International Journal of Pathogen Research

1(1): 1-7, 2018; Article no.IJPR.41061

Prevalence of Intestinal Helminthic Infections in Pregnant Women Attending Antenatal Clinic in Abeokuta, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AAA designed the study and performed the statistical analysis. Author OAA carried out the practical and wrote the protocol. Author JAO wrote the first draft of the manuscript. Authors IP and AAD managed the analyses of the study. Author EOO managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJPR/2018/v1i11202
Editor(s):
(1) Khadiga Ahmed Ismail Eltris, Professor, Ain Shams Faculty of Medicine, Ain Shams University, Cairo, Egypt.
Reviewers:
(1) Jorge Hernández Bourdón, Universidad Metropolitana de Puerto Rico, USA.
(2) Daniel Griffin, Columbia University, USA.
(3) Terhemen Kasso, University of Port Harcourt, Nigeria.
Complete Peer review History: http://www.sciencedomain.org/review-history/24772

Original Research Article

Received 5th March 2018
Accepted 13th May 2018
Published 25th May 2018

ABSTRACT

Intestinal infections during pregnancies are recorded with common factors which include prenatal mortality, poor nutritional status, impaired growth, low birth weight, anaemia and disease burden. It is one of the major public health problems in developing nations.

This survey was carried out with 100 pregnant women attending Oba Ademola II Maternity Hospital, Ijemo, Abeokuta, within six months to determine the infection prevalence, intensity, risk factors and packed cell volume (PCV) correlation. Determination of helminth was done by formo-ether sedimentation technique. Structured questionnaire was applied and analyzed using Analysis of variance (ANOVA).

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Results revealed the prevalence of Hookworm to be 18%, while that of Ascaris was 50%. Comparison of age between 18-45 years old and level of education was also taken into consideration.
Personal hygiene was significantly associated with reduced likelihood of infection. From this study, it is evident that helminthic infections were prevalent among pregnant women. It is therefore recommended that antenatal clinics should incorporate routine stool examination for pregnant women to detect parasitic worms and refer positive cases for medical treatment and routine deworming of all pregnant women after the first trimester should also be encouraged.

Keywords: Helminth; anaemia; prevalence; Ascaris; hookworm; disease burden.

1. INTRODUCTION

Intestinal helminthes are among the most common and wide spread of human infections/diseases in developing world. Thousands of rural and impoverished villagers throughout the tropics and sub-tropics are often chronically infected with several different species of parasitic worm [1]. About two-billion harbour these infections worldwide of which 300 million suffer associated severe morbidity and even death. The World Health Organization (WHO) estimates indicate that helminthiases account for more than 40% of the disease burden due to all tropical diseases [2].

Helminthiasis, also known as worm infection is any macroparasitic diseases of humans and other animals in which a part of the body is infected with parasitic worms known as helminthes. There are numerous species of these parasites which are broadly classified into tapeworm flukes, and roundworms [3]. They often live in the gastrointestinal tract of their host but they may also burrow into other organs where they induce physiological damage [4].

Soil transmitted helminthiasis and schistosomiasis are most important helminthiases among the neglected tropical diseases [5]. Soil transmitted helminthiases are responsible for parasitic infections in as much as a quarter of the human population worldwide [6].

Globally there are 800 – 1000 million cases reported of *Ascaris lumbricoides*, 700 – 900 million cases of *Necator americans* and *Ancylostoma duodenale* and 500 million cases of *Trichuris trichiura*. Prevalence and intensity of infection are especially high in developing countries, among populations with poor environmental sanitation [7].

Intestinal helminthiases contribute to poor nutritional status, anaemia and impaired growth. In the developing world, young women, pregnant women, infants and children frequently experience a cycle where malnutrition alongside with parasitic infections lead to adverse consequences that can continue from one generation to the next. In somewhat more limited or focal geographic settings, other parasitic diseases (e.g. schistosomiasis, filariasis) contribute similarly to this cycle [8].

