PREVALENCE OF HOOKWORM AND ANAEMIA IN PREGNANT WOMEN VISITING CHURCH DELIVERY HOME (ILE-AGBEBI) FOR ANTE-NATAL CARE

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CERTIFICATION

This is to certify that this project work was carried out by **ADEKUNLE VICTORIA FEYIKEMI (16-06-0025), OLASUNKANMI ABOSEDE AMINAT (16-06-0029), ADEKUNLE AYOMIDE ELIZABETH (16-06-0033), OLANIYI ABOSEDE OLAYEMI (16-06-0040), ALANI BABATUNDE IYANUOLUWA (16-06-0043)** Science Laboratory Technology, School of Science, Abraham Adesanya Polytechnic, Ijebu – Igbo, Ogun State. Under my supervision

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DEDICATION

We dedicate this research work to the Almighty God, the one who is worthy of our praise. Glory and Honor to your holy name.

ACKNOWLEDGEMENT

We give praise and honour to the Alpha, Omega of our life for the opportunity given to us to accomplish this wonderful project. Glory and Honour be to your holy name and we say. Thank you Lord.

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ABSTRACT

Hookworm is among the most common and widespread of human parasitic infections, contributing to poor nutritional status, anaemia and impaired growth. The objective of this study is to investigate the prevalence of helminthes infection among the pregnant women attending antenatal session at church delivery home (Ile- Agbebi) Ijebu Igbo, Ogun state Nigeria. Hemoglobin and total serum iron concentration were evaluated in blood sample and helminthes infections were evaluated in stool sample using standard methods. The Prevalence of anaemia in this study was 56.7%. Only 50% were infected with intestinal helminthes, the commonest being Ascaris lumbricoides infection 25%, Entameoba histolitica 15% and hookworm 10%. It was found out that a high number of pregnant women still prefer antenatal session at church delivery homes (Ile- Agbebi) compared to visiting hospitals. And little or nothing is done in terms of information about the iron requirement of the pregnant women at these centres. The study concluded that Ascaris lumbricoides which is an intestinal nematode of the ascariasis infection has a high prevalent rate among the pregnant women; which could be as a result of practices by the pregnant women. These findings reinforce the need to enlighten pregnant women and educate church mid wives about the need for appropriate iron supplement and also provide anthelmintics drugs during pregnancy.

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CHAPTER ONE

1.0 INTRODUCTION

Helminthes is a general term meaning worm and the helminthes are invertebrates characterized by elongated, flat or round bodies. In medically oriented schemes the flatworm or platyhelminths (platy from the Greek root meaning "flat") include flukes and tapeworms. Roundworms are nematodes (nemato from the Greek root meaning "thread").These groups are subdivided for convenience according to the host organ which they reside e.g. lung flukes, extra intestinal tapeworms and intestinal roundworms (Gilbert 2012).

Intestinal helminthes are among the most common and widespread of human infections. They contribute to poor nutritional status, anemia and impaired growth in children of school going age (Dickson *et al.*,2000).Epidemiological surveys have revealed that, poor sanitation and appropriate environmental conditions coupled with indiscriminate defecation ;geophagy and contamination of water bodies are the most important predisposing factors to intestinal worm infestation (Brooker *et al.*, 2008).

The prevalence of helminthes infection is high in developing countries, particularly among population with poor environmental sanitation (Ejik *et al.*, 2009). Other practices such as hand washing, disposal of refuse personal hygiene, wearing of shoes and others, which when not done properly may contribute to the infection or picking of these worms from the environment (staltzfus *et al.*,1997).Intestinal helminthes infections or aneamia during pregnancy is aggravated by low nutritional status of subjects whose staple foods, such as rice, cassava and maize are poor sources of folate and iron (Ayoya *et al.*,2006).

Anemia is a decrease in the total amount of red blood cells (RBCs) or hemoglobin in the blood (Stedman's 2006) and is a global public health problem affecting both developing and developed countries with major consequences for human health as well as

social and economic development. It occurs at all stages of life cycle but is more prevalent in pregnant women and young children and it also occur when the concentration of hemoglobin falls below what is normal for a person's age, gender and environment resulting in the oxygen carrying capacity of the blood being reduced(WHO 2011).

Anemia is often classified as mild degree (Hb9.0-11.0g/dl), moderate (Hb7.0-9.0g/dl), severe (Hb4.0-7.0g/dl), and very severe HB less than 4.0g/dl. It can also be classified based on the Haemocrit (PVC)%.A common etiological classification of anaemia, nutritional anemia's are by far t5the most common type of anemia worldwide and mainly include iron. Folate and vitaminB12 deficiencies (WHO 1992).

