

Prospective Study on the Effects of Serum Ferritin Levels and Anthropometric Profiles in Neonates Born to Anemic Mothers

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Received: 10-03-2024 / Revised: 24-04-2024 / Accepted: 11-05-2024

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Conflict of interest: Nil

Abstract:

Background and Objective: Iron deficiency anaemia is the most common type of anaemia. Pregnant women and infants are recognised as most vulnerable to Iron deficiency anaemia. Iron deficiency without anaemia may also adversely affect long term neurodevelopment and behaviour in infants which may be irreversible. Studies show that neonates of severe anaemic mothers tend to have low iron stores, retardation in growth and neurodevelopment. Comparison of the iron stores of neonates depicted by Cord serum Ferritin and haemoglobin levels and their anthropometric profile, is an important indicator of haematological status in newborns. These newborns were followed up at third and fourth month of life to further evaluate their Haemoglobin status and which in turn would pave the way to guidelines on iron therapy in these newborns.

Materials and Methods: Our study was a Prospective Hospital based study conducted during the time period from September 2020 to July 2021 on 70 patients who satisfied the inclusion criteria and after taking an informed written consent.. Neonates were divided into three categories on basis of Hb of mother as per WHO classification. Cord blood sample is collected for complete hemogram and serum ferritin assay, anthropometric profile of these neonates weight, head circumference, length were measured at birth, three months and at four months in whom supplementation was done as measured.

Conclusion: If adequate therapy given at the right time during infancy, then it is possible that even the children born to anaemic mothers with low haemoglobin and birth weight can catch up with the normal babies.

Keywords: Iron Deficiency Anaemia; Cord Serum Ferritin; Cord Hematogram; Anthropometric Profile; Iron Therapy.

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Introduction

Iron deficiency anaemia is the most common type of anaemia. Iron deficiency without anaemia is significant because iron is also required for normal development of central nervous system. It develops as the end result of a series of steps that begins by depletion of iron stores. Pregnant women and infants are recognised as the groups most vulnerable to Iron deficiency anaemia. Iron deficiency without anaemia may also adversely affect long term neurodevelopment and behaviour in infants which may be irreversible. Iron transfer from mother to foetus occurs against the concentration gradient. Maternal iron is the only source of foetal iron. So it is logical to think that maternal iron status will affect the iron status of the neonate. Infants will be iron deficient if serum ferritin will be less without anaemia. Studies have shown that neonates of severe anaemic mothers tend to have a low level of iron stores and subsequently growth and development. Severe anaemia is also associated with poor pregnancy outcome in the form of abortions, premature labour

and low birth weight babies. Several studies have been done to investigate the relationship between maternal and neonatal iron status, but results have been conflicting. So to ascertain the influence of maternal anaemia on their newborns, this study was undertaken. Here comparison of the iron stores of neonates depicted by Cord serum Ferritin levels and cord blood haemoglobin an important indicator of haematological status in newborns and their anthropometric profile at birth born to mothers with mild, moderate and severe anaemia. Here these newborns were followed up at their third and fourth month of life to further evaluate their Haemoglobin status and which in turn would pave the way to guidelines on iron therapy in these newborns.

Objectives

To study the significance of the anthropometric profile of the same babies.

To grade these anthropometric values of these newborns according to severity of maternal anaemia.

The above collected data to be assessed and to come to a conclusion that newborns of anaemic mothers will have less stores of iron and birth weight.

To conclude that the haematological and anthropometric derangements depends on the severity of maternal anaemia.

Material and Methods

The present study was a Prospective Hospital based study conducted during the time period from September 20120 to July 2021 on 70 patients who satisfied the inclusion criteria, and attending the Department of OBG and paediatrics at JLNMC, Bhagalpur. were included for the study after taking an informed written consent from all the subjects or their nearest legal heir most neonates were selected after informed consent of their mothers I

Inclusion Criteria

1. Neonates of Anaemic mothers (iron deficient).
2. Term infants with birth weight more than 2000gms.

Exclusion Criteria

1. Neonates born to mothers with chronic medical illness like breast and cervical cancers, epilepsy, underlying heart disease were excluded.
2. Neonates born to mothers with genetic disorders including thalassemia / hemoglobinopathies were excluded.
3. Neonates with major congenital anomalies, twin gestations, requiring NICU admissions, born to mothers with anaemia of any cause other than Iron deficiency and any factors (acute/chronic inflammation) which could adversely affect Serum ferritin levels, birth weight or gestation was excluded from the study. Maternal haemoglobin sampling will be done under aseptic precautions, peripheral veni-puncture blood samples will be collected from the pregnant subjects for the determination of Hb levels before delivery.

Anthropometric profile of these neonates. birth weight (grams) head circumference, birth length was measured at birth, three months and at four months in whom supplementation was done Birth weight method of measurement – for measuring birth weight either mechanical or electronic scales which provide reasonably valid and precise readings will be used.

