

Iron Status of Some Pregnant Women in Orlu Town- Eastern Nigeria

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ABSTRACT

BACKGROUND: High prevalence of anaemia has been reported among pregnant women especially in developing nations. This paper considers maternal haemoglobin (Hb) level, serum total iron, iron binding capacity, and serum ferritin in antenatal women in Orlu-Imo State Nigeria.

PATIENTS AND METHODS: Haemoglobin level, serum iron, serum ferritin, and total iron binding capacity (TIBC) were measured in different trimesters among 90 pregnant women aged 20-45 years, on iron supplements attending antenatal clinic of Imo State University Teaching Hospital Orlu. First trimester comprised of 16.7% (n=15), second trimester comprised of 50% (n=45) while as third trimester comprised of 33.3% (n=30). 30 non-pregnant women aged 26-40 years were used as controls.

RESULT: The mean Hb level was 11.28±1.4 g/dl in first trimester, 9.5±1.9g/dl in second trimester, 10.4±1.2g/dl in third trimester, and 10.9±1.5g/dl in controls. Mean serum iron level was 142±23µg/ml in first trimester, 235±118µg/ml in second trimester, 251±118µg/ml in third trimester, and 99.7±19.4µg/ml in controls. Mean serum ferritin was 57.7±30ng/ml in first trimester, 37.6±17ng/ml in second trimester, 37.3±20ng/ml in third trimester, and 86.7±16.9ng/ml in controls. TIBC was 337±90 µg/dl in first trimester, 441±119µg/dl in second trimester, 482±149µg/dl in third trimester and 271.8±89.0µg/ml in controls.

Hb level was relatively stable in pregnancy, but was significantly ($p<0.05$) lowest in the second trimester compared with controls. Serum iron and TIBC progressively increased from first trimester to third trimester. Conversely, serum ferritin declined progressively from first trimester to third trimester. The increments in serum iron was statistically significant ($p<0.05$) between first and second trimester, but not significant between second and third trimester. TIBC was significantly higher in third trimester compared with first trimester. Serum ferritin was significantly lower in second and third trimesters compared with controls. This implies a progressive mineral transfer from mother to fetus. TIBC and serum iron were significantly ($p<0.05$) lowest in non-pregnant controls

compared with the three trimesters of pregnancy. Conversely ferritin was significantly ($p<0.05$) higher among the non-pregnant controls compared with the three trimesters of pregnancy. This implies that the non-pregnant women had more iron store and had less iron need than their pregnant counterpart. The higher iron need in pregnancy necessitated its mobilization from its stores.

CONCLUSION: This study encourages more critical antenatal care especially at second trimester of pregnancy with much emphasis on dietary supplementation of iron and minerals through adequate consumption of local vegetables and other food diets rich in iron. There was poorest antenatal attendance in the first trimester. Pregnant women in this environment should be encouraged to register early for antenatal care.

KEY WORDS: Pregnancy, anaemia, Iron status.

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INTRODUCTION

Pregnancy is a state characterized with changes in a lot of biochemical parameters. As a result the expectant mother is often put under burdens that often negatively influence her health, life style, emotions, and physical wellbeing. The fetus also faces critical conditions that may result to eventual death or congenital malformation. High rate of fetal and maternal death, as well as other deleterious outcomes of pregnancy has been reported world wide¹⁻⁶. The case is however more alarming in underdeveloped countries with low income earners^{1,2,5}.

A lot of cases of mortality are traceable to anaemia⁷⁻⁹, with iron deficiency implicated in most cases^{7,10,11}. Iron deficiency anaemia is the most common nutritional deficiency in the world. Epidemiological data showed that 2 billion person's world wide is affected by this deficiency¹². It is quite understandable that pregnant women are among the most vulnerable groups affected due to their increased iron requirement. Iron is needed during pregnancy to increase the maternal red blood cell

mass, to supply the growing fetus, and placenta¹³. Iron requirement increases notably during the second half of pregnancy. The degree to which this enhanced requirement can be met depends on the size of iron store at the start of pregnancy. Iron deficiency anaemia in pregnancy could be worsened by poor dietary iron intake habit before conception, and during pregnancy^{14,15}. In this part of the world, women of child bearing age give poor attention to their diet; and worst still during pregnancy. And this happens despite the surplus availability of wide range of local fruits and vegetable which are rich in iron and other vital minerals necessary in pregnancy.

MATERIALS AND METHODS

Study Area: Orlu is one of the oldest senatorial areas, located in Imo State south eastern Nigeria. Although it is an old province, it has not much basic facilities, and as such inhabited predominantly by people of low socio-economic status. It has one teaching hospital, one general hospital, and many private hospitals.

Subjects: One hundred and forty five women attending antenatal clinic of the Imo State University Teaching Hospital Orlu were randomly selected for the study. Ninety were effectively followed up till third trimester. Thirty apparently healthy non-pregnant women were used as controls.

Blood Samples Collection: Whole blood samples were collected and dispensed into EDTA containers for Hb estimation. The remaining blood samples were dispensed into plain containers for other biochemical parameters. After clotting and retraction they were separated using a centrifuge. The supernatant sera were then stored frozen until analyzed.

Haemoglobin was estimated using standard cynmathaemoglobin method^{16,17}. Total iron and TIBC were estimated by ferozine method^{18,19}. Ferritin was measured by ELISA method.²⁰

Statistical analysis: The data obtained from the study was analyzed using SAS software. The student's t- test, and analysis of variance (ANAOVA) were used to determine the level of significance. Inter and intra group comparisons were made. Values were taken to be significant when $p < 0.05$.

RESULT

Figure 1, tables 1 and 2 show the results obtained from this study. In figure 1, antenatal attendance is higher in second trimester (50%) than in first (15%) and third (35%) trimesters.

