

The Prevalence of Intestinal Parasites and Anaemia among Pregnant Women Attending Antenatal Clinic in Federal Medical Centre Owerri, Imo State, Nigeria

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Abstract

Anaemia is a major contributor to maternal deaths in developing countries. Association of anaemia with intestinal parasites has been established, hence by eliminating intestinal parasite, anaemia may be reduced with positive effects on maternal outcome. A comparative cross-sectional study was done to determine the prevalence of anaemia and intestinal parasitic infection among pregnant mothers attending antenatal clinic in Federal Medical Centre Owerri Metropolis, Imo State. One hundred and twelve pregnant women with and without anaemia were enrolled in the study at the antenatal clinic of the hospital. The data on social and demographic variables was collected through a structured questionnaire. Haemoglobin estimation and stool examination for intestinal parasitic infection was done. Anaemia was found in 66 (58.9%) women and 52 (46.5%) had helminthic infestation. Anaemia was significantly related to intestinal parasites, especially hookworms. There was a highly significant relationship between education and the knowledge of women regarding effect of intestinal parasitic infestations ($P < 0.001$), transmission and spread of infestations ($P < 0.001$). The knowledge of women regarding the effect of intestinal parasitic infestation was significantly ($P < 0.001$) related to the occurrence of parasitic infestations. Intestinal parasitic infestation in pregnancy was significantly related to anaemia. Hence all women coming to antenatal clinics should be screened for intestinal parasites. The antenatal care should include deworming with correction and prevention of anaemia.

Keywords: Prevalence, Intestinal Parasites, Anaemia, Pregnant Women,

INTRODUCTION

Anaemia is defined as a reduction in the oxygen carrying capacity of the blood which may be due to a reduced number of red blood cells, a low concentration of haemoglobin or a combination of both⁽¹⁾. It is referred to as shortage of blood by the layman. It is a major contribution to maternal death in developing countries. Anaemia is also known as a condition that results from the lowering of the haemoglobin levels below what is considered to be normal for specific demographic groups⁽²⁾.

Anaemia is the most common nutritional deficiency in the world. Haemoglobin (Hb) is the oxygen-carrying component of red blood-cells. It is measured in g/dl which simply stands for grams per deciliter. Red blood cells (RBCs) are manufactured in the bone marrow and have a life expectancy of about 120 days (approximately 4 months)⁽³⁾.

Intestinal parasites are organisms that live in the intestines and derive their nutrients from their host⁽⁴⁾. World Health Organization (WHO)⁽⁵⁾ revealed that intestinal parasitic infections are endemic worldwide and have been described as constituting the greatest single worldwide cause of illness and diseases. The two main types of intestinal parasites are the helminthes (worms) and the protozoa. The helminthes have been mainly linked with an increased risk of nutritional anaemia, protein-energy malnutrition and growth deficit in children while in pregnancy, low pregnancy weight gain, low birth weight and inter uterine growth retardation⁽⁶⁾. The mean minimum value for haemoglobin accepted by the World Health Organization (WHO) is 11.0g/dl. A woman with haemoglobin levels below this value occurring in pregnancy has definition anaemia in pregnancy⁽⁷⁾.

Anaemia in pregnant women in developing countries is multifactorial in etiology. Iron and folate deficiency anaemia is related to poor intake and chronic haemoglobin states⁽⁸⁾. Anaemia is the commonest nutritional deficiency worldwide with its highest prevalence among young children and pregnant women. It is especially more common in developing countries like Nigeria due to poor nutrition and high prevalence of parasitic infections⁽⁹⁾. Malnutrition or anaemia caused by intestinal worms may be worsened by pregnancy and make room for complications. Hookworm for instances, induces deficiencies of iron, total energy, protein and possible folate and zinc⁽¹⁰⁾.

Pregnancy can be one of the most enjoyable and delight phase of a woman's life with increased expectations. However, there are several conditions that could make pregnancy painful and void of joy, disease, anaemia and intestinal worms are inclusive. Therefore, it is quite natural that pregnant women with any of these conditions

would be imposed with a considerable amount of stress on their body as it will be a major concern to them⁽¹¹⁾. Under normal circumstances, there are a lot of medicines and treatment options that can be used for the prevention or treatment of intestinal parasites but in pregnancy, use of conventional medicines may do more harm than good. Moreover, the type of treatment administered varies, based on the type of worms present in the pregnancy⁽⁶⁾. According to Myles⁽¹²⁾, it has been seen that the treatment of worm infestation on infested pregnant women takes much longer as compared to other group of individuals. Intestinal parasitic infection has been significantly related to anaemia in pregnancy. Hence, all pregnant women coming to antenatal clinics should be screened for intestinal parasites and antenatal care should include deworming and also anaemia prevention⁽³⁾.

