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Prevalence of Severe Anemia Among Pregnant Women of Bhopal District

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ABSTRACT

Background: Anemia can lead to severe complication in pregnancy, including death of both mother and her child. The objective of this study was to determine the prevalence of severe anemia and assess associated factors among pregnant women. **Material and Methods:** A facility-based cross-sectional study was conducted involving 764 pregnant women, at 8 hospitals of Bhopal district from September 2015 to May 2016. Non probability purposive sampling was used to recruit study participants. Socio-demographic, medical and obstetric data of the study participants were collected using structured questionnaire. **Results:** Overall, prevalence of any degree of anemia was 62.8 % and 4.7 % pregnant women had severe anemia. History of miscarriage, history of intestinal parasitic infection and history of anemia in last pregnancy were predictors of severe anemia in pregnancy. **Conclusions:** Routine testing of women before becoming pregnant or during inter-conception period and increasing awareness on factors predisposing to anemia is recommended.

KEYWORDS Severe anemia, Pregnant women, Determinants, Central India

INTRODUCTION:

Anemia is a medical condition characterized by reduction in the number of red blood cells in an amount to significantly reduce the oxygen-carrying capacity of blood.[1] Iron deficiency is the most common cause of anemia globally, although other conditions, such as folate, and vitamin B12 deficiency, chronic inflammation, and few inherited disorders can also cause anemias.[2,3] Malaria, HIV/AIDS, hookworm infestation, schistosomiasis, and other infections such as tuberculosis are particularly important diseases contributes to the high prevalence of anemia in tropical countries including India.[4,5] In developing countries every second pregnant woman and about 40% of preschool children are estimated to be anemic.[6] The major health consequences of severe anemia include poor pregnancy outcome, impaired physical and cognitive development, and increased risk of morbidity in children.[7]

Despite its high prevalence, not much importance is given to persistent anemia by women who suffers from it, mainly because anemia's manifestation are not serious but are of a more silent nature.[8] Anemia in pregnancy remains one of the most intractable public health problems in developing countries.[8] Anemia caused due to iron deficiency exacts its heaviest toll by increasing the severity of postpartum hemorrhage, the most common causes of maternal mortality; altogether anemia contributes to 20% of all maternal deaths in developing countries.[9] Anemia in pregnancy leads to premature birth, low birth weight, fetal impairment and infant deaths.[9,10]

Knowledge of the relative importance of the different etiological factors forms the basis for intervention strategies to control anemia. Determination of the magnitude of anemia among pregnant women helps to monitor health of the pregnant women, contributing to reduction in maternal morbidity and mortality. Also, assessment of factors predisposing to anemia in a local area enables to take targeted intervention activities. Therefore, this study is aimed at determining prevalence of severe anemia and assessing associated risk factors among pregnant women attending antenatal clinic.

MATERIAL AND METHODS:

Study Setting and Design. This was a hospital based cross-sectional study. The present study was conducted at 3 government and 5 private hospitals of district Bhopal the capital of state of Madhya Pradesh, India. The total duration of study was nine months (September 2015 to May 2016). The period of data collection was seven months (October 2015 to April 2015). *Study Population.* All pregnant women in the first trimester of pregnancy coming for their first antenatal visit at the selected health facilities of Bhopal. *Sample Size and Sampling Procedures.* Sample size was determined based on the single population proportion formula using $\mathbf{Z^2 \times p \times q / d^2}$ with a 95% CI, 5% margin of error, and an assumption that 58.0 % of pregnant women are anemic in the study area.[5] Assuming a 10% nonresponse rate and a design effect of 1.5, a total sample size of 616 pregnant women was required. But we included all the women attending the antenatal clinic during the period of study who gave valid informed consent for study. Following this 819 pregnant women were approached. Non-probable purposive sampling method was used to recruit study participants. All women who attended selected health facilities for first antenatal checkup during the first trimester and who gave their consent for study were enrolled in study. *Exclusion criteria:* pregnant women who were on any type of iron supplementation were excluded from the study. All enrolled women were administered questionnaire by trained health worker. *Data Collection:* Data was collected using pretested questionnaire, which contains sociodemographic characteristics (age, education, occupation, marital status, and others), obstetric, gynecological and medical history and dietary factors. Blood hemoglobin concentration was measured using standard method. All instruments were pre-calibrated designed for the measurement of hemoglobin concentration. The blood was drawn by a authorized laboratory technician posted at designated facility. World Health Organization (WHO) definition and classification for anemia during the pregnancy was used for the purpose of study.[11] All health workers were given one day training in administering questionnaire before the start of data collection. *Outcome variable:* The chief outcome variable was the prevalence of severe anemia among study participants. *Statistical analysis.* Data were checked for accuracy and completeness. Incomplete questionnaire were not included in the final analysis. Data were analyzed using SPSS version 20. Categorical variables were summarized as numbers and percentages, whereas normally distributed continuous variables were presented as means and standard deviations. To identify factors associated with the outcome variable (severe anemia), first a bivariate

