



ASCARIASIS AMONG CHILDREN ATTENDING TWO PRIMARY SCHOOLS IN IJEBU NORTH-EAST, SOUTH-WEST NIGERIA



A. R. Sowole, O. M. Agbolade* and R. O. Adebayo

Department of Zoology, Olabisi Onabanjo University, PMB 2002, Ago-Iwoye, Ogun State, Nigeria

*Corresponding author: agbolmos@yahoo.com

Received: December 02, 2016

Accepted: March 08, 2017

Abstract: Ascariasis is an important disease often associated with poor hygiene especially among indigent individuals and households in developing countries. Faecal samples from 306 pupils (125 males and 181 females) from Ilese-Ijebu and Ijebu-Imushin of Ijebu North East, southwest Nigeria, were examined using direct smear and formol-ether concentration techniques, between May and July 2013. A total of 205 (67.0%) pupils were infected with *Ascaris lumbricoides*. The total female prevalence (75.1%) was statistically similar to that of male (55.2%). Among the infected school children, 5-6 years age group (20.9%) had the highest prevalence, but this was not statistically significant ($\chi^2 = 6.70$, $P > 0.05$). The least geometric mean intensity recorded (130 eggs/g of faeces) was among females in Ilese-Ijebu. This study has shown that, *A. lumbricoides* infection has high prevalence and intensity: thus a serious problem of public health impact in Ilese-Ijebu and Ijebu-Mushin, Ijebu North East area, Ogun State. Therefore, cost-effective measures are urgently needed to effectively control the infection in the study areas.

Keywords: Ascariasis, *Ascaris lumbricoides*, school children, soil-transmitted helminths, stool samples

Introduction

Ascaris lumbricoides is one of the important soil-transmitted helminths (STHs) common among humans in many parts of the tropical and subtropical regions of the world (de Silva *et al.*, 2003). It has been estimated that world-wide, the infection occurs in 1450 million people, with 350 million cases of morbidity and about 60,000 deaths per year (WHO, 2002). Ascariasis is often associated with poor hygiene especially among indigent individuals and households in developing countries (de Silva *et al.*, 2003; Otubanjo, 2013). Although prevalent in virtually all age groups, studies have shown that *A. lumbricoides* infection is more common in children. The disease negatively impacts the nutritional status and cognitive development of children (WHO, 2002).

Literature is replete with information on *A. lumbricoides* infection and other STHs, particularly among children, from within Nigeria (Dangana *et al.*, 2012; Isyaku *et al.*, 2013) and outside world (Fonseca *et al.*, 2014; Umetsu *et al.*, 2014; Greenland *et al.*, 2015). In view of the public health importance of *A. lumbricoides*, this study was designed to evaluate the current epidemiological status of the infection among primary school children in some parts of Ijebu North East, Southwest Nigeria. It is anticipated that the findings of this study will be valuable to health workers and planners in the study area in their quest to provide health for all.

Materials and Methods

Study area and population

The study area consisted of Ilese-Ijebu and Ijebu-Imushin in Ijebu North East Local Government Area, Ogun State, Nigeria. Ilese-Ijebu is located on latitude $6^{\circ} 48' N$ and longitude $3^{\circ} 57' E$ while Ijebu-Imushin is on latitude $6^{\circ} 79' N$ and longitude $3^{\circ} 99' E$. Ilese-Ijebu and Ijebu-Imushin have estimated populations of 10,000 and 8,000 respectively, according to 2006 population census. The inhabitants are predominantly farmers and traders and their major sources of water are streams, rain and boreholes. In Ilese-Ijebu, the only public primary school (Muslim Primary School [MPS]) was used in this study. In Ijebu-Mushin, St. Mary Anglican Primary School (SAS) was selected due to its large population of pupils.

Pre-survey protocols and enlightenment

Before the study commenced, the Zonal Educational Authority of Ijebu North East Local Government was contacted for permission. The Parents/Teachers Associations of the targeted schools were also contacted for permission to conduct the survey. In addition, an interactive session with the primary school pupils was held in each of the schools visited.

There was health education on the transmission, symptoms, and side effects of intestinal helminths. The pupils were also enlightened on how to collect stool samples for laboratory examination. Eventually, only self-selected pupils were included in the study.

Sample collection and preservation

Labelled sterile wide-mouthed screw capped plastic bottles were used to collect stool samples from the pupils. Instructions were given to the pupils on how to collect the samples. The pupils were permitted to go home with the sample bottles which they returned with the faecal samples the following morning. Overall, 306 pupils (156 and 150 from Ilese-Ijebu and Ijebu-Imushin, respectively) returned with faecal samples. The samples were collected between May and July 2013. The samples were preserved with 1-2 drops of 10% formal-saline immediately after collection from the pupils, and transported to the laboratory for microscopic examination.