Table 1 shows the results of Hb, serum iron, ferritin, and TIBC in the three trimesters, and in control subjects. Hb remained relatively unchanged all through pregnancy.

While as serum iron and TIBC progressively increased with pregnancy. On the other hand, ferritin declined progressively with pregnancy.

Table 2 shows the inter group comparison of Hb, serum iron, ferritin, and TIBC in the three trimesters, and in control subjects.

Figure 1: Showing percentage antenatal attendance in the three trimesters

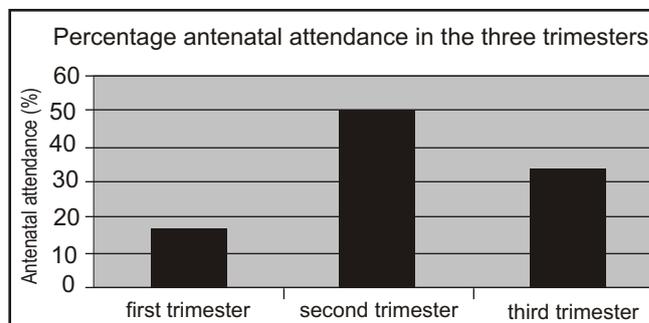


Table 1: The results of Hb, serum iron, ferritin, and TIBC in the three trimesters, and in control subjects.

Parameters	First trimester	Second trimester(n=45)	Third trimester(n=30)	Controls (n=30)
Hb (g/dl)	11.28 ±1.4	9.5 ±1.9	10.4±1.2	10.3±1.5
serum iron (µg/ml)	142 ±23	235 ±118	251 ±118	99.7±19.4
ferritin (ng/ml)	57.7 ±30	37.6 ±17	37.3 ±20	86.7±16.9
TIBC (µg/dl)	337± 90	441 ±119	482 ±149	271.8±89.0

NB: Values are mean± standard deviation

Table 2: Comparison of Hb, serum iron, ferritin, and TIBC between the three trimesters of pregnancy, and control subjects

Parameters	First trimester Versus Second trimester	First trimester Versus third trimester	First trimester Versus control	Second trimester Versus third trimester	Second trimester Versus control	Third trimester Versus Control
Hb	0.052(NS)	0.335(NS)	0.709(NS)	0.071(NS)	0.021	0.456(NS)
Ferritin	0.220(NS)	0.228(NS)	0.101(NS)	0.981(NS)	0.000	0.000
Serum iron	0.011	0.017	0.009	0.726(NS)	0.001	0.003
TIBC	0.069(NS)	0.036	0.224(NS)	0.476(NS)	0.000	0.002

NB: P values less than 0.05 were taken as significant. NS= Not significant

DISCUSSION

A considerable amount of knowledge is yet to be known concerning the nutritional status of pregnant women, especially in the developing countries. As part of the millennium development goals, infant and maternal health cannot be overemphasised. The future of mankind is based on the ability of man to reproduce thus making it worrisome for the high level of infant and maternal death in Nigeria and African continent. It is important to further identify a pattern of this mortality and morbidity in developing nations like Nigeria.

Iron status has been well established as a vital biochemical index of health in pregnancy. Iron as a major component of heam is necessary for the formation of haemoglobin; the oxygen transport molecule in blood. Iron is well absorbed in the intestine especially in the presence of vitamin C. It is believed to be abundant in food world wide especially in nuts and vegetables found

in rural areas²⁰⁻²¹. Thus this widely abundant essential trace element could be easily sourced in daily food.

This study showed a pattern of changing iron status in the three trimesters of pregnancy in Orlu senatorial area of Imo State Nigeria through combined effects of nutrition and increased fetal demand. This situation can be effectively improved upon by proper maintenance of iron status prior to conception through good diet, and a further monitoring of it all through pregnancy when supported with iron supplements. Pregnant mothers have high tendency of non-compliance with their medication and their recommended fruit and vegetable intake²². Counselling and other measures aimed at assisting them overcome this negligence and drug phobia should be employed in our region especially among low income earners who could easily assess foods rich in vitamins and minerals essential for their wellbeing in pregnancy.

This study showed an increasing serum iron level all through pregnancy mainly due to supplementation in spite of a concomitant decreasing iron store; as evidenced by lowered ferritin level. This depicts a state of inadequate iron supply. Similar to findings in other regions of this country²³, a large proportion of pregnant women in this area indulged in culture oriented habitual dietary intake of local fruits and vegetables. This however did not significantly improved iron status, and may imply insufficient or inappropriate intakes.

Anaemia among pregnant women is more common in developing countries than in the developed countries, with poverty, illiteracy, and malaria infection^{24,25,26} being some of the implicated factors. Various studies have also shown high prevalence of anaemia amongst pregnant women in Africa, Asia and Latin America to range from 35-75%²⁵ in contrast with findings in more developed countries like USA²⁷; where less than 30% prevalence rate of anaemia is reported in pregnancy. In these more developed countries, the three issues of poverty, illiteracy, and malaria infection are less prevalent.

Antenatal attendance was poorest in the first trimester of pregnancy similar to findings in studies done in a different region of this country²⁵. This is a typical reflection of the situation in African communities, as women are usually secretive about their pregnancies until it advances and can no longer be hidden. The implication of this has been well elaborated in studies which could include pregnancy loss.

CONCLUSION

This study encourages more critical antenatal care especially at second trimester of pregnancy with much emphasis on dietary supplementation of iron and minerals through adequate and appropriate consumption

of local vegetables and other food diets rich in iron. There was poorest antenatal attendance in the first trimester. Pregnant women in this environment should be encouraged to register early for antenatal care. Also women of child bearing age need to properly monitor their iron status, especially when they are anticipating pregnancy.

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