

Prevalence of maternal anemia and its impact on perinatal outcome in a rural area of Dakshina Kannada

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ABSTRACT


Background: The prevalence of anemia among pregnant women averages 56%, ranging between 35% and 100% among different regions of the world. It is now one of the most frequently observed nutritional diseases in the world. It is especially prevalent in women of reproductive age, particularly during pregnancy. The present study was planned to study the prevalence of anemia in pregnant females admitted to the tertiary care center for delivery and its impacts on perinatal outcome. **Objective:** The objective of this study is to estimate the prevalence of maternal anemia in a rural community and to assess its impact on neonatal outcome. **Materials and Methods:** A hospital record-based study was conducted in the tertiary health-care center after taking required permissions and ethics clearance from the institution. The data were collected from record and analyzed in SPSS Trial Version 18. **Results:** In this study, a total of 992 pregnant mothers were included, out of which 599 (60.38%) were anemic. Among 992 delivery, 83 mothers delivered low birth weight (LBW) baby, out of which 42 (50.60%) mothers were moderate anemic. The prevalence of stillbirth/intrauterine death (IUD) was 55 (5.54%) and found to be higher among mothers who were having moderate anemia (60%). **Conclusion:** The prevalence of maternal anemia in this study was 60.38%, which was still a major public health problem. Low maternal hemoglobin levels are associated with increased risk of stillbirth and IUD, and LBW babies.

Keywords: Maternal Anemia; Prevalence; Perinatal Outcome; Tertiary Health Care Centre

INTRODUCTION

According to the WHO, in developing countries, the prevalence of anemia among pregnant women averages 56%, ranging between 35% and 100% among different regions of the world.^[1] It is now one of the most frequently observed nutritional diseases in the world. It is especially prevalent in women of reproductive age, particularly during pregnancy. In one of the studies conducted on a large population, it was estimated that 87% of the Indian pregnant women are anemic.^[2] The extent up to which maternal anemia affects

maternal and neonatal health is still uncertain.^[3] Iron deficiency during pregnancy is thought to be caused by a combination of factors such as previously decreased iron supply, the iron requirements of growing fetus and expansion of maternal plasma volume.^[4] The WHO has defined hemoglobin of <110 g/L as anemia in pregnancy.^[5] Anemia in pregnant women has been regarded as detrimental to the fetal growth and pregnancy outcomes. Low birth weight (LBW) and preterm delivery have been persistently linked to anemia in pregnancy.^[2,6] The main causes of anemia in developing countries include inadequate intake and poor absorption of iron, malaria, hookworm infestation, diarrhea, HIV/AIDS and other infections, genetic disorders (e.g., sickle cell and thalassemia), blood loss during labor and delivery, heavy menstrual blood flow, and closely spaced pregnancies.^[7] In view of the above, the present study was carried out find out the prevalence of anemia among pregnant women and its impact on perinatal outcome.

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MATERIALS AND METHODS

The study was conducted in the tertiary health-care center in a Dakshina Kannada district of Karnataka, India after taking required permissions and ethics clearance from the institution. All the pregnant women who have delivered the baby during 01.03.14-31.08.14 were included in this study. Required information was collected from antenatal records and interview using pretested pro forma. Neonatal parameters such as birth weight, gestational age at delivery, perinatal outcome (live birth, intrauterine death (IUD), and intrauterine growth restriction (IUGR) were obtained at the time and after the delivery. The universal sampling method was used for sample size estimation. Anemia was classified as per the WHO severity grading criteria.^[8] Thus, anemia in pregnancy ranges from mild (≥ 10.0 g/dl), moderate (7.0-9.9 g/dl) to severe (< 7.0 g/dl). The typing of anemia was done as per standard peripheral blood smear examination method.^[9] Gestational age was calculated from the 1st day of last menstrual period. IUGR was defined as the fetal growth (measured by ultrasound) less than the 10th centile for that gestational age. Preterm delivery was defined as delivery after 24 and before 37 completed weeks of gestation. IUD was defined as fetus without cardiac activity, confirmed on ultrasound, at any time after 24 weeks of pregnancy. Perinatal mortality includes both late fetal deaths (stillbirth) and early neonatal deaths, which lasting from the 28th week of gestation to the 7th day after birth. Apgar score of neonate at 1 and 5 min were recorded. Apgar score was estimated based on heart rate, muscular tone, nasal catheter response, and baby appearance. Neonates with birth weight < 2.5 kg were defined as LBW baby.