Sample preparation and examination

Each stool sample was examined using direct smear and formol-ether concentration techniques. A drop of normal saline was placed in the middle of a clean grease-free slide. With the aid of an applicator stick, 2 mg of the stool sample was emulsified into the saline to give a homogenous mixture. The preparation was then covered with a cover slip and examined under the microscope using X10 and X40 objectives. A drop of iodine was placed on a clean grease-free glass slide and another 2 mg of the stool sample was mixed with the iodine to give a homogenous mixture. The preparation was then covered with a clean cover slip and examined under X10 and X40 objective, respectively (Cheesbrough, 2009).

Using the formol-ether concentration technique, 2 mg of stool sample was mixed with 7 mL of 10% formal-saline in a clean centrifuge tube. The mixture was then filtered through double-layered cotton gauze into a clinical flask and 3 mL of diethyl ether was added and the mixture was vigorously shaken. This was then poured into a clean centrifuge tube and spun for 2 min at 2,000 rpm. The faecal plug was loosened with an applicator stick and the supernatant fluid was discarded leaving the sediment. The sediment was transferred unto a grease-free glass slide and covered with a clean cover slip and examined under the microscope using x10 and x40 objectives for presence of ova (Cheesbrough, 2009).

Statistical analysis

The chi-square (χ^2) test was used to compare the prevalences of infection for significant differences.

Ascariasis Disease among Primary School Pupils

Results and Discussion

A total of 306 stool samples were collected and examined, out of which 205 (67.0%) were infected with *A. lumbricoides*. There was no significant difference between the total prevalence of infection in MPS and SAS. The gender-related prevalence of the infection among the school children is shown in Table 1. The male prevalence in SAS (67.2%) was statistically higher than that in MPS (43.8%) ($\chi^2 = 4.93$, $P < 0.05$). The female prevalence in MPS (72.8%) and SAS (77.5%) were statistically similar. The total female prevalence (75.1%) was not significantly different from that of total male prevalence (55.2 %).

A. lumbricoides infection is related to age groups (Table 2). The percentage distributions of the examined age groups were not significantly different. Among the infected school children, 5-6 years age group (20.9 %) had the highest prevalence, but this was not statistically significant ($\chi^2 = 6.70$, $P > 0.05$). The geometric mean intensities among males and females in MPS were 210 and 130 eggs/g of faeces, respectively. In SAS, the geometric mean intensities were 215 and 205 eggs/g of faeces among males and females, respectively.

Table 1: Prevalence of *A. lumbricoides* in relation to gender among primary school children in Ijebu North East, Nigeria

School ^a /Town	Males		Females		Total	
	No. examined	No. (%) Positive	No. examined	No. (%) Positive	No. examined	No. (%) positive
MPS, Ilese-Ijebu	64	28 (43.8)	92	67 (72.8)	156	95 (60.9)
MAP, Ijebu-Mushin	61	41 (67.2)	89	69 (77.5)	150	110 (73.3)
Total	125	69 (55.2)	181	136 (75.1)	306	205 (67.0)

^aMPS= Muslim Primary School; MAP= St Mary Anglican Primary School

Table 2: Prevalence of *A. lumbricoides* in relation to age among primary school children in Ijebu North East, Nigeria

Age group (years)	Examined		Infected	
	No.	%	No.	%
5-6	91	29.7	64	20.9
7-9	85	27.8	62	20.3
10-11	63	20.6	41	13.4
12-13	67	21.9	38	12.4
Total	306	100	205	67.0

The presence of ascariasis among school children vis-à-vis the high prevalence, provokes an urgent need for drastic control of *A. lumbricoides* infection in the study area. It has earlier been recommended that control intervention steps are indispensable in areas with appreciable prevalence of STHs (WHO, 2015). Many unhygienic habits in school children predispose them to *A. lumbricoides* (Otubanjo, 2013). Nevertheless, the observed prevalence level reflects low level of hygiene at individual and communal levels in the visited communities. The recorded high prevalence of *A. lumbricoides* infection in this study conforms to previous reports from some other parts of Nigeria (Emmy-Egbe *et al.*, 2012; Adeoye *et al.*, 2013). The similar total prevalence of infection among the visited schools is another pointer to the cosmopolitan substandard hygienic practices in the two communities. The pooled prevalence of *A. lumbricoides* infection showed that both genders were equally exposed and infected in the study areas. This agreed with some previous reports

