and the various prison units. Efforts to promote hygienic practices and health education were highly recommended.

Key words: Intestinal helminthes, prevalence, inmates, hygiene.

INTRODUCTION

Prisoners carry a much burden of illness than other member of the society (Ishaleku and Mamman, 2014). They harbor diseases that are determined both by the environment from which they come and by the prison in which they live. Most health professionals find it difficult to work in a prison set up, due to under nutrition, lack of concern, inadequate facilities and expertise, which deteriorates the health of inmates. Weishburch (1992) observed that there are problems of severe drugs abuse, alcoholism, trauma, homicide, suicide, HIV/AIDS, malaria, STDs, TB, skin and helminthes infections etc among prisoners. Intestinal helminthes are parasitic diseases with high morbidity and mortality in most tropical parts of the world, they are often referred to as the neglected (or the

forgotten) disease because they: are not subject to periodic reporting like other parasitic disease such as malaria infections (Ault, 2007); are not included in priority list of national policies of many countries (Ehrenberg and Ault, 2005); occur mostly among poor and neglected populations (Boudy and de Silva, 1998); little disease is associated with light infection, but when the worm load increases, a corresponding increase in disease usually occurs (Lee, 1985). Human intestinal helminthiasis exists in every country in the world, but the prevalence of the disease varies considerably between countries, and within population in response to predisposing factors (WHO, 1987; Stephenson, 1994; CDC, 1992). Although helminthes infections can infect all members of a population, it is clear that there are specific groups who

*Corresponding author. E-mail: Robin.ughava@yahoo.com

are at greater risk of morbidity than others, and who are more vulnerable to the harmful effects of chronic infections (Hotez et al., 2006; Brooker and Bundy, 2008)

The health and socio-economic implication associated with intestinal helminthes are enormous especially in rural communities of the developing countries where malnutrition and other factors complicate the impact of the infection (Ogbe and Odudu, 1990). However, because many parasitic infections especially those of helminthes origin are usually asymptomatic, they are often neglected until serious complications or chronic clinical features appear. Contrary to the success story of significant changes in prevalence of intestinal infections in many European, North American and Asian countries, Ulukanligil and Adnan Seyrek (2003) and WHO (2004) attributed increased burden of disease to poverty, poor environmental hygiene, urbanization, population growth and impoverished health services combined, in the developing countries.

There is paucity of published data on intestinal helminthiasis amongst prison inmates in Nigeria. Thus, this study was aim at determining the prevalence of intestinal helminthes infections, among the inmates of Jos central prison, Jos, Plateau State, Nigeria. The finding from this study would provide baseline information on the burden of intestinal helminthiasis of this vulnerable group of individuals. It will also encourage appropriate health authorities to embark on interventional health programmes against intestinal helminthiasis among prison inmates in Nigeria.

MATERIALS AND METHODS

Study area

This study was carried out in Jos central prison. This prison is located in Jos, the capital city of Plateau State, Nigeria. Jos is an old tin mining city with an upland stretching approximately 104 km from North to South, characterized by impressive ridges and isolated rocky hills separated by extensive plain. Jos is linked by road, rail and air to the rest of the country. It has an average daily temperature of 22°C, humidity of 60% and an average rainfall of 1400 mm (Udo, 1970). The inhabitants are mostly civil servants, businessmen, traders, farmers and casual laborers.

Study population

Three hundred (300) inmates that presented themselves for medical treatment at Jos prison clinic were used for this study.

This comprised of 110 awaiting trial (AT), 100 serving jail terms (SJT), 50 serving life terms (SLT), and 40 condemned prisoners (CP) ages ranging from less than 20 to above 60 participated in the study.

Sample collection

Following an official consent secured from the prison officers and the inmates and assurance of confidentiality of results, the inmates were told on how to collect stool samples without contaminating it with urine. Cleaned, dried and leak-proof labeled specimen containers were given to the inmates for stool samples. Demographic information such as age, sex and unit of each inmate were obtained orally.

