PERINATAL STATUS IN IRON DEFICIENCY ANAEMIA IN PREGNANCY

by

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Introduction

Anaemia in pregnancy has been a major problem for the obstetricians both with regard to maternal and foetal health. Intrauterine malnutrition has been suggested to occur in anaemia that plays a significant role in perinatal pathology and development. Conflicting results have been reported on the effects of iron deficiency anaemia in the newborn. Sisson and Lund (1958) observed a significant decrease in haematocrit values, haemoglobin values and plasma iron levels in children delivered to iron deficient mothers. Sturgeon (1959) indicated that minor variation in iron status of the mothers have no significant effect on the iron status of infants. However, it may well be possible that a more marked iron depletion of the mothers may interfere with a normal delivery of iron to the foetus.

Material

The present work is an analysis to study the relation between the maternal and foetal serum iron level. The serum iron is expressed in microgram/ml. The cases have been divided into 4 groups—Control group, Group I, Group II and Group III.

TABLE I

Number of Cases Studied in Control and Different Anaemic Groups (Total 80 Cases)

	Control group	Anaemic group		
		Group I	Group II	Group III
No. of cases	24	24	24	8
Range of Hb. in gm.%	11.7-14.0	9.0-11.5	6.0-8.5	3.0-5.5
Mean Hb.	12.43	9.91	7.21	4.45
Standard deiation (SD)	0.7	0.85	0.74	0.88

Table shows the distribution of cases served as control and anaemic group is further sub-divided into 3 groups according to haemoglobin of the mothers.

Fall in haemoglobin level, red blood and packed cell in anaemic group is sig-

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TABLE II

Haematological Values of Control and Anaemic Groups of Mothers

Group of mothers	No. of cases	Hb. in gm.%			RBC in Ml/cmm.			Packed cell volume		
		Range	Mean	S.D.	Range	Mean	S.D.	Range	Mean	S.D.
Normal control	24	11.7 to 14.0	12.43	0.7	3.0 to 4.9	4.17	0.21	36-45	40.0	3.00
Anaemic group	24	9.0 to 11.5	9.91	0.85	3.0 to 4.66	3.76	0.34	25-39	33.29	3.41
Anaemic group II	24	6.0 to 8.5	7.21	0.74	2.0 to 4.75	3.13	0.74	20-34	24.83	3.12
Anaemic group III	8	3.0 to 5.5	4.45	0.88	2.0 to 4.0	2.58	0.65	14-22	17.5	2.74

nificant from the control group ($p = 0.05$).

The above Table indicates definite correlation between maternal serum iron, cord serum iron and neonates serum iron.

The above Table shows the correlation between maternal, cord and neonatal serum iron.

The above Table shows the correlation between maternal, cord blood and neonatal serum iron. There is a significant difference between the maternal serum iron of anaemic and nonanaemic women. There is highly significant difference in serum iron of cord blood and neonates born of anaemic and non-anaemic mothers.

The above Table shows the definite relationship between maternal, cord blood and neonatal serum iron.

There is significant difference in birth weight, maternal serum iron, cord blood iron and neonatal serum iron of anaemic and non-anaemic patients.

The above Table indicates that out of 56 cases in anaemic group 32.14 per cent of babies were born preterm, 17.86 per cent were premature, 16.07 per cent were stillbirth, and 50 per cent were born at term. whereas in control group there was no premature birth, 4.17 per cent were preterm and 95.83 per cent was at term.

The above Table shows that the maximum number of stillbirth occurred at 30-34 weeks of gestation. There was no stillbirth at 38-40 weeks of gestation.

TABLE III

Serum Iron in Maternal Cord Blood and Neonates in Control Group Where Hb.% Ranging From 11.7-14.0 gm.%

	No. of cases	Range	Mean	S.D.
Maternal	24	100-120	112.62	6.36
Cord blood	24	200-240	215.62	16.73
Neonates	24	170-220	192.23	17.21

TABLE IV

Serum Iron in Maternal Cord Blood and Neonates in Anaemic Group I Where Hb.% Ranging From 9.0-11.5 gm.%

	No. of cases	Range	Mean	S.D.
Maternal	24	55-110	78.81	17.81
Cord blood	24	110-208	148.12	31.84
Neonates	24	85-180	125.79	31.16

TABLE V

Serum Iron in Maternal, Cord Blood and Neonates in Anaemic Group II Where Hb.% Ranging From 6.0-8.5 gm%

	No. of cases	Range	Mean	S.D.
Maternal	24	30- 70	49.92	8.34
Cord blood	21 + 3 stillbirth	100-140	105.83	10.01
Neonates	21 + 3 stillbirth	70-120	82.93	10.86

TABLE VI

Serum Iron in Maternal, Cord Blood and Neonates in Anaemic Group III Where Hb.% Ranging From 3.0-5.5 gm%

	No. of cases	Range	Mean	S.D.
Maternal	8	27- 55	36.25	8.99
Cord blood	2 + 6 stillbirth	100-110	102.00	4.00
Neonates	2 + 6 stillbirth	70- 80	73.00	4.00

