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Study of haematological parameters and intranatal status of Newborns of anaemic mothers

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Abstract
Background: Anemia in pregnancy has always been a topic of great Interst. Iron deficiency anemia holds the largest share of 88% in developing countries. Maternal iron is the sole source of iron until 6 months so, it is very logical to question the extension of effect of maternal iron deficiency anemia on the fetus during and beyond its stay in the womb. The hematological values of Newborns depend on several factors.
Methods: This was a Cross – Sectional & Prospective type of study. Total 200 patients were included, out of which 105 had normal haemoglobin levels and 95 had anemia of varying degree. When they presented to our hospital in Labor, blood samples were collected and sent for testing. Cord blood was collected at birth of the Newborn and results compared.
Results: No significant difference was found between most of the hematological parameters of Newborns of Anemic as well as non anemic mothers. Blood parameters like Hb, hematocrit, MCV, MCH, serum iron, transferring saturation and TIBC were all non-significant in both the groups. It was seen that the parameters in neonates were normal irrespective of the maternal anemic status.
Conclusions: Hence, we concluded that Newborns of Anemic mothers have equally normal hematological parameters as those of non anemic mothers. No significant difference was found at birth.

Keywords: Newborns, hematological parameters, anemic, pregnancy

Introduction
Anemia is an matter of great interest all over the world. Out of which iron deficiency anemia holds the largest share of 88% in developing countries. It has long been recognized that anemia is a major public health problem especially among poorer segments of the population in developing countries such as India, Pakistan & Bangladesh [1].
Pregnant women are more vulnerable to Iron Deficiency Anaemia as pregnancy in itself is a state of raised metabolic demands due to negative iron balance created in the body.
So, women before pregnancy start with an iron depleted state and if further deficiency is created it can cause deleterious effect on mother and fetus both.
Causes of iron deficiency are multi factorial. The risk is particularly high in women with multiple gestations & short interval between consecutive pregnancies [2]. Other factors which affect iron status are nutritional deficiency, hookworm infestation and hemorrhage. Certain intranatal complications associated with anemic mothers are preterm labor, low birth weight infants, IUGR & infections in the puerperial period.
Maternal iron is the sole source of iron uptil 6 months so, It is very logical to question the extension of effect of maternal iron deficiency anemia on the fetus during and beyond its stay in the womb [3]. The importance of good hemoglobin concentration during pregnancy for both the woman and the growing fetus cannot be overemphasized. Being a driving force for oxygen for the mother and fetus, a reduction below acceptable levels can be detrimental to both [4]. On the contrary, it is seen that even though the mother is hematologicaly compromised, there is little or no effect seen on the Fetuses hematological status intranatal.
The hematological values of Newborns depend on several factors including ethnic groups, maternal factors, Gestational age, Mode of delivery, maternal age, parity and fetal infections. The transfer of iron from mother to fetus is regulated by placenta via various factors like iron transporters (transferrin receptors, divalent metal transporter-1 & ferroprotein) & regulation of placental expression of these proteins.
In our study, we aim to compare hematological status and intra natal effects of Newborns of

anemic mothers with non-anemic mothers to see if and how iron deficiency status of the mother affects the fetus & how it affects the life of the fetus in the later years. There will be random selection of patients. Proper history taking on the basis of parity, nutritional status and history of infections will be noted meticulously. All the data will be collected, tabulated, analysed & applied to statistical tests for significance.

Methods

This study was conducted from October 2017 to September 2019 in the Department of Obstetrics and Gynaecology of Dr. D.Y Patil medical college and research centre, Pimpri Pune. This was a Cross – Sectional & Prospective type of study. Total 200 patients were included in our study.200 antenatal mothers and cord blood samples of their new born coming to Dr. D. Y. Patil Medical College, Hospital & Research Centre, Pimpri, Pune were studied.

Inclusion criteria

All the pregnant women with full term pregnancies (37-41 weeks), Primipara or multipara aged between 18-35 years delivering by vaginal or abdominal route were included in our study.

Exclusion criteria

Any pregnant woman with age less than 18yrs or more than 35yrs, Height less than 145cm or weight less than 45kgs suffering from any major chronic illness like Hypertension, Diabetes mellitus, Heart or Renal Disease or infections like HIV, TORCH, Malaria were excluded. Also the women with PIH or Eclampsia or not willing to participate were also not considered in the study.

Conduct of study

Institutional and ethical committee approval was obtained prior to commencement of the study. Informed and written consent of all the patients involved in the study was be taken.

The study was conducted as follows

Mothers fulfilling the inclusion criteria were involved in the study when they arrived at the Labor room for delivery in third trimester. Their blood samples were collected in an EDTA bulb by venipuncture and sent for complete blood count and iron profile. According to the hemoglobin levels the women will be segregated into two groups

a. Anemic group (women with hemoglobin <11gm%)
b. Control group (women with hemoglobin > 11gm%)

The anemic group (women with hemoglobin <11gm%) will be further segregated into 3 groups.

