

Maternal blood parameters and neonatal birth weight

E. SALAMALEKIS - N. PANAYOTOPOULOS - D. KASSANOS
L. BATALIAS - C. LOGHIS

Summary: The objective of this study was to examine the possible correlation between maternal hematologic parameters and neonatal birth weight. For this purpose 305 pregnant women were studied during labour. Hemoglobin, Ht, MCV, MCH, MCHC, serum Fe and reticulocytes were measured in maternal blood sample and umbilical cord blood sample. Fetal MCH and MCHC had no statistical significance compared to maternal, while maternal MCH and MCHC were statistically significant ($p < 0.05$ and $p < 0.01$ respectively) compared to neonatal weight.

Key words: Maternal anaemia; Fetal weight; Hemoglobinopathy.

INTRODUCTION

It is well known that there are considerable differences in hematological parameters between mother and fetus⁽¹⁾.

This is the result of great hemopoietic activity on behalf of the fetus. There is a 3-4 fold number of reticulocytes in the fetal umbilical cord compared to the maternal blood^(2,3).

According to studies there is a correlation between neonatal birth weight and fetal-maternal hematological parameters^(4,5). It has been reported recently that maternal anemia and iron deficiency has an effect on the ratio of fetal to placental weight⁽⁶⁾.

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The objective of this study was to examine the possible correlation between maternal hematological parameters and neonatal birth weight.

MATERIALS AND METHODS

Three hundred and five pregnant women who were admitted in our clinic for delivery were studied. All cases were singleton pregnancies and had no anti-Rh antibodies. In every case 2.5 cc of venous blood was obtained from the mother during the first stage of labour and the sample was placed in a plastic tube containing EDTA (potassium ethylenediamine tetracetic acid).

Immediately after delivery 2.5 cc of fetal blood from the umbilical vein was also placed in a plastic tube containing EDTA. Blood parameters were measured using a Coulter counter. Blood samples obtained during the night were placed in a refrigerator at $+4^{\circ}\text{C}$ until next day for examination.

All women were taking iron and folic acid preparations during pregnancy according to the usual policy. Gestational age was determined according to the last menstruation and was confirmed by ultrasonogram.

All women in our study were 18 to 41 years of age. One hundred and twenty five were primiparas and 180 multiparas and all delivered

Table 1. — MCH and MCHC of maternal and neonatal blood in correlation to mean neonatal birth weight.

Neonatal birth weight (grams)	Maternal MCH	Fetal MCH	Maternal MCHC	Fetal MCHC
< 3000	* 31 ± 1.10	29.68 ± 1.65	** 32.65 ± 1.58	31.50 ± 1.52
≥ 3000	* 28 ± 1.20	29.65 ± 1.23	** 31.24 ± 1.10	31.76 ± 1.29

* $p < 0.05$; ** $p < 0.01$.

after the 37th week. Out of the 305 neonates, 34 had weight less than 3,000 grams (Group A) and 271 weighed $\geq 3,000$ grams (Group B).

Haemoglobin, haematocrit, erythrocyte number, mean corpuscular volume, mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), iron and reticulocyte number were measured in the collected blood samples from mothers and neonates.

All values were placed in frequency histogram for analysis and the correlation was made using the t-test.

RESULTS

Table 1 shows the correlation between neonatal birth weight, maternal and fetal MCH and MCHC. The correlation of these values shows that fetal MCH and MCHC have no statistical significance while maternal MCH and MCHC are statistically significant ($p < 0.05$ and $p < 0.01$ respectively). No statistical differences were found between neonatal birth weight and all other parameters measured in maternal and fetal blood.

DISCUSSION

During pregnancy hemopoietic activity in the fetus is great ⁽²⁾. This is proved by the high rate of reticulocytes which are found in the umbilical cord ($6.5 \pm 2.08\%$) in correlation to those in the maternal blood ($1.91 \pm 1.13\%$) ⁽⁴⁾. There are studies referring to the correlation of neonatal birth weight and maternal and fetal hematological parameters. Hirsch *et al.* ⁽⁴⁾ reported that hemoglobin values of low birth weight neonates were higher (statistically significant) than in neonates weighing over 3,000 grams.

In our patient population we noted that neonatal hemoglobin, as well as the other hematological parameters, had no statistically significant correlation to neonatal birth weight. On the contrary, we found that maternal mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration have statistically significant differences in relation to neonatal birth weight ($p < 0.05$ and $p < 0.01$ respectively).

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Address reprint requests to:

E. SALAMALEKIS

30, Roumelis Str.

GR-152 33 Halandri (Greece)