The early stages of anemia in pregnancy are often symptomless. However, as the Hb concentration falls, oxygen supply to vital organs decline and the expectant mother begins to complain of general weakness, tiredness and headaches. Pallor of the skin and of the mucous membrane, as well as the nail bed and tongue may not become noticeable until Hb drops to about 7.0g/dl. With a further fall in Hb concentration to 4.0g/dl, most tissues of the body becomes starved of oxygen and the effect is most marked on the heart muscles, which may fall altogether (Sharma 1998).Death from anemia is the result of heart failure, shock or infection that has taken advantage of impaired resistance to disease in the patient (Khan *et al.*, 2006).

The most common causes of anemia in pregnancy worldwide are iron deficiency (Stoltzfus 1997). Anemia in pregnancy causes low birth weight (Banhidy *et al.*, 2011), fetal impairment and infant death (Kalaivani 2009). Iron deficiency anemia affects the development of the nation by decreasing the cognitive and motor development of children and productivity of adults (Stoltzfus *et al.*, 2000)

The most important cause of pathological chronic loss of blood and iron in the tropics is hookworm and other soil-transmitted helminthes (Brooker *et al.*, 2008) and

malaria in pregnancy (Fleming 1982). At a hospital in Kathmandu, Nepal, hookworm infection was associated with severe but not moderate anemia among women receiving antenatal care (Bonderik *et al.*, 2000). Hookworm infection has been established as a strong predictor of iron deficiency and anemia in other populations (Ayoya *et al.*, 2006). but few studies have examined their relationships in pregnant women (WHO 1993).

1.1 OBJECTIVES

i. To investigate the prevalence infection among the pregnant women attending church delivery home.

ii. To determined the prevalence of anemia among pregnant women visiting church delivery home (Ile-Agbebi) for antenatal care.

iii. Assess the level of knowledge of anemia and attitude of pregnant women toward control of anemia in pregnancy.

CHAPTER TWO

LITERATURE REVIEW

According to Chollon *et al* (2012)in a study designed to estimate the prevalence and speciation of hookworm in plateau state. 592 faecal samples were collected from patients with abdominal discomfort from six health facilities in the state and examined for presence of parasitic eggs or cysts. The result shows that 147(24.8%) were positive for at least one parasitic egg or cysts, whereas 39(6.6%) had hookworm eggs alone. Hookworm was found in all the localities. The study concluded that plateau state has a prevalence rate of 6.6% for hookworm infections with N. *americanus* as the dominant specie.

Baudoo *et al* (2010) stated that intestinal helminthes are among the most common and widespread of human infections, contributing to poor nutritional status, anaemia and impaired growth. The objective of this study was to assess the prevalence and severity of anaemia and iron deficiency and their association with helminthes among pregnant women in the Ashanti region of Ghana. In the result only 17.6% had evidence of helminthes infection, with *Necator americanus* (hookworm) being the commonest (13.9%). There infection and low iron stores and the study concluded that hookworm infection is a strong predictor of iron status.

2.1 CLASSIFICATION OF HELMINTHS

Helminths or parasitic worms are eukaryotic parasite characterized by their ability to feed and live on living host. The 3 commonly studied and well known groups include the intestinal nematodes (roundworms), tapeworms (cestodes) and blood tissue and organ flukes (trematodes). Intestinal helminthes are commonly transmitted through fecaily contaminated food and water and these parasites include *Ascaris lumbricoides*, trichuristricheura (whipworm) and enteroblusvermicularis (pin worm) (Nduka *et al; 2006).*

Hookworm includes *Ancylostomaduodenale* and *Necator americanus*, whose larvae penetrate the skin after their ova have been passed in human faeces. Those soil transmitted helminths are associated with climates that are warm and moist and where sanitation and hygiene are poor. The eggs are passed in the faeces of the infected individual, the larvae hatch, contaminate the soil and can penetrate the skin when contact is made (Nosten *et al;* 2007). *Ascaris lumbricoides*, the cause of ascarisis, is a type of soil transmitted helminthes. Ascaris, the largest round worm, live in the intestine and the eggs are passed in the faeces of the infected person (Rhew 2004). Ascaris is caused by ingestion of eggs from toad and water contaminated with faeces from humans infected with ascaris, and ingestion allows for contamination of the life cycle (Annibale *et al;* 2003)

Hookworms, another type of soil transmitted helminthes reside in the small intestine and eggs are passed in the faeces of the infected individual. The eggs with mature worms and hatch in the soil and the immature worms (larvae) will penetrate the skin of humans if contact is made. The hookworm is transmitted by exposing bare skin to contaminate soil.