Preparation and microscopic examination of parasites

Formal-ether concentration and Kato-Katz techniques for faecal specimens were used for microscopic identification of helminthes eggs as described by Cheesbrough (2000) and Arora and Arora (2005).

The data were analyzed using percentages and chi-square (χ^2) test to compare the rate of infections.

RESULTS

Of the 300 inmates screened, 292(97.33%) were males and 8(2.67%) females. The overall prevalence obtained from this study was 9.00%. Prevalence of Helminthes infections with respect to age groups were < 20 (16.10%), 21- 30 (9.10%), 31- 40 (10.29%), 41- 50 (3.70%), 51- 60 (0.00%) and 61> (0.00%) respectively (Table 1). The prevalence of helminthes infections with respect to the various units of the prison: AWT (Awaiting trial), JT (Jail term), LT (Life term) and CD (Condemned) were 6.36%, 14.00%, 4.00% and 10.00% respectively (Table 2). In relation to gender, male inmates had the prevalence of 9.25% while their female counterpart had the prevalence of 0.00% (Table 3).

DISCUSSION

The prevalence of intestinal helminthes as recorded from this study was 9.00%. The results of this present investigation showed clearly that intestinal helminthes infections among prison inmates in Jos prison assumed the level of public health importance. This finding is in consonance with the Okolie (2009), Nwaneri and Omuemu (2012) and Colman et al. (2013) who reported higher prevalence of 32.40, 20.70 and 22.80% respectively. Nigeria is a country where more than 80.0% of the population lives below one dollar per day, there is no doubt that the finding observed in this study is a reflection of the poor socioeconomic circumstances within the country, which advertently affected prison inmates.

Factors predisposing to infections include poor sanitation, inadequate water supply, unhealthy cultural practice and lack of education. Eating of raw or undercoo-

Table 1. Prevalence of helminthiasis in jos prison inmates with respect to age groups.

Age group	No. Examined	<i>Ascaris lumbricoides</i>	<i>Ancylostoma duodenale</i>	<i>Schistosoma mansoni</i>	<i>Strongyloides stercoralis</i>	Total
< 20	56	1(1.80)	1(1.80)	7(12.5)	0(0.00)	9(16.10)
21 – 30	110	2(2.48)	3(3.31)	5(4.55)	0(0.00)	10(9.10)
31 – 40	68	2(2.94)	2(2.94)	2(2.94)	1(1.50)	7(10.29)
41 – 50	27	0(0.00)	0(0.00)	1(3.70)	0(0.00)	1(3.70)
51 – 60	25	0(0.00)	0(0.00)	0(0.00)	0(0.00)	
61 >	14	0(0.00)	0(0.00)	0(0.00)	0(0.00)	
Total	300	5(1.91)	6(2.21)	15(4.18)	1(0.33)	27(9.00)

² = 9.62, P>0.05.

Table 2. Prevalence of helminthiasis among inmates in Jos prison with respect to prison units.

Unit	No. Examined	<i>S. mansoni</i>	<i>A. lumbricoides</i>	<i>A. duodenale</i>	<i>S. stercoralis</i>	Total
AWT	110	5(4.50)	1(0.91)	1(0.91)	0(0.00)	7(6.36)
JT	100	7(7.00)	2(2.00)	4(4.00)	1(1.00)	14(14.00)
LT	50	0(0.00)	1(2.00)	1(2.00)	0(0.00)	2(4.00)
CD	40	1(2.50)	2(5.00)	1(2.50)	0(0.00)	4(10.00)
Total	300	13(4.30)	6(2.00)	7(2.30)	1(0.30)	27(9.00)

² = 9.62, P>0.05

Legend: AWT: Awaiting trial, JT: Jail term, LT: Life term, CD: Condemned.

Table 3. Prevalence of helminthiasis among inmates in relation to gender.

