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Prevalence of Anemia among Pregnant Women Attending Antenatal Care in Indore Region

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Abstract
Background: *Anemia is a major public health problem affecting both the developed as well as the developing countries. According to WHO, prevalence of anemia among pregnant women in developed countries is about 14%, whereas it is still as high as 51% in the developing world.*
Objective: *There are very few studies have been published regarding prevalence of anemia in pregnancy in central India hence the present study was undertaken to assess the prevalence and determinant factors of anemia among pregnant women attending antenatal care follow up in M.Y. Hospital, Indore.*
Methods: *In this study, total 530 among pregnant women were selected randomly at antenatal clinic in M. Y. Hospital, Indore from September 2014 to August 2016, including different age group. Blood sample was taken to determine the hemoglobin concentration and haematocrit value. Interviewer administered structured questionnaire was used to assess different socio-demographic characteristics, obstetrics and dietary factors related to Anemia. Simple random sampling technique was used to select study subjects. Data were statistically analyzed and performed at the level of significance of 5%.*
Result: *In present study we found out of 530, eighty two patients who were under the age of 21 in 71% patients severe Anemia was observed in 11% patients whereas moderate Anemia was observed. In the age group of 21-30 years, severe and moderate type of Anemia was observed in 31% and 66.6% subjects respectively.*
Conclusion: *A high prevalence of Anemia was found in Indore region (M.P.) in pregnant women. These finding indicates the necessity of health awareness, early diagnosis and treatment.*
Keywords: *Anemia, Pregnant Women, Indore region.*

Introduction

Anemia is defined as low haemoglobin (Hb) level, or circulating red blood cells (RBC) and it is the most common haematological disorder in pregnant women. Insufficient intake or absorption of iron is linked with increased risks of maternal mortality and morbidity.[1] A high prevalence of Anemia is noted among pregnant women in pregnancy, Anemia has a significant impact on the health of the foetus as well as that of the mother. Foetuses are at risk of preterm deliveries, low birth weights, morbidity and perinatal mortality

due to the impairment of oxygen delivery to placenta and foetus. Thus, routine screening tests for Anemia are recommended in pregnant women. [1,2]

WHO has valued the prevalence of Anemia in pregnant women as 14% in developed and 51% in developing countries and 65-75% in India. About one third of the global population (over 2 billion) is anemic. Prevalence of Anemia in all the groups is higher in India as compared to other developing countries.[3,4] In most developing countries, Anemia in pregnancy makes an important contribution to maternal mortality and morbidity. The diagnosis of Anemia in pregnancy is difficult to establish based on clinical picture alone, yet it is important that treatment be initiated early because of the high mortality. Screening for Anemia in pregnant women has been done in various geographical areas time to time. Very few studies have been published regarding prevalence of Anemia in pregnant women of central India and there is no specific study has been in Indore region. This present study was designed to see the Anemia prevalence in pregnant women in Indore region among attending antenatal care of our institute. The results of this study will help to motivate antenatal care providers towards early detection and management of Anemia in pregnancy.

Material and Method

A cross-sectional study design was conducted at antenatal clinic in M. Y. Hospital, Indore, from September 2014 to August 2016. Source populations were all pregnant women who live in Indore region. A total of 530 pregnant women were enrolled in this study. All the recruited women were explained about the study and written consent was taken from every patient dually signed by her. Ethical approval and clearance was taken from institutional review board of College of Health Sciences, M. Y. Hospital and permission letter for data and sample collection has also been received from the Department of Obstetrics and gynecology.

Sampling

The required sample size for this study was calculated using formula for single population proportion based on the prevalence rate of 62.7% reported from the previous study and using the 95% confidence interval and 5% marginal error. By adding 10% for none response the final sample size will be 530. The study participants were selected based on the inclusion and exclusion criteria by using simple random sampling method. Exclusion criteria were pregnant women who were severely sick due to other medical conditions and elderly (>60yr).

Inclusion criteria

In this study, pregnant mothers who were residents of Indore region, not recently transfused, who had no chronic medical diseases, no diagnosed haemoglobinopathies, and who had no early bleeding or antepartum hemorrhage were included.

Data collection

A structured and interviewer administered questionnaire was used to collect data on the socio-demographic variables, dietary habit, and obstetric factors. The questionnaire of this study was developed from the Demographic and Health Survey guide lines which essentially contains the same information of the WHO guide lines. Data was collected by midwives of the hospital. Venous blood was collected to determine Hb concentration after an informed consent is obtained from the study subjects. The samples were collected in an ethylenediaminetetra acetic acid (EDTA) vaccutte and plain vaccutte by the technician and sent along with the requisition form to the pathology lab. The study recorded the Hb, Red cell indices, Peripheral blood smear examination and used these parameters to classify Anemia morphologically.