TABLE VII

Relationship Between Birth Weight of Newborn, Maternal and Neonatal Serum Iron

Group	No. of cases	Birth Wt. in Kg.	Mean Maternal serum iron		Mean neonatal serum iron	
			Mean	S.D.	Mean	S.D.
Control	24	2.8-4.0	112.62	6.36	192.25	17.21
Anaemic group I	24	2.0-3.3	78.81	17.81	125.81	31.16
Anaemic group II	24	2.0-3.0	49.92	8.34	82.93	10.86
Anaemic group III	8	2.0-2.5	36.25	8.89	73.00	4.0

TABLE VIII

Outcome of Pregnancies in the Series

Types of patients	No. of cases	Normal		Preterm		Premature		Still-birth	
		No.	%	No.	%	No.	%	No.	%
Pregnancy with anaemia	56	28	50	18	32.14	10	17.86	9	16.07
Pregnancy without anaemia	24	23	95.83	1	4.17	—	—	—	—

TABLE IX

Foetal Outcome in Different Non-anaemic and Anaemic Group According to the Period of Gestation

Period of gestation in weeks	Mean Hb.% in gm	Total cases		Live birth		Stillbirth	
		No.	%	No.	%	No.	%
30-34	3.0- 8.0	10	12.5	2	20.0	8	80.0
35-37	5.2-10.4	19	23.8	18	94.4	1	5.6
38-40	7.0-14.0	51	63.7	51	100.0	—	—

Discussion

Nutritional anaemia has been a major problem in developing countries. Pregnancy imposes extra nutritional demands on the mother and is likely to exaggerate any latent deficiency states. The impact of anaemia on the growing foetus in utero has not received similar attention. Since last 60 years there has been growing awareness on this aspect of anaemia in pregnancy. Several reports have been published from India and abroad reporting the effect of anaemia on the foetus.

In this study the mean maternal serum iron in control group was 112.62, and in the cord blood and in neonates it was 215.62 and 192.25 microgram respectively. The mean maternal serum iron gradually falls in the anaemic group I and II and Group III (78.81, 49.92 and 36.2 microgram). Similarly, cord iron and neonatal iron falls in the same proportion in the anaemic group I to III, mean cord iron in the control group was 215.62 microgram and gradual decline was observed 148.12 in anaemic group I, 105.83 in anaemic group II and 102.00 in anaemic group III. Statistically the difference between the mean group was found to be highly significant ($p > 0.001$), but the difference between the cord iron of anaemic group II and III was insignificant. This indicates that neonates of anaemic group I and II were largely affected while babies of anaemic group III were unaffected irrespective of maternal iron status because much of iron which was found in the cord blood of babies of anaemic group III must be essential for the formation of organs tissues and enzymes etc.

Our observations are mostly in agreement with Joshi and Mehta (1968), and Matto *et al* (1978), and many others were of opinion that at certain level maternal iron status affects the iron stores of the newborn. They noted a linear correlation between the maternal serum iron and

cord serum iron level. They also found that cord serum iron rises directly as the maternal serum iron rises. Matto *et al* (1978) observed that the lowering of maternal haemoglobin from over 12 to 9.1 gm.% resulted in a significant fall ($p < 0.05$) in the cord blood haemoglobin of the newborns. Further lowering of haemoglobin below 9 gm.% did not produce a significant fall ($p < 0.05$).

Mean haemoglobin level of pregnant mother studied by Matto *et al* (1978) in anaemic group II and III were 9.5 to 12 and 7.9 which corresponded to our group I and II mothers. The mean haemoglobin level of pregnant mothers studied by Sisson and Lund (1958) ranged between 11.2 to 9 gm. which corresponded to our anaemic group. They also suggested that infants of anaemic mother will frequently share the iron deficiency. They concluded that the "more severe the anaemia in the mother the more this will be reflected in the infant at birth", such a profound effect on the newborns depriving it of its readily available iron stores may be expected to influence the production of iron deficiency anaemia in later months of life.

In the present series the mean neonatal serum iron in control group is 192.25 microgram and it shows gradual decline to 125.79 microgram, 82.93 microgram and 73.09 microgram respectively in anaemic group I, II and III. Statistically the difference in the mean of control and anaemic group is found to be highly significant. The result of present study supported the concept that infant born to severely anaemic mother has less iron stores compared to that of relatively non-anaemic mother. According to Bwibo (1971) an infant born to an iron deficient mother has less iron stores even if born at term and thus is in the first stage of iron deficiency state. Several studies in India (Joshi and Mehta, 1968; Matoo *et al.* 1978) and Eastern countries have shown that the severe iron deficiency anaemia in pregnant women was associated with the development of nutritional anaemia in their offspring by the age of one year.

Prematurity was found in 50 per cent of anaemic women while in non-anaemic control group it was 4.17 per cent only. Total stillbirth rate in anaemic group was 16.07 per cent while no stillbirth was recorded in non-anaemic group.

Summary

Serum iron was estimated in maternal blood, cord blood and neonates. There is significant correlation between the maternal, cord and neonatal serum. It is therefore, concluded that the growth of the foetus depends upon the nutritional status of the mother and if a pregnant women is deficient in any of the essential element it will be reflected in the foetus.

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