

Prevalence of anemia in pregnant women at booking visit in India

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Abstract

Introduction: Based on the WHO stratification, anemia, in India is taken as a disease of severe public health importance. Anemia combines with hypertension and sepsis forming the deadly triad, leading up to 80% of maternal deaths in India. Knowledge of the prevalence and some sociodemographic factors associated with anemia, as the present study has done, will help to formulate strategies for this public health problem of medium importance.

Material and Methods: An observational study done in the Christian Medical College and Hospital, recruited 600 consecutive, eligible, pregnant women at their first antenatal visit after informed consent. Blood sample was taken for hemoglobin estimation, socio demographic and obstetric risk factors were collected. The prevalence of anemia in pregnant women at the booking visit was calculated and this was correlated with risk factors for its occurrence.

Results: Overall prevalence of anemia was 23.16% (95% CI: 20%-27%) with mean (SD) hemoglobin level of 11.7 (1.9). Working women had 2.64 (95% CI: 1.05 – 6.73, p= 0.04), women who booked in the second trimester had 3.84 (95% CI: 2.06 – 7.17) and women who had fewer (<=2) antenatal visits, had 3.28 (95% CI: 1.73 – 6.22, p<0.001) higher odds of presenting with anemia.

Conclusion: Prevalence of anemia at booking visit was 23.16%. Working women, women who booked during the second trimester and those who had fewer visits were at significant risk for presenting with anemia.

Keywords: Anemia prevalence, Tertiary hospital, Booking visit trimester, Working women, Gestation, Antenatal Checkup

Manuscript Received: 6th February, 2017

Manuscript Accept: 27th April, 2017

Introduction

The World Health Organization (WHO) has estimated the prevalence of anaemia (<11gm/dl) in pregnant women as 14% in the developed and 51% in developing countries.^(1,2) The Indian Council of Medical Research (ICMR) surveys showed over 70% pregnant women and adolescent girls in India to be anaemic, despite the availability of effective, low-cost interventions for prevention and treatment of the same.⁽³⁾

Based on the WHO stratification, anemia is taken as a disease of low public health importance when the prevalence is less than 20%, of medium public health importance, when it is between 20% to 39.9% and severe when the prevalence is 40% and more in the population. Anemia combines with hypertension and sepsis forming the deadly triad, leading up to 80% of maternal deaths in India.^(4,5) Knowledge of the prevalence and some sociodemographic factors associated with anemia, as the present study has done, will help to formulate strategies for this public health problem of medium importance.

Operational definitions

Booking visit: The first antenatal visit during the ongoing pregnancy.

Anemia in pregnancy: Based on the W.H.O. definition, Hemoglobin (Hb) < 11 Gms /dl.

Mild Anemia: Hb between 10 -10.9 gm/dl

Moderate Anemia: Hb between 7.0 -10.0 gm/dl

Severe Anemia: Hb< 7gm/dl

Trimesters of pregnancy: First trimester, between 1 and 12 weeks of gestation, Second trimester, between 13 and 28 weeks and third, from 29 weeks until delivery.

Private appointment: Antenatal appointment with a Specialist, costlier than a General appointment.

General appointment: Appointment with a doctor, not a specialist, less expensive.

Materials and Method

This observational study was carried out in the Christian Medical College and Hospital, a tertiary level, private, teaching hospital with about 15,000 deliveries a year and caters to patients mostly from Tamil Nadu, in South India. The sample size was calculated from a reported wide range of prevalence from 33% to 89%. Taking a worse case prevalence of 33%, with the precision of 5%, 4% and 10% of 33% (3.3%), with 95% CI, the sample size estimated ranged from 340 to 780 women and 600 pregnant women were recruited for the study. The primary outcome studied was the prevalence of anemia at booking visit. Sociodemographic factors that could affect the prevalence of anemia like age, parity, economic status, diet preferences (vegan or not), iron and folic acid supplementation, presence of chronic illnesses, footwear usage, occupation and education were assessed and correlated. After informed consent,

all eligible women had sociodemographic data, obstetric details and 2 ml of peripheral venous blood collected for Hb. Hb estimation was performed in the Laboratory using photocaloric method with Siemens machine. The only exclusion criteria was the presence of known pathological anemia in the pregnant woman. The aim of the study was to find out the prevalence of anemia in pregnant women at the booking visit and correlate with risk factors for its occurrence.

Statistical Analysis: The association between risk variables and prevalence of anemia were tested using Chi-square test with Yates correction. The variables which were significant at $p < 0.25$, were considered for multivariate logistic regression analysis. Results were presented with OR and 95% CI. SPSS 18.0 software was used to analyze data.

Results

The distribution of risk variables for anemia in pregnancy and the results of multivariate analysis are presented in Table 1. Overall prevalence of anemia at the booking visit was 23.16% (95% CI: 20% - 27%) with mean (SD) of hemoglobin level 11.7 (1.9).

