

**Original article:**

## **Co-relation of hematological profile at birth and at 5<sup>th</sup> month of life with factors influencing increased prevalence of anaemia in early infancy.**

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### **Abstract:**

**BACKGROUND:** Nutrition is an important factor in infant's growth and development especially during the first year of life which includes intrauterine and the postnatal period. Transfer of iron from the mother to the fetus is supported by a substantial increase in maternal iron absorption during pregnancy and is regulated by the placenta. Anaemia is a public health problem that affects populations in both rich and poor countries. Although the primary cause is iron deficiency, it is seldom present in isolation.

**OBJECTIVE:** This study was conducted to analyse the correlation of hemoglobin levels of infant at birth and at 5<sup>th</sup> month of life with the maternal factors during pregnancy, assess the hematological profile in early infancy: at birth and at 5<sup>th</sup> month of life among children born in a tertiary care hospital in south India and to assess the magnitude and severity of the anaemia.

**METHODOLOGY:** A retrospective cohort study was conducted on 100 sample of normally delivered babies at BGS GIMS Hospital. Data regarding maternal factors including diet, exercise, anthropometry, education status, haematological profile, placental insufficiency and hypertension disorders during pregnancy were collected according to the structured proforma from the mothers records. Following that babies were evaluated for birth weight, other anthropometric values and haemoglobin estimation at birth and followed up at 5<sup>th</sup> month of life.

**RESULTS:** Maternal obstetrical complications such as pregnancy induced hypertension was a factor contributing to the prevalence of anaemia during infancy. The prevalence of anaemia in early infancy is high (47%).

**CONCLUSION:** Maternal obstetrical complications such as pregnancy induced hypertension was a factor contributing to the prevalence of anaemia during infancy. Other maternal factors such as education, socio economic status and nutritional status of mother did not show statistically significant impact on infant's anthropometry at birth and at 5<sup>th</sup> month of life. Pediatricians to consider start of early iron supplements to prevent nutritional causes of anaemia in infancy.

**KEYWORDS:** Maternal anaemia, Hypertension related disorders, hematological profile of infant, infantile anaemia.

### **Introduction:**

Nutrition is an important factor in infant's growth and development especially during the first year of life which includes intrauterine and the postnatal period. (1) During the intrauterine growth the maternal factors play a key role for foetus stores. Inadequate maternal caloric intake due to the result of a diet that is nutritionally poor, leads to lower absorption of essential micronutrients, such as vitamin B12 and iron, for fetal growth. (1) This intricate process is controlled by a wide range of factors including genetic potential for growth, maternal health and nutrition, placental perfusion and function, fetal condition and environmental factors. Changes to any of these factors can result in fetal growth disorders. The development of a healthy placenta, vital in maintaining adequate fetal growth, involves invasion and remodelling of the maternal spiral arteries by fetal trophoblast cells. Ideally, this results in a low-resistance circulation, promoting increased blood supply to the placental bed. Any chronic maternal vascular conditions that contribute to abnormal placentation or reduced blood supply to the placental bed can cause fetal growth restriction [FGR]. (2,3). The most common of these are hypertensive disorders, including pre-eclampsia.

Although term neonates experience a reduction in haemoglobin during the first 6 to 12 weeks postpartum due to physiological infancy anaemia, they typically have enough iron reserves until early infancy, or the first 6 months of life. But while mild maternal iron deficiency anaemia has very little effect on the iron status of the newborn, severe anaemia should not be disregarded because it does have a considerable impact. When compared to their normal counterparts, the foetuses of moms with lower iron reserves have smaller haemoglobin masses.

### **Objectives:**

Correlation of hemoglobin levels of infant at birth and at 5<sup>th</sup> month of life with the maternal factors during pregnancy such as hypertensive disorders during pregnancy.

Assess the hematological profile in early infancy: at birth and at 5<sup>th</sup> month of life among children born in a tertiary care hospital in south India.

### **Methodology:**

A retrospective cohort study was conducted on 100 sample of normally delivered babies at BGS GIMS Hospital. Data regarding maternal factors including diet, exercise, anthropometry, education status, haematological profile were collected according to the structured proforma from the mothers records. Following that babies were evaluated for birth weight, other anthropometric values and haemoglobin estimation within 3 days of life. Mothers who satisfy the inclusion criteria, willing for exclusive breast feeding were included in the study and all the enrolled babies were called for follow up at around 5<sup>th</sup> month of life. A second sample of venous blood sample was drawn as per standard protocol to estimate the CBC and peripheral smear of the baby. First sample was taken at birth. Around 0.5ml of venous blood sample which was drawn for routine investigations in the post natal ward such as blood grouping and typing in newborn babies was sent for CBC with Peripheral smear. Second 0.5ml of venous blood sample was sent from OPD in infants who were called for follow-up, in whom investigations such as CBC with Peripheral smear was done at around 5<sup>th</sup> month.