Intestinal helminthes and filariasis have a dramatic impact on reproductive health. Many cases of unexplained pregnancy loss are due to undiagnosed tropical diseases. Occurrence of hookworm infection during pregnancy contributes importantly to the level of anaemia in mothers and child. Helminthiasis has been found to result in poor birth outcome, poor cognitive development, poor school and work performance, poor socio-economic development and poverty [3].

2. MATERIALS AND METHODS

2.1 Ethical Approval and Informed Consent

At the beginning of the study, the community at Maternity Hospital was briefed on the objectives of the study; afterwards, the study protocol was approved by the State health Authorities.

2.2 Collection of Samples

Stool, urine and blood samples were collected on every antenatal day of clinic visitation.

Stool: Fresh stool sample was collected from the participants after the next antenatal day. Labeled leak proof stool container was used. About 2gram of stool sample was collected into sterile container using applicator sticks.

Urine: About 10ml of fresh urine was collected in clear dry container place in a universal bottle.

Blood: Blood sample was collected by pricking the finger and collected through one end of the capillary tube and other sealed.

2.3 Examination of Samples

Stool Examination: Fresh stool sample were examined microscopically within 24 hours of collection using the formo-ether sedimentation concentration technique.

2.4 Procedure

About 2grams of stool was weighed in 8ml of 10% formalin. The suspension was sieved using a small white cotton cloth and collected in a boiling tube. The filtrate was then transferred into a universal bottle and spun at 3000 rpm (revolution per min). Hereafter, about 3-4 ml of diethylether or ethyl acetate was added.

Second centrifugation was done at 3000 rpm for one minute. After spinning, the parasites were found as sediments at the bottom of the tube and the faecal debris was also collected in a layer between the ether and formalin for each stool sample, the average total numbers of eggs were recorded. The magnifications of 10x and 40x were used respectively to visualize and identify intestinal helminth ova [9].

For more identification, a small drop of iodine was placed on the sediment on a slide under cover glass and viewed under microscopy which gave number per gram of faeces.

Urine Examination: About 10 millilitres of urine was collected in a clean dry container placed in a universal bottle and spun at 2500 rpm for 2 minutes. The supernatant fluid were discarded, all sediments were transferred on a slide with cover glass and examined microscopically using the 10x objective lens.

Enumeration of eggs in the preparation field were done and reported per 10 ml of urine while Schistosoma was absent.

For Ascaris:

Light infection→1-4999 eggs/ml
Moderate infection→ 4999-5000 eggs/ml
Heavy infection →50,000 egg/ml [10]

For Hookworm:

Light infection →1-999 eggs/ml
Moderate infection →1000-9,999 eggs/ml
Heavy infection →10,000 eggs/ml [10]

Blood Examination: Blood in capillary tube was spun with hematocrit machine at 2,000 rpm for 2 minutes. And later read on Hematocrit reader to determine the packed cell volume (PCV) present and values recorded.

2.5 Statistical Analysis

Data analyses were carried out by determining the frequency, mean, and chi-square for association.

3. RESULTS

Examination of intestinal helminthic infections in pregnant women often occur in gastrointestinal tract of their host and affects the outer layers of the intestinal wall, break the packed cell volume which lead to low level of red blood cells production and causes anaemia and leading to poor birth outcome.

The frequency and percentage distribution of study participants by socio-demographic variables is shown in Table 1. The margins in age range of most of the sampled respondents was little, however majority (29%) were between 34 and 45 years of age. Majority of the sampled respondents were married (96.0%) and a high proportion of participants were educated up to the secondary level (54.0%). Most were traders (44.0%), and the majority lived in flats (52.0%). Tap water (43.0%) and well water (41.0%) were the major drinking water sources, and majority had modern toilet facilities (77.0%) as their choice of waste disposal. A bulk of the respondents (94.0%) claimed they disposed their garbage properly and wearing foot wears (sandals) (73.0%) within the house was employed by the majority of the respondents. All of the respondents claimed they wore some form of protective foot wears (slippers/sandals) outside of the house.

The frequency and percentage distribution of the prevalence of *Ascaris* and *Hookworm* is shown in Figs. 1 and 2. The prevalence of *Ascaris* was equally split between the respondents i.e. (50%) negative, (50%) positive (Fig. 1), while a lesser percentage of the respondents (18%) were infected with *Hookworm* i.e. (82%) negative, (18%) positive (Fig. 2).

