

SEVERE ANEMIA AND ADVERSE PREGNANCY OUTCOME

RIFFAT JALEEL, AYESHA KHAN

ABSTRACT

Objectives To determine the association between severe anemia and maternal and perinatal complications.

Study design Cohort Study.

Place & Duration of study Department of Obstetrics and Gynecology Unit V, Dow Medical College and Lyari General Hospital Karachi, from January 2007 to July 2008.

Patients and Methods Fifty one pregnant women, admitted for delivery and having severe anemia were studied and compared with 108 non-anemic women of similar demographic features. Maternal and perinatal complications were observed. Pearson, Chi Square and Fischer Exact tests were used to calculate significance of results.

Results Frequency of anemia was 69.9% and that of severe anemia was 4.8%. Post-partum hemorrhage occurred in 9.8% of cases as compared to 0.9% of controls ($p = 0.013$). Frequency of infection of surgical wound was 7.8% in cases and none in controls ($p = 0.010$). Preterm birth was seen in 23.5% cases and 10.2% controls ($p = 0.026$). Of the severely anemic mothers, 29.6% babies were low birth weight ($p = 0.022$) and 27.8% were small for gestational age ($p = 0.001$), as compared to 14.5% and 8.2% of controls, respectively.

Conclusions Severe maternal anemia carries significant risk of hemorrhage and infection in the mother. It is also associated with preterm birth, low birth weight and small for gestational age infants, as well as low APGAR score and high perinatal mortality.

Key words Maternal anemia, Post-partum hemorrhage, Puerperal infection, Abruptio placentae, Preterm birth, Perinatal morbidity.

INTRODUCTION:

Anemia is the commonest medical disorder in pregnancy. This is particularly a major health problem in developing countries, where nutritional deficiency, malaria and worm infestation are common. Prevalence in non-industrialized

countries varies between 35 – 75 %, with the average being 56 %.¹ The prevalence is very high in Central Asia, reported as being 88 % in India.^{2,3} Ignorance, poverty and gender bias significantly contribute to this high prevalence. WHO defines anemia in pregnancy as hemoglobin (Hb) concentration of < 11 g / dl and hematocrit of < 0.33.⁴ Maternal anemia is considered a risk factor for adverse pregnancy outcome.⁵ It is responsible for 40 – 60 % of maternal deaths in developing countries. It causes direct as well as indirect deaths from cardiac failure, hemorrhage, infection and pre-eclampsia.^{6,7}

Correspondence:

Dr Riffat Jaleel
Department of Obstetrics & Gynecology
Unit V, Lyari General Hospital
Dow University of Health Sciences
Karachi.

It also increases perinatal morbidity and mortality rates due to increase in preterm births and in-utero growth restriction. It has also been found to cause low iron stores, iron deficiency anemia and cognitive and behavioral dysfunction in the infants.^{8,9} However, some studies do not confirm these findings.¹⁰

Owing to the high prevalence of anemia in Pakistan,¹¹ this study was designed to determine whether severe nutritional anemia in pregnancy is associated with adverse outcome.

PATIENTS AND METHODS:

The study was conducted in Obstetrics and Gynecology Unit V, Dow Medical College and Lyari General Hospital. Study period extended from January 2007 to July 2008. Hb estimation was performed in laboratory of Lyari General Hospital for all women admitted for delivery. For women presenting with ante-partum hemorrhage, Hb tested during the last one month, was used for diagnosis. Cases were selected by convenient sampling. All women admitted for delivery and having Hb < 7 g/dl were studied. Controls were defined by selecting every third woman admitted for delivery and having Hb more than or equal to 11 g/dl.

Exclusion criteria was pregnant women with mild to moderate anemia (Hb between 7 and 10.9 g/dl), known cases of thalassemia and sickle cell anemia, women with ante-partum hemorrhage and no available previous report of Hb and patients with pregnancy induced hypertension. Intra-partum and post-partum observations were made for maternal complications like abruptio placentae, post-partum hemorrhage due to uterine atony and surgical wound infection. Perinatal complications like preterm birth, low birth weight and small for gestational age infants, APGAR score < 7 at 5 minutes and neural tube defects were also noted. Data were entered and analyzed using SPSS version 15. Significance of results was calculated using Pearson, Chi Square test and Fischer Exact test.

RESULTS:

The number of patients delivered during the study period were 1072. Frequency of anemia was 69.9 % and that of severe anemia 4.8 %. Fifty one cases and 108 controls were studied. Baseline characteristics of patients is shown in table I. Mean Hb of cases was 6.1 g/dl and that of controls was 11.6 g/dl. Majority of severely anemic women were non-booked cases. Although all complications were more frequent in cases than in controls, but statistically significant difference was found in post-partum hemorrhage due to uterine atony, wound infection, preterm birth, low birth weight and small for gestational age infants (table II and III). One maternal death was observed amongst study subjects. The cause was decompensated

cardiac failure due to severe anemia.