### **Sampling technique: Purposive sampling.**

**Inclusion criteria:** All normal, appropriate for gestational age babies delivered at BGS GIMS following delayed cord clamping protocol. All the infants who are exclusively breast fed for first five months of life (Except Vitamin D3).

**Exclusion criteria:**

History of antenatal bleeds in mother.

Babies born to high risk pregnancy mothers (APH, eclampsia).

Babies born to serology positive mothers.

Babies with suspected bleeding disorders, Direct Coomb's test positive, pathological jaundice.

Babies with history of NICU admissions (>1 week stay, severe sepsis, bloodtransfusions, partial and double exchange transfusion).

High risk babies with endocrine, liver dysfunction.

**Statistical analysis:**

All the data was entered in a pre structured proforma. Data was analysed to determine the co-relation between maternal factors such as diet, habits, anthropometry of mother, BMI, education status, hematological profile and statistical test was applied to find the co-relation between these factors with infants CBC at birth and at 5<sup>th</sup> month of life.

**Results: Table 1:**Distribution of Study Subjects according to the Medical Complications(N=100).

Medical Complications	No.	Percent
Hypertension	1	1.0
Hypothyroidism	12	12.0
Nil	87	87.0

The results of the study showed majority of the mothers included in the study did not have any prior medical complications. Small fraction the sample group i. e, 12 % had hypothyroidism and 1% had hypertension.

**Table 2:**Distribution of Study Subjects according to the Obstetric Complications(N=100)

Complications	No.	Percent
Pre-eclampsia	1	1.0
Eclampsia	1	1.0
GDM	9	9.0
PIH	7	7.0
GDM+PIH	1	1.0
Nil	81	81.0

When obstetrical complications were considered majority of mothers (9%) had gestational diabetes mellitus which would affect the anthropometric measurements of infants at birth and 7% of mothers had Pregnancy induced hypertension which would inversely affect the weight of infants at birth.

**Table 3:** Association between Obstetric Complications and Haematological Parameters at Birth and at 5<sup>th</sup> Month (N = 100). In the study group mothers with obstetrical complications of pregnancy induced hypertension, pre-eclampsia and eclampsia showed mean hemoglobin below cut off i.e 10.9g/dl, 10.3g/dl and 10.7g/dl respectively at 5<sup>th</sup> month of life.

Obstetric Complications	HB at Birth Mean (SD)	MCV at Birth Mean (SD)	HB at 5 Months Mean (SD)	MCV at 5 Months Mean (SD)
Eclampsia	16.40	102.0	10.7	67.0
GDM	16.21 (1.05)	103.77 (4.43)	11.24 (0.37)	74.56 (10.38)
GDM+PIH	15.90	104.0	11.50	91.00
None	16.50 (0.96)	104.82 (3.36)	11.05 (0.59)	73.49 (10.52)
PIH	16.05 (0.53)	106.85 (3.93)	10.95 (0.51)	72.0 (11.13)
Preeclampsia	17.10	109.0	10.30	63.0
<b>P Value</b>	0.719	0.393	0.570	0.505

#### Discussion:

In the study of 990 infants aged 3 to 5 months, Saskia de Pee, Martin W. Bloem, Mayang Sari, et al. hypothesised that iron deficiency anaemia, specifically the increased risk of low haemoglobin concentration among infants of anaemic mothers, is the cause of the low haemoglobin concentration in many infants under the age of 6 months. (4) Four factors— maternal haemoglobin concentration, birth weight, child age, and breastfeeding status—were highly linked with the prevalence of low haemoglobin in infants less than 6 months, according to a univariate analysis. However in the study group, mothers with obstetrical complications such as pregnancy induced hypertension, pre-eclampsia and eclampsia showed mean hemoglobin below cut off i.e 10.9g/dl, 10.3g/dl and 10.7g/dl respectively at 5<sup>th</sup> month of life concluding that hypertension related disorders in pregnancy lead to higher prevalence of infants with anaemia.

The study showed maternal factors such as hemoglobin of mother during pregnancy had a significant effect on infant anthropometric measurements such as weight, length, head circumference both at birth and at 5<sup>th</sup> month of life i.e, low hemoglobin of mother resulted in low birth weight of infant at birth and increased incidence of anaemia (low hemoglobin at 5<sup>th</sup> month of life).

Maternal obstetrical complications such as pregnancy induced hypertension was a factor contributing to the prevalence of anaemia during infancy. The prevalence of anaemia in early infancy is high (47%).

#### Conclusion:

Maternal obstetrical complications such as pregnancy induced hypertension was a factor contributing to the prevalence of anaemia during infancy. Other maternal factors such as education, socio economic status and nutritional status of mother did not show statistically significant impact on infant's anthropometry at birth and at 5<sup>th</sup> month of life. The prevalence of anaemia in early infancy is high (47%) and need for evaluation of all infants

in well baby clinic is of importance. Pediatricians to consider start of early iron supplements to prevent nutritional causes of anaemia in infancy.

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