The data were entered into Microsoft Excel 10.0 and analyzed in SPSS Trial Version 18. Descriptive statistics such as mean, percentage, and tests of significance like Chi-square test were used and the statistical significance level was fixed at $P < 0.05$.

RESULT

In this study, a total of 992 pregnant mothers were included, out of which 599 (60.38%) were anemic. Out of 599 anemic mothers, 176 (29.38%) and 423 (70.62%) mothers were mild anemic and moderate anemic, respectively. No mother was found to be severely anemic.

The mean hemoglobin was 10.41 g/dl (SD = 0.78). The mean age of mother was 23.71 years (SD = 3.34), and the mean birth weight was 2.932 kg (SD = 0.39). The maximum prevalence of moderate anemia was found to be in the age group of 31 years and above (45.94%) followed by age group of 21-25 years (43.96%). The percentage of moderate anemia was found to be high among illiterate mothers (49.62%) as well as among mother who were doing service (63.71%)

which was significant. Mothers belong to BPL class, and parity 3 or more was found to have a high prevalence of moderate anemia, which was significant (Table 1).

The rate of cesarean section was 116 (11.69%), out of which 48 (41.38%) mothers were moderate anemic. Among 992 delivery, 55 (5.54%) was IUD or stillbirth, and out of which 60% belongs to mothers who had moderate anemia. The prevalence of LBW baby was 83 (8.36%), and the proportion was higher in mothers who had moderate anemia (50.60%) (Table 2).

The risk of perinatal mortality was 2.75 times higher among anemic mothers than non-anemic mothers, which was significant. Even IUGR, LBW baby, and low Apgar score at 5 min were 1.80, 1.99, and 1.55 times higher among anemic mothers than non-anemic mothers, respectively (Table 3).

DISCUSSION

Anemia is one of the most prevalent problems among pregnant women in developing countries, and it affects health of mother as well as neonates. In this study, the prevalence of maternal anemia was 60.38%, and it was higher among the mother aged 30 years and above. The mothers who were illiterate, doing job/service, belongs to BPL class and parity 3 or more, had a higher chance of moderate anemia which was statistically significant. The prevalence of perinatal mortality in this study was 5.54%, and anemic mothers had 2.75 times higher risk of perinatal mortality than non-anemic mother. The risk of IUGR was 1.80 times high in anemic mothers than non-anemic mothers. The study also showed that the risk of LBW baby and low Apgar score at 5 min were 1.99 and 1.55 times more among anemic mothers, respectively.

Our result in relation to prevalence of maternal anemia was slightly higher than NFHS 4 factsheet^[10] because of low sample size, but it was similar with the findings conducted by Kumar et al.^[11] in rural Maharashtra and Dalal and Shah^[12] In relation to the prevalence of perinatal mortality, the findings was slightly higher than SRS report of Karnataka state^[13] and study conducted by Siddalingappa et al.^[14] in rural Mysore. It may be because of complicated pregnancies and late approach to health-care center during the period of labor pain and delivery. Among anemic mothers, the risk of perinatal mortality was high, which was similar to the study conducted by Nair et al.^[15] and Lone et al.^[16] The study showed a significant association between maternal anemia and perinatal mortality, which was already established in many studies. Nair et al.^[17] and Sangeeta and Pushpalatha^[18] also showed that the risk of IUGR was more in anemic mothers and the findings are similar to our study. Borah and Agarwalla,^[19] showed that LBW baby was 1.93 times more among anemic mothers, which are similar to the findings of our study. The above findings can be accepted because

Table 1: Distribution of maternal anemia by sociodemographic characteristics ($n=992$)