Whipworms is a type of soil transmitted helminths resides in the large intestine and eggs are passed in the faeces of the infected individuals with whipworm may have light or heavy infection, light infection are usually not significant symptomatic. However, heavy symptoms include frequent, painful passage of stool that contains mucus, water and blood (Brooker 2004).

2.2 CAUSES OF HOOKWORM IN PREGNANCY

Hookworm infection is an infection by a type of intestinal parasite known as a hookworm (Bethony *et al.*, 2006) initially, itching and a rash may occur at the site of infection (Booker *et al.*, 2006). Those only affected by a few worms may show no symptoms. Those infected by many worms may experience abdominal pain, diarrhea, weight loss

and tiredness (Bethony *et al.*, 2006). The mental and physical development of children may be affected (Bethony *et al;* 2006).

2.3 ETIOLOGY

Causative organisms

Organisms that have been shown to cause hookworm diseases include the following.

- *Necator Americanus*
- *Ancyclostomaduodenale*
- *Ancyclostomabrazililiense*
- *Ancyclostomaceylonicum*
- *Ancyclostomacaninum*

N. americanus is a predominant human hookworm and is the only member of its genus to infect humans (Adenusi and Ogunyomi, 2003).

A.duodenale primarily infects humans and is responsible for hookworm diseases.

N.americanus is very similar in morphological to *A.duodenale* and it is smaller than A.duodenale (Markell *et al*; 2006).

A.ceylonicum primarily infects canines and felines but can cause middle hookworm disease in human (Capello *et al* 2008).

A number of studies have investigated the prevalence of anaemia in pregnancy, findings; have shown that effect of anaemia pregnant women is due to the lack of iron deficiency and also deficiencies of other micronutrients such as B12 and folic acid (Dreyfuss *et al.*, 2000)

In another study conducted to assess the status of anaemia among 6,923 pregnant women and 4,337 adolescent girls from 16 districts of 11 states of India. Anaemia was diagnosed

by estimating the hemoglobin concentration in the blood with the use of the indirect cynamethemoglobin method. The result showed that 84.9% of pregnant women anemic 13.1% had severe anaemia and of 60.1% had moderate anaemia. Among adolescent girls the overall prevalence of anaemia was 90.1%, with 7.1% having severe anaemia. The study concluded that any intervention strategy for this population must address not only the problem of iron deficiency, and vitamins.

In Malawi area a study was conducted to analyze the determinants of anaemia in pregnant women the subjects were 4104 pregnant women attending the ante natal clinic (ANC) facilities of two hospital in a rural area. The results revealed that man mean (S.D) hemoglobin (Hb) concentration was significantly lower in the primigravidae8.7 (1.6)g\dl and the variables associated with an increased risk for moderately severe anaemic were iron deficiency (RR=4.2, Cl=3.0- 6.0) and malaria parasitaemia (RR=1.9, Cl=1.3- 2.7). the study concluded that illiteracy and poor nutritional status were significantly associated with increased risk of anaemia and the basis of anaemia prevention in this population of pregnant women was found to be malaria control and haematinic supplementation (Huddle *et al;1999).*

According to (cheema *et al*., 2016) observed that there is high prevalence of anaemia is 65.5%, among the pregnant women. The current studies shows (60%) cases of mild anaemia, (30.4%) of moderate anaemia, and (9.6%) of severe anaemia. Then in the current study it was observed that the factor influencing anaemia, it is infrequent consumption of iron folic tablets. A study was done to assess the effects of different treatments for anaemia in pregnancy attributed to iron deficiency (defined as hemoglobin less than 11gldl or other equivalent parameters) on maternal and neonatal morbidity and mortality. The samples were 3,198 women. The results revealed that the oral iron in pregnancy showed a reduction in the incidence of anaemia (risk ratio 0.38, 95% confidence interval 0.26 to 0.55). The study concluded that despite the high incidence and burden of diseases associated with this condition, daily oral iron treatment improves

hematological indices and large, good quality trials, assessing clinical outcomes (including adverse effects) as well as the effects of treatment by severity of aneamia required. A cross sectional study was conducted to compare prevalence of anaemia and hemoglobin (Hb) levels in Brazilian pregnant women before and after flour fortification with iron (Van de broek *et al; 2009).*

The subjects were 12,119 pregnant women distributed in two groups: before fortification and after fortification. Statistical analysis was carried out using chi- squared test, student test and logistic regression analysis showed that group, geographic region, marital status, trimester of pregnancy, initial nutritional status, and prior pregnancy were associated with anaemia ($P<0.05$). The study concluded that prevalence of anaemia decreased after fortification (Cheema et al; 2016).