The management and control of anaemia in pregnancy is enhanced by the availability of local prevalence statistics, which is however not adequate in Nigeria. Therefore, this study aims at providing prevalence statistics of anaemia and intestinal parasites in pregnancy. Intestinal parasitic diseases and anaemia are Siamese twins in tropical zones like Nigeria. This is due to the inadequate attention given to sanitation, personal hygiene and nutrition. The burden of infection is estimated to exceed 1,000 million infected persons each round worm, hookworm and whipworm⁽¹¹⁾. Data from WHO⁽¹²⁾ disclosed that 44 million of pregnant women in the developing world harboured hookworm infestation. Federal Medical Centre (FMC) Owerri was chosen for this study due to the fact that women from both rural and urban areas attend antenatal care there, thereby giving an insight into both regions. The specific objectives of the study include the following;

- To access the prevalence of anaemia and its relationship to intestinal parasitic infection among pregnant women receiving antenatal care in Federal Medical Centre, Owerri.
- To determine the cause and consequences of anaemia and intestinal parasites in pregnancy.
- To identify the preventive measures to be carried out to reduce their incidence.
- To map out strategies to prevent reoccurrence.

The study will help in providing knowledge and awareness on the rate which anaemia and intestinal parasitic infection dwells in our society. It also aims at providing prevalent statistics of anaemia and intestinal parasitic infections in pregnancy. The assessment of the effectiveness of antenatal care in preventing these conditions will also be viewed.

MATERIALS AND METHODS

Study Area

The study was carried out on pregnant women attending antenatal clinics in Federal Medical Centre (FMC) Owerri Municipal, Imo State South Eastern part of Nigeria in West Africa.

Sample Selection/Scope of the Study

Simple Random Sampling method was used to select pregnant women attending antenatal clinics in FMC Owerri on their first visit.

Sample Size Determination

The test of significance used was 0.05 (i.e. 5%). To determine the sample size, this formula was used:

$$n = \frac{N}{1 + n(e^2)}$$

Where: n = Sample Size
N = Population Size
1 = Constant
e = Margin of error test of significance (0.05)²

$$= \frac{150}{1 + 150(0.05)^2}$$
$$= \frac{150}{1 + 0.375}$$
$$= \frac{150}{1.375}$$
$$= 108$$

In case of drop outs, 5% of this will be added to the sample size.

$$\begin{aligned} \text{Thus} &= \frac{5}{108} \times 100 \\ &= 4.3 \\ &\approx 4 \\ &\bullet \quad 108 + 4 = 112 \text{ pregnant mothers will be used.} \end{aligned}$$

Validation of Study

- Questionnaire was validated by the lecturers and few course mates in the Department of Nutrition and Dietetics and pretested on subjects that are not part of the study and corrections were effected.
- The blood and stool samples were collected promptly in sterile containers to avoid contamination..

Data Collection Method

Data was collected using biochemical method involving the use of stool and blood of the pregnant women attending antenatal clinic. With the help of the laboratory attendants, the samples were collected in sterile containers and the tests were run. Questionnaire was also administered.

Stool

The stool smears were examined microscopically immediately the hookworm eggs and after 48 hours for egg of other intestinal parasites.

Blood

Their blood haemoglobin was determined by *cyanmethhemoglocin* method ⁽¹⁴⁾.

Statistical Analysis

The data collected was analyzed using descriptive methods such as means, percentages, with Statistical Packages for Social Science (SPSS). Chi-Square test was used to assess association between categorical variables.

RESULTS

Table 1: Personal Data and Socio-Economic Status

		(n = 112)	100 (%)
A	Age	F	%
	< = 25	92	82.14
	> 25	20	17.86
B	Educational Status		
	Primary	18	16.07
	Secondary	77	68.75
	Higher Institution	17	15.18
C	Gravida/Number of Pregnancy		
	First	62	55.35
	Second	43	38.40
	More than 2	07	6.25
D	Occupation of Women		
	Housewife	96	85.71
	Skilled worker	10	8.92
	Unskilled worker	06	5.36
E	Husband's Occupation		
	Farmer	50	44.64
	Skilled worker	61	54.46
	Unskilled worker	01	0.9
F	Trimester of Pregnancy		
	First	29	25.90
	Second	46	41.07
	Third	37	33.03
G	Family Size		
	2 or less	28	25.00
	3 to 4 members	27	24.10
	4 to 8 members	51	45.54
	9 or more	06	5.36

In table 1, 92 (82.14%) of the women were 25 years and below, 77 (68.75%) of them being secondary school certificate holders. 62 (55.35%) being pregnant for the first time and 96 (85.71%) of the women being housewives, 46 (41.07%) of them were in their second trimester.