Gender	No. Examined	No. Positive (%)
Male	292	27(9.25)
Female	8	0(0.00)
Total	300	27(9.00)

ked vegetables or unwashed fruits among the inmates might also be regarded as a probable source of parasitic infection among the inmates. Person to person transfer of these parasites among the inmates constitute another likely source of infection (Colman et al., 2013). The living condition of the prisoners prior to getting imprisoned could be responsible for the observed high prevalence recorded.

Out of the 300 inmates examined; *Schistosoma mansoni* recorded the highest prevalence which was significant. The detection of *S. mansoni* in stool samples examined even at low prevalence is a serious concern for health hazard free environment and poses a risk to public health.

The significantly higher *A. duodenale* prevalence than *Ascaris* prevalence was similar to a previous report from eastern Nigeria (Ohaegbula, 1996: Hassan et al., 2013). Abu-Madi et al. (2008) reported that *Ancylostoma duodenale* occurs more frequently in mild and humid conditions as the free-living larval stages are unlikely to survive under extremes of temperature and desiccation

typical of a tropical dry season as found in study area. The prevailing physical conditions at the time of the present investigation must have favoured *A. duodenale* transmission more than *Ascaris* transmission. The reported varieties of routes by which *Ascaris* can be acquired and capacity of embryonated eggs to survive under adverse environmental conditions were obviously influenced by the rains which predispose higher *A. duodenale* transmission (Hotez et al., 2007). This could also be attributed to the fact that most of the subjects do not wear shoes/foot-wears thus could have been exposed to these helminthes. The major and common portal of entry of some helminthes is the skin of the foot (Wagbatsoma and Aimiwu, 2008).

With respect to the age groups of the inmates examined, those belonging to age groups < 20, 21-30, 31-40 had the higher prevalence of 16.10, 9.10 and 10.29% respectively. These age groups are the most active and highly infected groups in the prison. They were constantly taken out for manual/hard labour on farms, homes, schools, construction sites etc which predisposes

them to helminthes infections. This is in agreement with the work of Okolie (2009), who reported high helminthes infections among young adults' inmates in Owerri prison.

Based on the various prison units, inmates serving jail terms (JT) have the highest infection rate of 14.00%. This could be because inmates in this unit are regarded as the mobile and working inmates. They are often taken out for manual/hard labour which predisposes them to helminthes infections. Low intensity of helminthes infection was recorded among inmates in life term unit. This could probably be due to their constant confinement which curtail them from been exposed to parasitic organisms.

Male inmates were reported to have higher prevalence of helminthes infection than their female counterpart; who had none. This may be due to the fact that male inmates are freer than females; which leisure hours are strictly controlled and restricted. Also, female inmates have better personal hygiene practices.

Conclusion

Chronic intestinal helminthes infections and moderate to heavy worm intensity in a vulnerable population (such as observed in this study) will not only jeopardize their health, but will also render them susceptible to other diseases. Regular public health enlightenment campaign to inmates and prison staff be instituted; protection and adequate cooking of food and quality of water given to inmates; provision of improved latrines, beddings, and social welfare facilities be provided.

