A Prospective Observational Study to Assess the Prevalence and Associated Factors of Anemia in Pregnant Women

Fauzia Perveen[1], C.P. Jaiswal[2]

[1]Tutor, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India

[2]Associate Professor and HOD, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India

Abstract

Aim: This study was aimed to determine the prevalence and associated factors of anemia in pregnant women in Bihar.

Material & Methods: A prospective observational study was conducted in Department of pathology, Nalanda Medical College and Hospital, Patna, Bihar, India for one year. A sample size of 223 pregnant women was estimated based on the prevalence of anemia of 59% among pregnant women (National Family Health Survey [NFHS]-3 survey) with 95% confidence level and with an absolute precision of 5%, including a dropout rate of 20%.

Results: A total of 223 pregnant women were involved in the study. Most of the pregnant women were within the age group of 18-25 years with mean age of 22.94 years (±2.39year). Among all study participants, 35(15.9%) were illiterate. Prevalence and severity of anemia: Two hundred twenty-three pregnant women, 39.94 (95% CI: 34.7% - 45.2%), were anemic. The mean Hb concentration was 11.55 ± 2.97 g/dl with a range of 5.4 to 18.7g/dl. Among anemic pregnant women, 84(37.50%) had mild anemia, 139(62.50%) had moderate anemia, and 14(9.66%) had severe anemia. From a total of anemic pregnant women, 139(62.5%), 56(25%) and 28(12.5%) had normocytic normochromic, microcytic hypochromic and macrocytic anemia, respectively. Among 223 study participants, 18 (8.07%) were anemic (Hgb: < 11 g/dl). The general distribution of anemia was 15 (62.5%) microcytic hypochromic, 6 (25.0%) normo- cytic hypochromic and 3 (12.5%) macrocytic hypochromic based on the morphology of red blood cells. Entamoeba histolytica 18 (8.07%), Giardia lamblia and both Entamoeba histolytica/dispar and Giardia lamblia 12 (5.3%) were among intestinal parasites detected from stool of the pregnant women. The majority of anemic cases 66.66% (12/28) showed mild type of anemia.

Conclusion: This study revealed that the prevalence of anemia among pregnant women was relatively low. Rural residence, history of abortion, current blood loss and third trimester gestational age was statistical significant associated factors with anemia in this study.

Keywords: Anemia, Factors, Pregnant women.

Introduction

Anemia in pregnancy is a major public health problem, especially in developing countries. It affects 41.8% of pregnant women globally, with the highest prevalence in Africa (57.1%) which corresponds to 17.2 million. [1] Anemia in

pregnant women has severe consequences on health, social, and economic development. [1,2] Anemic pregnant women will be at risk of low physical activity, increased maternal morbidity and mortality, especially those with severe anemia. [1,3] In addition, both pregnant women and their neonates encounter negative consequence including fetal anemia, low birth weight (LBW), preterm delivery, intrauterine growth restriction and perinatal Mortality. [3,4-9]

In most of the cases, anemia is largely preventable and easily treatable if detected in time. Effective management of anemia includes treatment of the underlying causes, restoration of the hemoglobin concentration to normal levels, and prevention and treatment of complications. Despite this fact, anemia still continues to be a common cause of mortality and morbidity among pregnant women [10] and data on relative contributions of associated factors are limited which makes it difficult to effectively address the problem.

Anemia is a global public health problem. Women of reproductive age are particularly at risk. [11,12] Anemia can be caused by both nutritional and non-nutritional factors, with iron deficiency being the most common cause. [13] Previous studies reported that anemia affected about 40% of pregnant women and more than 20% of non-pregnant women. [11] Due to the increased demand for iron, normal diet cannot meet the demand of some pregnant women for iron, especially women with an already established iron deficiency. [14] Anemia not only can increase the risk of adverse pregnancy outcomes [15-17], but may reduce cognitive function [18], and reduce work efficiency. [19] In 2011, World Health Organization (WHO) reported that the global prevalence of anemia for all women of reproductive age was 29.4%, with 38.2% in pregnant women and 29.0% in non-pregnant women. [20]

This study was aimed to determine the prevalence and associated factors of anemia in pregnant women in Patna.