Table 2: Knowledge of Helminthic Infestation Among the Women

		(n = 112)	100 (%)
A	Knowledge of Helminthic Infestation	F	%
	Yes	87	77.68
	No	25	22.32
B	Knowledge on Modes of Transmission		
	Yes	62	55.36
	No	50	44.64
C	Knowledge of its Prevention		
	Yes	97	86.61
	No	15	13.39

For table 2, 87(77.65%) of the women had prior knowledge of infestation and 62 (55.36%) having the knowledge of its transmission and 97 (86.61%) having the knowledge of its prevention.

Table 3: Prevalence of Anaemia Among the Pregnant Women

Status	Hb Level	F (n = 112)	100 (%)
Anaemia	<11g/dl	66	58.92
Normal	>11g/dl	46	41.07

Classification according to WHO (2006).

For table 3, 66 (58.92%) of the pregnant women had anaemia.

Table 4: Prevalence of Helminthic Infestation

Infestation Parasites	F (n = 112)	100 (%)
Hookworm	18	16.07
<i>Ascaris</i>	24	21.44
<i>Trichuris</i>	05	4.46
<i>Giardia</i>	05	4.46
None	60	53.57

From table 4, 52 (46.5%) of the pregnant women had helminthic infestation.

Table 5: Association of Anaemia in Pregnancy with Social and Demographic Variables

Risk Factors for Anaemia	Normal (n = 16)		Anaemia (n = 46)		P-Value
	N	%	N	%	
Age Group					
<= 25 years (n = 92)	36	39.1	56	60.8	0.371
>25 years (n = 20)	10	50	10	50	
Type of Parasite					
• Hook worm (n = 18)	02	11.1	16	88.9	0.063
• <i>Ascaris</i> (n = 24)	10	41.7	14	58.4	
• <i>Trichuris</i> (n = 05)	03	60			
• <i>Giardia</i> (n = 05)	03	60			
Educational Status					
• Primary school (n = 18)	07	38.9	11	61.1	0.857
• Secondary school (n = 17)	31	40.3	46	59.7	
• Higher institution (n = 17)	08	47.1	09	52.9	
Source of Water Tap (n = 107)					
	43	40.2	64	59.8	0.379
Gravid/Pregnancy					
• First (n = 62)	22	35.5	40	64.5	0.355
• Second (n = 43)	20	46.5	23	53.5	
• More than two (n = 07)	04	57.1	03	42.9	
Occupation of Women					
• Housewife (n = 96)	40	41.7	56	58.3	0.176
• Skilled worker (n = 10)	02	20	08	80	
• Unskilled worker (n = 06)	04	66.7	02	33.3	
Husband's Occupation					
• Farmer (n = 50)	19	38.0	31	62.0	0.732
• Skilled worker (n = 61)	26	42.6	35	57.4	
• Unemployed (n = 01)	01	100	00		
Trimester of Pregnancy					
• First (n = 29)	09	31	20	69	0.237
• Second (n = 46)	23	50.0	23	50	
• Third (n = 37)	14	37.8	23	62.2	
Toilet Present in House (n = 107)					
	45	42.1	62	57.9	0.327
Family Size					
• 2 or less (n = 28)	14	50.0	14	50	0.106
• 3 to 4 members (n = 27)	09	33.3	18	66.7	
• 5 = 8 members (n = 51)	23	45.1	28	54.9	
• 9 or more (n = 06)	00		06	100	
Knowledge of Women Regarding Helminthic Infestation (n = 62)					
	38	43.7	49	56.3	0.536
Transmission of Intestinal Parasites (n = 62)					
	27	43.5	35	56.5	0.192
Prevention of Infestation (n = 77)					
	35	45.5	42	54.5	0.232

For table 5, there was a significant relationship of anaemia with hookworm infestation ($P < 0.001$). Anaemia had no relationship with education, trimester of pregnancy, family size, occupation of women and husband and age group of the pregnant women. However, the knowledge of women had no relationship with the severity and occurrence of anaemia during pregnancy.