Data Analysis

The data obtained from the study was statistically analyzed with the aid of SPSS-20 package. The level of significance in the research work was P≤ 0.01 or P≤0.05.

Results

Prevalence and severity of Anemia

Socio-demographic characteristics of study subjects total of 530 informed and consented pregnant women who came for their antenatal follow up were enrolled in this study and all were Indore region. The mean age of the attendants was 28.8 years old (range from 18-45). Majority of the study groups were in the age range of 21-30 years. Many of the respondents were married 519 (98%).

Four hundred twenty nine (81%) of the respondents were housewife and 85 (16%) were merchants. Forty three percent of the respondents had educational status of 9-12 grade and 137 (26%) had diploma/degree and 112 (21)had educational status of 1-8 grade. Two hundred sixteen(41) of the respondents did not know their income and 183(34.5%) had an average income. Three hundred eighty two (72%) respondents had family size of greater than four (Table 1)

Table 1: Socio demographic characteristics of pregnant women attending at antenatal clinic in M. Y. Hospital, Indore from September 2014 to August 2016

Variables		Number	Percent (%)
Age Groups	<21 year	82	15.5
	21-30 year	415	78.3
	>30 year	33	6.2
Religion	Hindu	190	36
	Muslim	270	51
	Other	70	13
Marital status	Married	519	98
	Single	3	0.6
	Divorced	6	1
	Widowed	2	0.4
occupation	House wife	429	81
	Civil servant	14	2.6
	Merchant	85	16
	Others	2	0.4
Education status	Illiterate	18	3.4
	Read and write	35	6.6
	1-8 grade	112	21
	9-12 grade	228	43
	Diploma/degree	137	26
Income	< = 60000 per year	183	34.5
	> 60000 per year	72	13.5
	< = 120000 per year	34	6.4
	> 120000 per year	25	4.6
	I don't know	216	41
Family size	<=4	382	72
	> 4	148	28

Anemia and socio-demographic characteristics

Out of 82 patients who were under the age of 21 in 71% patients severe Anemia was observed in11%patients whereas moderate Anemia was observed. In the age group of 21-30 years, severe and moderate type of Anemia was observed in

31% and 66.6% subjects respectively. Out of 6 divorced pregnant women 5 were severe anemia and one was moderate Anemia. Sixty six percent (66%) and 45.9% of anemic pregnant women were illiterate and had family size of greater than four respectively. (Table 2)

Table 2: Anemia and socio-demographic characteristics among pregnant women

Variables		Severe Anemia	Moderate Anemia	No Anemia	Total
Age Groups	<21 year	58 (71 %)	9 (11%)	15 (18 %)	82
	21-30 year	129(31%)	276(66.6%)	10(2.4%)	415
	>30 year	10(30.3%)	21(63.6%)	02(6.1%)	33
Religion	Hindu	97(51%)	72(38%)	21(11%)	190
	Muslim	116(43%)	134(49.6%)	20(7.4%)	270
	Other	50(71.5%)	15(21.4%)	05(7.1%)	70
Marital status	Married	90(17.3%)	357(68.7%)	72(14 %)	519
	Single	3(100%)	0(0%)	0(0%)	3
	Divorced	5(83.3%)	1(16.7%)	0(0%)	6
	Widowed	2(100%)	0(0%)	0(0%)	2
occupation	House wife	288(67.1%)	115(26.9%)	26(6.0%)	429
	Civil servant	4(28.5%)	10(71.5%)	0(0%)	14
	Merchant	70(82.5%)	15(17.5%)	0(0%)	85
	Others	2(100%)	0(0%)	0(0%)	2
Education status	Illiterate	12(66.6%)	4(22.2%)	2(11.2%)	18
	Read and write	30(85.7%)	5(14.2%)	0(0%)	35
	1-8 grade	65(58%)	44(39.2%)	3(2.8%)	112
	9-12 grade	46(20.1%)	174(76.3%)	8(3.6%)	228
	Diploma/degree	37(27%)	90(65.8%)	10(7.2%)	137
Income	< = 60000 per year	100(54.6%)	83(45.4%)	0(0%)	183
	> 60000 per year	27(37.5%)	36(50%)	09(12.5%)	72
	< = 120000 per year	11(32.3%)	17(50%)	06(17.7%)	34
	> 120000 per year	12(48%)	13(52%)	0(0%)	25
	I don't know	87(40.2%)	108(50%)	21(9.8%)	216
Family size	<=4	175(45.9%)	191(50%)	16(4.1%)	382
	> 4	67(45.2%)	74(50%)	07(4.8%)	148

Association of various types of Anemia

An association was also drawn between the various types of Anemia on the peripheral smear and the absolute values. It was observed that the packed cell volume was the lowest in patients with macrocytic RBCs and the highest in dimorphic RBCs. The RBC was count was the lowest in patients having macrocytic RBCs. The difference in total RBC count was statistically significant. Serum iron and % TFR saturation was lowest in moderate Anemia group. The difference in mean serum iron and %TFR in different groups was statistically significant (P<0.0001). The difference in mean TIBC was also statistically significant across the groups.