REFERENCES

- Abu-Madi MA, Pal P, Al-Thani A, Lewis JW (2008). Descriptive epidemiology of intestinal helminth parasites from stray populations in Qatar. *J. Helminth*, 82: 59-68.
- Arora DR, Arora B (2005). *Medical Parasitology*. 2nd Edition. CBS publishers and distributors, New Delhi, India, pp. 76-77.
- Ault SK (2007). Pan American Health Organization Regional Strategic Framework for Addressing neglected population in Latin America and the Carribean. *Memorias do Instituto Oswaldo Cruz*, 102 (Suppl. 1): 99-107.
- Brooker S, Bundy DAP (2008). Soil-transmitted helminths (geohelminths). *In* Manson's Tropical Diseases. 22nd Edition. Edited by Cook GC, Zumla AI. London: Elsevier; pp. 848-853.
- Bundy DAP, de Silva NR (1998). Can we deworm this wormy world? *Br. Med. Bull.*, 54(2): 421- 432.
- CDC (1992). International Update for disease eradication, 41(37): 691-698.
- Cheesbrough M (2000). *Medical Laboratory Manual for Tropical Countries*. 2nd Edition, Cambridge University Press, p. 605.
- Colman S, Mangoro ZM, Isa L (2013). Incidence of intestinal and urinary parasites among prison inmates. *Acad. J. Microbiol. Res.*, 1(1): 011-015.
- Ehrenberg JP, Ault SK (2005). Debate: Neglected diseases of neglected populations: Thinking to reshape the determinants of health in Latin America and the Carribean. *Pub. Health*, 5: 119.
- Hassan AA, Rogbesan AC, Akinsanya B (2013). The Spread Of Intestinal Helminth Infection Among Apparently Healthy Humans In Keffi Area, Nigeria. *J. Sci. Res. Dev.*, 14: 35-46.
- Hotez PJ, Bundy DAP, Beegle K, Brooker S, Drake L, de Silva N, Montresor A, Engels D, Jukes M, Chitsulo L, Chow J, Laxminarayan R, Michaud C, Bethony J, Oliveira R, Xiao SH, Fenwick A, Savioli L (2006). Helminth Infections: soil-transmitted helminth infections and schistosomiasis. *In* Disease Control Priorities in Developing Countries. Edited by Jamison DT, Breman J, Measham AR, Alleyne G, Claeson M, Evans DB, Jha P, Mills A, Musgrove P. New York: Oxford University Press; pp. 467-497.
- Hotez PJ, Morlyneux DH, Kenwick A (2007). Control of Neglected Tropical Diseases. *NEng. J. Med.*, 357: 1018-1027.
- Ishaleku D, Mamman AS (2014). Co-infection of malaria and Helminthes infection among prison inmates. *J. Microbiol. Res. Rev.*, 2(1): 1- 5.
- Lee SM (1985). *Gastrointestinal Parasites Gastroenterology*. 5th Edition. Cambridge University Press, New York, p. 1773.
- Nwaneri DU, Omuemu VO (2012). Prevalence and intensity of intestinal helminthiasis in children living in orphanages in Benin City, Nigeria. *J Prev. Med. Hyg.*, 53: 146-151.
- Ogbe MG, Ogunsekan FA (1990). *Schistosoma haematobium* Infection among school children in Abeokuta, Nigeria, a preliminary report. *Nig. J. Parasitol.*, 9(1): 60-62.
- Ohaegbula AB (1996). Prevalence of gastric – intestinal parasites in two contrasting communities in Enugu, Nigeria. *Nig. J. Parasitol.*, 17: 89-95.
- Okolie NJC (2009). Intestinal parasites distribution among inmates of Owerri prison. *Intern. J. Parasitic Dis.*, 4(1): 10-17.
- Stephenson LS (1994). Helminthes parasites, a major factor in malnutrition. *World Health Organization Forum*, 15: 16-172.
- Udo RK (1970). Jos Plateau. *In* Geographical Region of Nigeria. Macmillian Press, Jos. Pp 127
- WHO (2004). Commission on Social Determinants of Health (Concept paper) Geneva, World Health Organization, 2004.
- Ulukanligil M, Adnan Seyrek A (2003). Demographic and parasitic infection status of school children and sanitary conditions of schools in Sanliurfa, Turkey, *BMC Public*

- Health 3(29): 1-7.
- Wagbatsoma VA, Aimiwu U (2008). Sanitary provision and helminthiasis among school children in Benin City, Nigeria. *Nig. Postgrad. Med. J.*, 15: 105-111.
- Weishburch JC (1992). Prison Health. In: Last JM, Wallace, RB, Editors, *Public Health and Preventive Medicine*, 13ed. California, Appleton and Lange, pp. 1159-1162.
- WHO (1987). Public Health Significance of Intestinal Parasitic Infection. *Bull. WHO*, 66(5): 575-588.