Table-I: Baseline Characteristics of Patients

Characteristics	Cases		Controls		
	n	%	n	%	
Booking Status	Booked	19	37.3	69	63.9
	Non-Booked	32	62.7	39	36.1
Mode of Admission	OPD	10	19.6	16	14.8
	Emergency	41	80.4	92	85.2
Age (years)	< 20	4	7.8	1	0.9
	20 – 35	45	88.3	105	97.2
	> 35	2	3.9	2	1.9
Parity	0	14	27.5	25	23.1
	1 - 4	26	51	71	65.8
	≥ 5	11	21.5	12	11.1
Gestational Age (weeks)	< 37	12	23.5	11	10.1
	37 - 42	37	72.6	95	88
	> 42	2	3.9	2	1.9
Hb (g/dl) Mean± SD		6.1± 0.6		11.6± 0.6	
Estimated Blood Loss (ml) Mean ± SD		427± 358		262± 128	

Table-II: Maternal Complications

Complications	Cases		Controls		P –value
	n	%	n	%	
Post-partum hemorrhage	5	9.8	1	0.9	0.013
Abruptio Placentae	3	5.9	1	0.9	0.097
Surgical Wound Infection	4	7.8	0	0	0.010
Maternal Death	1	1.9	0	0	0.321

Table-III: Perinatal Complications

Complications	Cases		Controls		P –value
	n	%	n	%	
Preterm Birth	12	23.5	11	10.2	0.026
Low Birth Weight Infants	16	29.6	16	14.5	0.022
Small for Gestational Age Infants	15	27.8	9	8.2	0.001
APGAR score < 7	6	11.1	5	4.5	0.180
In-utero Death	5	9.2	4	3.6	0.157
Perinatal Deaths	9	16.7	5	4.5	0.150

DISCUSSION:

In Pakistan it is common to see patients with severe anemia late in pregnancy with no prior antenatal care, especially in low socioeconomic settings. The same is evident in this study, where a vast majority of patients were anemic at delivery. Baig Ansari N found that 90.5 % pregnant women were anemic in an urban setting in Pakistan, of whom 0.7 % were severely anemic.¹¹ Bantley ME reported 2.2 % severely anemic pregnant women in Andhra Pradesh.¹² Trinh LT has reported 4% severe anemia in Vietnam.¹³

This study has demonstrated a causal relationship between severe anemia and various maternal and perinatal complications. The underlying cause is postulated to be iron deficiency. Iron deficiency anemia results in impaired transport of hemoglobin and thus oxygen to uterus, placenta and fetus. It also causes tissue enzyme and cellular dysfunction. This mechanism can explain impaired myometrial contractility resulting in atonic uterus, as well as placental dysfunction leading to preterm birth, low birth weight and growth restricted babies and perinatal deaths. Reduced oxygen delivery can also result in impaired wound healing.

We have found that severe anemia results in post-partum hemorrhage in a significant proportion of patients. Kavle JA, et al also found strong association of moderate to severe anemia with increased blood loss at delivery and in the post-partum period.¹⁴ Wandabwa J has also indicated chronic anemia as a predictor for post-partum hemorrhage.¹⁵ Another study from Zimbabwe highlights the importance of anemia in causation of post-partum hemorrhage.¹⁶ We have also observed that severely anemic patients developed infection of caesarean section / episiotomy wound far more commonly as compared to controls. Maharaj D has also proposed anemia to be a predisposing factor for puerperal pyrexia.¹⁷ Dare FO and colleagues found that amongst patients with puerperal sepsis, 69.2 % were anemic.¹⁸ A population based study conducted in Israel by Levy A et al,¹⁹ found that abruptio placentae was more common in anemic subjects. Our result matches their study.

We found a high frequency of preterm birth, low birth weight and small for gestational age infants in cases as compared to controls. Scanlon, et al performed a retrospective cohort analysis of Hb and birth outcome and found 70 % increased risk of preterm birth associated with moderate to severe anemia. They did not find any increased risk of small for gestational age infants.²⁰ Lone FW and associates have found that risk of preterm delivery, low birth weight and small for gestational age infants in anemic women was 4, 2.2 and 1.9 times higher than in non-anemic women, respectively.²¹ Numerous other studies also suggest similar results.^{22, 23}

Consistent with our study, Lone FW have also reported that newborns of anemic mothers had 1.8 times increased risk of having low APGAR score at birth.²¹ Bondevik GT²⁴ and Marhatta R⁴ have also found significant risk of low APGAR score in babies of severely anemic mothers. Similarly, our finding of a higher risk of in-utero death and overall perinatal mortality amongst anemic women has also been demonstrated by studies by Marhatta R⁴, Lone FW²¹ and Geelhoed D.²²

This study has highlighted the importance of considering maternal anemia an indicator of adverse pregnancy outcome. Therefore, to reduce the burden of this problem and related morbidity, measures need to be implemented at community level, which can prevent and treat anemia in adolescent girls and women.

