

## Original Article

# Relationship between maternal hemoglobin and Perinatal outcome

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## ABSTRACT

**Objective:** To Study the Relationship between Maternal Hemoglobin and Perinatal outcome in a cohort of 860 pregnant women and to highlight the importance of antenatal care regarding maternal health and fetal outcome.

**Methods:** All Singleton pregnancies delivering at Pakistan Railway Hospital Rawalpindi from January 2004 to December 2005 that fulfilled the required criteria were included.

**Results:** Out of the 860 patients, 402 were anemic ( $<11$  gm/dl) and 458 were non anemic. Perinatal outcome included preterm delivery, low birth weight, intrauterine growth retardation, perinatal death, low apgar scores and intrauterine fetal deaths. Risk of preterm and Low birth weight among anemic women was 3.4 and 1.8 times more than non anaemic women. The neonates of anemic woman also had 1.7 times increased risk of having low Apgar scores at 1 min. Among anemic women there was 2.2 times greater risk of intrauterine fetal death than the non-anemic women.

**Conclusion:** Regular antenatal care from first trimester has a vital role in assessing and managing maternal anemia timely and it directly affects the perinatal outcome. The patients with anemia have also higher risk of having low birth weight, preterm births and intra uterine fetal death. (Rawal Med J 2007;32:102-104).

**KEY WORDS:** Maternal hemoglobin, perinatal outcome, preterm birth

## INTRODUCTION

Maternal anemia is a common problem in pregnancy in developing countries like Pakistan. According to WHO anemia is defined as the hemoglobin level of  $\leq 11$  gm /dl. Anemia due to Iron Deficiency has serious health and functional consequences and the most of its nutritional component is controllable with a very high benefit/cost ratio.<sup>1</sup> It is estimated that 1,200 million people are anemic globally.<sup>2</sup> The prevalence of anemia depends upon socio economic status lifestyle, parity, associated medical problems and regular antenatal care. Maternal anemia in pregnancy is commonly considered as risk factor for poor pregnancy out come and can threaten the life of mother and fetus.<sup>3</sup> However, the extent to which the maternal hemoglobin concentration affects the fetal weight and fetal out come is still uncertain. Some studies have shown a strong association between low hemoglobin before delivery and adverse out come<sup>4</sup> while other studies have not found a significant association.<sup>5</sup> Thus

the aim of this study was to evaluate the antenatal maternal hemoglobin and find its impact on perinatal outcome.

## **MATERIALS AND METHODS**

The study was carried out on pregnant women attending Obstetric outpatient Department of Pakistan Railway Hospital Rawalpindi from January 2004 to December 2005. Total number of women delivering during this period was 1578. Women attending the out clinic before 24 weeks of gestation, with singleton pregnancy and ages 18 and above were included in the study. Women with multiple pregnancies, past preterm labor and other associated medical complications were excluded. Anemia was defined according to WHO criteria i.e. Haemoglobin <11 gm/dl. In this study, anemia was labeled if Hb was <11gm/dl on 2 occasions during pregnancy and labour.

Hemoglobin levels were measured at first visit, then at the end of second trimester and twice in the third trimester. If the Hemoglobin levels were <9 gm/dl after 34 weeks than parenteral iron therapy either intramuscularly or intravenously were given. At Hb <7gm/dl blood transfusions were given. All the information regarding gestational age at delivery, complications at delivery, fetal outcome in term of weight and Apgar score was recorded.

## **RESULTS**

A total of 860 women fulfilled the inclusion criteria, 420 in non anemic group and 540 in anemic group. Twenty-one women were lost to follow-up after first interview. Mean age of the women in anemic group was 25.85 and 24.20 in non-anemic group. There was no statistically significant difference between the two groups in terms of education level up to primary (table 1).

**Table 1. Demographic characteristics of two groups. (n=860)**

<b>Variable</b>	<b>Anemic (n = 402)</b>	<b>Non-anemic (n = 458)</b>
Age (years)	25.85	24.20
Maternal Education		
Up to Matric and above	64	106
Up to Primary	203	290
Illiterate	135	62
Employment Status		
Employed	138	130
House wife	262	328
Family Structure		
Extended	252	303
Nuclear	150	155
Monthly Income (in Rupees)		
Less than 5000/-	187	148
5 to 10000/-	113	205
More than 10,000/-	102	105

Risk of preterm deliveries (<37 wks) was 3.4 times greater in anemic women than the non-anemic. There were 1.8 and 1.7 times greater risk of Low birth rate and Intra uterine growth retarded babies in anemic group (table 2). Perinatal mortality was 3.5 times more in anemic group. Low Apgar at 1 min and intra uterine fetal death also showed increased ratio in this group.

**Table 2. Perinatal Outcome among the anemic and non-anemic women.**

Variable	Anemic (n = 402)	Non- anemic (n = 458)	Adjusted relative risk
Premature birth			
Yes	62	18	3.4
No	340	440	1.0
Low birth weight			
Yes	41	22	1.8
No	361	436	1.0
IUGR			
Yes	39	23	1.7
No	363	435	1.0
Perinatal Mortality			
Yes	7	2	3.5
No	395	456	1.0
Low Apgar at 1 min			
Yes	35	20	1.7
No	367	438	1.0
Intra uterine fetal death			
Yes	11	5	2.2
No	391	453	1.0

IUGR = Intrauterine growth retardation.

## DISCUSSION

In the developing world, current strategies, to prevent and correct anemia and iron deficiency in pregnant women have met with little success.<sup>6</sup> Two large studies in the industrial world, involving over one million pregnancies clearly indicated that favorable pregnancy outcomes are less frequent among anemic mothers.<sup>7,8</sup> The causality of anemia in these undesirable pregnancy outcomes has been established further by studies that show the positive results obtained in births weights and perinatal deaths by the successful treatment of anemia with iron and folic acid as low birth weight (<2000g) was reduced from 50% to 7% and perinatal mortality from 38% to 4% in a study in Nigeria.<sup>9</sup>

Our data showed association of maternal anemia in pregnancy with increased risk of delivery of premature and LBW babies, intrauterine death and low Apgar score at one minute. These deaths were commonly found to be due to prematurity and sepsis. Since our study was done at a tertiary care unit and majority of women in Pakistan deliver at home, it is expected that the burden of anemia and its effect on pregnancy outcome is much greater outside the hospital settings. Maternal hemoglobin values during pregnancy are associated with LBW and preterm birth in a U-shaped

relationship with a high rate of low birth weight at low and high concentration of maternal hemoglobin.<sup>10</sup>

It is estimated that 7.3 million perinatal deaths occur annually in the world<sup>11</sup> and, by correcting anemia; many of these deaths can be prevented. This study also showed high ratio of perinatal deaths due to prematurity. Anemia with <Hb 8gm/dl has seem to be associated with birth weight values that are 200-300g lower than in women with >10g/l hemoglobin.<sup>12</sup> The relationship between anemia and infection has also been proposed<sup>13</sup> as Corticotrophin Releasing Hormones plays a role in causing preterm labor or premature rupture of membranes.<sup>14</sup> Presentation for antenatal care in third trimester is common in our country.<sup>15</sup> Since demand for micronutrients is maximum in third trimester, this could be one factor underlying the high prevalence of anemia.<sup>16</sup> In conclusion, this study showed an association of maternal anemia with increased prematurity, LBW, intra uterine deaths and low Apgar scores. Other nutritional deficiencies can also be the causative factors. Further studies are needed in this area.

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