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Original Article

Haemoglobin Level and Intestinal Parasites in Pregnant Women in Eziama, Imo State of Nigeria

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Abstract

This prospective study was carried out between January to June, 2008 at Eziama in Isiala Mbano Local Government Area of Imo State to determine the haemoglobin level and intestinal parasites in pregnant women attending antenatal clinic. In total, 281 stool and blood samples were collected from the women. The stool samples were examined using direct wet preparation and formol ether concentration technique while the haemoglobin levels of the women were estimated using cyanmethaeoglobin technique. The overall prevalence of *E. histolytical, A. Lumbricoides*, Hookworm Spp, *T. trichuria* and *G. lamblia* was 10(3.6), 31(11.0), 29(10.3), 10(3.6) and 3(1.1) respectively. The proportion of pregnant women with helminithic infestation was 83 (29.6%) while their mean Heamoglobin concentration was 9.7±1.8g/dl while the pregnant women without helminthic infestation had Heamoglobin concentration of 10.4 ± 1.3g/dl. The poor socioeconomic status of the women coupled with poor environmental sanitation and lack of clean portable water supply may have contributed to the high prevalence.

1. Introduction

Anemia is the commonest nutritional problem worldwide with its highest prevalence among young children and pregnant women. It is especially more common in developing countries because of poor nutrition and high prevalence of parasitic infestation [1]. Anemia was defined as haemoglobin (HB) of less than 11g/dl, according to WHO criteria [2]. Any woman with heamoglobin (Hb) of 11g/dl or more was considered normal, haemoglobin between 9g/dl to 10.9g/dl was considered as mild anemia, between 7g/dl to 8.9g/dl moderate and Hb less than 7g/dl was serve anemia [3].

Intestinal parasites are parasites that populate the gastro-intestinal tract. In humans, they are often spread by poor hygiene related to faeces, contact with animals, or poorly cooked food containing parasites [4]. Parasites can get into the intestine through the mouth from uncooked or unwashed food, contaminated water or hands or by skin contact with larva infected soil or if they have mouth contact with the genital or rectal area of a sexual partner who is infected. When the organisms are swallowed, they move into the intestine, where they can reproduce and cause disease. Prevalence of anemia among pregnant women in developing countries averages 56% with a range of 35% to 100% among various regions of the world [3]. In the USA, less than 30% of pregnant women develop anemia, whereas the prevalence rates in Africa, Asia and Latin America range from 35% to 75% [5]. Maternal deaths from anemia range from 34 per 100,000 live births in Nigeria to as high as 194 per 100,000 live births in Pakistan [6].

Intestinal parasitic diseases and the tropical zones have remained like Siamese twin [7]. The effects of parasitic infections are particularly severe during pregnancy when the demand for protein and iron by the developing foetus puts an extra chain on the mothers blood need. Heavy parasitic infections can cause premature birth, infant with low birth weight or stillbirth. It has been reported that iron-deficiency anemia is commonly associated with hookworm infections [8]. In some people, intestinal parasites do not cause any symptoms or the symptoms may come and go. Common signs and symptoms include coughing, cramping, abdominal pain, bloating, flatulence and diarrhea. In more serious infections, sex loss, skin-itching, fever, nausea, vomiting or bloody stool may occur [9]. Eradication of parasitic infection in a community can be feasible with adequate sanitary disposal of faeces, thus keeping the prevalence and severity under control and significantly reduction of morbidity and mortality. Intestinal parasitic infections which are very common in Nigeria have become so important because of the high rates of morbidity and sometimes mortality among patients in Nigeria towns and villages [7,10]. An earlier survey on the prevalence of helminthic infection in the general populace in Enugu established a prevalence rate of 27.9% [11].

Eziama is a fairly small town from its northern point in Oboh hills to its southern-Most of Isu area. Eziama stretches from the western boundary of Abba across the Okigwe - Owerri highway to Ezumoha in the east - the northern border of hills and river Ezealakatam of Oboh to the southern border of Isu (Dim-na-Nume) and Anara autonomous communities. It measures about ten kilometers. Its greatest width from Abba boundary to the eastern neighbor of Ezumoha is almost same length. Eziama is a plain along which ran the federal highway to Enugu, Owerri, Orlu and Eziama-Abba-Owerri-Nkworji roads. It is most fertile, hence very populated with about 30,000 inhabitants in 2004 [12].

The study was carried out to determine the haemoglobin concentration and the prevalence of intestinal helminthes in pregnant women attending antenatal clinic at Eziama.

2. Materials and Methods

2.1 Subjects

The survey was carried out on 281 pregnant women in Eziama isiala Mbano LGA of Imo state attending antenatal clinic between January 2008 and June 2008. A questionnaire covering information's such as names, age, occupation and environmental factors were given to each subject.

