Original Article

Proportion of anaemia and factors associated with it among the attendees of the antenatal clinic in a teaching institute of northeast India

Arpita Debnath[1], Asish Debbarma[2], Saru Kumar Debbarma[3], Himadri Bhattacharjya[1]

[1]Departments of Community Medicine, [2]Biochemistry and [3]Medicine, Agartala Government Medical College, Agartala, Tripura, India

Abstract

Background: Anaemia is an important cause of maternal morbidity and mortality in India. According to National Family Health Survey-4, the prevalence of anaemia among pregnant women in Tripura was 54.4%, but the proportion of anaemic women attending antenatal clinics is not known. **Objectives:** To find out the proportion of anaemia and associated factors among pregnant women attending antenatal clinic at Agartala Government Medical College. **Materials and Method:** This hospital-based cross-sectional study was conducted among 200 pregnant women attending the antenatal clinic of Agartala Government Medical College from 14th July to 7th August 2019 chosen by consecutive sampling. **Results:** Majority (69.5%) of the women were aged either ≤ 25 years, 94.5% were Hindu, 37% belonged to scheduled caste community, 58.5% from a rural area, 28% belonged to BG Prasad's class II socioeconomic status and 52.5% had only primary education. The proportion of anaemia was found to be 60%. It was 63.3% among ≤ 25 years age group and 62.9% among those who studied up to primary level. Mean (SD) Hb level was 9.9 ± 0.6 g%. Among the anaemic, 57.5% were primigravida and 45% were carrying the third trimester of pregnancy. Only 1% of the study women reportedly consumed either 200 or more number of iron tablets. Age < 25 years, (OR = 1.824, 95% CI = 1.231–2.108, *P* = 0.003), holding BPL or similar ration cards (OR = 3.482, 95% CI = 1.201–5.371, *P* = 0.031) and getting at <18 years (OR = 4.482, 95% CI = 2.317–6.451, *P* = 0.003) were identified as the significant predictors of anaemia during pregnancy. **Conclusion:** The proportion of anaemia among attendees of the antenatal clinic was higher than the state prevalence of anaemia among pregnant women. Lower literacy, lower socioeconomic status, rural residence, etc., had significant associations with anaemia in this population.

Keywords: Anaemia, antenatal clinic, northeast India, pregnant women

Introduction

Anaemia during pregnancy is a public health problem, especially in developing countries and is associated with adverse outcomes in pregnancy. Global data shows that 56% of pregnant women in low- and middle-income countries are anaemic.[1] The prevalence of anaemia among pregnant women in sub-Saharan Africa is highest (57%), followed by Southeast Asia (48%) and lowest in South America (24.1%).[2] The negative health effects for the mother include fatigue, poor work capacity, impaired immune function, increased risk of cardiac diseases and mortality. Some studies have shown that anaemia during pregnancy contributes to 23% of the indirect causes of maternal deaths in developing countries.[1] India has the highest prevalence of anaemia in

Address for correspondence: Dr. Himadri Bhattacharjya, Associate Professor, Department of Community Medicine, Agartala Government Medical College, Kunjavan - 799 006, Tripura, India.
E-mail: hbhattacharjya@rediffmail.com

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pregnancy and is the home to the largest number of anaemic pregnant women in the world.[3]

Although dietary deficiency, parasitic infestations and chronic diseases are well-known risk factors, the physician needs to understand the ecological or structural risk factors that could be of regional interest. These include sociodemographic characteristics, obstetric factors, mental health and nutritional status reflected by the body mass index. Studies have evaluated the association of various attributing factors to maternal mortality and various models of antenatal care (ANC) in the population of western as well as low- and middle-income countries.[4,5]

Being involved with two-thirds of the total pregnant population of low- and middle-income countries, anaemia has been given paramount importance in maternal health. It is a universal fact that ANC plays an instrumental role in maternal and child safety. But unfavourable sociodemographic factors are the major barriers to the efforts put in place for the prevention of anaemia during pregnancy. Knowledge of the sociodemographic factors associated with anaemia in pregnancy can be used to formulate a multipronged strategy to tackle this important public health problem. Studies have considered data from antenatal clinics as a source of information for estimating the prevalence of various risk factors for anaemia during pregnancy.[6]

Different studies have reported the prevalence of anaemia in pregnancy in different settings including the community level in the state of Tripura. However, the prevalence of anaemia at the national level and the state level cannot be generalised. Limited data are available regarding the proportion of anaemia among the attendees of antenatal clinics both at the national and regional levels. Moreover, the proportion of anaemic women attending antenatal clinics may differ across different levels of the healthcare delivery system.

