

# Anemia during Pregnancy: Most Preventable yet most Prevalent

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## ABSTRACT

**Objective:** To study the relationship between maternal hemoglobin and maternal and perinatal outcomes in a cohort of 1200 women, and to highlight the importance of antenatal care to improve maternal health, maternal and fetal outcome.

**Method:** All singleton pregnancies delivering at NKPSIMS, from January 2009 to December 2009 that fulfilled the required criteria were included.

**Results:** Out of 1200 women, 787 were anemic (67.2%) < 11 gm of Hb and 413 were nonanemic. Perinatal outcome included preterm delivery, birth weight, intrauterine growth restriction, perinatal death, low Apgar scores and intrauterine fetal death. Risk of preterm and low birth weight among anemic women was 4.2 times and 1.8 times more than nonanemic women. The neonates of anemic women had 1.8 times more risk of low Apgar scores at 1 minute. Among anemic women there was 2.4 times greater risk of intrauterine fetal death than nonanemic women.

The women with anemia had 2.5 times higher incidence of PPH than nonanemic women. Puerperal complications were 2.5 times more in anemic women than nonanemic women.

**Conclusions:** Regular patient education by imparting proper knowledge regarding iron-rich foods, food fortification, implementation of anemia prophylaxis program from adolescence, regular antenatal care from 1st trimester has a vital role in assessing and managing maternal anemia timely, and it directly affects the perinatal outcome. The patients with anemia have higher risk of having low birth weight, preterm birth and Intrauterine fetal death (Rawalmeds 2007,32:102:101:104).

**Keywords:** Maternal hemoglobin, Perinatal outcome, Preterm birth.

## INTRODUCTION

Maternal anemia is a common problem in pregnancy in developing countries like India. According to WHO, anemia is defined as the hemoglobin level of < 11 gm/dl. Anemia due to iron deficiency has serious health and functional problems and most of its nutritional components are controllable with a very high benefit/cost ratio.<sup>1</sup> It is estimated that 1200 million people are anemic globally.<sup>2</sup> Maternal anemia is considered as a risk factor for poor pregnancy outcome and 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 outcome is still uncertain. Some studies have shown a strong association between low hemoglobin before delivery and adverse outcome,<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 maternal and perinatal outcomes.

## MATERIALS AND METHODS

The study was carried out on pregnant women attending obstetric outpatient department of a rural tertiary care hospital, Nagpur, India, from January 2009 to December 2009.

Total number of women delivering during this period was 1898. Women attending outpatient department before 20 weeks of gestation with singleton pregnancy, aged 18 years and above were included in study.

Women with multiple pregnancies, past preterm labor and other associated medical complications were excluded. Anemia was defined according to WHO criteria, i.e hemoglobin < 11 gm/dl. In this study, anemia was labelled, if Hb was less than 11 gm/dl on two occasions during pregnancy and labor.

Hemoglobin levels were measured at first visit then at the end of second trimester and twice in third trimester. If the hemoglobin level < 9 gm/dl after 3 weeks then parenteral iron therapy was given intramuscularly or intravenously, and at hemoglobin < 7 gm/dl blood transfusions were given. All information regarding gestational age at deliveries, complication at delivery, fetal outcome in term of weight and Apgar score was recorded.

## RESULTS

A total of 1200 women fulfilled the inclusion criteria, 787 in anemic group and 413 in nonanemic group. Around 13 patients were lost to follow-up after first interview (Table 1).

The mean age of women in anemic group was 24.85 and 24.20 years in nonanemic group. There was no statistically significant difference between the two groups in terms of education level up to primary.

Risk of preterm deliveries was 4.2 times in anemic women than nonanemic. There were 1.8 and 1.3 times greater risk of low birth weight and intrauterine growth restriction in anemic women. Perinatal mortality was 3.2 times more in anemic group. Low Apgar at 1 minute and intrauterine fetal death also increased in anemic women (Table 2).

Table 3 shows that postpartum hemorrhage was 2.5 times more in anemic women, and puerperal complications like puerperal pyrexia, puerperal sepsis wound gaping, secondary PPH were 4.8 times more in anemic.

## DISCUSSION

In the developing world, anemia is most preventable yet most prevalent, current strategies to prevent and correct anemia and iron deficiency in pregnant women have met with little success.<sup>6</sup> Two large studies involving over one million pregnancies clearly indicate that favorable pregnancy outcomes are less frequent among anemic mothers.<sup>7,8</sup>

| Table 1 Demographic characteristics (n = 1200) |                   |                      |
|--|-------------------|----------------------|
| Variable                                       | Anemic<br>n = 787 | Nonanemic<br>n = 413 |
| Age  | 24.85             | 24.20                |
| Maternal education—matric and above            | 104               | 108                  |
| Up to 5th standard                             |                   | 258                  |
| Illiterate                                     | 325               | 47                   |
| Employment status                              | 238               | 240                  |
| Family structure (extended)                    | 525               | 302                  |
| Nuclear  | 262               | 111                  |
| Monthly income < 5000                          | 528               | 297                  |
| 5000-10000                                     | 208               | 80                   |
| >10000   | 51                | 36                   |

