

ABSTRACT

HAEMOGLOBIN CONCENTRATIONS AND INDICES OF IRON STATUS IN THE THREE TRIMESTERS OF PREGNANCY AND THEIR RELATIONSHIP TO FOETAL OUTCOME

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The study was conducted to determine the effect of iron on changes in haemoglobin concentration throughout pregnancy and the subsequent impact on foetal outcome. One hundred and fifty seven (157) primigravid women attending the Antenatal Clinic in the Obstetrics and Gynaecology department at the University Hospital of the West Indies; with ages ranging from 15 - 25 years were studied. Blood samples for all participants were collected by venepuncture between weeks 8 – 10 in the first trimester, at week 28 in the second trimester and at week 36 in the third trimester. K⁺ EDTA blood was used to obtain the complete blood count while serum was used to determine serum ferritin and serum iron concentration, total iron binding capacity and transferrin saturation.

The results showed that haemoglobin concentration was highest in the first trimester, lowest in the second trimester and begins to return to normal at term (12.73 ± 1.14 , 11.41 ± 1.16 and 11.67 ± 1.18 g/dl, respectively). In contrast, serum ferritin concentration was highest in the first trimester and lowest in the third trimester. Only first trimester iron status parameters were observed to have an impact on haemoglobin concentration. Educational level, occupational status, smoking and BMI had no effect on the haematological parameters while a history of iron deficiency anaemia resulted in lower haemoglobin concentrations and elevated total iron binding capacity. Persons with the sickle cell trait (HbAS) maintained a higher haemoglobin concentration throughout pregnancy than those with normal haemoglobin genotype (HbAA). In the third trimester the mean haemoglobin concentration for women with the sickle cell trait was 11.97 ± 0.84 g/dl while women with a normal haemoglobin genotype had a mean haemoglobin concentration of 11.64 ± 1.22 g/dl.

Maternal anthropometric variables, educational level, employment status, history of iron deficiency anaemia and smoking did not significantly affect the duration of gestation. However, maternal weight had a significant impact on birth weight, crown heel length and head circumference. A unit increase in maternal weight was associated with a 0.009 unit increase in the birth weight of the babies. Participants with a history of iron deficiency anaemia had higher birth weight babies.

Haemoglobin concentration in the first and second trimester of pregnancy had no significant effect on foetal outcome, but third trimester haemoglobin concentration affected crown rump length ($p = 0.036$). Women with a lower haemoglobin concentration had babies with a higher crown rump length. Second and third trimester serum ferritin concentration had no impact on foetal outcome. However, a high serum ferritin concentration in the first trimester was indicative of preterm delivery. Similarly, early in pregnancy serum ferritin concentration had a significant impact on the birth weight ($p = 0.044$) and head circumference of infants ($p = 0.016$). A unit increase in serum ferritin caused a 0.002 unit decrease in the birth weight of infants. The results also showed that women with higher total iron binding capacity (trimester 1) produced babies with higher crown heel length, birth weight and gestational age.

The results indicate that the changes that occur in the iron status parameters, the haemoglobin concentration and hence their effect on foetal outcome during normal pregnancy are trimester specific. This indicates that the parameters both independently and cooperatively can have an impact on foetal outcome.