Dry clean leak proof plastic universal bottle was given to each subject for collection of their faecal sample. Also 2ml of blood was collected by venepuncture and dispensed into labeled EDTA anticoagulant bottles for the heamoglobin estimation.

2.2 Macroscopic Examination

Physical characteristic of the stool sample e.g. color, consistency (i.e. whether formed or semi formed unformed, or watery), presence of blood, mucus or pus and presence of adult worms were observed.

2.3 Direct Smear Examination

Saline and iodine preparations were used. A drop of fresh physiological saline was placed on one end of a clean grease free slide and a drop of iodine on the other end. Using an applicator stick a small quantity of the sample 2g(match stick head) was emulsified with both saline and iodine respectively until a smooth thin preparation was obtained. Each preparation was covered with a cover slip and examined microscopically using x10 and x40 objective. The iodine preparation was to assist in the identification of cysts found in the saline preparation Formol Ether Concentration Technique.

This method was carried out to concentrate parasite by centrifugal force. About 1g of faeces was emulsified in 4ml of 10% formol saline contained in a glass test tube and mixed by shaking. The emulsified faeces was sieved and collected in a beaker. The suspension was transferred to a centrifuge tube and 4ml of diethyl ether was added, covered, mixed for 1 minute and centrifuged immediately at 1,000rpm for 5minutes. Applicator stick was used to loosen the layer of the faecal debris from the side of the tube and the supernatant discarded. The tube was tapped to resuspend and mix the sediment. The sediment was transferred to a slide and covered with a cover slip. The preparation was examined microscopically using x10 objective with the condenser closed to give a good contrast .then x40 used to examine small cysts and eggs and a small drop of iodine was run under the cover slip to assist in the identification of cysts.

Table 1: Mean haemoglobin level of the pregnant women at different age group

Age group (Year)	Total number examined	Mean haemoglobin (g/dl)	Number Infected (%)
18 – 22	41	11.2±0.01	15(36.6)
23 – 27	81	10.4±0.01	20(24.7)
28 – 32	70	10.2±0.01	16(22.9)
33 – 37	60	9.6±0.01	21(35.0)
38 – 42	29	9.5±0.01	11(37.9)
Total	281	50.9± 0.01	83(29.6)

Table 2: Mean Hemoglobin Level of Infected and Non Infected Pregnant Women

Mean HB of women with intestinal parasite (g/dl)	Mean HB of women without intestinal parasite (g/dl)	P-value
9.7±1.8	10.4 ± 1.3	P<0.05

The prevalence of *E. histolytical* was 1 (2.0), 2 (3.3) and 7 (4.1) in pregnant women who drank Borehole, Well Water and Open Stream while pregnant women who drank Borehole, Well Water and Open Stream had hookworm prevalence of 3(6.0), 4 (6.6) and 22 (12.9). Also prevalence of *T. trichuria* was 2 (4.0), 3 (4.9) and 5(2.9) in

2.4 Haemoglobin Estimation *(Cyanmethaemoglobin Method)*

The Haemoglobin (Hb) concentration was determined using the cyanomethamoglobin method described by Cheesbrough [13]. Ferricyanide present in Drabkins solution oxidizes the iron (II) present in haemoglobin, oxyhaemoglobin and carboxyhaemoglobin into iron (III) giving rise to Methaemoglobin which in the presence of cyanide ion produces cyanomethaemoglobin a stable red compound that is photometrically determined at 540nm. Haemoglobin estimation was done by pippetting 5mls of Drabkins solution into test tube and 0.20ml (20ul) of blood added, mixed and allowed to stand at room temperature for 10 minutes to allow complete conversion to cyanomethamoglobin. The absorbance of the solution was read at 540nm using Drabkins solution as blank. The value of unknown was extrapolated from the calibration curve already prepared [13].

3. Result

The Mean Hemoglobin (HB) level in age group18 – 22 was 11.2g/dl while it was 10.4g/dl in age group 23-27years. Also in age group 28—32 years the HB concentration was 10.2g/dl. In age group 33-37 years the HB was 9.6g/dl while it was 9.5g/dl in age group 38 – 42years as shown in Table 1 below.

