

## Maternal Anemia and Its Effect on Cord Blood Hemoglobin And Newborn Birth Weight

Najeeba C.M<sup>1</sup>, Anitha S. Prabhu<sup>2</sup>, Prakash R.M Saldanha<sup>3</sup>

<sup>1</sup>(Department of Pediatrics, Yenepoya Medical College, India)

<sup>2</sup>(Department of Pediatrics, Yenepoya Medical College, India)

<sup>3</sup>(Department of Pediatrics, Yenepoya Medical College, India)

**Abstract:** Background- Maternal anemia in pregnancy has several deleterious effects on the health of the mother and the fetus. Aims and Objectives: To study the significant correlation between degree of maternal anemia and birth weight of the newborn and to assess the effect of maternal anemia on fetal cord blood haemoglobin. Materials and Methods: The present study was prospectively conducted in 50 pregnant mothers who were in labour and their newborn after birth in the pediatric department, Yenepoya Medical College, Mangalore from November 2014 to April 2015. Results: 18(36%) Mothers had mild anemia (haemoglobin between 9-11 g/dl), 2(4%) had moderate anemia (haemoglobin between 7-9 g/dl) and only 1(2%) had severe anemia (haemoglobin between 4-7g/dl) and 29(58%) mothers had normal haemoglobin level. None of the mothers had very severe anemia (<4 g/dl). The cord blood haemoglobin values reduce as the haemoglobin level of the mother reduces, but the reduction is not statistically significant. The Mean Birth weight reduces in babies born to moderate anemic mothers but no statistical difference seen. Conclusion: There is no effect on cord blood haemoglobin and newborn birth weight if the mother is only mild to moderately anemic. Maternal anemia should be very severe enough to affect the fetal health.

**Keywords:** birth weight, cord blood haemoglobin, maternal anemia, newborn, pregnancy.

### I. Introduction

One of the most frequently observed nutritional deficiency diseases in the world during pregnancy is iron deficiency anemia and it is often a contributory cause of maternal death<sup>1</sup>. Anaemia in pregnancy is associated with adverse consequences both for the mother and the foetus<sup>2</sup>. Decreased intake and increased demands of iron, disturbed metabolism, prepregnant health status and excess iron demands as in multiple pregnancies, women with rapidly recurring pregnancies, blood loss during labour, heavy menstrual blood flow, inflammation and infectious diseases are important factors which lead to development of anaemia during pregnancy<sup>3</sup>. In tropical countries, the incidence of anemia in pregnancy is about 40-80%<sup>4</sup>. In developed countries, it ranges between 10-20%. It is responsible for 20% of maternal death in developing countries. Women with anaemia in pregnancy may experience fatigue, reduced energy levels, reduced mental performances and in cases of severe anaemia it is associated with preterm birth, low birth weights, and a small for gestational age fetus<sup>1</sup>.

Anemia is routinely screened for in pregnancy by estimating the Hb concentration by means of full blood count at the beginning of pregnancy and again later in pregnancy, often at the start of 3<sup>rd</sup> trimester, and again at term. Iron deficiency anemia (IDA) during pregnancy had significant adverse effect on the foetal outcome<sup>5</sup>. Irrespective of maternal iron stores, the fetus still obtains iron from maternal transferrin, which is trapped in the placenta and which, in turn, removes, and actively transports iron to the fetus. Gradually, however, such fetuses tend to have decreased iron stores by 5-6 weeks due to depletion of maternal stores. Adverse perinatal outcome in the form of pre-term and small-for-gestational-age babies and increased perinatal mortality rates have been observed in the neonates of anemic mothers<sup>6</sup>.

### II. Aim Of Study

To study the significant correlation between degree of maternal anemia and birth weight of the newborn and to assess the effect of maternal anemia on fetal cord blood haemoglobin.

### III. Materials And Methods

The study was conducted prospectively in the pediatric department, Yenepoya Medical College, Mangalore from November 2014 to April 2015. The study included 50 pregnant mothers who attended for the safe confinement who were in labour. Women with chronic illness, had complications of pregnancy, delivered prior to 37 weeks of gestation were excluded from the study. Venous samples were taken from the pregnant mothers for assessing the haemoglobin level. Anemia in mother were classified according to their haemoglobin levels into mild, moderate and severe as per ICMR classification is shown in Table 1.