Materials & Methods

A prospective observational study was conducted in Department of pathology, Nalanda Medical College and Hospital,Patna, Bihar, India for one year. A sample size of 223 pregnant women was estimated based on the prevalence of anemia of 59% among pregnant women (National Family Health Survey [NFHS]-3 survey) with 95% confidence level and with an absolute precision of 5%, including a dropout rate of 20%. Ethical clearance was obtained. Permission was obtained from Medical director office before data collection. Written informed consent was obtained from each pregnant woman prior to enrollment in the study. Individual level medical information obtained from the pregnant women was kept strictly confidential, and the participants were assured that only aggregate data will be reported

The pregnant woman was examined by the OBG consultant, and postgraduates and the data were collected. The hemoglobin (HB) of the pregnant women was measured at the first visit and repeated at every 3rd month. The HB measurements of the pregnant woman were measured using HemoCue analyzer (HemoCue Hb 301). Anemia was classified based on the WHO criteria; HB concentration of <11gm/dl was considered as Anaemia. HB concentration of 10–10.9 g/dl, 7–9.9 g/dl, and <7gm/dl was considered as mild, moderate, and severe anemia, respectively.

Statistical Analysis:

The data were analyzed using IBM SPSS Statistics V22.0 (IBM United States). The quantitative measures are presented by mean and standard deviation and qualitative variables by proportions. Chi-square test, correlation coefficient, and logistic regression were used for testing

significance. P ≤ 0.05 was considered statistically significant.

Results

A total of 223 pregnant women were involved in the study. Most of the pregnant women were within the age group of 18-25 years with mean age of 22.94 years (±2.39year). Among all study participants, 35(15.9%) were illiterate. (Table 1).

Prevalence and severity of anemia: Two hundred twenty-three pregnant women,

39.94 (95% CI: 34.7% - 45.2%), were anemic. The mean Hb concentration was 11.55 ± 2.97 g/dl with a range of 5.4 to 18.7g/dl. Among anemic pregnant women, 84(37.50%) had mild anemia, 139(62.50%) had moderate anemia, and 14(9.66%) had severe anemia. From a total of anemic pregnant women, 139(62.5%), 56(25%) and 28(12.5%) had normocytic normochromic, microcytic hypochromic and macrocytic anemia, respectively.

Table 1: Socio-demographic characteristics of participants and outcome of different factors on the prevalence of anemia in pregnant women

Variables	Frequency N (%)	Anemia prevalence Positive (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Age (in years)						
18–25	140 (62)	5.39	1			
26–34	73 (33)	12.26	0.44(0.2,1.2)	0.100		
> 34	10 (5)	13.47	0.26(0.06,1.1)	0.070		
Educational level						
Illiterate	35 (15.9)	46.75	0.87(0.7,2.3)	0.700		
1–8	49 (21.9)	5.45	0.50 (0.9, 3.5)	0.350		
9–12	127 (56.8)	1.98	0.40 (0.061, 5.03)	0.900		
> 12	12 (5.4)	–	1			
Residence						
Urban	167 (75.1)	3.75	1		1	
Rural	56 (24.9)	17.58	8.70 (2.01, 38.4)	0.004	6.00 (1.34,27.6)	0.019
Occupation						
Housewife	172 (77.3)	7.65	0.39(0.051,3.04)	0.370		
Self employed	29 (12.8)	7.69	1.30 (0.08, 21.8)	0.850		
Governmental	22 (9.9)	10.00	1			
Pregnancy gap (last and current pregnancy)						
1 year	27 (12.2)	32.43	0.02(0.005,0.08)	0.000	0.19 (0.02,1.7)	0.138
2 years	31 (13.8)	7.14	1.13 (0.12, 11.3)	0.900		
3 years	31 (13.8)	7.14	0.50 (0.09, 3.5)	0.500		
> 3 years	58 (23.7)	4.17	1.90 (0.19, 18)	0.600		
First pregnancy	76 (36.5)	2.70	1		1	
Iron supplements						

Yes	139 (62.5)	–	1		1	
No	84 (37.5)	7.90	0.08 (0.02, 0.31)	0.000	0.06 (0.01,1.22)	0.089
Presence of current blood loss						
Yes	31 (14.1)	41.86	5.90 (2.17, 16.2)	0.001	3.40 (1.16, 10.2)	0.026
No	192 (85.9)	2.29	1		1	
Trimester (weeks)						
1	44 (19.7)	–	1		1	
2	70 (31.6)	3.12	2.00 (0.79,12)	0.005	0.14 (0.65, 9.12)	0.070
3	109 (48.7)	14.18	5.00(1.49,17.67)	0.010	4.90 (1.39, 17.6)	0.013
Recent history of abortion						
Yes	65(29)	17.04	9.60 (2.76,33.2)	0.000	7.90 (2.23, 28.1)	0.001
No	158 (71)	4.17	1		1	
History of coffee (the last 3 months)						
Yes	155 (69.7)	8.01	0.12(0.014,0.81)	0.030	0.09 (0.010, 1.84)	0.054
No	68 (30.3)	7.61	1			
Home delivery (previous pregnancy delivery)						
Yes	31 (14.1)	6.97	0.05(0.02,0.13)	0.000	0.26 (0.04, 1.60)	0.145
No	192 (85.9)	8.01	1			