The correlation between the packed cell volume (PCV), *Ascaris* and *Hookworm* is shown in Table 2. The correlation between the variables was negative and significant implying that an

increase in one would yield a decrease in the other. The correlation between PCV and *Ascaris* was (r = -0.568, p<0.01) at -56.8%, while the correlation between PCV and Hookworm was (r = -0.414, p<0.01) -41.4 %. Correlation between *Ascaris* and *Hookworm* was however weak (r = -0.263, p<0.01) at -26.3%.

In Table 3, there were no significant differences (p>0.05) in the prevalence of *Ascaris* with the age groups. Mean values however ranged from 9.94 to 14.00 for *Ascaris*. There were significant (p<0.05) differences in the prevalence of *Hookworm*s due to the age groups. There was an increase in the population of the *Hookworm*s with an increase in age of the respondents. The highest number of *Hookworms* was obtained from respondents in the age range of 34–35 years of age.

There were significant differences (p>0.05) in the prevalence of *Ascaris* and *Hookworm* with the home types (Table 4). Prevalence of *Ascaris* ranged from 3.40 in respondents squatting with others to 17.25 in respondents living in family houses. Differences in the prevalence of *Hookworm*s recorded for respondents living in rented apartments (4.25) and self-owned apartment (8.36) were similar (p>0.05), prevalence values were however significantly higher (p<0.05) than obtained from those from other home types.

Table 1. Socio-economic characteristics of the respondents

Variables		Frequency	Percentage	Mode
Age	18-25	21	21.0	34 – 45
	26-30	28	28.0	
	31-33	22	22.0	
	34-45	29	29.0	
Marital status	Single	1	1.0	Married
	Married	96	96.0	
	Divorced	2	2.0	
	Widowed	1	1.0	
Level of education	Primary	3	3.	Secondary
	Secondary	54	54.0	
	Tertiary	43	43.0	
Occupation	Unemployed	12	12.0	Traders
	Artisan	27	27.0	
	Trader	44	44.0	
	Farmer	1	1.0	
	Civil Servant	16	16.0	
Type of living quarters	Face to Face	47	47.0	Flat
	Flat	52	52.0	
	Others	0	0.0	
Water Source of drinking	Well	7	7.0	Tap
	Tap	43	43.0	
	Borehole	9	9.0	
	Sachet water	41	41.0	
Toilet facility	None	2	2.0	Modern
	Latrine	21	21.0	
	Modern	77	77.0	
Garbage disposal	None	6	6.0	Other
	Other	94	94.0	
Use of Sandals/Slippers within the house	Yes	73	73.0	Yes
	No	27	27.0	
Use of Sandals/Slippers outside the house	Yes	100	100.0	Yes
	No	0	0.0	