CONCLUSIONS:

The burden of nutritional anemia in pregnant population is alarmingly high. Severe maternal anemia carries significant risk of hemorrhage and infection in the mother. It is also associated with preterm birth, low birth weight and small for gestational age infants, as well as low APGAR score and high perinatal mortality.

REFERENCES:

1. World Health Organization. WHO Global Database. Geneva: WHO, 1997.
2. Sarin AR. Severe anemia in pregnancy, recent experience. *Int J Gynecol Obstet* 1995;50:45-49.
3. Brabin L, Nicholas S, Gogate A, Karande A. A high prevalence of anemia among women in Mumbai, India. *Food Nutr Bull* 1998;19:205-9.
4. Marhatta R. Study of anemia in pregnancy and its outcome in Nepal Medical College Teaching Hospital, Kathmandu, Nepal. *Nepal Med Coll J* 2007;9:270-4.
5. Gregory P, Taslim A. Health status of Pakistani population: a health profile and comparison with the United States. *Am J Public Health* 2001;91:93-8.
6. Bhatt R. Maternal Mortality in India – FOGSI – WHO Study. *J Obstet Gynecol Ind* 1997;47: 207-14.
7. Viteri FE. The consequences of iron deficiency and anemia in pregnancy. *Adv Exp Med Biol* 1994;352:127-39.
8. Lozoff B, Beard J, Connor J, Felt B, Georgieff M, Schallert T. Long Lasting Neural and

- Behavioral Effects of Iron Deficiency in Infancy. *Nutr Rev* 2006;64:34-91.
9. Prema K, Neela KS, Ramalakshmi BA. Anemia and adverse obstetric outcome. *Nutr Rep Int* 1981;23:637-43.
10. Klebanoff MA, Shiono PH, Berendes HW, Rhoads GG. Facts and artifacts about anemia and preterm delivery. *JAMA* 1989;262:511-15.
11. Baig- Ansari N. Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. *Food Nutr Bull* 2008;29:132-39.
12. Bantley ME, Griffiths PL. The burden of anemia among women in India. *Eur J Clin Nutr* 2003;57:52-60.
13. Trinh LT, Dibley M. Anemia in pregnant, postpartum and non pregnant women in Lak district, Daklak province of Vietnam. *Asia Pac J Clin Nutr* 2007;16:310-15.
14. Kavle JA, Stolfus RJ, Witter F, Tielsch JM, Khalfan SS, Caulfield LE. Association between anemia during pregnancy and blood loss at and after delivery among women with vaginal births in Pemba Island, Zanzibar, Tanzania. *J Health Popul Nutr* 2008;26:232-40.
15. Wandabwa J, Dovle P, Todd J, Ononge S, Kiondo P. Risk factors for severe postpartum hemorrhage in Mulago Hospital, Kampala, Uganda. *East Afr Med J* 2008;85:64-71.
16. Tsu VD. Postpartum haemorrhage in Zimbabwe: a risk factor analysis. *Br J Obstet Gynaecol* 1993;100:1152.
17. Maharaj D. Puerperal pyrexia: a review. *Obstet Gynecol Surv* 2007;62:400-06.
18. Dare FO, Bako AU, Ezechi OC. Puerperal sepsis: a preventable postpartum complication. *Trop Doct* 1998;28:92-95.
19. Levy A, Frasen D, Katz M, Mazor M, Sheiner E. Maternal anemia during pregnancy is an independent risk factor for low birth weight and preterm delivery. *Eur J Obstet Gynecol Reprod Biol* 2005;122:182-86.
20. Scanlon KS, Schieve LA, Cogswell ME. High and low hemoglobin levels during pregnancy: Differential risks for preterm birth and small for gestational age. *Obstet Gynecol* 2000;96:741-48.
21. Lone FW, Qureshi RN, Emanuel F. Maternal anaemia and its impact on perinatal outcome. *Trop Med Int Health* 2004;9:486-90.
22. Geelhoed D. Maternal and fetal outcome after severe anemia in pregnancy in rural Ghana. *Acta Obstet Gynecol Scand* 2006;85:49-55.
23. Fareh OI, Rizek DE, Thomas L, Berg B. *J Obstet Gynecol* 2005;25:440-44.
24. Bondevik GT, Ulstein M, Kvale G. Maternal hematological status and risk of low birth weight and preterm delivery in Nepal. *Acta Obstet Gynecol Scand* 2001;80:402-08.