Original Research Article

Prevalence of Anaemia and Its Determinants in Rural and Tribal Pregnant Women in India: A Cross Sectional Study

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Abstract

Introduction: Anemia is a worldwide public health problem mainly affecting developing countries. Anemia in pregnancy can have serious consequences on social, health and economic development. The etiology of anemia is multifactorial in pregnancy. Many cases of anemia are easily preventable and treatable if detected on time. The aim of the present study was to estimate the prevalence of anaemia and its determinant factors like socio demographic factors, obstetrical and dietary factors in the pregnant women from rural and tribal area.

Methods: This was a cross sectional analytical study conducted at Pacific Medical College and Hospital, Udaipur, Rajasthan from January 2022 to April 2023. Total 398 pregnant women from rural and tribal area were included in the study. Data collection was done using pre tested interviewer administered structured questionnaire. The primary outcome of the study was to estimate the prevalence of anaemia in rural and tribal pregnant women. Secondary outcome measures were to find the association of potential determinants of anaemia.

Results: The prevalence of anaemia was found to be 72% ($n = 398$). Mild anaemia (Haemoglobin = 10-11.9 gm%) was found to be 55%. While moderate anaemia (Hb 7-9.9 gm%) and severe anaemia (< 7 gm%) was found in 25% and 20% respectively. The mean haemoglobin of the study group was 7.7(2.6) gm/dL. The results of bivariate analyses showed that anemia was significantly associated with socio demographic parameters like lower socio-economic status and lower education level. This study revealed that multigravida status (OR 2.20, 95% CI (1.4051 to 3.4497) and inappropriate birth interval OR 41.42, 95% CI (22.505 to 76.239) were the independent predictors of anaemia among pregnant women.

Conclusion: The study confirmed that anemia in women of reproductive age group is a major health problem. The findings revealed increased prevalence of anemia in rural and tribal pregnant women. There are various sociodemographic, obstetrical, and dietary factors associated with prevalence of anaemia.

Keywords: Anaemia, Pregnant women, rural and tribal.

Introduction

Anemia is a condition where oxygen carrying capacity of Red Blood Cells to the tissues decreases. Anemia is a worldwide public health problem mainly affecting developing countries. Globally, anemia affects 500 million women of reproductive age. As per World health organization (WHO)Anemia is defined as hemoglobin less than 11 gm/dL at any time during pregnancy [1]. Anemia affects all stages of life cycle [2,3], but it is more common in children under the age of five and pregnant women [4].

Anemia in pregnancy is a serious health issue globally as it leads to significant morbidity and mortality. Pregnant women with anemia can have premature births, abortions, fetal growth restriction, post-partum hemorrhages, low birth weight babies and cognitive impairment in children [5-7]. Anemia in pregnancy can have serious consequences on social, health and economic development [8,9].

Anemia is a major health problem in India. As per National family health Survey (NFHS)-4, the overall prevalence of anaemia is consistently high, at more than 50%, in almost all the subgroups of women. According to NFHS-4, prevalence of anaemia differs according to maternity status—58 % lactating women are anaemic, compared with 50 % pregnant women who are anaemia and 52 % of women who are neither pregnant nor breastfeeding. Anaemia prevalence has not changed much in the 10 years between NFHS-3 and NFHS-4, decreasing from 55 % in 2005-06 to 53 % in 2015-16 among women [10].

The etiology of anemia is multifactorial in pregnancy. Anemia can occur due to physiological causes, nutrient deficiency, parasitic infections, and preexisting anemia [11,12]. There are many other contributing factors for anemia like gravidity, parity, maternal age, birth spacing, level of education marital age, gestational age [13-16]. Many cases of anemia are easily preventable and treatable if detected on time.

There is relatively scarce data on prevalence and associate factors in rural and tribal pregnant women. Identification of maternal anemia and its determinant factors will really help in ensuring good maternal and neonatal outcome. Hence, this study was conducted to know the prevalence of anemia and its determinant factors in rural pregnant women attending antenatal clinic at Pacific medical College and Hospital, Udaipur.

Material and Methods

Institute based analytical cross-sectional study was conducted in antenatal clinic (ANC) of Department of Obstetrics and Gynaecology at Pacific Medical College and Hospital, Udaipur, Rajasthan from January 2022 to April 2023. Pacific Medical College and hospital is a tertiary care hospital and Department of Obstetrics and Gynaecology provides cost effective care to women from nearby rural and tribal area of Udaipur, Dungarpur and Banswara districts of Rajasthan.

