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Research Article

Socio-environmental Factors and Ascariasis Among Patients Attending Plateau Specialist Hospital, Jos, Plateau State, Nigeria

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Abstract

Background: Infection by helminthes is a major human health problem and often considered Neglected Tropical Diseases (NTDs). In Jos, there is general lack of interest in the control of important human intestinal helminthic diseases following reduced concerns for their morbidity and mortality rates among its residence, consequently, low research interests recorded.

Objective: This study investigated the prevalence of such human helminthic infections, emphasize Ascariasis among vulnerable patients attending Plateau Specialist Hospital, Jos.

Methodology: Studies were conducted considering 150 stool samples collected and examined from both in and out patients. Different human based sociological and socio-economic indices, such as sex, age group, types of toilet facilities and sources of drinking water were used to analyze the effects and distribution of the parasite. Formol-ether concentration method was used in the analysis of the collected stool samples.

Results: Results indicate that the overall prevalence of Ascariasis infection was 14(9.33%), of which 4(2.67%) were males and 10(6.67%) females. The age group between 0 - 4 years had 1(0.67%), 5 - 8 years had 3(2.00%), 9 - 12 years had 1(0.67%) and 13 years and above had 9 (6.00%) prevalence. Patients that defecate in the bush had the highest prevalence of Ascariasis infection with 9 (6.00%), those for pit latrine had 4(2.67%) while those for water system had the least prevalence of 1(0.69%). Observably, those who drink water from Rivers/Stream had the highest prevalence of 11(7.33%), those that drink well water had the least prevalence of 3(2.00%) and those that drink tap water had no infection at all. Also, the knowledge, attitude and perception of patients were taken to know their level of awareness or ignorance on the pathogenicity of the parasites.

Conclusion: In view of this prevalence, there is need to provide adequate toilet facilities and infection-free sources of drinking water to cushion the effect of the parasite among patients attending the hospital. Mass health education campaign on the pathogenicity of the parasite, creation of more health facilities to control and investigate the parasite. As well as administration of appropriate medication in treating the disease.

Keywords: Helminthiasis; Ascariasis; Socio-environmental Factors

Introduction

Intestinal helminths parasites are multicellular organisms that infect a wide range of human and animal hosts, causing widespread chronic diseases and morbidity [1]. Most parasitic helminths infections of the intestines have been acknowledged as public health problems in the Tropics [2,3]. Infections due to intestinal parasites rank high among the prevalent human infections that affects about one quarter of the global population largely school aged children, as a result of poor sanitary conditions, as well as feeding habits [4-6]. Infections with helminths parasites are very common and important due to high rate of morbidity among children in Nigerian towns and villages [7,8]. These infections are the major problems in rural communities in Nigeria because of low standard of leaving and the shortage of basic amenities such as clean water and toilet facilities [9,10]. Ascariasis has been reported as one of the most prevalent soil-transmitted helminthiases in Jos, Plateau State and its environs [11,12]. In Sub-Saharan Africa, intestinal helminth infections are of serious health concerns because factors that predispose human to the parasitic-infections such as poverty, poor sanitation, ignorance, contaminated food or water, environmental hygiene and malnutrition prevails [13]. Furthermore, the habit of playing on the sand by children and eating habits that involves the consumption of raw vegetables, fish, crustaceans and meat allows the transmission of helminth infections [14]. Estimates indicate that soil transmitted helminthiasis is among the most common of all parasitic infections [15,16]. Helminthiases usually occur without symptoms or produce just but mild symptoms that are seldom neglected until critical or chronic picture appears [17]. *Ascaris lumbricoides* worms are large and heavy infections and can be serious, especially in children; worm masses can cause obstruction of the bile duct and pancreatic ducts [18]. This study investigated the prevalence of human helminthic infections with emphasis on ascariasis as one of the most important soil- transmitted helminths among vulnerable patients attending Plateau Specialist Hospital, Jos, Plateau State, Nigeria.

Methodology

Study site

The research was conducted at the Plateau State specialist Hospital Jos North Local Government Area of Plateau State. Jos North a small city that lie over 1000m above sea level on the Jos Plateau and enjoys a good climate condition that is temperate compared to the rest of the state, the mean average monthly temperature from 21-250 C. It is the most populated LGA in Plateau state with a population of 437,217 [19]. Jos has a good educational system starting from primary to tertiary institutions and also standard research institutions are also located in the state. The Local Government Area has an area of 291km. The main source of drinking water for the people are wells, streams, pipe borne water and few boreholes; the stream water is used mostly during dry seasons when the wells get dry and can also serve as source of drinking water for the people.

