

The Effect of Maternal Anaemia on Cord Blood Haemoglobin and Newborn Birth Weight

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Abstract

Background: Maternal anaemia is a common problem in pregnancy, particularly in developing countries. Iron requirements increase during pregnancy, and a failure to maintain sufficient levels of iron may result in adverse maternal-fetal consequences.

Aim of study: To determine the effect of maternal anaemia on fetal cord blood haemoglobin & its birth weight.

Patients & Methods: The study was conducted in Babylon Teaching Hospital for Gynaecology & Paediatrics from February 2008 to February 2009. The study included ninety pregnant women at term who attended the labour room & they were in labour. Fifty women were anaemic with a haemoglobin level less than 11 g/dL, while the other forty had normal haemoglobin. Women under study were assessed & followed up through out labour. After delivery of the baby, the cord clamped & divided then blood sample taken from the cord & sent for PCV assessment. The newborn weighed and the results compared between the two groups.

Results: cord blood haemoglobin & newborns weights were lower in anaemic women compared to non-anaemic women at the same gestation.

Conclusion: Maternal anaemia has a lot of consequences including neonatal complications like neonatal anaemia. In addition, there is a positive relation between maternal haemoglobin fetal cord blood haemoglobin.

Recommendations: Optimization of maternal haemoglobin with good nutrition, iron supplementation & good spacing between pregnancies will avoid a lot of complication of maternal anaemia.

الخلاصة

اشتملت الدراسة ستين امراة حامل في الشهر التاسع من الحمل كانت لديهن حالة ولادة و تم ادخالهن الى صالة الولادة في مستشفى بابل للنسائية والاطفال. ثلاثون امراة كن يعانين من فقر الدم حيث كانت نسبة الهيموغلوبين لديهن اقل من 11 غم/ديسيلتر في حين كانت نسبة الهيموغلوبين عند باقي النساء طبيعية تم متابعة هؤلاء النسوة حتى الولادة وبعد ولادة الطفل قص الحبل السري تم أخذ عينة من دم الحبل السري وقياس نسبة الهيموغلوبين فيها كما تم قياس وزن الطفل ومقارنة النتائج في المجموعتين.

اظهرت النتائج أن مستوى الهيموغلوبين في الحبل السري و وزن الطفل أقل عند الحوامل المصابات بفقر الدم مقارنة بالحوامل الطبيعيات. مما يدل على وجود علاقة وثيقة بين نسبة الهيموغلوبين عند الأم والجنين وان التغذية الحيدة واعطاء حبوب الحديد الوقائية تمنع المضاعفات الناتجة عن فقر الدم عند الام.

Introduction

Anamia is a pathological condition in which the oxygen-carrying capacity of red blood cells is insufficient to meet the body's needs⁽¹⁾.

Often the diagnosis is based on blood values, in particular Hb concentration. The World Health Organization (WHO) recommends that the Hb concentration should not fall below 11 g/dL at any time during pregnancy⁽²⁾.

During pregnancy, plasma volume increases by 50 per cent, red cell mass increases by up to 25 per cent and there is a consequent fall in Hb concentration, haematocrit and red cell count because of haemodilution, sometimes called physiologic anaemia of pregnancy⁽³⁾.

Anaemia is the commonest medical disorder of pregnancy. Around 30-50 per cent of women become anaemic during pregnancy, with iron deficiency being responsible in more than 90 per cent of cases. The incidence of folate deficiency is around 5 per cent (though it is often underdiagnosed) and this is almost always the cause of megaloblastic anaemia in pregnancy, with vitamin B12 deficiency being rare⁽¹⁾.

Anaemia is very often asymptomatic in pregnancy, with the diagnosis being made on routine screening. Clinical features include tiredness, dizziness, fainting and lethargy. Pallor may be apparent⁽⁴⁾.

Anaemia is routinely screened for in pregnancy by estimating the Hb concentration by means of a full blood count at the beginning of pregnancy and again later in pregnancy, often at the start of the third trimester, and again at term. This lacks specificity but has the advantage of being cheap and simple to perform. The presence of a low Hb does not reveal the cause of the anaemia⁽¹⁾.

Anaemia is classified into mild, moderate, severe & very severe as shown in the table below:

Table 1. The Indian Council of Medical Research categories of anaemia⁵

Category (Anaemia severity)	Haemoglobin level (g/dL)
Mild	10.0-10.9
Moderate	7.0-9.9
Severe	<7.0
Very severe (decompensated)	<4.0

Fetal risks: The fetus obtains the iron from maternal transferrin regardless of maternal iron stores. The placenta traps maternal transferrin, removes the iron & actively transports it to the fetus, mainly in the last four weeks of pregnancy. When maternal iron stores are depleted the fetus cannot accumulate as much iron & there is a decrease in fetal iron stores. This may have an important bearing on iron stores & the development of anaemia in the first year of life.⁶ Adverse perinatal outcome in the form of preterm & small for gestational age babies & increased perinatal mortality rates have been observed in the neonates of anaemic mothers⁽⁵⁾.