All pregnant women from rural and tribal area attending the ANC in Pacific Medical College and Hospital were eligible for the study. Exclusion criteria included pregnant women who were recently transfused blood, who received therapy for anaemia, women with antepartum haemorrhage, and coexisting severe illness. Institute ethics committee approval was taken before start of the study. Informed consent was taken from participants, and they were also ensured about confidentiality of data and their right to withdraw from study at any point.

To estimate the prevalence of anaemia among pregnant women of the study area,

sample size was calculated using single proportion formula by considering the following assumptions: prevalence of anaemia 45%, 95% level of confidence, 5% margin of error. Thus, the sample size of 360 was obtained; considering a 10% non-response rate, the final sample size for this study was approximately 400. All the pregnant women from study area were enrolled consecutively during study period.

Data collection was done using pre-tested interviewer-administered structured questionnaire. The data collection tool was prepared in Hindi and Mewari (regional language). The questionnaire was divided in three parts: first part dealt with socio demographic factors, second part with obstetric history and third part included details about environmental and dietary history. Two clinical nurses participated as data collectors and author herself was involved as supervisor. Three days training was given to data collectors regarding the objective of the study and technique of interview. The questionnaire was pretested in sample of 20 women and modified accordingly.

As per departmental policy and WHO guidelines, all pregnant women attending ANC undergo Hb estimation at first ANC visit. Anaemia was categorized in mild, moderate and severe anaemia as per WHO classification for pregnant women. Participants who had haemoglobin (Hb) concentrations of 9.0 to 10.9 g/dL were classified as mild anaemia, moderate anaemia as Hb concentrations of 7.0 to 8.9 g/dL, and participants with Hb concentrations < 7.0 g/dL (1) were classified as severe anaemia. The modified Kuppuswamy scale was used to determine the socio-economic status of participants.

The primary outcome of the study was to estimate the prevalence of anaemia in rural and tribal pregnant women. Secondary outcome measures were to find the association of potential determinants of anaemia.

Data quality was checked for consistency, completeness and accuracy. Data were analysed by using Statistical Package for Social Sciences (SPSS) version 22.0, (IBM Corp). Descriptive statistics were calculated: frequency and percentage for categorical variable and mean and standard deviation for continuous data. We used univariate analysis to determine the prevalence of anaemia. Bivariate and multivariate regression tests were done to measure the strength of association between dependent and independent variables. To determine the strength of association, the Odds ratio (Chi square test) was estimated. A p value<0.05 was considered as significant.

Results

The study population included 410 subjects with response rate of 97%; 12 participants did not give consent at the time of blood collection. Table 1 outlines the socio-demographic parameters of the participants. The mean age (SD) of the participants was 26 (8) years with age ranging from 17 years to 43 years.

The participants were grouped in different socio-economic classes according to the modified Kuppuswamy scale. Almost 40% of women did not have any formal education while 33% women had secondary level and above education. 75% women belonged to lower socio-economic status. Majority of the women were housewives. 35% women were primigravida. At the time of interview, 70% participants were in their 2nd trimester while 30% in 3rd trimester. 26% participants started ANC care in their first trimester while 50% participants started ANC care in second trimester.

70% of the participants were vegetarian diets. 90% participants were taking diet deficit in calories and protein as per requirement. History of pica was present in 10% of

women. 90% women did not mention about
any alcohol intake.

Table 1: Socio-economic parameters of the study participants (n=398)

Variable	Category	n (%)
Age	<18	60 (15%)
	18-35	234 (59%)
	>35	104 (26%)
Educational status	No formal education	159 (40%)
	Primary	107(27%)
	Secondary	68 (17%)
	Diploma and above	64 (16%)
Occupation	Housewife	230 (58%)
	Unskilled	56 (14%)
	Semi-skilled	103(26%)
	Small business owner	9 (2%)
Socio-economic status	Lower	214 (54%)
	Upper lower	84 (21%)
	Lower middle	48 (12%)
	Upper middle	31(8%)
	Upper	21(5%)
History of heavy menstrual cycle	Yes	123 (31%)
	No	275(69%)
Gravida	Primi	139 (35%)
	Multi	259(65%)
Birth spacing	First pregnancy	139(35%)
	<1 year	68(17%)
	1-2 year	95(24%)
	2-3 year	47(12%)
	> 3 years	49(12%)

The prevalence of anemia was 72%. According to WHO anemia severity classification, 55% participants had mild anemia, 25 % moderate anemia while 20 % participants had severe anemia. The mean hemoglobin of study population was 7.7(2.6) gm/dL.