(Akinseye *et al.*, 2013). Nevertheless, it contradicted some other reports in which *A. lumbricoides* infection was gender dependent (Isyaku *et al.*, 2013; Fonseca *et al.*, 2014). However, the reason for relatively higher prevalence among males in SAS compared to those in MPS is not known, more so that among the two schools the females had similar *A. lumbricoides* prevalences. *A. lumbricoides* intensity of infection seems high among both genders in the present study areas. This implies heavy environmental contamination with eggs and transmission of *A. lumbricoides* in the study areas. A corollary to this scenario is the urgent need for mass treatment of the school children against *A. lumbricoides* infection in these areas. In addition, concerted enlightenment and education of the school children, their teachers, parents and guardians on transmission of *A. lumbricoides* infection in

relation to personal, family and community hygiene are important towards effective control of the infection in the study areas.

In conclusion, *A. lumbricoides* infection has a high prevalence and thus a serious problem of public health impact in Ilese-Ijebu and Ijebu-Mushin, Ijebu North East, Ogun State. Therefore, cost-effective measures are urgently needed to effectively control the infection and other STHs in these areas.

Acknowledgements

We thank the Zonal Educational Authority of Ijebu North East Local Government for the permission to conduct this study. We also appreciate the understanding and cooperation of the teachers, parents and pupils of the schools visited during the study.

Conflict of Interest

The authors declare that there are no conflicts of interest.

References

- Adeoye GO, Ayodele ET & Adubi TO 2013. Polyparasitism with transmission risk factors among school aged children in Ibadan, Southwestern Nigeria. *Nigerian J. Parasitol.*, 34(1): 1-6.
- Akinseye JF, Nmorsi OPG & Akinbolaji TJ 2013. Prevalence of ascariasis among the students of Joro Grammar School, Ibule-Soro, Ondo State, Nigeria. *Nigerian J. Parasitol.*, 34(2): 135-139.
- Chessbrough M 2009. District Laboratory Practice in Tropical Countries. Part 1, 2nd edn. Tropical Health Technology. Cambridge University Press, pp. 191-198.
- Dangana A, Abayomi RO & Way GD 2012. Survey of *Ascaris lumbricoides* among pupils of primary school in

Ascariasis Disease among Primary School Pupils

- Jos South Local Government Area of Plateau State. *J. Med. Sci. Adv.*, 1(1): 21-26.
- de Silva NR, Brooker S, Hotez PJ, Montresor A, Engels D & Savioli L 2003. Soil-transmitted helminth infections: updating the global picture. *Trends in Parasitol.*, 19(12): 547-551.
- Emmy-Egbe IO, Ukaga CN, Nwoke BEB, Eneanya CI & Ajero CMU 2012. Prevalence of human intestinal helminthiasis in Njikoka Area of Anambra State, Nigeria. *Nigerian J. Parasitol.*, 33(1): 15-19.
- Fonseca AM, Fernandes N, Ferreira FS, Gomes J & Centeno-Lima S 2014. Intestinal parasites in children hospitalized at the Central Hospital in Maputo, Mozambique. *J. Infect. Dev. Ctries*, 8(6): 786-789.
- Greenland K, Dixon R, Khan SA, Gunawardena K, Kihara JH, Smith JL, Drake L, Makkar P, Raman S, Singh S & Kumar S 2015. The epidemiology of Soil-transmitted helminths in Bihar State, India. *PLOS Negl. Trop. Dis.*, 9(5): e0003790. doi: 10.1371/journal.pntd.0003790.
- Isyaku NT, Alayande MO, Ayim EM & Singh R 2013. Prevalence of geohelminth infection among the pupils of a Primary School in Aliero, Kebbi State, Nigeria. *Nigerian J. Parasitol.*, 34(1): 51-54.
- Otubanjo O 2013. *Parasites of Man and Animals*. Concepts Publications Ltd., Lagos, Nigeria, pp. 444-454.
- Umetsu S, Sogo T, Iwasawa K, Kondo T, Tsunoda T, Oikawa-Kawamoto M, Komatsu H, Inui A & Fujisawa T 2014. Intestinal ascariasis at pediatric emergency room in a developed country. *World J. Gastroenterol.*, 20(38): 14058-14062.
- WHO (2002). *Prevention and control of schistosomiasis and soil-transmitted helminthiasis*. Report of a WHO Expert Committee. WHO Technical Report Series 912, pp.1-8.
- WHO (2015). *Weekly epidemiological record*. No. 10, 2015, 90, pp. 89-96.