2.4 CLASSIFICATION OF ANAEMIA

Anaemia in pregnancy can be classified under two main method: the morphological and etiological classification:

MORPHOLOGY: is the most common form of anaemia which includes cell size(cytic), color(chromic), and shape of the RBCs. Measurement of hemoglobin, haematocrit, and red cells indices provides information about the appearance of the RBCs, which aids in the classification (Janz et al;2013).

Red cell indices include the mean corpuscular volume mean haemoglobinmean corpuscular haemoglobin concentration and red blood cell distribution width. Transferrin is the protein to which iron is bound for transport form within the body (Goonewardene 2012).

ETIOLOGY: Anaemia can be caused by impaired cell production, blood loss, and increased rate of destruction of the red cell. Blood loss occurs during acute condition such as trauma, or chronic diseases and gastro intestinal bleeding. Increased rate of

destruction of red cells occurs in haemolytic anaemia resulting from condition inside and outside the cell. Disorder in enzymes within the red cell, such as glucose -6- phosphate dehydrogenase and pyruvate synthesis disease, also can cause anemia such cell anaemia and thalessemia are genetically determined disease in which RBCs have structural abnormalities (Kumar *et al*., 2002).

2.5 PREGNANCY RELATED ANAEMIA

Pregnancy is accompanied by several changes including physical changes. Physiological changes and behavioral changes. In the maternalhaematology system, plasma volume increase progressively reaching a peak above 45% in non- pregnant volume in the last trimester. The changes are greater in multiple pregnancies with increase red cell mass. but a lesser proportion, resulting in haemo dilution leading to a decrease in haemoglobin concentration, packed cell volumes and red cell count. The early stages of anaemia in pregnancy are usually without symptom. As the haemoglobin falls, however, oxygen supply to the vitals organs decrease and the women begin to complain of general weakness, dizziness, tiredness and headaches (El wood 2014).

2.6 CAUSES OF ANAEMIA IN PREGNANCY

Anaemia in pregnancy may be attributed to three main factors. These are nutritional factors, infections and genetic factors.

NUTRITIONAL ANAEMIA: This result from the deficiency of any of the nutrients necessary for the maintenance of a normal haemoglobin level. The WHO define nutritional anaemia as a condition in which the haemoglobin content of blood is lower than normal as a results of a deficiency (WHO 1968). Nutritional anaemia is the most common type of anaemia in the world and mainly includes iron, folate and B12 deficiency. These make up approximately 75% of all anaemia in pregnancy (Bhutta 2012). In pregnancy, the reduced bio-availability of iron is unavoidable due to increase in

demand for iron by the foetus during pregnancy compared to 45% in excess of blood produced in non- pregnant state is necessary for oxygen and nourishment requirement of the foetus which is received through the placenta (Reveiz *et al.*, 2010).

GEOPHAGIA (PICA) AS A CAUSE OF ANAEMIA IN PREGNANCY: Geophagia is the ingestion of clay or soil during pregnancy. Geophagia was related to more than two fold increase risk of anaemia. The ingestion of clay or soil impairs the absorption of iron and other nutrients, resulting in anaemia. A study in Sudan has shown that ingestion of clay was a risk factor for maternalanaemia (Elbashir *et al.*, 2005).

GENETICS FACTORS: Certain factors can cause haemolysis of the red cells, resulting in such diseases as thalessemia and sickle cell anaemia, which is found frequently in the black African population. In Ghana unlike thalessemia, sickle cell anaemia is the most prevalent of anaemia though in depth studies is yet to be carried out basically on sickle cell and anaemia in other to buttress or refute this claim (Roberts, 2012).

Accordingly to (Samuel *et al.*, 2015) a cross sectional analytical study was conducted to assess the associated between hookworm infection and anaemia among pregnant women obtaining antenatal care at the university of uyo teaching hospital, uyo, Nigeria. The result shows that twenty four of 211 women had hookworm infection resulting in a prevalence of 11.4% (95% Cl7.4%- 16.5%). Sixty two (29.8%) of the 62 women with iron deficiency anaemia had hookworm infection while 9 (6.3%) of 143women without iron deficiency anaemia had hookworm infection. The study concluded that hookworm infection is associated with anaemia in pregnant women in uyo.