logistic regression analysis was performed for each independent variable and crude odds ratio (COR) with 95% confidence intervals was obtained. Then, significant variables observed in the bivariate logistic regression analysis (p value < 0.05) were subsequently included in the multivariable logistic regression model to determine independent predictors for the outcome variable among the pregnant women. The strength of statistical association was measured by adjusted odds ratios (AOR) and 95%confidence intervals. Confidentiality of information was maintained throughout the procedure. All women who had different grade of anemia were given appropriate treatment by the physician posted at respective facility.

RESULTS:
A total of 819 women were approached for this study, 38 women refused to participate and 17 women didn't complete the questionnaire. Thus final data analysis was done on a total of 764 pregnant women. The overall prevalence of any type of anemia in this study was 62.8%. Of the anemic pregnant women, 58.1%, had mild to moderate anemia, 4.7% had severe anemia and 37.2% no anemia.

About table 1 here:
Socio-demographic profile of the study participants is presented in Table 1. The age of study participants ranged from 17 to 33 year (mean 28.9 ± 3.4). Table 2 details the obstetric and medical history of pregnant women.

About table 2 here:
One hundred and five (13.7 %) of the pregnant women had miscarriage/abortion within last nine months. Majority of the pregnant women were multigravidae. The prevalence of severe anemia was highest (34.6%) in pregnant women in the age group of 21-25 years; however, the difference was not significant. Majority of the study participants were urban residents with significantly.

About table 3 here:
Associated factors of anemia after adjusting for other variables: h/o intestinal parasitic infection [AOR = 2.96 (1.39-4.27)] and history of blood transfusion during last pregnancy [AOR = 2.96 (1.59-4.27)], who didn't consumed at least 50 IFA tablet during last pregnancy [AOR = 2.56 (1.15-4.31)] were the predictors of anemia among the pregnant women (Table 3).

Discussion:
The overall prevalence of severe anemia among pregnant women was 62.8 %.

The overall prevalence of anemia obtained in this study is higher than reports from NFHS-3. This might be due difference in the time period between the two surveys. This might be due to variation in sample size and sampling method adopted. In this study, mild to moderate anemia was more than ten times higher than severe anemia. Similar findings were reported in other local studies and NFHS-3. Heavy infection with soil-transmitted helminthes (STHs), particularly the hookworms, predisposes pregnant women and individuals with low iron store to anemia. In this study, more than a 60.0% of the pregnant women with severe anemia reported having hookworm infection within last one year.

Pregnant women with a history of miscarriage during the last nine month of age had higher odds of being severely anemic. Also many pregnant women with history of malaria within last six months were anemic. Malaria infection during pregnancy is life-threatening. In this study, eleven of the pregnant women were malaria positive by routine microscopy. Malaria infection during pregnancy in the area calls urgent intervention activities targeting pregnant women to be in place to prevent tragic outcomes of the infection during pregnancy. Most of the detected cases were due to Plasmodium vivax. In our study we didn't found any significant association between body mass index, occupation place of living, family size.

The findings of this study should be interpreted with caution due to the following limitations of the study. First, due to the cross sectional study design used, whether anemia preceded the predisposing factors or the vice versa could not be verified in this study. Secondly, micronutrients were not measured in this study, which limits further classification of the anemia.

Conclusion:
The prevalence of anemia among pregnant women is high but the prevalence of severe anemia id low. But since the manifestations of severe anemia in pregnancy are life threating even such a low proportion can result in higher mortality rate. As the severity of anemia increase it is important to treat any anemia as soon as it is diagnosed. Awareness creation on the consequences

of anemia during pregnancy should be given to women in child bearing age in general and pregnant women in particular. Routine screening and deworming of pregnant women infected with intestinal parasites is recommended.