People of northeast India differ from the rest of the nation regarding ethnicity, general health conditions, culture, literacy, social customs, food habits, access to healthcare delivery system, etc., and all these factors may be associated with a haemoglobin (Hb) level of the pregnant women. Hence, the present study was designed to find out the proportion of anaemia and its associations with selected clinical and sociodemographic factors of the pregnant women attending the antenatal clinic of a teaching institute of northeast India.

Materials and Method

This hospital-based cross-sectional study was conducted from 14th July to 7th August 2019 among 200 pregnant women attending Antenatal Clinic of Agartala Government Medical College, chosen by consecutive sampling with the objectives to find out the proportion of anaemia and its associations with clinical and sociodemographic factors among them.

The minimum sample size requirement for this study was calculated by using the formula for calculating sample size for prevalence studies using proportion, i.e., $N = (Z^2_{\alpha/2} \times p \times q) \div l^2$.[7] N is the sample size; $Z^2_{1-\alpha/2}$ is the standard normal deviate and its value is 1.96 at 95% confidence interval (CI). *P* is the proportion

Table 1: Haemoglobin status by sociodemographic factors of the study subjects

Sociodemographic factors		Haemoglobin status		*P*
Variables	**Subgroups**	**Anaemic, *n* (%)**	**Non-anaemic, *n* (%)**	
Age group	<=25 year	88 (63.3%)	51 (36.7%)	0.248
	26-30 year	20 (48.8%)	21 (51.2%)	
	>30 year	12 (60.0%)	08 (40.0%)	
Residence	Urban	46 (55.4%)	37 (44.6%)	
	Rural	74 (63.2%)	43 (36.8%)	0.266
Religion	Hindu	114 (60.3%)	75 (39.7%)	
	Mushlim	05 (50.0%)	05 (50.0%)	0.579
	Christian	01 (100%)	00 (0.0%)	
Literacy	Primary educated	66 (62.9%)	39 (37.1%)	
	Secondary educated	37 (58.7%)	26 (41.3%)	0.598
	Graduate ad above	17 (53.1%)	15 (46.9%)	
Socioeconomic status	Upper class	19 (54.3%)	16 (45.7%)	
	Upper middle class	35 (62.5%)	21 (37.5%)	0.948
	Middle class	33 (61.1%)	21 (38.9%)	
	Lower middle class	26 (59.09%)	18 (40.9%)	
	Lower class	07 (63.6%)	4 (36.4%)	
Category of Ration card	APL	51 (50.0%)	51 (50.0%)	0.026
	BPL	59 (72.0%)	23 (28.0%)	
	Ad-hoc-BPL	06 (60.0%)	04 (40.0%)	
	Antodaya	02 (33.3%)	04 (66.7%)	

Table 1 shows that a higher proportion of women (63.3%) aged 25 years or less, women belonging to rural areas (63.2%), Hindu (60.3%) by religion, those who studied up to primary level (62.9%), women belonging to the lower class as per BG Prasad's socioeconomic classification (63.6%) were found to be anaemic, but statistically, these were not significant ($P>0.05$). On the other hand, a significantly higher proportion of women (72%) holding BPL category ration cards were found to be anaemic ($P<0.05$)

Table 2: Haemoglobin status by obstetrics factors of the study subjects

Obstetric factors		Haemoglobin status		*P*
Variables	**Subgroups**	**Anaemic, *n* (%)**	**Non-anaemic, *n* (%)**	
Parity	Primi Gravida	69 (60.5%)	49 (39.5%)	
	Second Gravida	41 (60.3%)	27 (39.7%)	0.921
	Third Gravida	10 (55.6%)	08 (44.4%)	
Duration of pregnancy	1st Trimester	11 (55.0%)	09 (45.0%)	
	2nd Trimester	55 (61.8%)	34 (38.2%)	0.842
	3rd Trimester	54 (59.3%)	37 (40.7%)	
Age at marriage	<18 year	28 (60.9%)	18 (39.1%)	
	18-25 year	57 (38.3%)	92 (61.7%)	0.021
	>25 year	0 (0.0%)	05 (100%)	
Age at first pregnancy	≤18 year	29 (70.7%)	12 (29.3%)	
	19-25 year	75 (58.6%)	53 (41.4%)	0.225
	>25 year	16 (51.6%)	15 (48.4%)	