Table 2: Association of anemia and risk factors among pregnant women in rural and tribal area

Variable	N	Normal n (%)	Anemic n (%)	OR (95% CI)	p-value
Age group					
<35 years	294 (74%)	84 (28%)	210 (72%)	0.92	0.748
> 35 years	104 (26%)	28 (27%)	76 (73%)	(0.557 to 1.521)	
Education					
Illiterate	159 (40%)	16 (10%)	143 (90%)	5.89	0.0001
Literate	239 (60%)	95 (40%)	144 (60%)	(3.307 to 10.509)	
Socioeconomic status					
Lower	298 (75%)	64 (22%)	234 (78%)	3.375 (2.088 to 5.454)	0.0001
Middle and upper	100 (25%)	48 (48%)	52 (52%)		

Gravidity					
Primi	139 (35%)	54 (39%)	85 (61%)	2.20	0.0006
Multi	259 (65%)	58 (23%)	201 (77%)	(1.4051 to 3.4497)	
Birth spacing					
<3 year	349 (88%)	90(26%)	259 (74%)	41.42	0.0001
>3 year	49 (12%)	22 (45%)	27 (55%)	(22.505 to 76.239)	
Iron supplementation					
Yes	123 (31%)	46 (37%)	77 (63%)	1.891	0.0064
No	275 (69%)	66 (24%)	209 (76%)	(1.1963 to 2.9915)	
Gestational age					
2nd trimester	282 (70%)	88 (31%)	194 (69%)	0.575	0.035
3rd trimester	116 (30%)	24 (21%)	92 (79%)	(0.3436 to 0.9626)	

The results of bivariate analyses (table 2) showed that anemia was significantly associated with socio demographic parameters like lower socio-economic status and lower education level. This study revealed that multigravida status (OR 2.2095% CI (1.4051 to 3.4497) and inappropriate birth interval OR 41.42, 95% CI (22.505 to 76.239) were the independent predictors of anaemia among pregnant women.

Discussion

We investigated the prevalence of anemia and its determinants in a specific population of pregnant women from rural and tribal area in Rajasthan, India. Our study reported high prevalence of anemia in the rural and tribal setting. the result suggest that it is a serious public health problem in the study area. The results are consistent with other studies conducted in different parts of where the prevalence of anemia has found to be between India 70-90% [17,18] The results are also like prevalence data reported from different developing nations [19-22]. However, prevalence in these studies is much higher compared to NFHS 4 data where the prevalence in rural pregnant women is reported to be 54% [10]. Variation in the results may be due to variation in sociodemographic factors, geographic locations, and dietary habits of study participants in different part of India. In this study, majority of the cases were mild anemic followed by moderate anemia. These results are consistent with the studies from Ethiopia [23], Kenya [24], and Nepal [25].

We also studied various sociodemographic, obstetric, and dietary factors affecting prevalence of anemia. The study revealed that poor socioeconomic status and education level were significantly associated with anemia despite robust national health program. This can be explained by the effect of education on knowledge, attitude, and prevention practices against anemia. However, there was no effect of advance age on anemia which is consistent with the findings reported from Mexico [26] and Malawi [27]. Contradictory results are reported from Ethiopia [28], China [29], and Afghanistan [4].

The study also showed the effect of obstetrical factors. Anemia was significantly found in women who were multigravida or having inadequate birth interval. Our results are consistent with other studies form Afghanistan [4], Ethiopia [21] and Ghana [22]. Every pregnancy increases the risk of hemorrhage as well as iron stores and other nutrients are depleted due to frequent pregnancies. The third trimester of gestational age was associated with higher incidence of anemia compared to second trimester. Similar results are reported from

Pakistan [30], Libya [31], Nepal [32], and eastern Ethiopia [33].

The dietary intake was overall deficient in the study population. Women who were taking regular iron folic acid supplementation showed significantly reduced incidence of anemia. WHO also recommends oral daily iron and folic acid supplementation for pregnant women because of increased physiological demands [34]. The WHO included a target of reducing anaemia among women of reproductive age by 50% by 2025 in its Global Nutrition Targets [35].

The high prevalence of anemia in our study could be due to unawareness, poor access to healthcare and cultural practices. The study evaluated various socio-demographic, obstetrical, and dietary factors to identify the potential risk factors in the specific population of rural and tribal pregnant women. The strength of the present study is that the outcome variable was objectively measured, thereby the possible biases linked with subjective measurements.

The limitation of the study is that we could not detect causality in this study due to the cross-sectional design of the study. The specific study population may restrict the generalizability of our results. Large scale longitudinal studies are recommended to identify root causes of anemia among pregnant women.

Conclusion

The study confirmed that anemia in women of reproductive age group is a major health problem. The findings revealed increased prevalence of anemia in rural and tribal pregnant women. There are various sociodemographic, obstetrical, and dietary factors associated with prevalence of anemia. These findings provide a rationale to make necessary policy changes and interventions to address maternal anemia.

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