

# Effect Of Maternal Anemia On Cord Blood Hemoglobin Of Full-Term Newborn

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## Abstract

**Background and purpose:** Anemia during pregnancy is related to major problems of mother and fetus. The purpose of the study was to find any correlation between maternal anemia and the baby's cord blood hemoglobin (Hb) level.

**Methods:** This cross-sectional study was conducted in neonatal and midwifery departments women in Mashhad Azad University hospitals from January 2014 to September 2021. A total of 200 pregnant women over 34 weeks of pregnancy who gave birth participated in the study and umbilical cord blood. The hemoglobin of their babies was collected. Average maternal hemoglobin and average cord blood hemoglobin comparison using Pearson's correlation coefficient in different non-anemic, anemic, mild, moderate, and severe anemia groups were classified.

**Findings:** Out of 200 pregnant women, 136 (67.8%) were anemic and 64 (32.2%) were not anemic. Medium hemoglobin in non-anemic mothers and anemic mothers was 11.67 and 9.56 g/dl, respectively. Pearson's correlation coefficient of non-anemic, anemic, mild, moderate, and severe anemia groups with  $P < 0.05$  is statistically significant, which showed a positive correlation between maternal hemoglobin and umbilical cord hemoglobin.

**Conclusion:** From this study, we concluded that maternal anemia affects the hemoglobin of the baby's umbilical cord blood. According to the findings, anemic women give birth to babies with lower hemoglobin levels than non-anemic mothers. Findings showed a linear relationship between maternal hemoglobin and cord blood hemoglobin of their babies.

**Keywords:** Anemia, Pregnancy, Hemoglobin

## INTRODUCTION

Anemia is very common during pregnancy in developing countries. According to WHO/World Health Statistics data, 40.1% of pregnant women worldwide were anemic in 2016. The problem is particularly common in Asian countries, where anemia is responsible for about half of maternal deaths. Worldwide, more than 300,000 women die each year due to complications during pregnancy and childbirth. The World Health Organization (WHO) reports that around 700 women die each year in the United States, with approximately 830 women dying each day worldwide. Most of these women (99%) live in poor and developing countries. In some places, the chance of dying from pregnancy is as high as 1 in 15. The sad reality is that many of these deaths are preventable. (1).

Cord blood hemoglobin is an essential predictor of anemia in newborns at delivery. It used to be assumed that the baby would not be anemic regardless of the mother's hemoglobin level. According to several studies, women who had iron deficiency anemia during pregnancy gave birth to babies with reduced hemoglobin levels in the cord blood. Recent research has discovered a linear relationship between the mother's hemoglobin and the baby's umbilical cord blood hemoglobin. Cord blood for newborn lab tests is a promising new method that has been found to improve newborn outcomes. As a result, the full implementation of this method is a vital step towards improving the use of cord blood in improving neonatal outcomes (2).

Further research is needed for important validation the relationship between maternal hemoglobin level and the umbilical cord of the newborn the aim of the study was to see how the Hb level of the blood maternal Hb anemia affected the baby's umbilical cord blood.

## Materials and Methods

This cross-sectional study in the sector pediatrics and Obstetrics Azad University hospitals in Mashhad from January 2014 to September in 2021. All pregnant women over 34 weeks of pregnancy and their babies were included in this study. Mothers with risk factors such as antepartum bleeding, blood pressure, gestational diabetes due to pregnancy, kidney disease, hypothyroidism and babies who have given birth to twins, asphyxia at birth, congenital and pathological abnormalities, jaundice such as Rh incompatibility, are excluded. A total of 200 pregnant women participated in the study, and cord blood Hb of their infants was collected after obtaining their informed consent. Maternal hemoglobin was tested before delivery and mothers were divided into two groups based on maternal hemoglobin levels. The anemia group was divided into mild (Hb 10-10.9 g/dL), moderate (7-9.9 g/dL) and severe anemia (Hb <7 g/dL). The data was analyzed using descriptive statistics using SPSS version 26 software. Pearson's correlation coefficient was used to find a linear correlation between maternal anemia and umbilical cord blood hemoglobin with a p value less than 0.05, which was considered statistically significant. The mean hemoglobin of mother and the mean hemoglobin of umbilical cord blood in non-anemic groups were compared using Pearson's correlation coefficient (R=0.67) and it had a positive and significant correlation with  $p < 0.001$ . Similarly, Pearson correlation coefficient of mild, moderate, and severe anemia were 0.84, 0.65, 0.72 respectively with  $P < 0.05$ , which showed a positive correlation between maternal hemoglobin and cord hemoglobin (Table 1).