Table 2 shows that a significantly higher proportion of women (60.9%) aged either 18 years or less were found to be anaemic ($P<0.05$). The proportion of anaemia was also high (60.5%) among the primigravida, women carrying 2nd trimester of pregnancy (61.8%) and women, who had first pregnancy at either 18 years or less (70.7%). But statistically, these were not significant ($P>0.05$)

Table 3: Haemoglobin status by the practise of the study women

Variables		Haemoglobin status		*P*
		Anaemic, *n* (%)	**Non-anaemic, *n* (%)**	
Dietary habit	Vegetarian	76 (57.5%)	34 (42.5%)	0.005
	Nonvegetarian	44 (42.5%)	46 (57.5%)	
Antenatal visit	1st visit	09 (39.1%)	14 (60.9%)	0.059
	2nd visit	30 (66.7%)	15 (33.3%)	
	3rd visit	20 (51.3%)	19 (48.7%)	
	4th visit or more	61 (65.6%)	32 (34.4%)	
Intake of IFA	<100	88 (59.1%)	61 (40.9%)	0.669
	100-200	31 (62.0%)	19 (38.0%)	
	>200	01 (100%)	00 (0%)	
TT immunization	1st dose	24 (68.6%)	11 (31.4%)	0.299
	Booster dose	86 (57.0%)	65 (43.0%)	
	None	10 (71.4%)	04 (28.6%)	

Table 3 shows that the proportion of anaemia was significantly higher (57.5%) among vegetarian women ($P<0.05$). A higher proportion of anaemia was also observed among women who came for advanced antenatal checkups (2nd to 4th visits), women who consumed <200 number of IFA tablets during pregnancy and those who did not receive any dose of tetanus toxoid (TT) immunization, but these were not significant ($P>0.05$)

of anaemia among pregnant women, which is considered as 52.6%.[8] Thus the sample size was determined to be 277.

Being accompanied by the Medical Social Workers of Community Medicine Department, Antenatal Clinic was visited by the research team. Women coming out after consulting the doctor at the Antenatal Clinic were approached consecutively for participation in this study and written informed consent for participation in this study was solicited from them. However, among these pregnant women, 25 had severe bleeding p/v, 20 had pain abdomen, two were considered mentally unfit to make any valid statement, five had preeclampsia, 10 were in labour, ten refused to participate in this study and five women were on a repeat visit. Thus 77 women met the exclusion criteria and finally, 200 pregnant women got enrolled in this study. A group of sixth-semester medical students having clinical posting in the Department of Community Medicine was trained in research methodology and they also helped in data collection.

Eligible consenting women were interviewed using a pretested structured interview schedule maintaining confidentiality. Women having no formal schooling were considered as illiterate, schooling of any level up to standard V as primary educated, between standard VI to XII as secondary and literacy of any level beyond standard XII were considered as graduate and above. Women from the municipal area were considered as urban and those from village panchayat areas as rural subjects. BG Prasad's socioeconomic status classification for the year 2018[9] was used for classifying the socioeconomic status of the study subjects. Participant's prescriptions and laboratory reports etc., were also examined. The information thus collected was recorded in the interview schedule and later on, data entry and analysis were performed on a computer using Statistical Package for the Social Sciences (SPSS-25).

For summarising the qualitative data: frequency and percentages and for quantitative data, mean and SD were used. Chi-square statistic was applied to test associations of anaemia with different sociodemographic and clinical parameters and also to see their significance. *P* value < 0.05 was considered statistically significant. The competent authority of Agartala Government Medical College permitted to conduct this study.