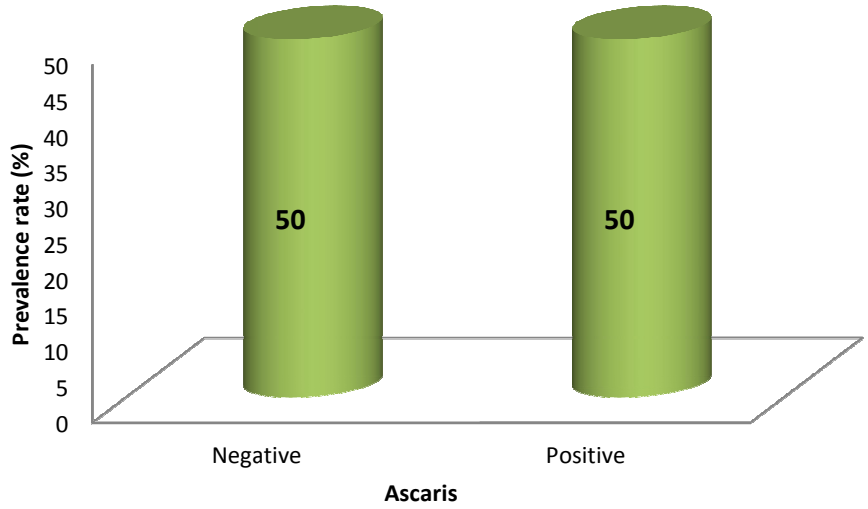

Figure 1. Prevalence of *Ascaris* amongst the respondents

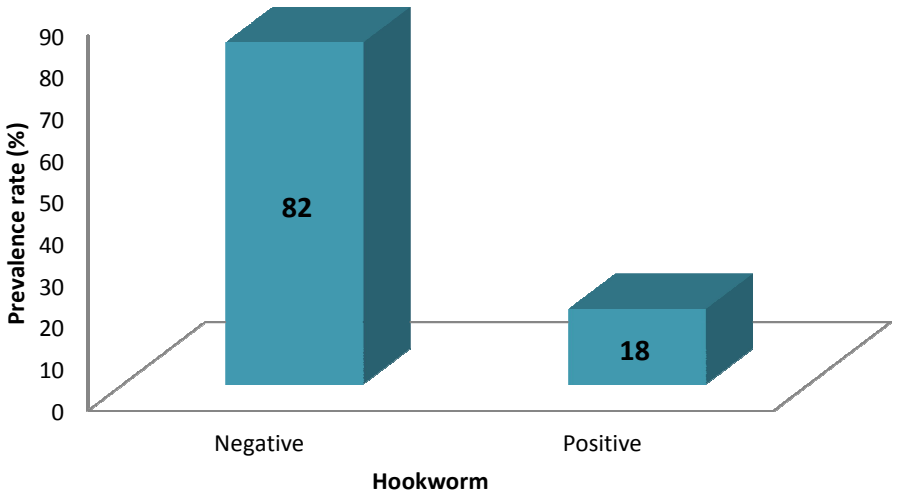

Figure 2. Prevalence of *Hookworm* amongst the respondents

Table 2. Correlation between the intestinal helmiths and packed cell volume

	Packed cell volume	*Ascaris*	*Hookworm*
Packed cell volume	1		
Ascaris	-0.568**	1	
Hookworm	-0.414**	-0.263**	1

***: p<0.01*

4. DISCUSSION

The Prevalence of intestinal helminthic infections among pregnant woman, attending antenatal clinic at Oba Ademola maternity hospital, shows different parameters; most popular are the environmental factors, parasitic factors and host factor. Intestinal helminthiases with A.

Lumbricoides and hookworm have been seen among pregnant woman attending antenatal services [11].

Table 3. Influence of the age groups on the prevalence of *Ascaris* and *Hookworm*

Age groups (Years)	*Ascaris*	*Hookworm*
18 – 25	9.94	2.25[b]
26 – 30	10.46	3.38[b]
31 – 33	14.00	5.96[a]
34 – 35	8.62	7.21[a]

[abcd]: means on the same column with different superscript differ significantly (p<0.05)

Table 4. Influence of the type of home on the prevalence of *Ascaris* and *Hookworm*

Home type	*Ascaris*	*Hookworm*
Squatting	3.40[c]	0.00[b]
Rented	9.78[b]	4.25[a]
Family House	17.25[a]	0.13[b]
Self-Owned	13.23[a]	8.36[a]
Others	1.00[c]	0.00[b]

[abcd]: means on the same column with different superscript differ significantly (p<0.05)

The parasites species encountered in the study of overall prevalence rate was high compared to other related studies form countries like Congo, Kenya and other parts of the world [7] where 30-40% of pregnant women were reportedly infected. The prevalence was lower in studies carried out in countries like Brazil, Indonesia, Kassena–nankana district of Ghana [12]; variation could be attributed to difference in sample size and area of geographic study. Dominance of *Ascaris lumbricoides* was compared with previous studies for example parasitic infections in a rural community southwest Nigeria [13].

Ascariasis was a common infection because of ease spread of faecal pollution of soil [14]. Human get infection by ingesting contaminated eggs into food, drink or soil. It can be spread by animals and survive for a longer periods in the soil. These explain why the infection is distributed throughout the world [15].