CHAPTER 3

MATERIALS AND METHOD

3.0 STUDY AREA

The study was conducted at two missionary house delivery home (Ile Agbebi) located at Oke-Alafia and Oke-Ife area of Ijebu-North Local Government Area, Ogun State, Nigeria.

3.1 QUESTIONNAIRE ADMINISTRATION

The questionnaire which was administered to the pregnant women was divided into three (3) section which covers personal data, knowledge about anaemia and helminthes" and the nutritional status of the individual respondent.

The respondents were separated before the administration of the questionnaire in order to ensure that each respondent do not know what the other respondent has said.

Section A of the questionnaire include questions related to personal information e.g. age, sex, marital status, Religion, occupation, level of education, gestational age of current pregnancy, medication taken during pregnancy, the use of long-lasting insecticide net and family size.

Section B of the questionnaire include question on anaemia related to helminthes (Hookworm) in helminthes in pregnancy, Anaemia in pregnancy symptoms of anaemia, effect of anaemia in pregnancy on the unborn child, malaria in pregnancy visitation of the mission house, malaria in prevents effect of anaemia in pregnancy on the mother and gestational stages.

sediment which remain was transferred to a slide and covered with cover glass. The sediment was placed on a glass slide and was viewed under the microscope to check for parasite eggs.

The stool specimen was examined with an electron microscope within one hour to avoid clearing of intestinal helminthes eggs by glycerin (katz*t al*; 1972). The magnification of X10 andX40 was used respectively to visualize and identify the oval eggs of intestinal parasites.

3.3 DATA ANALYSIS

Data were stratified according to the intensity of infection based on thresholds recommended by WHO Light(1-1,999.epg); moderate (2,000-3,999 epg) and heavy (4000 epg);(WHO 1987).Anaemia was defined as Hb<10g/dL and differentiated as severe anaemia(Hb 4.0-7.0g/dL),moderate anaemia (7.0-9.0g/dL), normal(9.0-11.0g/dL)and very severe anaemia less than 4.0g/dL (WHO 1992).In the morphological examination of iron deficiency anaemia, the morphology of the red cell was microcytic,hypochromic with anisocytosis and poikilocytosis (The Merck Manual 1999).

CHAPTER FOUR

RESULT

A total of thirty (30) pregnant women were enrolled for the study. Few were primigravidae at 6.7% (2). The mean age of pregnant women was 26years with a standard deviation of 5.6years. Fourteen (46.7%) pregnant women attained secondary education, twenty-five (83.3%) were married. Twenty (20) of the pregnant women were traders, five (5) were civil servant and five (5) were unemployed. (Table 1)

4.1 HELMINTH INFECTION

Out of the (30) pregnant women who responded to the questionnaire only twenty (20) provided stool and blood sample while the remaining ten (10) provided only blood samples and therefore were excluded from the study.

Of the twenty(20) pregnant women recruited for the study, only 10 (50%) were infected with helminthes the commonest being *Ascaris lumbricoides* infection 5 (25%) followed by Hookworm 2 (10%), *Entamoeba histolitica* 3 (15%) and co-infection of *Ascaris lumbricoides and Entamoeba histolitica* 2 (10%) A bar chart indicating the species of helminthes identified among the pregnant women studied was shown below. The commonest helminthes detected was Ascaris lumbricoides.. (Fig 1)

4.2 PREVALENCE OF HOOKWORM INFECTION AND IRON DEFICIENCY ANAEMIA

All ten (10) women infected with at least one species of pathogenic intestinal helminthes were found to have moderate to severe anaemia. All Five (5) pregnant women who were infected with *Ascaris lumbricoides* were found to be anaemic (Hbx4.0-7.0gldl), with 8 of them being severely anaemic, Hookworm infection had a strong association with all two indicators of anaemia.