## Discussion

The findings of our study were consistent with those of Klebanov et al. (1991) and Lu et al. (1991) who reported an association between maternal anemia and a higher risk of preterm birth. The research findings were present (3).

Like the study conducted by Prasad et al. who reported a positive and significant relationship with the increase in the number of children and pregnancy status. Our findings were comparable to those of Tembhare et al who found the number of vaginal deliveries, instrumental deliveries, and caesarean section. Sections (LSCS) were similar in both anemic and non-anemic mothers, but more anemic mothers required labor induction. Our findings were consistent with them (4,5,6).

Figueiredo et al found that maternal anemia was associated with low/inadequate birth weight, suggesting that it is a risk factor for pregnancy outcomes assessed (7).

The present study compared maternal hemoglobin with infant cord hemoglobin to see if there was a correlation between the two measurements. As the mean hemoglobin of the mother decreased, the mean hemoglobin of the umbilical cord also decreased, which indicated a linear correlation between the hemoglobin of the umbilical cord and the mother's hemoglobin. This suggests that maternal anemia influences cord Hb. This indicates that at higher levels of anemia, placental iron is transferred mechanisms may fail, resulting in decreased umbilical cord Hb (8). The findings of our study were like the study conducted by Timilsina et al., which showed a moderate positive correlation between maternal and fetal hemoglobin. Our findings were comparable to the study by Sarin et al., who concluded that infants born to anemic mothers had lower umbilical cord blood Hb than non-anemic mothers. Also, our findings were like a study conducted at Babol University by Najiba et al., which showed a linear relationship between maternal hemoglobin and infant cord hemoglobin. Debarma et al. found a linear relationship between umbilical cord and maternal hemoglobin, which is like the present study. In another study conducted by Mamoury et al. From northeastern Iran, contradictory findings were reported that there is no relationship between cord blood hemoglobin, umbilical cord hemoglobin, or maternal hemoglobin (9,10,11).

## Conclusion

This study concluded that maternal anemia affects the hemoglobin of the infant's cord. Based on findings, anemic mothers give birth to babies with lower hemoglobin levels than non-anemic mothers. The findings show that there is a linear correlation between the mother's hemoglobin and the hemoglobin of the cord blood of their babies. Prevention during pregnancy may prevent anemia in underdeveloped countries such as Iran, perhaps reducing the risk of fetal and maternal problems and thus improving infant survival rates.

Table 1: Relationship between maternal hemoglobin (Hb) (g/dl) and cord Hb (g/dl) in pregnant women (N=200).

Pregnant women Hb	N	Mean maternal	Mean cord Hb	Pearson correlation coefficient	P value
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		Hb			
Non-anemic (Hb $\geq$ 11)	64	11.67	17.02 (1.36)	0.67	
Anemic (Hb<11)	136	9.56	15.56 (0.57)	0.71	<0.001
Mild anemic (Hb 10-10.9)	59	10.43 (0.18)	15.28 (0.87)	0.84	<0.001
Moderate anemic (Hb 7-9.9)	60	8.68 (0.89)	15.16 (0.44)	0.65	<0.001
Severe anemic (Hb	17	6.43 (0.82)	14.43 (0.53)	0.72	<0.001

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