| Table 2 Perinatal outcome among anemic and nonanemic women |                   |                      |                              |
|--|-------------------|----------------------|------------------------------|
| Variable   | Anemic<br>n = 787 | Nonanemic<br>n = 413 | Adjusted<br>relative<br>risk |
| Premature birth  | 132               | 31                   | 4.2                          |
| Low birth weight   | 82                | 41                   | 1.8                          |
| Intrauterine growth restriction                            | 78                | 56                   | 1.3                          |
| Perinatal mortality  | 16                | 5                    | 3.2                          |
| Low Apgar at 1 minute                                      | 70                | 50                   | 1.4                          |
| Intrauterine fetal death                                   | 20                | 10                   | 2.0                          |

| Table 3 Maternal outcome among anemic and nonanemic women |                   |                      |                              |
|---|-------------------|----------------------|------------------------------|
| Variable  | Anemic<br>n = 787 | Nonanemic<br>n = 413 | Adjusted<br>relative<br>risk |
| Postpartum hemorrhage                                     | 25                | 10                   | 2.5                          |
| Puerperal complications                                   | 72                | 15                   | 4.8                          |

In a study in Nigeria<sup>9</sup>, treatment of anemia with iron and folic acid has reduced the low birth weight from 50 to 7% and perinatal mortality from 38 to 4%. This association clearly indicates the association between anemia and unfavorable perinatal outcome.

The increased risk of perinatal mortality can be attributed to sepsis and prematurity.

Higher incidence of maternal complications in mothers with anemia is due to inadequate oxygen, decreased immunity and these coincides with Kitay, Harbort (1975).<sup>10</sup>

According to Dallman (1987),<sup>11</sup> anemia alters immunity, increases maternal and fetal stress, and it alters the transfer of oxygen from hemoglobin to fetus through placenta.

It is estimated that 7.3 million perinatal deaths occur annually in the world,<sup>12</sup> and by correcting anemia many of these deaths can be prevented.

The relationship between anemia and infection has also been proposed<sup>13</sup> as corticotrophin releasing hormones play a role in causing preterm labor and premature rupture of membranes.<sup>14</sup>

Since, the demand for micronutrients is maximum in third trimester and women present for antenatal care in third trimester; this could be one of the reasons for high prevalence of anemia.<sup>15,16</sup>

## CONCLUSION

This study showed an association of maternal anemia with increased risk of postpartum hemorrhage, postpartum complications, prematurity, low birth weight, intrauterine death and low Apgar scores. Other nutritional deficiencies can also be the causative factors, and further studies are needed in this area.

## REFERENCES

1. Viteri FE. The consequences of iron deficiency and anemia in pregnancy in nutrient regulation during pregnancy, lactation and infant growth. Alien L, King J, Lonnerdal B (Eds). Plenon Press New York 1994;121-33.
2. WHO. National strategies for overcoming micronutrient malnutrition document EB 1991, 89/27 Executive board 89th session.
3. Gregory P, Taslim A. Health status of the Pakistan population: A health profile and comparison with the United States. AM J Public health 2001;91:93-98.
4. Iron deficiency anemia reexamining the nature and magnitude of the public health problem. Proceedings of a conference. May 2000;21-24. Belmont Maryland, USA. J nutrition 2001;131:5635-7038.
5. Karim SA, et al. Anemia in pregnancy—its cause in under privileged class of Karachi. J Pak Med Assos 1994;44:90-92.
6. ACC/SCN (1991) controlling bar deficiency. A report based on an ACC/SCN workshop. Gillespie S, Kevany J, Mason J (Eds). ACC/SCN state of the art series. Nutrition policy discussion paper No. 9 Acc/SCW C/o WHO, Geneva Switzerland.
7. Garn SM, Ridella SA, Petzold AS, Falkner F. Maternal Hematological level and pregnancy outcomes. Sem in perinatal 1981;5:115-62.

8. Murphy JF, Newcombe RG, Coles EG, Pearson JF. Relation of hemoglobin levels in first and second trimester to outcome of pregnancy. *Lancet* 1986;1992-95.
9. Fleming AF. A study of anemia in pregnancy in Ibadan, Western Nigeria with special reference to folic acid deficiency. MD thesis, University of Cambridge Quoted by A Hughes in anemia of pregnancy maternal health and safe motherhood, WHO 1991.
10. Kitay DZ, Harbort RA. *Clin Perinatol* Sept 1975;2(2):255-73.
11. Dallman PR. *British Journal of Hematology* 1978;40:179-81.
12. Shazia T, Faheem S, Saad R. Perinatal mortality: A survey. *Pak J Obstet Gynaecol* 1994;7:1-8.
13. Steer P, Alam MA, Wadsworth J, Welsh A. Relationship between maternal hemoglobin in concentration and birth weight in different ethnic groups. *Brit Med J* 1995;310:489-91.
14. Hooton TM, Scholes D, Hughes JP, Winter C, Roberts PL, Stapleton AE, et al. A prospective study of risk factors for symptomatic urinary tract infection in young women. *N Engl J Med* 1996;335:468-74.
15. Khan MM. Effect of maternal anemia on fetal parameters. *J Ayub Med Coll Abbottabad* 2001;13:38-41.
16. Blot DD, Tehernin G. Iron deficiency in pregnancy effect on the newborn. *Curr Opin Hematol* 1999;6:65-70.