4.3 PREVALENCE OF ANAEMIA AND AGE GROUP

Anaemia was found to be more prevalent in women aged between 16-25years at 56.7% as compared to 36.7% in the 26-35years age group and 6.7% in 36-45. However, a statistical analysis of age being a factor in predicting anaemia in pregnancy was not significant. Anaemic condition prevailed in 56.7% of pregnant women. Among them 47% were severely, 17.6% moderately and 35.2% mildly anaemic. Anaemia was present in more than 50% of the pregnant women studied and iron deficiency appeared to be the dominant cause of anaemia especially moderate to severe anaemia in these communities. shows that (35.2%) women suffered from mild anaemia, 17.6% suffered from moderate anaemia and only 47% suffered from severe anaemia.(Table 2 &3)

TABLE 1: EDUCATIONAL STATUS

EDUCATIONAL LEVEL	NUMBER	PERCENTAGE%
No. formal education	5	16.7
Primary	5	16.7
JSS/SSS	19	63.3
Tertiary	1	3.3
TOTAL	30	100

FIGURE 1: DISTRIBUTION OF HELMINTH INFECTION

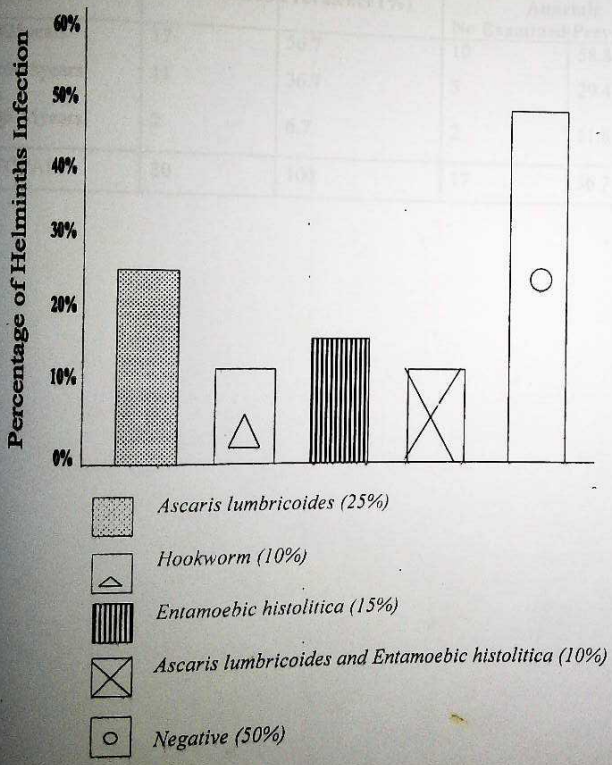

TABLE 2: PREVALENCE OF ANAEMIA AND AGE GROUP.

Age Range	No Examined	Prevalence (%)	Anaemic	
			No Examined	Prevalence (%)
<25years	17	56.7	10	58.8
26-35years	11	36.7	5	29.4
36-45years	2	6.7	2	11.8
TOTAL	30	100	17	56.7

TABLE 3: AGE RELATED PREVALENCE OF ANAEMIA.

Age Range	No Examined		Anaemic Status					
			Mild		Moderate		Severe	
<25yeras	17	56.7	1	5.8	3	17.6	6	35.2
26-35years	11	36.7	4	23.5	-	-	1	5.8
36-45years	2	6.7	1	5.8	-	-	1	5.8
TOTAL	30	100	6	35.2	3	17.6	8	47

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.0 DISCUSSION

The intestinal helminthes infection result in intestinal blood loss which in turn can contribute to anaemia .Two (2) of twenty (20) in this study had hookworm infection thus; the overall prevalence of hookworm in this study was 10%. The prevalence rate of 10% in this study is lower to 11.8% reported in university of Nigeria Teaching Hospitals, Enugu. It is however lower than those reported from studies conducted in Port Harcourt (46%), Ishiagu in Abia state (34.6%), 68.2% obtained by Adenusi and Ogunyomi in the urban city of Ibadan and a rural community in Lagos (83.3%), all in Nigeria. It is also lower than 46.5% reported from Nepal, due to the sample size.

The low incidence of hookworm infection can be explained due to the general cleanliness of the environment in Ijebu-North. Both species of hookworm were found to be present in the state and *Ascaris lumbricoides was* the demand species obtained (25%). More so, only one stool sample from each woman was used in investigating for intestinal helminthes, meaning that a proportion of women with low intensity infection would have been misclassified as uninfected and the helminthes estimates imprecise.

The prevalence of anaemia, Iron deficiency and iron deficiency anaemia among pregnant women in this study was 56.7%, the prevalence of iron deficiency anaemia recorded in this study is higher than the 43.7% reported for Nigeria in the National food consumption and Nutrition survey of 2003. The probable explanation for the high proportion of pregnant women with iron deficiency anaemia in this study is due to the fact that this study was community based but was done in a church delivery home (Ile Agbebi). Also, the majority of the women were illiterate, and they are not slightly better informed with good health awareness. This is in addition to the improved sanitary condition of Ijebu

North, Ogun State previously mentioned. This corroborates with earlier findings among pregnant women in South Eastern Nigeria. Iron deficiency anaemia constituted 55.1% of total anaemia and in support of the general belief of iron deficiency being the most common cause of anaemia in pregnancy.