Birth weight will be recorded in kilograms. Babies are weighed naked immediately after birth. A transfer paper placed on the scale and the newborn weighed as quickly as possible never leaving unattended and the scale cleaned between uses.

Babies weighed in a weighing machine on lever actuated weighing scales to the nearest 50g. The machine balanced to zero position each time before taking the measurement. The weighing machine checked periodically by known standard weights.

Results

The present study conducted from September 2020 to July 2021 on 70 patients at the Department of OBG and paediatrics at JLNMC, Bhagalpur, we had the following observations We have grouped the mothers into three groups depending on their hemoglobin values according to WHO classification of anaemia in pregnancy. There is only a single mother in group 1 with severe anaemia, 41 mothers in group 2 with moderate anaemia and 29 mothers in group 3 with mild anaemia

58% of the study population had a hemoglobin level 7.1-10.0mg/dl.: Mean Hemoglobin in each group Hemoglobin Group Mothers Hb mean

In our study in the moderate and mild group there was no statistical association between the maternal hemoglobin and serum ferritin .but in the severe anemic group there was statistical association between the maternal hemoglobin and serum ferritin. $p < 0.0001$. In our study we found that there was adequate weight gain among all the three groups the mean of the babies weight showed an increasing trend. In our study we found that there was adequate gain in the length among all the three groups the mean of the length showed an increasing trend as shown in the graph above indicating that maternal anemias does not affect the growth of the child in the long run .at fourth month only 21 cases were studied, in those whom therapeutic intervention was done.: Red cell distribution width Mothers Hb Groups RDW-NB RDW-3 mths.

There was a significant difference in the platelet with maternal hemoglobin as depicted above Pearson Chi-Square $p1$ gm/dl and 4 had 0.8-1gm/dl improvement ,this number is statistically significant as the p value.

Discussion

The present study was a Prospective Hospital based study conducted during the time period from September 20120 to July 2021 on babies of 70 anaemic mothers who satisfied the inclusion criteria, and attending the Department of OBG and paediatrics at JLNMC, Bhagalpur, we compared our findings with other studies. Study Inference Our study Maternal anaemia has significant association with LBW Ekta Dalal. et. al. [1] Maternal anaemia has significant association with neonatal adverse outcome in form of LBW and IUGR Vandana Agrawal. et. al. [2] neonatal birth weight which had a significant positive correlation with maternal haemoglobin levels. Study Inference Our study The HC birth length and weight had positive relation to

the maternal hemoglobin Ekta Dalal. et. al.[3] Maternal anaemia affects Anthropometric measurements Causing low birth weight Solange Augusta. et. al. [4] Maternal iron deficiency anemia does not interfere with the child's anthropometric parameters Hadipour R. et. al. [5] Maternal iron deficiency anemia does not interfere with the child's anthropometric parameters Vandana Agrawal. et. al. [6] No significant correlation was found between maternal iron status and neonatal anthropometric parameters except in case of neonatal birth weight Our study Maternal anaemia reduces the Iron store status in newborns Sandhya V. et. al. Maternal anaemia has significant association with neonatal low Iron stores. Sweet DG. et. al. [7] Infants born to anaemic mothers do suffer from low iron stores Ziaei S. et. al. [8] Infants born to anaemic mothers do suffer from low iron stores Singla P. et. al. [9] increasing severity of maternal anaemia, the foetus accumulates less and less of iron stores Sweet DG. et. al. linear relationships with maternal HB and ferritin levels Vandana Agrawal. et. al. neonatal serum ferritin had a significant positive correlation with maternal iron status in maternal Iron Deficiency Anaemia Jaime-Perez. et. al. [10] iron deficiency anemia during pregnancy significantly lower levels of hemoglobin and ferritin Our study Only severe maternal anaemia adversely affects the fetal red cell indices Sweet DG. et. al. [7] Infants born to anaemic mothers are themselves not anaemic Vandana Agrawal. et. al. [7] Neonatal haemoglobin had a significant positive correlation with maternal Iron Deficiency Anaemia Jaime-Perez. et. al. [10] iron deficiency anemia during pregnancy significantly lower levels of hemoglobin In our study we supplemented iron in 21 neonates at third month and evaluated their birth weight and peripheral smear. 9 had an improvement in Haemoglobin >1 gm/dl and 4 had 0.8-1gm/dl improvement this number is statistically significant as the p value <0.001

Conclusion

In our study we intended to study the significance of haematological profile of newborns of anaemic mothers and we concluded that it is needed to evaluate the haematological profile so that if the IDA persists beyond 3 months supplementation in adequate doses is needed so that adequate development occurs.

We also found that haematological profile of infants of anaemic mothers varied according to the severity of anaemia in these mothers the more severe the anaemia the chances.

- When we evaluated the anthropometric profile of the babies, the babies of mothers with more severe anaemia had statistically significant lower values

- In our study we had a conclusion that newborns of anaemic mothers have less stores of iron and birth weight. And that the haematological and anthropometric derangements depends on the severity of maternal anaemia.

- We also found that iron supplements started at the right time will improve their haematological profile and weight gain.

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