Table 6: Knowledge of Women Regarding Helminthic Infestations and its Relationship with Education

Correct Knowledge of Women Regarding Helminthic (n = 112)	P-Value	Education:					
		Primary School Certificate Holder N%		Secondary School Certificate Holder N%		Higher Institution N%	
Effect of helminthic infestation on the body (n = 87)	0.000	07	08.1	63	72.4	17	19.5
Transmission of worms and spread of infestation (n = 62)	0.000	02	03.2	44	71.0	16	25.8
Prevention of helminthic infestation (n = 77)	0.001	08	10.4	53	68.8	16	20.8

For table 6, there was a highly significant relationship between education and the knowledge of women regarding effect of intestinal parasitic infestations ($P < 0.001$), transmission and spread of infections ($P < 0.001$) and method of prevention of intestinal parasites ($P < 0.001$).

Table 7: Relationship of Correct Knowledge of Women Regarding Helminthic Infestation with Occurrence of Parasitic infestation

Correct Knowledge of Women Regarding Helminthic (n = 112)	Parasitic Infestation										P-Value
	Hookworm (N%)		<i>Ascaris</i> (N%)		<i>Trichuris</i> (N%)		<i>Giardia</i> (N%)		None (N%)		
Effect of helminthic infestation on the body (n = 87)	12	13.8	18	20.7	3	03.4	2	02.3	52	59.8	0.001
Transmission of words and spread of infestation (n = 62)	8	12.9	16	25.8	2	03.2	1	01.6	35	56.5	0.066
Prevention of helminthic infestation (n = 77)	11	14.3	16	20.8	2	02.6	2	02.6	46	59.7	0.426

For table 7, the knowledge of women regarding effect of helminthic infestation was significantly ($P < 0.001$) relate to the occurrence of parasitic infestations although the knowledge of the prevention and transmission of infestation had no significant ($P > 0.001$) effect on the occurrence of parasite infestation.

DISCUSSION

Prevalence of Anaemia and Intestinal Parasites among the Women

In this study, the proportion of women with anaemia was 66% which is a little lower than the prevalence figures reported by most previous researches^(13, 15). It has been seen around the world that micronutrient deficiency, parasitic infestation and stunting are significantly related problems⁽¹⁶⁾. High prevalence of intestinal parasitic infestation is associated with morbidities like anaemia and reduced resistance due to other nutritional disorder made the condition worse⁽¹⁷⁾. The study done by Shah and Gupta in the eastern region of Nepal-Southern Asia also reported a 68.8% prevalence of anaemia in adolescent girls⁽¹⁷⁾. The probable reason for the lower proportion of women with anaemia in our study is due to the fact that this study was done in the hospital setting, which is located in the city. The women who came for antenatal care in the hospital are slightly better informed with good health awareness. On the other hand, women in rural settings might as well have a better result considering their easy access to micronutrient rich foods like fruits and vegetables which is mostly available in the rural settings. Although we cannot generalize the results of this study to the overall prevalence of anaemia in this region but can envisage that the real prevalence of anaemia in the area could be much higher or lower.

Relationship/Association between Anaemia and Helminthic Infestation

In this study, we found a strong association between anaemia and intestinal parasitic infestations, which is similar to the results of earlier studies elsewhere^(2-3, 19). The degree of severity of anaemia was also higher with hookworm compared with *Ascaris* (n = 6), 33.3% of women with hookworm infestation were severely anaemia with haemoglobin less than 9g/dl as per WHO criteria⁽²⁾. Several studies have been done in the developing

countries and have shown that by giving iron during pregnancy and reducing anaemia, some mortality associated with anaemia can be averted⁽²⁻³⁾. Various strategies have been found in the world including in India where cooking iron pots was tried which showed a significant reduction of iron deficiency in women⁽¹⁹⁾.

Socio-Economic Status of the Women

The study also found that women who had higher educational status knew more about the mode of infestation, transmission and prevention of parasitic infestation. Surprisingly, the educational status had no effect on the proportion of women with anaemia and the knowledge of intestinal parasites. As can be seen from the results, more than 50% of the women with correct knowledge of helminthes had absence of any kind of parasite in their stools (refer to table 3). This means that if women were educated and had knowledge regarding the effect of intestinal parasites, then indirectly this could protect them from intestinal parasitic infestations.

Conclusion

Intestinal parasitic infestation in pregnancy is significantly related with anaemia. Hence, all women coming to antenatal clinics should be screened for intestinal parasites. The antenatal care should include de-worming with correction and prevention of anaemia. It is necessary that in antenatal clinics, the health education should include the causes of anemia with emphasis on intestinal parasitic infestations specifically the mode of transmission and prevention especially of hookworm infestation.

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