Parasitic infestation, micronutrient deficiency and anaemia are significantly related problems. In a Nepal study, there was a strong association between anaemia and hookworm infestation. Likewise in this study, there was a statistically significant association between hookworm infection and iron deficiency anaemia. In Nepal cooking in iron pots and de-worming showed a significant reduction of iron supplementation for pregnant women residing in rural area of Ijebu – Igbo North and environs where intestinal helminthes infestation (*Ascaris lumbricoide)* is more prevalent is worth considering.

In this study, the prevalence of iron deficiency anaemia was higher than that of hookworm infection. The reason for this relationship is not known but anaemia in pregnant women may be a result of combination of factors including iron and folate deficiency, parasitic infections other than hookworms HIV\AIDS and haemoglobinopathies. This therefore implies that pregnant women in Ijebu igbo North irrespective of their educational status need to be better informed about intestinal helminthes infections and its effect on pregnancy. This indirectly could protect them from helminthic infestations and by extension anaemia.

5.1 CONCLUSION

This study concluded that anaemia is prevalent within rural communities of Ijebu Igbo North church delivery home (Ile Agbebi) and that *Ascaris Lumbricoides* which is a nematode intestinal helminthes of the ascariasis infection has a high prevalent rate among pregnant women;which could be as a result of unhygienic practices by the pregnant women.

5.2 RECOMMENDATION

Anthelminthic therapy is inexpensive and save pregnancy after the first trimester, therefore it should be part of the antenatal programme since malaria treatment is also part of the antenatal programme (Larocque 2006). The world Health Organization (WHO) recommends anthelminthic therapy for pregnant women to control infection in areas, in which the prevalence of infection is high and anaemia is prevalent.

Also, other causes of anaemia should be looked at in the Ijebu Igbo North district to arrive at a comprehensive approach in solving the problem of anaemia.

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APPENDIX 1

Department of Science Laboratory Technology,

Abraham Adesanya Polytechnic,

P.M.B 1020 DagboluAkanran/Ibadan Road, Atikori,

Ijebu-Igbo, Ogun State.

r Respondents

are final year student of Science Laboratory Technology department of the above institution;
are conducting a research work on the topic **"PREVALENCE OF HOOKWORM AND AEMIA IN PREGNANT WOMEN ATTENDING CHURCH DELIVERY HOME – AGBEBI)"** in partial fulfillment of the requirement for the award of National Diploma in nce Laboratory Technology. We would be grateful if you could provide answers to the hed questionnaire.

mation provided is for academic purpose and shall be treated with strict confidence.

QUESTIONNAIRE

We are final year student of ABRAHAM ADESANYA POLYTECHNIC, Ijebu Igbo in Science Laboratory Technology Department. We are carrying out a research study on Geohelminth infection in pregnant women and anaemia, Relationship between malaria infection and anaemia in pregnant women Association between Hookworm infection and Anaemia in pregnant women.

We will appreciate your cooperation in filling out the questionnaire. Any information you provide will be used mainly for research purpose.

Thank you.

SECTION A- BIO- DATA.

1. Sex : Male [ ] Female [ ]

2. Age : 16-25[ ] 26-35[ ] 36-45[ ] 46 and above [ ].

3. What is your marital status? (i) Single [ ] (ii) Married [ ] (iii) Divorced [ ] (iv) Separated [ ] (v) Widowed [ ].

4. Occupation (i) Trader [ ] (ii) Civil servant [ ] (iii) Unemployed [ ] (iv) seamstress [ ] v) Hairdresser [ ] (vi) Other _____.

. What is your level education? (i) No former education [ ] (ii) primary school [ ] (iii) Hs/Jss [ ] (iv) SHs/Sss [ ] (v) Tertiary [ ].

. What is your religion? (i) Christian [ ] (ii) Muslim [ ] (iii) Traditional [ ].

What is the gestational age of your current pregnancy (i) 1-3 month first trimester [ ]) 4-6 month second trimester [ ] (iii) 7-9 month third trimester [ ].

8. What medication do you take during pregnancy (i) folic acid [ ] (ii) Vitamin c [ ] (iii) Fansidar [ ] (iv) ACT drugs [ ] (v) Quinine [ ] (vi) Ferrous [ ].

