

Relationship of Maternal and Neonatal Iron Status

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A total of 80 full term pregnant women were selected and were divided into two groups on the basis of hemoglobin level. Group A included 40 pregnant women having Hb level more than 11.0 g/dl. Group A₁ included neonates born to group A mothers. Group B included 40 pregnant women having Hb < 11.0 g/dl and B₁ included their respective neonates. Serum iron, serum TIBC and serum ferritin were done by commercially available kits. Results obtained were analyzed by using students 't' test and level of significance was done. Serum iron and serum ferritin was reduced in mothers of group B and their respective neonates while serum TIBC was higher in mothers and neonates of group B.

Key words: Serum ferritin, maternal and neonatal iron status.

Iron deficiency anemia is a common health problem in developing countries¹. In 1985 world Health organization (WHO) report, it was estimated that 15% to 20% of the worlds population had iron deficiency anemia². Iron is indispensable for life, serving as metal cofactor for many enzymes, either nonheme or hemoproteins. In the latter, iron is inserted in the center of heme prosthetic group. Hemoproteins are involved in a broad spectrum of crucial biological functions³. Although one of the most important function of iron is its role in oxygen transport and storage, iron participates in a variety of biochemical processes including mitochondrial electron transport, catecholamine metabolism and DNA synthesis. Not surprisingly a broad spectrum of abnormalities resulting from iron deficiency has been described⁴.

Approximately two billion people in the world suffer from anemia and that is one third of the world's population. It is believed that anemia is caused by iron deficiency in the majority of these people⁵. 35% to 75% of pregnant women in developing countries are affected by iron deficiency⁶. Iron deficiency affects 20% to 50% of world's population⁷ and 20% to 25% of all infants in the world⁸.

Iron deficiency continues to be one of the most prevalent nutritional deficiency throughout the world. Infants are especially susceptible because of high iron required for their growth⁹. Iron deficiency in infants is a common problem worldwide. If left unattended it is thought to cause impairment of psychomotor development and alteration in behavior¹⁰.

Body iron stores at birth averages 78 mg/kg body weight of which 60 mg are in circulating hemoglobin while the rest is in stores. Newborn babies in the upper range of normal birth weight have 80% more iron than those at lower range. The most important single factor influencing iron stores at birth is low birth weight¹¹.

World Health Organization (WHO) recommended that the cut off value for diagnosis of iron deficiency anemia is less than 12.0 µg/l for serum ferritin and less than 11.0 g/dl for hemoglobin⁵.

Puolakka et al¹² has reported that serum ferritin concentration of newborn babies born to the mothers with low serum ferritin level at term was significantly lower than that of those born to the mothers with normal serum ferritin level. Iron stores of newborn delivered by mothers with low serum ferritin concentration were lower in the newborns of mothers having normal serum ferritin levels¹³. Singla et al¹⁰ also gives a positive correlation between maternal and fetal iron status while other authors have advocated no correlation between maternal and fetal iron status, Hussain et al¹⁴ found no correlation between serum ferritin of mothers and their babies, nor between serum ferritin and serum iron of mothers at the end of pregnancy or between these parameters in the newborn. Turkay et al¹⁵ reported that they were not able to detect any correlation between maternal ferritin, hemoglobin and newborn gestational age and also no correlation was observed between hemoglobin and birth weight.

Subjects and methods:

Eighty subjects were selected with their respective neonates. They were divided into different group.

Group A = mothers of Hb > 11.0 g/dl.

Group A₁ = Neonates born to group A.

Group B = Mothers of Hb < 11.0 g/dl.

Group B₁ = Neonates born to group B.

Five ml of blood was taken and serum iron, TIBC and ferritin were performed by commercially available kits.

Results:

The results and level of significance of these groups is given in Table 1 and 2.

Table 1 Comparison of Investigations in groups A and B

Tests	A	B	A Vs B
Serum Iron	84.03 ± 26.4	29.3 ± 7.01	HS
Serum TIBC	401.6 ± 41.2	486.07 ± 20.06	HS
Serum Ferritin	56.7 ± 28.9	10.77 ± 45.7	HS

Table 2. Comparison of investigation in groups A₁ and B₁

Tests	A ₁	B ₁	A ₁ Vs B ₁
Serum Iron	192.1 ± 47.8	125.6 ± 55.8	HS
Serum TIBC	230.8 ± 84.4	352.07 ± 99.03	HS
Serum Ferritin	63.91 ± 60.05	29.7 ± 45.78	HS

Discussion

Serum Iron: In this study serum iron was found to be higher in Group A and Group A₁ subjects and lower in Group B and Group B₁ subjects. The difference was significant ($p < 0.01$) statistically. Singla¹⁰, Pavelka¹⁶, MacPhail⁸, Agarawal¹⁷ and Gasper¹⁸ also found higher serum iron in non-anemic mothers and in neonates born to non-anemic mothers. This higher level of serum iron in non-anemic mothers and neonates born to non-anemic mothers may be due to iron supplementation of non-anemic subjects as also reported by MackPhail⁸, Singla¹⁰ and Wintrobe¹¹.

Total Iron Binding Capacity (TIBC): In this study, serum TIBC was found to be higher in Group A and Group A₁ subjects and lower in Group B and Group B₁ subjects. The difference was found to be significant ($p < 0.001$) statistically. Singla¹⁰ and Agarawal¹⁷ also found higher level of TIBC in non-anemic subjects and in neonates born to non-anemic subjects. The increase in TIBC of non-anemic subjects and in neonates born to non-anemic subjects may be due to iron supplementation as also reported by Singla¹⁰, Agarawal¹⁷ and Wintrobe¹¹.

Serum Ferritin: In this study Serum ferritin was found to be higher in Group A (non-anemic mothers) and Group A₁ (neonates born to Group A) as compared to Group B (anemic mothers) and Group B₁ (neonates born to Group B) and the difference was significant ($p < 0.01$) statistically. This study is consistent with the results of Gasper¹⁸, Kelly¹⁹, Ilyas¹³, Pavelka¹⁶, MackPhail⁸, Agarawal¹⁷, Puolakka¹² and Singla¹⁰ who also observed higher ferritin level in their neonates born to non-anemic mothers. Higher serum ferritin level in Group A and Group A₁ may be due to iron supplementation as also reported by Agarawal¹⁷ and Wintrobe¹¹.

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