Table 1 Socio-demographic characteristics and anemia among the pregnant women (n=764)

Variable	Hemoglobin		
No anemia (n=284)	Mild and Moderate anemia (n=444)	Severe anemia(n=36)	
Age			
< 20	46(16.2)	68(15.3)	8(22.2)
20-25	83(29.2)	126(28.4)	14(38.9)
26-30	98(34.5)	153(34.5)	12(33.3)
30 and more	57 (20.1)	97(21.8)	2(5.6)
Education			
Illiterate	65 (22.9)	100 (22.5)	19(52.7)
School educated	129 (45.4)	282(63.5)	12(33.3)
College educated	90 (31.7)	62(14.0)	5(13.8)
Residence			
Slum-Urban	188 (66.2)	226 (50.9)	26 (72.2)
Non Slum-urban	77 (27.1)	190 (42.8)	9(24.0)
Rural	19 (6.7)	28 (6.3)	1(2.8)
Family size			
3	45(15.8)	66(14.9)	4(11.2)
4	102(35.9)	187(42.1)	8(22.4)
5	78(27.5)	121(27.3)	10(28.0)
6 and more	59 (20.8)	70(15.8)	14(29.2)
Occupation			
Housewife	53 (18.7)	56 (12.6)	7(19.6)
labor	94 (33.1)	210(47.3)	12(33.3)
Agriculture	50(17.6)	61(13.7)	6(16.8)
Business	87 (30.6)	117(26.4)	11(30.8)
Diet			
Veg	162 (57.0)	328(73.9)	26(72.0)
Non-veg	122 (43.0)	116(26.1)	10(28.0)

Table 2 Clinical variable and anemia among the pregnant women (n=764)

Variable	Anemic Status		
	No anemia (n=284)	Mild and Moderate anemia (n=444)	Severe anemia (n=36)
History of miscarriage with in last 9 months			
Yes	34 (12.0)	48(10.8)	23(64.6)
No	250 (88.0)	396(89.2)	13(36.4)

Using contraceptive during last six months			
Yes	165 (58.1)	278(62.6)	7(19.6)
No	119 (41.9)	166(37.4)	29(80.6)
Type of contraceptive(n=450)			
Condom	78 (47.3)	187(67.3)	2(28.6)
IUCD	65 (39.4)	52(18.7)	4(57.1)
OCP	22 (13.3)	39(14.0)	1(14.3)
Parity			
0	108 (38.0)	118(26.6)	2(5.6)
1-2	131(46.1)	234(52.7)	11(30.8)
3and more	45(15.8)	92(20.7)	23(63.9)
History of blood transfusion during last pregnancy (n=536)			
Yes	69(39.2)	108(33.1)	29 (85.3)
No	107(60.8)	218(66.9)	5 (14.7)
Consumed at least 50 or more IFA tablet during last pregnancy(n=536)			
Yes	118(67.0)	189 (58.0)	33(97.1)
No	58(33.0)	137 (42.0)	1(2.9)
Malaria during last six months			
Yes	33 (11.6)	28(6.3)	25(69.2)
No	251(88.3)	416(93.7)	11(30.8)
H/O hookworm infection in last one year			
Yes	32(11.3)	92(20.7)	23(64.6)
No	252(88.7)	352(79.3)	13(36.4)
Body mass index			
Low	93 (32.7)	116(26.1)	27(75.0)
Normal	156 (54.9)	239(53.8)	7(19.6)
High	35(12.3)	89(20.1)	2(5.4)

Table 3: Predictors of severe anemia among the pregnant women

Variable	COR	P-Value	AOR	P value
History of miscarriage within last 9 months				
Yes	2.98 (1.08- 3.86)	0.01	1.68 (1.08- 2.54)	0.01
No	1.00		1.00	
History of blood transfusion during last pregnancy				
Yes	4.60 (2.15-7.87)	0.03	2.96 (1.59-4.27)	0.012
No	1.00		1.00	
Consumed 50 or more IFA tablet during last pregnancy				
No	4.76 (2.18-7.13)	0.024	2.56 (1.15-4.31)	0.019
Yes	1.00		1.00	
Anemic during last pregnancy				
Yes	6.80 (3.17-10.9)	0.04	4.80 (2.75-8.58)	0.003
No	1.00		1.00	
Consumed IFA during post-partum period				
No	3.68 (1.18- 5.93)	0.019	2.32 (0.78- 3.63)	0.001
Yes	1		1	
Malaria during last six months				
Yes	1.27 (0.88-1.77)	0.15	1.65 (1.03- 2.79)	0.06
No	1.00		1.00	
H/O hookworm infection in last one year				
Yes	4.60 (2.15-7.87)	0.019	2.96 (1.39-4.27)	0.07
No	1.00		1.00	
Education				
Illiterate	2.76 (1.23- 3.59)	0.230	1.45 (1.23- 2.19)	0.084
School educated	2.06 (0.93- 2.99)	0.244	1.16 (0.73- 1.69)	0.134
College educated	1.00		1.00	

AOR: Adjusted Odds Ratio, adjusted for other variables in the table CI: Confidence interval COR: Crude Odds Ratio.

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