**Table 1 The Indian Council of Medical Research categories of Anemia<sup>7</sup>.**

Severity of anemia	Hb in g/dl
Mild	10–10.9
Moderate	9.9–7
Severe	6.9–4
Very severe	<4

After delivery of the baby blood sample were collected in an EDTA bottle from a 15-20 cm length of the umbilical cord incised while severing it at the time of birth of the baby and blood sent for Hemoglobinanalysis. After birth, weight of the newborn were recorded. Written informed consent was taken from parents.

#### IV. Results

In this present study out of 50 mothers, 18 (36%) Mothers had mild anemia (haemoglobin between 9-11 g/dl), 2 (4%) had moderate anemia (haemoglobin between 7-9 g/dl) and only 1 (1%) had severe anemia (haemoglobin between 4-7g/dl) and 29 mothers had normal haemoglobin level. None of the mothers had very severe anemia (<4 g/dl). Table (2) shows the cord blood haemoglobin levels in mothers with Anemia. The cord blood haemoglobin values reduces as the haemoglobin level of the mother reduces, but the reduction is not statistically significant.

**Table (2) .The cord blood haemoglobin levels in mothers with anemia.**

Category (anemia severity)	Haemoglobin level(Hb)	Haemoglobin level of mothers (Mean ± SD)	No. of mothers	Cord blood Hb (Mean ± SD)	P value
Mild	9-11	10.3±0.57	18	15.5 ± 1.570	.671
moderate	7-9	8.60±0.28	2	15.35 ± 0.494	.973
Severe	4-7	6.30	1	13	-
Very severe	<4	-	0	-	-
Normal	>11	12.3±.998	29	16.04 ± 2.29	-

The relation of maternal haemoglobin with newborn birth weight is shown in Table 3. The Mean Birth weight reduces in babies born to moderate anemic mothers but no statistical difference seen.

**Table (3) .The relation of maternal haemoglobin with newborn birth weight.**

Category (anemia severity)	Haemoglobin level(Hb)	Haemoglobin level of mothers (Mean ± SD)	No. of mothers	Birth weight(Mean± SD)	P value
Mild	9-11	10.3±0.57	18	2.90 ± 0.47	.998
moderate	7-9	8.6000±0.2828	2	2.86 ± 1.10	.990
Severe	4-7	6.3000	1	2.5	-
Very severe	<4	-	0	-	-
Normal	>11	12.3±0.9987	29	2.91 ± 0.67	-

Among Anemic mothers there were 7 cases of low birth weight and the proportion of low birth weight increases in the moderate anemia compared to mild anemia, but it was not statistically significant. Among normal mothers there were 4 cases of low birth weight.

#### V. Discussion

Maternal anemia has several deleterious effects on the health of the mother and the fetus. In our study the effects of maternal anemia on the newborn by assessing the cord blood haemoglobin level and the birth weight was taken. We find that there is no linear correlation between maternal and cord haemoglobin except in reduction in haemoglobin values in severe maternal anemia at birth thus leading to the conclusion that the fetus continues to extract iron efficiently from the mother regardless of her iron status. This study is in line with Klibride J et al study<sup>8</sup>. The similar results noted in Erdem A et al study<sup>9</sup>.

Another study done by Sweet et al found that maternal iron depletion is associated with reduced fetal iron stores but no change in free iron availability by assessing the serum transferrin receptors<sup>10</sup>.

In contrast to our study, previous studies have shown that there is a direct relationship between maternal and fetal haemoglobin, demonstrated that the cord haemoglobin is lower in anemic mothers and that the decrease appears to be proportional to the degree of anemia and was statistically significant, suggesting that placental iron transport mechanisms may not work at higher degrees of maternal anemia thus leading to a fall in cord haemoglobin<sup>11</sup>. Regarding the birth weight of the newborn babies of anemic mothers, we find that reduction in mean birth weight with decreasing maternal haemoglobin level, but statistically no significant may be due to

small sample size selected for the study. Study done by Singla et al., who stated that the birth weight, placental weight and number of placental cotyledons were significantly reduced in the very severely anemic mothers and had direct relationship with the maternal haemoglobin levels<sup>12</sup>.

#### **VI. Conclusions**

The limitations of the study include small sample size. We could not assess the haemoglobin in mothers during the first and second trimester. We did not assess the iron status of the mother directly and we assumed that cause of anemia could be iron deficiency. There is no effect on cord blood haemoglobin and newborn birth weight if the mother is only mild to moderately anemic. Maternal anemia should be very severe enough to affect the fetal health.

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