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The Effect of Maternal Anaemia on Anthropometric and Haematological Profile of Neonates

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Abstract: ***Aim of study:- To determine the effect of maternal anaemia on anthropometric and haematological profile of neonates. Subject and method: - it is a cross sectional observational study done at tertiary care institute. It includes 130 neonates born to non-anaemic and anaemic mothers (46 and 84 respectively). All data were collected in selected performs and anthropometry was measured as per standard norms. Haematological profile of cord blood was done and data analysed. Results:-Present study suggests that number of premature labour/birth is statistically significantly higher in severely anaemic mother with P <0.005 as compared to non anaemic. It also states that mean birth weight, head circumference and total length of neonates of severely anaemic mothers are severely compromised (p< 0.0005). However, our study states that maternal haemoglobin has no effect on neonatal haematological profile at birth. Conclusion: Maternal anaemia has significant effect on physical growth of foetus and preterm birth.***

Keywords: Maternal Anaemia, Physical Growth, Preterm Birth

1. Introduction

Anaemia has been a subject of great interest throughout the world since long. It is very common haematological problem in developing countries in infancy and childhood and reproductive women. The association of anaemia with pregnancy is unavoidable. It is associated with antenatal and postnatal complications. It also affects neonate's health in various aspects. It may cause premature or low birth weight babies. It predisposes infant to serious complications leading to morbidities, ultimately it decreases the efficiency and manpower of society. The commonest cause of anaemia in pregnant women in India is due to iron deficiency.Data suggests presence of anaemia in 59% cases of pregnancy and 63% in lactating women.(NFHS 3). Severe anaemia (Hb < 6g/dL) is associated with poor pregnancy outcome in form of abortions, premature labour; and LBW babies. We aim to study physical growth and haematological profile of babies born to anaemic mothers with control group.

2. Material and Methods

Study design: prospective observational study done in year 2011(Jan 2011 to Dec 2011). Study was conducted at 30 bedded NICU of tertiary care hospital. We had selected 130 neonates after informed consent of their mothers. Neonates born to mothers with chronic medical illness and hemoglobinopathies, hypertension were excluded from the study. All neonates were divided into 4 groups on basis of haemoglobin of mother as per WHO classification of anaemia of pregnancy ;(G1- Hb<7gm/dl n=26, G2 Hb7to<10gm/dl n=45,G3-10to<11gm/dl n=13,G4 Hb>or=11gm/dl n=46). Birth weight of neonates was taken with digital weighting machine having accuracy of 5gms.Head circumference and total lengths were taken as per standard protocol. Haematological profile was taken from cord blood, with complete blood cell counter machine. Data analysis was done by using Z test and epi info software version 3.5.1 .At 95% confidence level, P value < 0.05 was labelled as significant.

3. Results

The results are summarized as below. The table I shows no. of LBW as per maternal haemoglobin. On comparing G1 and G4 group, P value is 0.002 which suggests LBW neonates are associated with severe maternal anaemia. Our study has incidence of LBW of 48.46% which is comparable with other study done by Modern et al[1] (33.45%), Singla et al[3] (33.56%), Agrawal et al[5] (37.97%).

Table 1: Effect of maternal haemoglobin on birth weight of neonate:

Group	*No of LBW*	*No of normal birth weight*
G1	21	5
G2	31	14
G3	4	9
G4	7	39

Table 2: Effect of maternal haemoglobin on growth of neonate:

Group	*Birth weight in kg (Mean)*	*Head circumference in cm (mean)*	*Total length in cm(mean)*
G1	2.10 (1.3-.8)	31.08 (26.0-34.5)	43.13 (33.5-49.0)
G2	2.40 (1.9-3.0)	32.61 (30.5-34.5)	45.94 (41.5-49.0)
G3	2.41 (1.7-2.6)	32.85 (28.5-34.0)	46.54 (39.5-48.5)
G4	2.67 (1.9-3.6)	32.27 (30.5-35.0)	47.96 (42.0-50.0)

Above data shows mean weight, head circumference and total length of neonates at birth with range in bracket. On statistical analysis between G1 and G4 group P values are as follows for birth weight P < 0.001(z=7.12) Head circumference p < 0.05(z=24.7) Total length P<0.01 (z=5.55) respectively. Our results suggest that foetus growth is significantly compromised in utero with severe maternal anaemia. It is due to chronic placental insufficiency or hypoxia or both. We also observed rate of prematurity is

high with severely anaemic mothers. i.e. 12.3 % Similar like Klebanoff et al[9] (9.9%) and Erdem et al [4](11.3%)

Table 3: Effect of maternal anaemia on haematological profile of neonates

Group	*Haemoglobin (mean) in gm/dL*	*PCV(mean) in %*
G1	15.67	49.42
G2	14.96	47.98
G3	14.85	47.00
G4	15.03	47.85

On analysis of data, we found that maternal haemoglobin has no effect on neonatal mean haemoglobin at birth. (P value > 0.05). Other studies done by Herdari et al[6], Singla et al[3] and Aggrawal et al[5] have also observed similar results. This explains parasitic nature of the foetus which obtains its nutrition from mother irrespective of maternal nutritional status.

4. Discussion

Anaemia in pregnancy is an important public health problem in the developing countries. It is estimated that 47% non pregnant and 60 % of pregnant women have anaemia; out of which about 90% have iron deficiency anaemia. We study the effect of iron deficiency anaemia on physical growth and haematological profile as compared to nonanemic mothers. We observed that maternal anaemia has significant negative effect on growth of foetus, which explains role of maternal iron status in foetal development during intrauterine life.

Iron need of pregnant female increases to 5-6mg/day as compared to 2mg/day of adult menstruating women. The poor are more affected. Iron need further increase to women with pre-pregnancy iron deficiency, less birth spacing and multipara. We also observed that maternal anaemia has higher incidence of prematurity and LBW babies Lone et al[2] have showed in their multivariateate analysis in owasis population that risk of LBW babies in anaemic population was 1.9 times higher than non anaemic mother. (95% CI 1 – 3.4)

Preterm and LBW also have long term complications like malnutrition, recurrent infection, poor memory and low IQ. It results in poor school performance and low productivity of population. In our study maternal anaemia has no effect on haematological profile of cord blood. Study done by Sweet et al [1]found at maternal iron depletion is associated with reduced foetal hepatic and brain contents but no change in iron availability to foetus. Placenta play crucial role in iron transport to foetus. This process is protective mechanism to foetus survival. We suggest that further study is required to compare maternal and cord serum ferritin levels.

5. Conclusion

To conclude, our study states that maternal anaemia has significant association with neonatal adverse outcome in form of LBW and IUGR. By maintaining optimal haemoglobin (10-12g/dL) throughout the pregnancy, we can achieve better physical growth of foetus. In future we can have more systematic study of cord blood and maternal serum ferritin level to have interventions. We can improve outcome by giving early iron therapy to high risk neonates.

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