Serum vitamin B12 was measured in macrocytic cases to rule out Vitamin B12 deficiency, we found all cases were Vitamin B12 deficiency in 21 cases. Folic acid deficiency was observed in observed in 16 cases having macrocytic RBC type.

Table 3: Association ofvarious types of Anemia on the peripheral smear and the absolute values

	<7gm%	7-9.9 gm%	10-10.9 gm%	≥11 gm%	P value
AV. RBC	2.5±0.85	4.0±0.93	4.07±0.82	4.11±0.94	<0.0001
AV. PCV %	18.39±3.55	29.15±5.43	33.58±3.7	39.76±5.6	<0.0001
AV.MCV	79.13±20.7	75.85±14.17	83.61±12.28	87.98±7.81	<0.0001
AV.MCH	27.90±115.0	23.57±6.72	26.06±5.35	27.03±3.3	<0.0001
AV. MCHC	30.05±6.2	30.58±3.8	31.38±3.02	30.68±2.28	0.095
Serum Iron	54.05±26.54	49.15±25.6	75.56±70.59	65.41±24.5	<0.0001
TIBC	413.38±143.66	449.50±137.31	389.94±145.83	312.59±104.37	<0.0001
%TFRs	16.32±11.94	12.82±8.6	20.16±13.01	21.74±8.67	<0.0001

Discussion

Anemia is defined as Hb concentration of less than 12 gm% in female and mild Anemia was defined as Hb ranging from 10-11.9 gm/dl in adult females. Moderate Anemia was define as Hb level of 7-9.9 gm/dl and severe Anemia was defined as Hb level of less than 7 gm/dl for all the age group.[5] The present study was done to estimate the prevalence of Anemia, which is one of the common hematological problems among the pregnant women of developing countries. *Muttaya et al* [6] in their study shows a low prevalence (13.6%) in school children in Bangalore which they associated with school based intervention program like deworming, where as another study shows a prevalence (56.5%) in school children in uttarakhand.[7] Various studies on different study group have demonstrated that a high prevalence of Anemia is common feature in almost all parts of India.[3] However no study found that asses prevalence of Anemia among pregnant women in Indore region. In present study we found out of 530 eighty two patients who were under the age of 21 in 71% patients severe Anemia was observed in 11% patients whereas moderate Anemia was observed. In the age group of 21-30 years, severe and moderate type of Anemia was observed in 31% and 66.6% subjects respectively. A study from Bihar in 2009 showed prevalence of Anemia in general population to be 43.21% in which maximum cases belonged to 0-20 year of age group (47.11%).[8] A survey of 10.5-18 year old adolescent girls shows Anemia prevalence rate of 63.15% amongst girls in school & 96.5 % amongst girls that are not in school (Gwarikar 2006) [9]. As pregnant females were not included in the study in order to reduce the bias arising due to Anemia of pregnancy, there was no rise in the prevalence of Anemia in female in reproductive age group. M:F ratio in reproductive age group is more due to menstrual losses, deliveries, abortions and is compounded by the poor diet available to females in many low socioeconomic settings.

Based on Clinical history, Physical examination , Red cell count, Red cell indices, Red Cell distribution width, Peripheral blood smear examination, Reticulocyte count and by other hematological parameters taken by automated cell counter, Anemia's were classified into Microcytic Hypochromic (24.74), Normocytic Normochromic (12.64%) and Macrocytic types(7.50%) *Verma Metal*[10] reported 55.4% Microcytic Hypochromic type, 37.5% Normocytic Normochromic type and 1.7% Dimorphic type of Anemia whereas *kumari et all*[8] reported Microcytic Hypochromic (53.3%), Normocytic Normochromic (35.8%) and Macrocytic types (10.8%). Such morphological typing of Anemia allows an estimate of the prevalent etiology in the absence of confirmatory tests in screening studies. The etiology can be derived from those parameters which need further confirmation by more specific tests like Iron studies, Vitamin-B 12/Folate levels or Electrophoresis e.g. to detect Iron deficiency Anemia, Thalassemia syndromes Anemia of chronic disorders, Megaloblastic Anemia etc.

Severe Anemia was seen in 33/1645(2%) cases in our study. Bentley and Griffith [11] found 2.2% cases of severe Anemia in their study. *Sharma* et al [12] and *Toteja* et al [13] found severe Anemia in 5.3% and 13.1% respectively. This slightly higher percentage could be attributable to the fact that they had all pregnant females in their study.