The result showed that mean hemoglobin of the women with intestinal parasites to be 9.7±1.8g/dl while it was 10.4 ± 1.3 in women without intestinal parasite as shown in the Table 2 below (P<0.05).

pregnant women who drank Borehole, Well Water and Open Stream while pregnant women who drank Borehole, Well Water and Open Stream had *G. lamblia* had prevalence of 0 (0), 0(0), and 3 (1.8). The prevalence of A. Lumbricoides was 2 (4.0), 5 (8.2) and 24(14.1) in pregnant women who drank Borehole, Well Water and Open Stream as shown in Table 3 below. The prevalence of *E. histolytical* was 3(3.0), 1(1.5) and 6(5.3) in pregnant women who used Pit Latrine, Water Cistern and Bush Method respectively while pregnant women who used Pit Latrine , Water Cistern and Bush Method had hookworm prevalence of 5(5.1), 3 (4.3) and 21 (18.6). Also prevalence of *T. trichuria* was 3 (3.1), 3 (4.3) and 4(3.5) in pregnant women who Pit Latrine, Water Cistern and Bush Method respectively while pregnant women who Pit Latrine , Water Cistern and Bush Method had *G. lamblia* prevalence of 2 (2.1), 1(1.5), and 0 (0.0) respectively. *A Lumbricoides* prevalence of 7(7.1), 5(7.2) and 19(16.8) respectively was obtained in .pregnant women who used Pit Latrine , Water Cistern and Bush Method as shown in Table 3 below.

Table 3: Prevalence of intestinal parasites in pregnant women based on source of their drinking water and toilet facilities

	Toilet Source				**Water source**			
Parasite	**Pit Latrine N(%)(99)**	**Water Cistern N(%)(69)**	**Bush Method N(%)(113)**	**Total N (%)(281)**	**Borehole N(%)**	**Well Water N(%)(61)**	**Open Stream N (%)(170)**	**Total N (%)(281)**
E. histolytica	3 (3.0)	1 (1.5)	6 (5.3)	10 (3.6)	1 (2.0)	2 (3.3)	7 (4.1)	10 (3.6)
A. Lumbricoides	7 (7.1)	5 (7.2)	19 (16.8)	31 (11.0)	2 (4.0)	5 (8.2)	24 (14.1)	31 (11.0)
Hookworm Spp	5 (5.1)	3 (4.3)	21 (18.6)	29 (10.3)	3 (6.0)	4 (6.6)	22 (12.9)	29 (10.3)
T. trichuria	3 (3.1)	3 (4.3)	4 (3.5)	10 (3.6)	2 (4.0)	3 (4.9)	5 (2.9)	10 (3.6)
G. lamblia	2 (2.1)	1 (1.5)	0 (0)	3 (1.1)	0 (0)	0 (0)	3 (1.8)	3 (1.1)
Total	**20 (20.2)**	**13 (18.8)**	**50 (44.2)**	**83 (29.5)**	**8 (16.0)**	**14 (23.0)**	**61 (35.9)**	**88 (29.5)**

The overall prevalence of *E. histolytical, A. Lumbricoides*, Hookworm Spp, *T. trichuria* and *G. lamblia* was 10(3.6), 31(11.0), 29(10.3), 10(3.6) and 3(1.1) respectively in pregnant women studied as shown in Table 4 below.

Table 4: Prevalence of Intestinal Parasites in Pregnant Women

Parasites	***E. histolytica***	***A. Lumbricoides***	***Hookworm* Spp**	***T. trichuria***	***G. lamblia***	**Total**
Prevalence N(%)	10(3.6)	31(11.0)	29(10.3)	10(3.6)	3(1.1)	83(29.6)

The prevalence of *E. histolytical* was 3(2.7), 1(2.4), 1(3.3) and 5(5.0) in pregnant women who are Traders, Housewives, Civil Servants and Farmers while pregnant women who are Traders, Housewives, Civil Servants and Farmers had hookworm prevalence of 6(5.5), 4(9.8), 2(6.7)and 17(17.0). Also prevalence of *T. trichuria* was 3(2.7), 2(4.9), 1(3.3) and 4(4.0) in pregnant women who are Traders, Housewives, Civil Servants and Farmers while pregnant women who are Traders, Housewives, Civil Servants and Farmers had *G. lamblia* had prevalence of 0 (0), 0(0), and 3 (3.0). The prevalence of *A. Lumbricoides* was 9(8.2), 3(7.0), 2(6.7) and 17(17.0) in pregnant women who are Traders, Housewives, Civil Servants and Farmers as shown in Table 5 below.

Table 5: Prevalence of Intestinal Parasites In Pregnant Women based on their occupation

Parasite	Traders	Housewives	Civil Servants	Farmers	Total
	No (%)	No (%)	No (%)	No (%)	No (%)
E. histolytica	3(2.7)	1(2.4)	1(3.3)	5(5.0)	10(3.6)
A. Lumbricoides	9(8.2)	3(7.0)	2(6.7)	17(17.0)	31(11.0)
Hookworm Spp	6(5.5)	4(9.8)	2(6.7)	17(17.0)	29(10.3)
T. trichuria	3(2.7)	2(4.9)	1(3.3)	4(4.0)	10(3.6)
G. lamblia	0(0.0)	0(0.0)	0(0.0)	3(3.0)	3(1.1)
Total	21(19.1)	10(23.3)	6(20.0)	46(46.0)	83(29.5)

4. Discussion

The study showed that women with parasitic infestation were severely anaemic. The study also found a strong association between anemia and helminthic infection, which is similar to the result of earlier studies by Murthy *et al* [14] and Singh *et al*[15]. It has been seen around the world that micronutrient deficiency, parasitic infestations and stunting are significantly related problems [16]. A similar study in Nepal found high prevalence of parasitic infection where the associated morbidities like anemia and reduced resistance due to other nutritional disorders made the condition worse and helminthes infestation further aggravated anemia.