COR, crude odds ratio, CI, confidence interval, AOR, adjusted odds ratio); 1 (referent); − (no)

Table 2: Laboratory finding of the pregnant women attending

Hematocrit value (Hgb value)	Number of cases (%)
Anemic < 33% (< 11 gm/dl)	18 (8.07)
Not-anemic > 33% (> 11 gm/dl)	205 (91.9)
Red blood examination	
Microcytic–hypochromic	12 (62.5)
Normocytic–hypocromic	5 (25)
Macrocytic–hypocromic	3 (12.5)
Stool examination	
Entamoeba histolytica/dispar	18 (8.07)
Giardia lamblia	12 (5.3)
Entamoeba histolytica/dispar and Giardia lamblia	12 (5.3)
No ova or parasite	185 (82.95)

Among 223 study participants, 18 (8.07%) were anemic (Hgb: < 11 g/dl). The general distribution of anemia was 15 (62.5%) microcytic hypochromic, 6 (25.0%) normo- cytic hypochromic and 3 (12.5%) macrocytic hypochromic based on the morphology of red blood

cells. Entamoeba histolytica 18 (8.07%), Giardia lamblia and both Entamoeba histolytica/dispar and Giardia lamblia 12 (5.3%) were among intestinal parasites detected from stool of the pregnant women.

Table 3: Prevalence of anemia

Prevalence of anemia	N%
Mild (10-10.9 g/dl)	12 (66.66)
Moderate (7-9.9 g/dl)	6 (33.34)
Severe (<7 g/dl)	0

The majority of anemic cases 66.66% (12/28) showed mild type of anemia.

Discussion

Anemia is one of the most common nutritional deficiency disorders affecting the pregnant women; the prevalence in developed countries is 14%, in developing countries 51%, and in India, it varies from 65% to 75%. [21,22] Anemia is also an established risk factor for intrauterine growth retardation, leading on to poor neonatal health and perinatal death. [23-25]

The prevalence of anemia in the present study was 8.07%. This was in line with previous studies conducted in Debre Berhan, 9.7% [26], Sudan, 10% [27], Addis Ababa, 11.6% [28] and Iran, 13.6%. [29] In this study, the majority of anemic cases, 66.66% (12/18) were mild type followed by 33.34% (6/18) moderate cases of anemia. A similar provision was reported in Kenya (62.5% and 37.5%) [30] and Nepal (67.1%, and 28.6%) [31] in which majority of the cases was mild anemia followed by moderate anemia respectively. In contrast to this report, study performed in Kenya (70.7% and 26.3%) [32] and southern Ethiopia (60% and 34.3%) [33] majority of the anemia case was moderate followed by mild correspondingly.

Moreover, elevated anemia was found with rural residence and third trimester of gestational age. The pregnant women of rural residence were about 6 times high likely to be anemic than the urban dwellers. The risk of getting anemia was also 4.9 times higher among women in the third trimester of gestational age. This study was parallel with the report in Pakistan [34], India [35], Libya [36], Nepal [37], eastern Ethiopia [38] and northwest Ethiopia. [39] In contrast to this study; as reported in western Nepal [31] and Nigeria [40], the distribution of anemia was higher in second trimester of gestational age.

In this study, anemia among pregnant women was significantly associated with presence of clinical illness. Pregnant women who had clinical illness and intestinal parasitic infection were more likely to be anemic than pregnant women who did not have clinical illness and intestinal parasitic infections. Similar findings were obtained from Nigeria2 and Ethiopia. [41] In the present study, anemia was more prevalent at the third trimester. This might be due the fact that increase in trimester may cause reduction in maternal iron reserves. [42] There was also a statistically significant association between anemia and history of excess menstrual bleeding (usage of more than two sanitary pads within a day during menstruation). These might be due to the fact that increase in number of sanitary pad usage per day reflects increase in the amount of blood flow-one of the predisposing factors for the occurrence of anemia. Undernourished pregnant women who had low BMI<18.5 kg/m2 were more likely to have anemia. This might be due to the fact that anemia is one of the most common nutritional deficiency disorders. Because the study was cross-sectional in design, it did not show which preceded, anemia or risk factors. Additionally, Micronutrient

(serum iron, folate and vit-B12) levels, which might be root causes of anemia, were not assessed.

Conclusion

This study revealed that the prevalence of anemia among pregnant women was relatively low. Rural residence, history of abortion, current blood loss and third trimester gestational age was statistical significant associated factors with anemia in this study. Therefore, further large scale longitudinal studies should be done in respect to the importance of regular visit to maternal care centers and health education promotion programs regarding the cause and prevention of anemia among pregnant women by assessing micronutrients and other causal related factors for anemia.

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