Aim of study: To determine the effect of maternal anaemia of various degrees on fetal cord blood haemoglobin and newborn birth weight.

Patients & Methods

The cross sectional study was conducted in Babylon Teaching Hospital for Gynaecology & Paediatrics from February 2008 to February 2009. The study included ninety pregnant women at term who attended the labour room and they were in labour.

Fifty women were anaemic with a haemoglobin level less than 11 g/dL, while the other forty had normal haemoglobin values & used as control. Women were excluded if they suffered medical conditions, had complications of pregnancy, multiple pregnancies, or delivered prior to 36th week of gestation.

Women under study were assessed thoroughly; venous blood samples

were taken from them for measurement of haemoglobin level. Haemoglobin was estimated by the cyanomethaemoglobin method using spectrometer at a wave length of 450 nm.

The anemic women were classified according to their haemoglobin levels into women with mild, moderate and severe anaemia.

Women were followed up through out labour. After delivery of the baby, the cord clamped and divided then blood sample taken from the cord and sent for PCV and haemoglobin

measurements. The newborn weighed and the results compared between the different groups.

Results

Table (2) showed the neonatal haemoglobin level in women with anaemia. Patients with mild to moderate anaemia have their babies with haemoglobin levels within the lower limit. While patients with severe anaemia have their newborns with low haemoglobin.

Table 2. the cord blood haemoglobin levels in women with anaemia.

Maternal hemoglobin (g/dL)	No. of patients	Cord blood haemoglobin (g/dL)	P value
10-10.9	35	14.79 ± 1.36	.000
8-9.9	11	13.89 ± 0.9	.000
≤ 7	4	12.1 ± 1.04	.02
≥ 11 (control)	40	16.75 ± 1.17	

Table (3) showed the relation of maternal haemoglobin with newborn birth weight. The newborn birth weight was within normal range in patients

with mild & moderate anaemia while women with severe anaemia had low birth weight babies.

Table 3. the relation of maternal haemoglobin with newborn birth weight.

Maternal hemoglobin (g/dL)	No. of patients	Neonatal birth weight (Kg)	P value
10-10.9	35	3.1 ± 0.35	.01
8-9.9	11	2.7 ± 0.29	.002
≤ 7	4	2.2 ± 0.25	.01
≥ 11 (control)	40	3.3 ± 0.40	

Discussion

Maternal anaemia has a lot of complications, maternal & fetal. In our study we take one of the aspects of maternal anaemia that is its effect on the newborn baby through the study of cord blood haemoglobin level & the newborn birth weight. We find a linear relationship between maternal & fetal haemoglobin levels. With the cord blood haemoglobin decrease with decreasing maternal haemoglobin level.

This result coincides with that obtained by Adam I. et.al. ⁽⁷⁾ who studied the risk factors for poor perinatal outcome in Sudan & found that maternal anaemia is a risk factor for fetal anaemia.

A study done by Singla et.al. found that The haemoglobin and iron levels in the cord blood and placental tissue have linear correlations with the maternal haemoglobin levels⁽⁸⁾.

However, only patients with severe anaemia had babies with anaemia. This may be explained by the fact that the fetus in utero traps iron regardless of maternal iron stores so only in severe

cases the newborn may become effected & develop anaemia.

Study done by Emery D.et.al. that measure the iron & ferritin levels in the mother & the newborn baby found that in mild & moderate anaemia of the mother the cord blood iron levels were normal⁽⁹⁾.

Another study done by Sweet et.al found that Maternal iron depletion is associated with reduced fetal iron stores but no change in free iron availability by studying the serum transferrin receptors⁽¹⁰⁾.

Regarding the birth weight of newborns of anaemic mothers. Low birth weights were found only in women with severe anaemia while it was within the normal range in women with mild & moderate anaemia though lower than newborns of non-anaemic mothers. Similar results found in the study done by Singla et.al who stated that The birthweight, placental weight and number of placental cotyledons were significantly reduced in the severely anaemic mothers (haemoglobin ≤ 60 g/l) and had direct relationships with the maternal haemoglobin levels.⁽⁸⁾

Conclusions

1. Maternal Anaemia can be associated with adverse fetal & perinatal outcome.
2. Cord blood haemoglobin decreases significantly with decreasing maternal haemoglobin.
3. There is a linear relationship between maternal & cord blood haemoglobin.
4. The newborn can develop anaemia in severely anaemic mothers.
5. The newborn birth weight is affected by maternal anaemia especially in severely anaemic patients who may have low birth weight infants.

Recommendations

1. Maternal anaemia is a common & important complication of pregnancy that can be detected by simple & cheap screening test.
2. Maternal & fetal complications of anaemia can be prevented by adequate prophylaxis during pregnancy.
3. Further studies are needed to determine the relation of maternal iron status to the fetal iron & ferritin levels.

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