Among the population of the locality, the sanitary systems are mostly pit latrines, water systems, but some defecate in open places like bushes thereby enhancing the transmission of helminthes. Plateau State Specialist Hospital Jos Nigeria, is a tertiary Health institution that provides specialized medical services, train Health professionals and serves as a research centre. It is located in Jos-North Local Government Area in Plateau State, Nigeria and has an area of 291km.

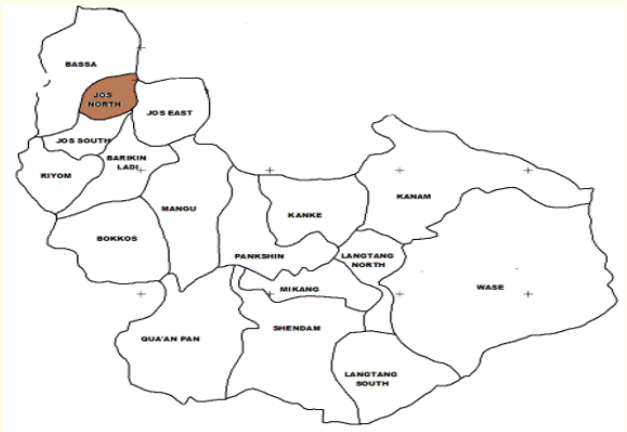


Figure 1: Map of Plateau State Showing the study Area Adapted from (Plateau state ministry of lands and survey.

Study population

The study was conducted on one hundred and fifty (150) in and out patients. The population included adults and children of both male and female sexes attending the hospital between different age groups. The samples were collected from patients and his or her attention was drawn to the health implications of harboring any

intestinal parasites for a long period of time. The patient's consent was then taken and the samples then collected and taken to the laboratory.

Sampling technique

Random sample collection was adopted in the collection of samples in order to give a fair representation of the whole population involved. Clean and transparent well labeled specimen bottles were used for the collection of faecal samples for easy processing of the samples. A bottle about 2g of weight each per individual for faecal sample collection. However, the specimen bottles were labeled with the following information inscribed on each bottle such as name, sex, age, source of drinking water, type of toilet facilities, and socio-economic status of the patient. The patients are instructed to collect the samples into the bottles in the morning to be returned to the laboratory.

The stool samples were collected and preserved in 10% formaldehyde to avoid putrefaction in case bioassay were delayed or processed immediately. Meanwhile samples collected were immediately taken to the laboratory for diagnosis using WHO parasitology guide [20]. Also, hospital records were collected from the record unit of the hospital to know the prevalence of the parasites over time and check the level of attention given.

Laboratory diagnosis of samples

After collection and preservation, the samples were first observed using microscopic examination method to check for presence of adult worms. The methods employed for the examination of the specimens included direct Smear method [21] and Formol-Ether Concentration Technique [22]. The two methods employed were not for comparative study but rather complementary to each other.

Direct smear method

As described by [21] a drop of normal saline was placed on a clean grease-free slide using a pipette. Using an applicator stick, a small amount of the faecal sample was taken and placed in the saline preparation. It was thoroughly emulsified to remove all debris (undigested food particles) and a drop of lugol's iodine was added to the smear. A cover slip was placed at an angle of 45^0 to avoid trapping air bubbles. The slide was observed under the microscope using X10 objective for scanning and X40 objective for identification.

Formol - ether concentration method

Here, 1g of the faecal sample is placed into test tube containing 10ml of normal saline and emulsified thoroughly to give a homogenous solution. The mixture was filtered and afterwards thoroughly shaken and transferred into a centrifuge tube by sieving through a sieve into a beaker so that roughage was trapped and discarded. This was then centrifuged at 200 Revolution Per for 3minutes and 7ml of 10% formal-saline with 3ml of ether was added to the clear deposit. The mixture was then rigorously shaken and allowed to stand for 2 minutes and the supernatant discarded. The deposit was then examined under the microscope using X10 and X 40 objective [23].

Results

Gender based analysis for Ascariasis infection

The prevalence of Ascariasis in relation to gender among study participants in the study area is shown in table 1. The infection was slightly higher in females 10(6.67%) compared to males 4(2.67%).