Screening also gives evidence for Thalassemia minor which can later be confirmed by Electrophoresis. In our study, many cases showed indices suggestive of Thalassemia minor. Such diagnosis made while screening can prevent Thalassemia major in offspring's which causes great economic and emotional burden to the family and to the society in the form of usage of Medical resources which can be prevented by timely intervention. Thus the finding of higher prevalence of Anemia among the pregnant woman of Indore region shows that the population needs health awareness, early diagnosis and treatment so that the grave complications of Anemia can be prevented. *Kumari S* [14] conducted studies on

scheduled caste preschool children in Bihar and found that socioeconomic environment is responsible for poor nutritional status. *Friedman* and *Somani* [15] have studied health conditions in tribal villages in South Bihar and concluded that disease prevalence and mortality rates are significantly higher here and the main obstacles are lack of health awareness and education. Therefore the interventions for Anemia should be directed on the community as a whole.

Conclusion

The overall prevalence of Anemia in this study using a cut off level of haemoglobin<11 g/dl (<33% haematocrit) was 66.6% and the majority of them were of the mild type (Hb: 10-10.9 g/dl). The present study has shown a statistically significant association between Anemia and age, family size, educational status (illiterates) and Anemia of all types were more prevalent in the age group 21-30 years. There was the close correlation of PCV, tRBC counts and absolute values with both, the severity and the type of Anemia. The PCV and tRBC count was a valuable diagnostic index in severe Anemia. Severe Anemia was mainly caused due to low RBC count whereas moderate type of Anemia is mainly caused by iron deficiency. Serum iron and total iron binding capacity are valuable indices for diagnosing the cause of Anemia and for detecting latent cases of iron deficiency Anemia which may reveal them with the progression of pregnancy. Folic acid deficiency was also observed in observed in having macrocytic RBC type. This emphasizes the need for continuing strengthening of interventions on factors associated with Anemia. A high prevalence of Anemia was found in Indore region (M.P.) in pregnant women. These finding indicates the necessity of health awareness, early diagnosis and treatment.

Conflict of Interests

There was no conflict of interests with respect to all authors.

References

1. Noran M. and Mohammed M. The impact of maternal iron deficiency and iron deficiency Anemia on child's health Saudi. Med J. 2015; 36(2):146-149.
2. Shill KB, Karmakar P, Kibria G, Das A, Rahman MA, Hossain MS, et al. Prevalence of iron-deficiency Anemia among university students in Noakhali region, Bangladesh. J Health PopulNutr. 2014; 32:103-110.
3. P. Thankachan, S. Muthayya, T. Walczyk, A. V. Kurpad, and R. F. Hurrell. An analysis of the etiology of Anemia and iron deficiency in young women of low socioeconomic status in Bangalore, India. Food and Nutrition Bulletin.2007; 28(3): 328-336.
4. K. Kalaivani. Prevalence & consequences of Anemia in pregnancy. Indian J. of Medi. Rese.2009; 130(5): 627-633.
5. WHO. The global Anemia prevalence in 2011. Geneva: World Health Organization; 2015.
6. Muthayya S., Thankachan P., Zimmermann M. B., et al. Low anemia prevalence in school-aged children in Bangalore, South India: possible effect of school health initiatives. Euro. J of Clini. Nutri. 2007;61(7):865-869
7. Jain N and Jain V M. Prevalence of anemia in school children. Indian MediPracti and Revi.2012; 3(1):1-4.
8. Kumari S, Choudhary AK, Negi G. Prevalence of anemia among the general population of Bihar, India. Ind Med Gaz. 2009; 11:418-21.
9. GawarikaR, GawarikaS, Mishra A.K. Prevalence of Anemia in Adolescent Girls

Belonging to Different Economic Group.Indian J of Comm. Medi.2006; 31 (4): 287-288.

10. Verma M, Chhatwal J, Kaur G. Prevalence of anemia among urban school children of Punjab. Indian Pediatr 1998; 35: 1181-1186.

11. Bentley ME, Griffiths PL. The burden of anemia among women in India. Eur J ClinNutr. 2003; 57(1):52-60.

12. Sharma JB, Soni D, Murthy NS, MalhotraM.Malhotra M.Effect of dietary habits on prevalence of anemia in pregnant women of Delhi. J ObstetGynaecol Res. 2003;29(2):73-8.

13. Toteja G.S., Singh P., Dhillon B.S., Saxena B.N. , Ahmed F.U., Singh R.P. et al.-Prevalence of anemia among pregnant women and adolescent girls in sixteen districts of India. Food Nutr Bull. 2006;27(4):311-5.

14. Kumari S. Nutritional status of scheduled caste pre-school children. Indian J Pub Health. 2005;49(4):258-259

15. Friedman MS, Somani J.Health conditions in the tribal villages of South Bihar: an epidemiologic survey.J Assoc Physicians India. 2002;50:1376-80.