9. Do you make use of long- lasting insecticides net? (i) Yes [ ] (ii) No [ ] (iii) At times [ ].

10. Family size (i) 2 or less [ ] (ii) 3-4 [ ] (iii) 4-8 [ ] (iv) 9 or more [ ].

SECTION B

1. Have you ever heard about helminth in pregnancy?(1)No [ ] (ii)Yes [ ],If yes ,from what source did you learn of it? (i) Health worker [ ] (ii) Friend [ ] (iii) Relative [ ] (iv) Radio [ ] (v) school [ ] (vi) other _____

2. Have you ever heard about anaemia in pregnancy.? (i) No [ ] (ii) yes if yes, from what source if yes, what do you understand by anaemia in pregnancy (i) A problem of blood shortage in pregnant woman [ ] (ii) Low level haemoglobin in pregnancy [ ] (iii) low oxygen carry capacity o blood (iv) low volume of blood in pregnancy [ ] (v) other_____

What cause anaemia drug pregnancy (i) mosquitoes [ ] (ii) Bleeding [ ] (ii) not eating well [ ] (iv)Genetic diseases [ ] (v) other

What are the symptoms of anaemia (i) Dizziness [ ] (ii) Easy fatigability [ ] (ii) weaker [ ] (iv) weakness [ ] palpitations [ ] (iv) others _____

What are the effects of anaemia in pregnancy on the unborn child? (i) low birth weight [ ] (ii) Intra –uterine death [ ] (iii) Congenital anomalies [ ] others_____

What are effect of anaemia in pregnancy on the mother? 9i) Body weakness [ ] maternal death [ ] (iii) stoke [ ] (vi) others_____

7. When did you start using the antenatal centre? (i) 1st trimester (ii) 2nd trimester [ ] (iii) 3rd trimester [ ]

8. How often do you go for antenatal care? (i) Every month [ ] (ii) Every 2 months [ ] (iii) every week [ ] (iv) Every 2 weeks [ ]

9. Have you taken any ante –malaria drugs lately or in the last 2 weeks (i) yes [ ](ii)no [ ] no

10. Since your pregnancy how often have you had malaria? 9i) Fever [ ] (ii) One [ ] (ii) Trace [ ] (iv) Thrice [ ] (v) Always [ ] (vi) others_____

11. What symptoms make you think you have malaria (i) Fever [ ] (ii) Headache [ ] (iii) Body pain [ ](iv) Shivering [ ] (v) Vomiting [ ] loss of appetite [ ] (vi) others_____

12. When you have /had malaria, how did? _____

13. What methods of preventing malaria infection do you know? (i) use of smoke to drive away mosquito [ ] (ii)Mosquito paper [ ] (ii) coils [ ] (iv) Liquid [ ] (v) Vapourizer [ ] (vi) Insecticide Spray [ ] (vii) use of fan [ ] (viii) Covering of body with clothes [ ] (ix) Insecticide treated net (x) other_____

14. Since your coming to this antenatal care centre, have you received any treatment for malaria (i) yes [ ] (ii) No [ ] (iii) Others _____

If yes, have being observed by a health care worker while taking the drug yes [ ] no [ ]

15. Have you ever heard about hookworm infection in pregnancy (i) Yes [ ] (ii) No [ ]

16. Do you take herbal mixture? (i) Yes [ ] (ii) No [ ]

SECTION C NUTRITIONAL STATUS

1. Do you think pregnant women should eat egg? (i) No [ ] (ii) Yes [ ]

If yes, why (i) Baby will grow rapidly [ ] (ii) baby will have a very sharp brain [ ]

If No, why, why 9i) Baby will grow bigger & make delivery difficult [ ] (ii) Baby will become a thief [ ] (iii) Mother will undergo operation [ ] (iv) others _____

2. What foods are forbidden during pregnancy? (i) Too much of tea [ ] (ii) Raw eggs [ ] (iii) Refrigerated meat [ ] (iv)caffeine during first trimester [ ] (v) Alcohol [ ] (vi) unwashed vegetable [ ] (vii) Others_____

3. It is good for pregnant women to take iron supplements? (i) no (ii) Yes

If yes at which pregnancy stage did you take it? (i) First trimester [ ] (ii) Second Trimester [ ] (iii) Third trimester.

If no, why? (i) It is causes diseases in the body [ ] (ii) If causes colour charges in toilet [ ] (iii) it increases appetite [ ] (iv) it delays birth [ ] (v) others_____

NUTRITIONAL STATUS (SCALE)

S/N	HEIGHT (M)	WEIGHT (KG)