Gender	No. examined	No. infected	Percentage prevalence (%)
Male	71	4	2.67
Female	79	10	6.67
Total	150	14	9.33

Table 1: Gender-related Prevalence of Ascariasis in the study area.

Calculated value = 1.98.

The tabulated value at P = 0.05 = 3.841.

Since calculated value < tabulated value, therefore there is no significant difference between males and females and the null hypothesis (H_0) has to be accepted.

Age based analysis for Ascariasis infection

The prevalence of Ascariasis in relation to age among study participants in the study area is shown in table 2. The highest was recorded in age group 13 years and above 9(6.00%) while the least infection was recorded in 0-4 years and 9-12 years 1(0.67%).

Age group (years)	No. examined	No. infected	Percentage prevalence (%)
0-4	8	1	0.67
5-8	16	3	2.00
9-12	27	1	0.67
13-above	99	9	6.00
Total	150	14	9.33

Table 2: Age-related Prevalence of Ascariasis in the study area.

Calculated value = 13.23

Tabulated value at P = 0.05 = 7.815

Since calculated value > tabulated value, the null hypothesis (H_0) that the age of patients does not affect the prevalence of Ascariasis is therefore rejected.

Analysis of ascariasis infection based on the types of toilet facilities

The prevalence of Ascariasis in relation to toilet facilities among study participants in the study area is shown in table 3. The infection was slightly highest in those that defecate in the bush 9(6.00%) and lowest in those who uses Water Cistern 1(0.67%).

Type of toilet facilities	No. examined	No. infected	Percentage prevalence (%)
Water cisten	60	1	0.67
Pit latrine	55	4	2.67
Bush	35	9	6.00
Total	150	14	9.33

Table 3: Types of Toilet facilities-related Prevalence of Ascariasis infection in the study area.

Calculated value = 16.21.

Tabulated value at p = 0.005= 5.991.

Since calculated value > tabulated value, the Null hypothesis that the type of toilet facilities used by patients has no effect on the prevalence of Ascariasis therefore is rejected.

Analysis of Ascariasis Infection based on Sources of Drinking Water

The prevalence of Ascariasis in relation to water sources among study participants in the study area is shown in table 4. The infection was highest in those that have their water form river/ streams 11(7.33%) and zero in those who uses Tap water (0.00%).

Source of drinking water	No. examined	No. infected	Percentage prevalence (%)
Tap water	67	0	0
Well water	34	3	2
River/stream	49	11	7.33
Total	150	14	9.33

Table 4: Sources of drinking water-related Prevalence of Ascariasis in the study area.

Calculated value = 30.896.

Tabulated value at p = 0.05= 5.991.

Since calculated value > tabulated value, the null hypothesis that the source of drinking does not affect the prevalence of Ascariasis is therefore rejected.

Discussion

This study on the prevalence of Ascariasis among patients attending Plateau State Specialist Hospital reported higher prevalence (9.33%) than a study conducted amongst primary school pupils in neigbouring Jos south local government area (0.2%) [25] even though, this study Dangana, 2011 had an overall prevalence of soil-transmitted helminth as 5.3%. The findings in the current study are relatively low compared to other studies (Okonkwo, 2002) 84.7% and 30% (10/60) [26]. These differences could be attributed to the difference in time when these studies were conducted and the study groups. The earlier studies in 2002 and 2011 reported higher prevalence compared to the current study. This could be as a result of increase in awareness and educational campaigns towards the control of soil-transmitted infections. The study with the highest prevalence [11] was conducted amongst vegetable farmers which is a more exposed population compared to the tertiary institution students and the patients attending Plateau Specialist Teaching Hospital in the current study. Prevalence in relation to gender, age group, source of

drinking water, and toilet facilities used by patients were observed to be different as reported elsewhere [23]. Helminthes infections are prevalent in Plateau State Specialist Hospital among both the old and young people. From the data obtained from the record unit of the hospital in the years 2013 and 2014, it was observed that that helminthiasis was higher among adults than in children and in relation to sex, females have a higher infection rate than males. From the current study, there was a higher prevalence of ascariasis among patients within the age group 13 and above 9 (6%) observed but it decreases as age advances toward 60 years as reported by other researchers [23,24]. In relation to sex, females were found to have a higher prevalence with 10 (6.67%) than males who had 4 (2.6-lkgb/.7%). This is in agreement with other studies [26]. This is probably because female do a lot of domestic chores and get contaminated with the parasites than males. In relation to the source of drinking water, there was a higher prevalence of infection among patients who drink water from stream or rivers with 11 (7.33%), followed by those who drink water from wells 3 (1.00%) and from tap water was 0 (0.00%). This is because improved water treatment and sanitation can protect people from Ascariasis and other water borne infections [27]. In relation to the toilet facilities, a higher prevalence was more among those who used bush with 9 infected (6.00%), followed by pit latrine had 4 patients infected (2.67%), and water system had 1 patient infected (0.67%). This could be true as the socio-economic status of the people have been reported to determines the prevalence of ascariasis [28,29]. This is probably due to the indiscriminate defecation around streams and bush, where the faeces get washed by water into the stream, the eggs released and the streams now serves as a potential source of infection.