1. Mild anemia (Hb 10.0 – 10.9 gm/dL)
2. Moderate anemia (Hb 7-9.9 gm/dL)
3. Severe anemia (Hb < 7 gm/dL)

After the delivery of the baby, cord blood was collected before cord clamping in K_2EDTA containers and sent for testing. The following hematological parameters were tested in mothers and their Newborns: complete blood count, RBC indices, peripheral smear and iron profile. Babies were weighed immediately after birth without any clothes. Both the groups were compared for intra natal effects (like premature delivery, IUGR, neonatal and prenatal death), mode of delivery, maturity of fetus, birth weight of the baby, hematological profile, physical profile of fetus and neonatal outcome. A sum of 105 patients with Hb > 11 gm% and 95 pregnant women with Hb <11 gm% were enrolled in our study.

Statistical analysis

Data was compared using student's t test and statistically significant level was considered to be <0.05.

Results

Hemoglobin was found to be significantly lesser in anemic group. The mean Hb in normal group was 13.17gm% whereas in anemic group it was 8.65gm%. A gradual fall in haemoglobin levels was seen based on severity of anemia. Also other hematological parameters such as Hematocrit, MCV, MCH were significantly lower in anemic group. As depicted by Table 1 there was no significant difference with regard to serum ferritin, serum iron levels in both the groups. However trans-saturation and total iron binding capacity was higher in Anemic group. It was observed that other parameters such as Hematocrit, MCV, MCH, MCHC gradually reduced from mild to severe form of anemia. Serum ferritin levels gradually increased along with total iron binding capacity which was highest in severe anemia. Serum iron levels were lowest in severe anemia as seen in Table 2. On comparing the peripheral smears of both the groups majority of patients in normal group had normocytic normochromic picture. Anemic patients showed majorly microcytic hypochromic like picture. The percentage of microcytic anemia gradually increased from mild to severe anemia.

No significant difference was found between most of the hematological parameters of Newborns of Anemic as well as non anemic mothers. As evident from table 3 and corresponding graph, complete blood count as well as iron parameters speci Hb, hematocrit, MCV, MCH, serum iron, transferring saturation and TIBC were all non significant. However, Serum ferritin along with MCHC were significantly lesser in neonates born to anemic mothers indicating lower iron stores in the Newborns of Anemic mothers.

Discussion

Our study evaluated the role of maternal anemia on perinatal parameters both in the mother and the neonate. Anemia was classified based on severity-mild, moderate and severe anemia and the respective parameters were looked into. Of the 200 patients, 105 had normal hemoglobin levels constituting 52.5% of the participants. 95 patients had anemia and majorly they had moderate anemia at 28%, followed by mild anemia at 13% and severe anemia at 7%. In a study by de Sá SA *et al.* [5] the frequency of maternal anemia was 53.7%. This is almost similar to our study where the incidence of maternal anemia was 47.5% irrespective of the severity.

As we observed earlier, maternal hematological profile in patients with normal hemoglobin when compared to anemic patients. It is to be noted that Hemoglobin was significantly lesser in anemic group. The mean Hb in normal group (13.17gm%) was much higher than the mean haemoglobin in the anemic group (8.65gm%). Also other hematological parameters such as Hematocrit, MCV, MCH were significantly higher in normal group. There was non-significant difference with regard to serum ferritin, serum iron levels. However trans saturation and total iron binding capacity was higher in anemic group. There was gradual fall in hemoglobin based on severity of anemia. Other parameters such as Hematocrit, MCV, MCH, MCHC gradually reduced from mild to severe form of anemia. Serum ferritin levels gradually increased along with total iron binding capacity which was highest in severe anemia. Serum iron levels were lowest in severe anemia. Patel A *et al.* [6] conducted a study in eastern part of Maharashtra and determined

that risk of adverse perinatal complications increases with severity of anemia. This included risk of still births, low birth weights, preterm deliveries among others.

Majority of patients in normal group had normocytic normochromic anemia. The percentage of microcytic anemia gradually increased from mild to severe anemia. None of the patients having severe anemia had normocytic normochromic blood picture. As evident from the available parameters most of the patients had microcytic hypochromic anemia corresponding to iron deficiency. This is similar to iron deficiency anemia which is prevalent in pregnant women in our country [7].

There was no significant difference between most of the hematological parameters in Newborns of Anemic and non Anemic mothers as evident from Graph 3. Hb, hematocrit, MCV, MCH, serum iron, transferring saturation and TIBC were all non- significant. However, Serum ferritin along with MCHC values was significantly lesser in neonates born to anemic mothers. It is to be noted that almost all the neonates irrespective of maternal anemic status had a normochromic and normocytic blood picture. It should be noted that prematurity is a known cause of neonatal anemia [8]. Considering maternal anemia leading to premature delivery there is some chance of neonate having anemia at birth in such cases.

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Declarations

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Ethical Approval: Taken

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