Hookworm was the second most common helminthic infection which is related to anaemia among pregnant women with low prevalence rate compared with related reported studies in Uganda, Kenya, Venezualae [16]. Brooker et al. [17] likewise reported low prevalence of helminthic infections in pregnant women in antenatal clinic of Tanzania.

5. CONCLUSION

The results of this study show that intestinal helminths are underestimated public health problem among pregnant women and socio-economic factors play an important role in the establishment and spread of the infections in communities. Intestinal helminthiases were more prevalent in pregnant women of 25 years and below compare to older women.

Eating of soil-contaminated foods and lack of regular hand washing also contribute to the establishment of this infections [11]. Pregnant women in rural areas are susceptible to this infection due to the poor environmental sanitation, improper waste disposal techniques. It can be concluded that intestinal helminthiases are prevalent among pregnant women. Ascariasis, hookworm infection were the most Prevalent infections in the study participants. The differences in prevalence may be due to environmental factors and sample size used in various studies as reported in Nigeria [18].

6. RECOMMENDATIONS

It should be recommended that antenatal clinics should have routine stool examination to detect parasitic infections in pregnant women and send positive cases for appropriate medical treatment and routine deworming of all pregnant women after the first trimester should also be encouraged.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Hotez PJ, Diemert D, Bacon KM. The human hookworm vaccine. 2013;31:227-232.
2. Gotuzzo GB, Bentwich Z. Eradication of helminthic infections. Bulletin of W.H.O.; 2004.
3. W.H.O. World Health Organization, Intestinal helminth infection and Global brief on vector borne diseases. 2002; 1(2):22.
4. Del Brutto OH. Nerocysticercosis: A review. The Scientific World Journal Epidemiology of Iron Deficiency Anemia in School Children. 2012;21(3):234-256.

5. Mabaso WU, Alakija. Prevalence of intestinal parasitic disease in stool of people in rural area of Nigeria. The Southeast Asian Journal of Tropical Medicine and Public Health. 2012;80(5): 545–547.
6. Madiba TE, Hadley GP. Surgical management of worm volvulus South African Journal of Survey. 1996;34(1):33 – 35.
7. Van Eijk AM, Lindblade KA, Odhiambo F. Geo-helminth infections among pregnant women in rural western Kenya: A cross-sectional study. The New England Journal of Medicine. 2009; 3(1):516-520.
8. Steketec MO, Eckert J. Helminths Medical Microbiology. 2003;560–562.
9. Crompton DWT. Human nutrition and parasitic infection. Cambridge University Press; 1993.
10. Shrestha JB, Dreyfuss ML. Hookworms, malaria and vitamin A deficiency. The Journal of Nutrition. 2000;130.
11. Cheesebrough M. District laboratory practice in tropical countries, part 2. Cambridge University Press; 2004.
12. Fusein G, Edoh D, Kelifa BG, Hamid AW, Knigtn D. Parasitic infection and anaemia during pregnancy in the Kassena-Nankana District of Northern Ghana. Journal of Public Health and Epidemiology. 2000; 2(3):48-52.
13. Adeyeba OA, Akinlabi AM. Intestinal parasitic infestations among school children in a rural community, South West Nigeria. Nigerian Journal of Parasitology. 2002;23(1):11-18.
14. Mordi RM, Ngwodo POA. A study of blood and gastro-intestinal parasites in Edo State. African Journal of Biotechnology. 2007;6(19):2201-2207.
15. Nmorsi SD, Humphries DL, Stephenson LS, Pearce PH, Dan HT, Khanh LT. The use of human faeces for fertilizer is associated with increased intensity of hookworm infection in Vietnamese women. Transactions of the Royal Society of Tropical Medicine and Hygiene. 1991;91(5):518-520.
16. Mugenda OM, Mugenda GM. Research method, quantitative and qualitative approaches. Acts Press, Nairobi, Kenya; 1999.
17. Brookers FM. The potential of geographical information systems. Advance parasitology and control of human helminth infection. 2002;47:245–288.
18. Alli JA, Okonko IO, Kolade JC, Ogunde M. Prevalence of intestinal nematode infection at University College Hospital, Ibadan, Nigeria. Advances in Applied Science Research. 2011;2(4):1-13.

Peer-review history:
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