Parameters	Normal $n=393$ (%)	Mild anemia $n=176$ (%)	Moderate anemia $n=423$ (%)	Total	P value
Age (in years)					
<20	66 (44.59)	28 (18.92)	54 (36.49)	148	0.313
21-25	221 (39.82)	90 (16.22)	244 (43.96)	555	
26-30	96 (38.09)	48 (19.05)	108 (42.86)	252	
31 or more	10 (27.03)	10 (27.03)	17 (45.94)	37	
Education					
Illiterate	36 (26.07)	31 (23.31)	66 (49.62)	133	<0.00001
Primary	175 (37.96)	63 (13.67)	223 (48.37)	461	
Middle	117 (46.43)	59 (23.41)	76 (30.16)	252	
PUC and above	65 (44.52)	23 (15.75)	58 (39.73)	146	
Occupation					
Homemaker	190 (36.12)	111 (21.10)	225 (42.78)	526	<0.00001
Laborer	118 (52.91)	48 (21.53)	57 (25.56)	223	
Business	46 (38.66)	11 (9.24)	62 (52.10)	119	
Service/Job	39 (31.45)	6 (4.84)	79 (63.71)	124	
Socio-economic status					
BPL	134 (37.43)	48 (13.41)	176 (49.16)	358	0.002251
APL	259 (40.85)	128 (20.19)	247 (38.96)	634	
Parity					
1	66 (20.25)	94 (28.83)	166 (50.92)	326	<0.00001
2	239 (58.15)	53 (12.90)	119 (28.95)	411	
3 or more	88 (34.51)	29 (11.37)	138 (54.12)	255	

Table 2: Comparison of maternal anemia with perinatal outcome $n=992$

Parameters	Normal $n=393$ (%)	Mild anemia $n=176$ (%)	Moderate anemia $n=423$ (%)	Total	P value
Delivery					
Vaginal	346 (39.50)	155 (17.69)	375 (42.81)	876	0.958102
Cesarean	47 (40.52)	21 (18.10)	48 (41.38)	116	
Perinatal outcome					
Normal live baby	382 (40.77)	165 (17.61)	390 (41.62)	937	0.006949
IUD/stillbirth	11 (20.0)	11 (20.0)	33 (60.0)	55	
Birth weight of baby					
Normal	371 (40.82)	157 (17.27)	381 (41.91)	909	0.036327
LBW (<2.5 kg)	22 (26.51)	19 (22.89)	42 (50.60)	83	
Apgar score at 1 min					
0-3	11 (33.33)	3 (9.09)	19 (57.58)	33	0.46669
4-6	16 (40.0)	7 (17.50)	17 (42.50)	40	
7-10	366 (39.83)	166 (18.06)	387 (42.11)	919	
Apgar score at 5 min					
0-3	3 (27.27)	3 (27.27)	5 (45.46)	11	0.813208
4-6	6 (31.58)	4 (21.05)	9 (47.37)	19	
7-10	384 (39.92)	169 (17.57)	409 (42.51)	962	

maternal anemia and malnutrition, both are associated with various degree fetal growth retardation. They are recognized as one of the most important cause of IUGR and LBW baby.

Even the findings of low Apgar score at 5 min among anemic mothers are similar with a study conducted by Malhotra et al. and Bora et al.^[20,21]

Table 3: Association of maternal anemia with perinatal outcome (*n*=992)

Parameters	Non anemic (<i>n</i> =399)	Anemic (<i>n</i> =599)	OR (95% CI)	<i>P</i> value
Delivery				
Vaginal	346	530	1	0.8329
Cesarean	47	69	0.95 (0.64-1.42)	
Perinatal mortality				
No	382	555	1	0.0032
Yes	11	44	2.75 (1.40-5.39)	
IUGR				
No	386	580	1	0.1859
Yes	7	19	1.80 (0.75-4.33)	
LBW				
No	371	538	1	0.0119
Yes	22	61	1.91 (1.15-3.16)	
Low Apgar score at 1 min (6 or less)				
No	366	553	1	0.6332
Yes	27	46	1.12 (0.68-1.84)	
Low Apgar score at 5 min (6 or less)				
No	384	578		0.277
Yes	9	21	1.55 (0.70-3.42)	

The strength of this study was that it included a good sample size and the prevalence of maternal anemia was found to be high, which was major public health problem in rural areas. The factors associated with the maternal anemia and perinatal outcome are also significant in this study.

As it was retrospective cohort study, the information regarding mother hemoglobin at the different gestational period was not mentioned in the tertiary health care center record. Therefore, the effects of anemia in relation to the different gestational periods could not be explained.