Conclusion/Recommendation

We have reported in this study that gender, age, source of drinking water and toilet plays very vital roles in the transmission of soil-transmitted helminths with emphasis on ascariasis. This could be attributed to negligence, ignorance and lack of awareness in relation to the disease transmission.

An enlightenment campaign should be embarked upon by the government and non-governmental organization on water and food related diseases and other diseases that have to do with public hygiene in general. Actions have to be taken concerning the campaign in order to address the problem. Preventive and control measures have to be put in place to cushion the effect of parasitic infection.

Financial Support and Sponsorship

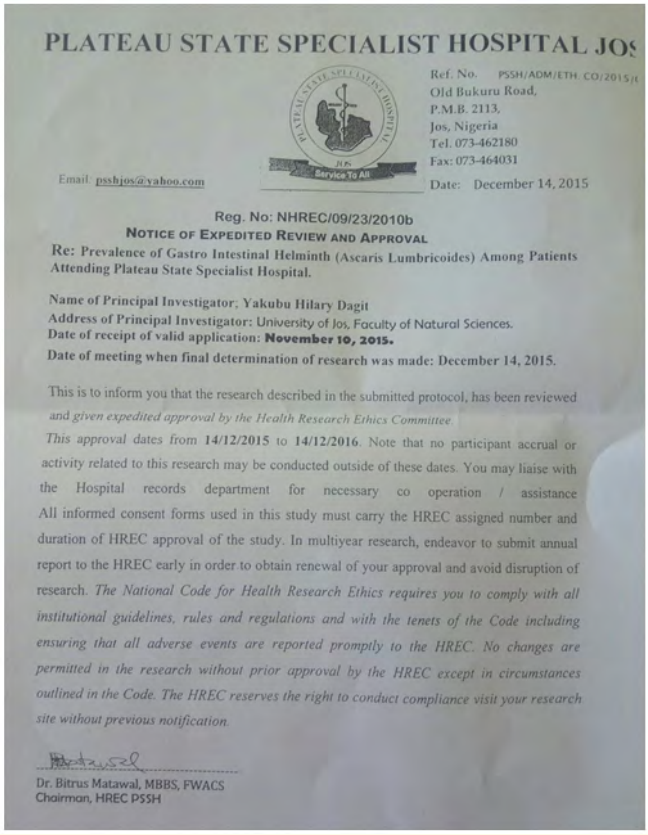
Nil.

Conflicts of Interest

There are no conflicts of interest.

Ethical Consideration

Ethical clearance (PSSH/ADM/ETH.CO/2015/005) for this study was given approval by the Health Research Ethics Committee (HREC), Plateau Specialist Hospital, Jos (See Appendix 1).



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Date: December 14, 2015

Reg. No: NHREC/09/23/2010b

NOTICE OF EXPEDITED REVIEW AND APPROVAL

Re: Prevalence of Gastro Intestinal Helminth (Ascaris Lumbricoides) Among Patients Attending Plateau State Specialist Hospital.

Name of Principal Investigator; Yakubu Hilary Dagit
Address of Principal Investigator: University of Jos, Faculty of Natural Sciences.
Date of receipt of valid application: **November 10, 2015.**
Date of meeting when final determination of research was made: December 14, 2015.

This is to inform you that the research described in the submitted protocol, has been reviewed and *given expedited approval by the Health Research Ethics Committee.*

This approval dates from **14/12/2015** to **14/12/2016**. Note that no participant accrual or activity related to this research may be conducted outside of these dates. You may liaise with the Hospital records department for necessary co operation / assistance All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of research. *The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the HREC. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.*

Dr. Bitrus Matawal, MBBS, FWACS
Chairman, HREC PSSH

Appendix 1

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