Working women had higher odds 2.64 (95% CI: 1.05 – 6.73, $p < 0.04$). Women who booked in the second trimester had 3.84 (95% CI: 2.06 – 7.17) and women who had fewer (≤ 2) antenatal visits, had (OR= 3.28, 95% CI: 1.73 – 6.22, $p < 0.001$) higher odds of presenting with anemia. The majority of women were moderately anemic 79(31.2%) and mild anemia was found in 76(30%) of the women. Severe anemia was present in only 1 woman.

Table 1: Risk factor analysis

Variables	Bivariate				P value	Multivariate		
	Hemoglobin					OR	95% CI	P value
	No Anemia		Anemia					
	n	%	n	%				
Age:								
≤ 20	37	74.0	13	26.0	0.60			
> 20	424	77.1	126	22.9				
Area:					0.63			
Rural	247	76.0	78	24.0				
Urban	214	77.8	61	22.2				
Religion:					0.98			
Hindu	368	77.0	110	23.0				
Christian	33	76.7	10	23.3				
Muslim	60	75.9	19	24.1				
Occupation:					0.04	1.00 2.65	1.05 – 6.73	0.04
Housewife	415	78.2	116	21.8				
Working	46	66.7	23	33.3				
Education:					0.15	1.20 1.00	0.57 – 2.54	0.63
Primary/High School	194	74.0	68	26.0				
College/Above	267	79.0	71	21.0				
Income:					0.20	1.00 1.39 1.58	0.64 – 3.03 0.62 – 4.04	0.41 0.34
> 16000	171	80.7	41	19.3				
8000 -16000	174	76.0	55	24.0				
≤ 8000	116	73.0	43	27.0				
Chart:					0.84			
Private	163	76.2	51	23.8				
General	298	77.2	88	22.8				
Family:					0.48			
Nuclear	175	78.5	48	21.5				
Joint	286	75.9	91	24.1				
Diet:					0.65			
Vegetarian	50	74.6	17	25.4				
Non vegetarian	411	77.1	122	22.9				
BMI:					0.94			
Underweight (18.4)	45	75.0	15	25.0				
Normal (18.5 - 24.9)	219	76.6	67	23.4				
Overweight(25-29.9)	146	76.8	44	23.2				
Obese(≥ 30)	51	79.7	13	20.3				
Ante Natal Checkup:	48	60.0	32	40.0	0.001			

<=2 >2	139	80.3	34	19.7		3.28 1.00	1.73 – 6.22	<0.001
Gestation: I and III II	336 125	81.8 66.1	75 64	18.2 33.9	<0.001	1.00 3.84	2.06 – 7.17	<0.001
Score: Primi Multi	238 223	76.5 77.2	73 66	23.5 22.8	0.92			
Iron Folic acid: Yes No	199 88	73.7 77.9	71 25	26.3 22.1	0.44			
Worm P/R: Yes No	7 454	70.0 76.9	3 136	30.0 23.1	0.70			
Foot wear inside: Yes No	66 395	79.5 76.4	17 122	20.5 23.6	0.58			
Footwear Outside: Yes No	454 7	76.8 77.8	137 2	23.2 22.2	1.00			
Bleeding P/R: Yes No	14 447	73.7 76.9	5 134	26.3 23.1	0.78			
Bleeding Gums: Yes No	44 417	74.6 77.1	15 124	25.4 22.9	0.63			
Menorrhagia: Yes No	2 459	50.0 77.0	2 137	50.0 23.0	0.23			
Chronic Diseases: Malaria Tuberculosis Others	1 4 6	50.0 80.0 66.7	1 1 3	50.0 20.0 33.3	0.67			
Childhood: Anemia Jaundice	4 5	57.1 62.5	3 3	42.9 37.5	1.00			

Demographics

The mean (SD) age of the women was 26(4.2) years. Of the teenaged pregnant women (<20years), 13(26%) were anaemic, as compared to 126(22.9%) women who were >20 years of age. Approximately 78 (24%) rural and 61(22.18%) the urban area of women were found to be anemic. Most of the recruited women 478(79.67%) were Hindus, 79(13.17%) were Muslims and 43(7.17%) were Christians and anemia was prevalent equally among them (23% - 24%).

Out of a total of 214 women registered for a Private Consultation, 51(23.8%) were anemic, and it was almost similar to 386 women who registered with a General appointment, among whom 88(22.8%) were anemic. Similarly, when family structure was considered, 48(21.5%) women in a nuclear family were found to be anemic, which was almost similar to

91(24.1%) in a joint family. There were a total of 67 women who were purely vegan in their diet and 17(25.4%) of them were anaemic. This was not too different from the 122(22.9%) of the 411 women who consumed non vegan diet, who were anaemic as well.

The prevalence of anemia was highest in women with underweight BMI was 25% (95% CI: 16%-37%). There was no statistically significant difference in the prevalence of anaemia among those who had iron and folic acid supplementation 71(26.3%) during pregnancy and those who did not 25(22.1%). The anemia status of both groups (primigravidae and multigravidae) of mothers was similar, around 23%.

With the idea that non use of footwear outdoors could relate to the increased prevalence of anemia, especially in the rural areas, it was found that 454(76.8%) were using foot wear outdoors regularly.