CONCLUSION

The prevalence of maternal anemia in this study was 60.38%, which was still a major public health problem. The findings of this study show that there is strong association of maternal anemia with increased risk of perinatal mortality, LBW babies, and IUGR. Low Apgar score (<7) at 1 and 5 min are also associated with maternal anemia.

REFERENCES

- World Health Organization. The Prevalence of Anaemia in Women: A Tabulation of Available Information. 2nd ed. Geneva: WHO; 1992.
- Kalaivani K. Prevalence and consequences of anaemia in pregnancy. *Indian J Med Res.* 2009;130(5):627-33.
- Ahmad MO, Kalsoom U, Sughra U, Hadi U, Imran M. Effect of maternal anaemia on birth weight. *J Ayub Med Coll Abbottabad.* 2011;23(1):77-9.
- Cohen JH, Flass HD. Haemoglobin correction factors for estimating the prevalence of iron deficiency anaemia in pregnant women residing at high altitudes in Bolivia. *Pan Am J Public Health.* 1999;6(6):392-9.
- Jaleel R, Khan A. Severe anaemia and adverse pregnancy outcome. *J Surg Pak Int.* 2008;13:147-50.
- Haggaz AD, Radi EA, Adam I. Anaemia and low birthweight in western Sudan. *Trans R Soc Trop Med Hyg.* 2010;104(3):234-6.
- World Health Organization. Iron Deficiency Anaemia: Assessment, Prevention and Control. Geneva: World Health Organization; 2001.
- WHO. Preventing and Controlling Iron Deficiency Anaemia through Primary Health Care. Geneva: WHO; 1989.
- Firkin F, Chesterman C, Penington D, Rush B. deGruchy's Clinical Haematology in Medical Practice. 5th ed. Oxford: Oxford University Press; 1990. p. 31.
- National Family Health Survey (NFHS-4) 2015-2016. International Institute for Population Sciences, Mumbai. Available from: <http://www.rchiips.org/NFHS/pdf/NFHS4/India.pdf>. [Last accessed on 2017 Apr 21].
- Kumar P, Pore P, Patil U. Maternal anemia and its impact on perinatal outcome in a tertiary care hospital of Pune, in Maharashtra. *Indian J Basic Appl Med Res.* 2012;1(2):111-9.
- Dalal E, Shah J. A comparative study on outcome of neonates born to anemic mothers versus non anemic mothers. *Natl J Med Res.* 2014;4(4):270-3.
- Government of India. Sample Registration System Statistical Report 2012. Report No. 1. Office of Registrar General of India; 2013.
- Siddalingappa H, Murthy MR, Kulkarni PN. Prevalence and factors influencing perinatal mortality in rural Mysore, India. *J Clin Diagn Res.* 2013;7(12):2796-699.
- Nair M, Choudhury MK, Choudhury SS, Kakoty DK, Sarma UC, Webster P, et al. *BMJ Glob Health.* 2016;1(1):e000026. DOI: 10.1136/bmjgh-2015-000026.
- Lone FW, Qureshi RN, Emmanuel F. Maternal anaemia and

- its impact on perinatal outcome in a tertiary care hospital in Pakistan. *East Mediterr Health J.* 2004;10(6):801-7.
17. Nair A, Chandana C, Venkatesh S, Kumar S. Evaluation of maternal anemia in tertiary care centre and its neonatal outcomes. *Int J Reprod Contracept Obstet Gynecol.* 2016;5(10):3506-11.
 18. Sangeeta VB, Pushpalatha S. Severe maternal anemia and neonatal outcome. *Sch J Appl Med Sci.* 2014;2(1C):303-9.
 19. Borah M, Agarwalla R. Maternal and sociodemographic determinants of low birth weight (LBW): A community based study in a rural block of Assam. *J Postgrad Med.* 2016;62:178-81.
 20. Malhotra M, Sharma JB, Batra S, Sharma S, Murthy NS, Arora R. Maternal and perinatal outcome in varying degrees of anemia. *Int J Gynaecol Obstet.* 2002;79(2):93-100.
 21. Bora R, Sable C, Wolfson J, Boro K, Rao R. Prevalence of anemia in pregnant women and its effect on neonatal outcomes in Northeast India. *J Matern Fetal Neonatal Med.* 2014;27(9):887-91.

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