Table 4: Result of binary logistic regression analysis showing odds of having anaemia by the predictor variables

Variables		Odds ratio (95% C.I)	*P*
Age	>25 year	1	0.003
	<= 25 year	1.824 (1.231-2.108)	
Residence	Urban	1	0.094
	Rural	1.796 (0.154-3.123)	
Literacy	Above the primary level	1	0.521
	Up to primary level	0.509 (0.165-2.573)	
Socioeconomic status	Middle class and above	1	0.986
	Bellow middle class	7.381 (0.830-11.406)	
Type of ration card	APL	1	0.031
	BPL or similar	3.482 (1.201-5.371)	
Age at marriage	≥ 18 year	1	0.003
	< 18 year	4.482 (2.317-6.451)	
Age at first pregnancy	≥ 18 year	1	0.072
	< 18 year	3.119 (0.317-4.217)	
Parity	Primi para	1	0.952
	Multi para	3.211 (0.517-6.821)	
Dietary habit	Nonvegetarian	1	0.742
	Vegetarian	1.975 (1.017-8.341)	
Consumption of IFA tablets	≥200 tablets	1	0.312
	<200 tablets	2.531 (1.017-7.846)	

Table 4 shows that women aged 25 years or less had an 82.4% higher chance of developing anaemia during pregnancy (95% CI=1.231-2.108, *P*=0.003). Similarly, women holding either BPL or similar ration cards had a 3.482 times higher chance (95% CI=1.201-5.371, P=0.031) and women who got married before 18 years of age also had a 4.482 times higher chance of developing anaemia during pregnancy (95% CI=2.317-6.451, *P*=0.003), whereas the rest did not attain the level of statistical significance

Result

The response rate in this study was 72.2%. Majorities i.e., 69.5% of the pregnant women were aged less than 25 years, followed by 20.5% between 26 to 30 years and only 10% were aged either 30 years or more. Among the study women, 94.5% were Hindu, 5% were Muslim and 0.5% were Christian by religion. Regarding community, 37% belonged to the scheduled caste community, 22% to general caste, 5% to scheduled tribes and 36% to other backward communities. The residence of 58.5% of women was rural and the rest was urban. Out of all, 28% belonged to the upper-middle class, followed by 27% to the middle class, 22% to the lower middle class, 17.5% to the upper class and 5.5% belonged to the lower class as per BG Prasad's socioeconomic classification. Regarding literacy, 52.5% of women studied up to primary level, 31.5% up to secondary and 16% up to graduate level or above. Regarding occupation, 93.5% were homemakers, 4% were service holders and 2.5% were self-employed. Among the study subjects, 51% possessed above poverty line (APL) category ration cards, 41% possessed below poverty line (BPL) category, 5% possessed the ad-hoc BPL category and 3% possessed Antodaya category ration cards. Associations between haemoglobin status and socio-economic parameters are shown in [Table 1].

The proportion of anaemia among the women attending Antenatal Clinic was found to be 60%. Among these anaemic women, 39.5% had mild, 18.9% had moderate and 1.6% had severe anaemia. Mean (SD) Hb level was 9.9 ± 0.6 gm%. Among the women, 17.5% had short stature, 8% were hypertensive, 8.5% were hyperglycaemic and 80% received some services from the Accredited Social Health Activist (ASHA) using home visits. Associations between selected obstetric factors and haemoglobin level is shown in [Table 2]. Out of the total, 37.5% of the pregnant women got registered under Janani Suraksha Yojana (JSY). Associations between practices of the study women and haemoglobin level is shown in [Table 3]. Logistic regression analysis has shown that women aged less than 25 years (OR = 1.824, 95% CI = 1.231–2.108, *P* = 0.003), women holding BPL or similar ration cards (OR = 3.482, 95% CI = 1.201–5.371, *P* = 0.031) and those who got married before 18 years of age (OR = 4.482, 95% CI = 2.317–6.451, *P* = 0.003) had significantly higher chance of developing anaemia during pregnancy [Table 4].

Discussion

In the present study proportion of anaemia among pregnant women attending the antenatal clinic was found to be 60%. However, Rajaratnam *et al.* found it to be 69.3%,[10] Vanamala *et al.* found it to be 52%[11] and Mishra *et al.* found it to be 54.8%.[12] These observed differences may be since settings of these studies were different and the determinants like literacy rate, socioeconomic status, nutritional status, parity, consumption of prophylactic iron therapy, etc., of these study populations were also different and all these factors had determined their Hb status.

An unusually high prevalence of anaemia (98%) in rural Haryana was found in a study conducted by Mangla[13] which was much higher than the present study. This may be due to the patriarchal nature of that society and discrimination against women's rights since birth in the form of equal availability of food and education. Very high prevalence was also observed by Viveki *et al.*,[14] Totega *et al.*,[15] Agarwal *et al.*[16] and Gautam *et al.*[17] (82.9%, 84.9%, 84% and 96.5%, respectively).