The prevalence of anemia was similar about 23% in both categories. Only 10(1.67%) women had reported intestinal parasites. Other etiological factors like a positive history of bleeding per rectum, bleeding from gums, history of menorrhagia six months prior to conception comprised only less than 10% of the study population. Chronic illnesses like tuberculosis or malaria contributing to anemia comprised less than 3%.

When comparing those women who had Primary and High school education with those who had College education, 68 (26%) and 71 (21%) were anemic respectively. When comparing 3 groups of women whose monthly household income was >16,000 INR, 8000 -16000 INR and <8000 INR, the prevalence of anemia was 19%, 24% and 27% respectively.

Discussion

In the study by Cheema et. al.⁽⁶⁾ and other studies, a high prevalence of anaemia, 65.6% was observed in pregnant women in India. Although anemia is reportedly prevalent in high percentage in India (a developing country), in the present study, the overall prevalence was only 23% and mild and moderate anemia were observed only in 31.2% and 30% respectively, which was similar to studies from Uganda and Ethiopia.^(7,8) The population studied may not represent the vast majority of the population of India, since the study was carried out in a Private Hospital, where women had to pay for their treatment, thus precluding the really non affordable women.

Teenage pregnancy, women from rural areas and those from joint families are considered at high risk for anaemia.^(6,9) In the present study, none of the above variables had any effect on the prevalence of anaemia.

The lower prevalence could be the result of the implementation of the Indian Government's various policies for prevention and treatment of anaemia, from 1972 onwards, namely through the "The National Anaemia Prophylaxis Programme (NAPP)", National Anaemia Control Programme (NACP) and Tenth Plan strategy for combating anaemia in pregnant women.^(5,10-11)

In the study by Siddalingappa et. al.⁽⁹⁾ the prevalence of anemia was high with early age at marriage, lower educational level, mothers living in nuclear families, lower socio economic status (SES), history of menstrual problems, consumed less than 100 Iron and Folic acid (IFA) tablets and multi-parity. In the present study, there were no differences found with relation to any of the above risk factors.

Hindus who were generally vegans with inadequate dietary iron, low B12 intake and poor bioavailability of dietary iron from the fibre, phytate rich Indian diets were considered as high risk for anaemia.⁽²⁾ On the contrary, in the present study, this was not found to be so, probably as vegan dietary habits have changed with modern times and have become not so strictly vegan any more.

Women who took Private appointments (payed extra) to consult senior Obstetricians, hence considered wealthier than those who took a general appointment had similar prevalence of anemia, unlike data from the District level Health Survey (DLHS) that showed that prevalence of moderate and severe anaemia was high even among educated and higher income groups.⁽⁴⁾

In the studies by Tippawan, underweight women had a significantly higher prevalence of maternal anaemia, LBW, and preterm birth Andin the study by Peter et al, overweight and obese women had a lower prevalence of anaemia^(12,13) but there were no differences based on the BMI in the present study.

Unlike a recent study by Taner et. al.⁽¹⁴⁾ and Alsammani et. al.,⁽¹⁵⁾ where parity >3, illiteracy, primary educational level, household monthly income per person <250 Turkish liras and duration of iron supplementation <3 months and 3-6 months, were independently associated with anemia,⁽¹⁴⁾ the present study showed no significant differences when the above variables were considered except the number of antenatal visits which showed a higher prevalence of anaemia with fewer visits, number of antenatal visits <5 (OR=1.45, 95% CI=10.5-2.11) and 5-10 (OR=1.3, 95% CI=1.03-2.09).

Moreover, higher prevalence of anaemia was observed in the last trimester of pregnancy (81.4%) in the above 2 studies as also the studies by Siddalingappa et. al.⁽⁹⁾ and Cheema et. al.⁽⁶⁾ where the last trimester had higher prevalence (62%) of anemia. This was in contrast to the present study where those women who booked in the second trimester were significantly more anaemic 64(33.9%) than those who booked during the first and third trimesters 75(18.2%), $p < 0.001$. Women booking in the second trimester having a significantly higher prevalence of anemia could be explained by the fact that the first trimester with its attendant nausea and vomiting of pregnancy could have got corrected with iron and folate supplementation and better gastrointestinal tolerance.

Housewives constituted 88.5% and working women 11.5% and working mothers had 1.99 times higher chance of presenting with anemia than the housewives. These results were different from those reported by Idowu et. al.,⁽¹⁶⁾ where unemployed women had (89%) higher prevalence of anemia than those in civil service(63.8%) where women, who were currently employed, were more mildly anemic (42.5%) than the women who are not employed (40.2%)⁽¹⁷⁾ and those where the prevalence of anemia was similar (around 9%) in both employed and unemployed pregnant women.⁽¹⁸⁾

Conclusion

The overall prevalence of anaemia at the booking visit in this tertiary level Hospital was 23% and was found to be lower than that of most studies reported in India. The second trimester of pregnancy reported

higher prevalence of anemia and working women had a significant risk of presenting with anemia.

Acknowledgements

All the contributions by the authors to the research work were voluntary and not funded by any organization.

Competing interest

The authors declare that they have no competing interests.

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