The study showed that women with parasitic infestation were severely anaemic. The overall age group specific prevalence in the age group revealed increased infection rate among the "38 – 42" age group (37.9%) as in table 1 and this could also be the illiterate group. This transmission and most may not be attending ante-natal clinics from the onset of pregnancy. The low prevalence of the infection among the women in the 28 – 32 age groups (22.9%) as in table 1 could be due to exposure to health programmes/lectures usually organized in their ante-natal clinics.

This study showed total prevalence of intestinal parasitic infection of 29.6% as in Table 1 which is higher than the value of 27.9% reported by Uchenna *et al*[17] in Enugu State, Nigeria. *Ascaris lumbricoides* (11.0%) was the commonest of all the intestinal parasites found infecting pregnant women in this study as in Table 4. this is similar to the studies made by Chan [18] and Uchenna *et al*[17]. Heavy parasite burden may cause digestive and Nutritional disturbances, blockage of the guts and perforation of tissues. Infection is spread through eggs, which are swallowed as a result of ingestion of contaminated soil or contact between the month and various objects carrying the adherent eggs.

Hookworm was the second most common parasite Table 4. Similar report was made by Chan [18] which showed that Hookworm was the second highest intestinal parasite. Effiome *et al*[19] also reported Hookworm infection in antenatal women. The value of Hookworm in this study is lower to that reported by Egwunyenga *et al*[20]) who reported infection rate of 22.5% at Eku in Delta State of Nigeria and Nwosu *et al*[21] who reported 25.8% in Aba, Abia State Nigeria while it was higher than the value reported by Azomine *et al*, who reported a prevalence value of 8.17% in Enugu State, Nigeria. Hookworm infection occurs by skin penetration of the infective larve due to poor sanitary disposal of human faeces. Prevalence is high in agricultural communities where human faeces are used as fertilizers and also where people go about barefooted.

In this study *Entamoeba histolytica* with prevalence of 3.6% and *Giardia Lamblia* (1.1%) were the protozoan parasite isolated. In this study *E. histolytica* had higher prevalence of 10(3.6%). Similar studies by Obiamiwe and Nmorsi [22] reported a value of 3.9% while, Anosike *et al*[23] reported 5.5% respectively. The parasite may sometimes invade tissue resulting in intestinal or extra - intestinal disease. This parasite (*E. histolytica*) though low in prevalence was found in all the zones of the communites. Infections occurs through transmission of viable cysts by direct contact with contaminated food such as raw vegetables fertilized with human caeces and also though the intermediary of fulthy flies contaminated hands of human cyst carries.

G. lambia infection results as a result of ingestion of the viable cysts as a result of poor sanitary habits or contaminated food. *G. Lamblia* may be harboured by animals but they play little or no part in the epidemiology of human infections. In this study *T. trichiura* had a prevalence rate of 3.6% as shown in Table 4. This result is lower compared with the reports of Anosike *et al*[23] who reported a value of 14% amongst post primary school children in Owerri, Imo State, Nigeria and Oyindo *et al*[24] who reported a value of 5.3% among the inhabitant of Amaechi - Idodo community in Nkanu East Local Government Area of Enugu State.

T. trichuria popularly known as Whipworm because of the whip like from of the adult worm has a cosmopolitan distribution. It is however, prevalent in the warm humid tropics.

The high incidence recorded in this group of farmers (46.0%) and also in the group that uses bush as their toilet facility (44.2%) as shown in tables 3 and 5 respectively may be due to the fast most of the parasites are geo-helminths. The value of the group of farmers and that of users of bush higher to that reported by Ulstein *et al*[25]) who reported infection rate of 38.0% and 40.6% in Nepal. They are transmitted through the faecal-oral route via contact with infected soil through unwashed hand, fruits and vegetables and also as infective larvae penetrating human skin in a faecally polluted soil.

High prevalence recorded in the group that drinks open stream (39.9%) may be as a result of the water being contaminated by run-off from the infected environment.

5. Conclusion

Intestinal parasite infestation in pregnancy is significantly related with anemia, hence all women coming to antenatal clinics, should be screened for intestinal helminths infestation. The antenatal care should include de-worming, Health education to prevent anaemia while Pregnant women diet should be fortified with folate and iron supplement.

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