A study conducted by Shredevi[18] in Telangana has detected the prevalence of anaemia in pregnancy as 20%, Mahamoud *et al.* in their study also observed that the prevalence of anaemia in pregnancy was 25.8%.[19] These findings were far less than the present study. Chandrayan and his colleagues[20] in their study also revealed that 31.31% of the pregnant women had manifestations of anaemia. The present study revealed that 1.6% of pregnant women had severe anaemia. Similar results were found by Kumar *et al.*,[21] Baruah *et al.*[22] and Kumari *et al.*[23]

In the present study mean (SD) Hb level was found to be 9.9 ± 0.6 gm%. Bansal *et al.*[24] reported mean Hb concentration as 9.06 g/dL among the anaemic, which was at par with the present study. Mahamoud *et al.* reported a mean Hb level as 7.9 g/dL this was lesser than the present study.[19] The mean age of the respondents in the present study was 23.77 ± 4.72 year, which is comparable with the study conducted by Kumar *et al.*,[21] where the mean age of the study participants was 24.67 ± 3.31 year. Omote *et al.* reported it to be 30.65 ± 5.52 years, which was

much higher than the present study[25] In that study, the youngest was 12 years old and the oldest was 47 years, whereas in the present study youngest was 17 years and the oldest was 38 years old. The highest proportion of anaemia (63.3%) in the present study was observed among the <25 years age group. Bansal *et al.* reported a higher prevalence of anaemia (48.4%) among subjects aged 26–30 years.[24] In a study conducted by Kaur *et al.,* a higher proportion of anaemia was found among younger women (<30 years),[26] Mishra *et al.* in their study have found that ≥30 years age group were having the highest proportion of anaemia (88%).[12] Raghuram *et al.* have also reported the highest proportion of anaemia among pregnant women aged between 41–45 years.[27] A higher proportion of anaemia among pregnant women belonging to low socioeconomic status has also been reported by Mishra *et al.*[12] and Gautam *et al.*[17] which was on par with the present study. Suryanarayana *et al.* in Karnataka[28] and Chowdhury *et al.* in Bangladesh[29] found that literacy of pregnant women was significantly associated with anaemia is also at par with the present study.

The present study has detected a higher proportion of anaemia among the vegetarian subjects as compared to the nonvegetarians. A similar phenomenon was observed by Khan *et al.*[30] and Ahmed *et al.*[31] in their studies. In this study, anaemia in pregnant women did not have any significant associations with the order of pregnancy, starting with the first antenatal checkup and iron-folic acid (IFA) tablet consumption. These findings are contradictory to the observations made by Kumar V *et al.*,[21] Kundap *et al.*,[32] Kumari *et al.*[23] and Rajput *et al.*[33] Baruah *et al.*[22] could not found any association with the order of pregnancy and the Hb levels of pregnant women, which is similar to our finding. Consumption of >100 number IFA tablets by 62% of the pregnant women detected by the present study is contradictory with the findings of Mangla *et al.*,[13] where 27.6% of the pregnant women consumed either 100 or more number of IFA tablets. But Sarala *et al.* in their study found that 68% of the subjects consumed IFA tablets regularly, which was at par with the present study.[34] Biswas and Baruah in their study observed that 46.04% of the pregnant women received IFA tablets. Regarding full antenatal checkup, they also reported that 91.37% of the pregnant women got registered and availed ANC[35] whereas, the present study has found that 65.6% of the pregnant women have received it, though Mangla *et al.*[13] have found it to be 12.5% only. Though the proportion of anaemia in the study population is high, majorities are mild to moderate; so they can be corrected through ANC if detected early.

Conclusion

The proportion of anaemia among pregnant women attending antenatal clinic in a teaching institute of Tripura is found to be 60%, which is higher than the state prevalence of anaemia among pregnant women. It may be since the present settings being a tertiary one, more complicated cases are coming here. Low literacy, early marriage, lower socioeconomic status, rural residence, etc., were found to be associated with anaemia in this population. The majority of the anaemic women were either mild or moderate type. Primary care physicians being the first point of encounter for these women, besides taking all possible measures, must counsel the women regarding food and nutrition during pregnancy including adherence to the consumption of iron tablets during ANC.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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