Original Article

A study on anemia and its risk factors among pregnant women attending antenatal clinic of a rural medical college of West Bengal

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Abstract

Background: Anemia is the commonest nutritional deficiency disorder in the world, particularly in developing countries. Though anemia is easily treatable and largely preventable disease if timely detected, it still continues to be significantly prevalent among pregnant women. **Aim:** The aim of this study was to measure the extent of anemia in pregnancy and to assess the association of risk factors with anemia. **Study Design:** Hospital-based cross-sectional descriptive study. **Materials and Methods:** A total of 200 women were selected among pregnant women attending antenatal clinic. Sampling was done by selecting every fifth woman visiting antenatal clinic within the duration of two months on alternate days. Data were collected using a predesigned, pretested semi-structured schedule. Hemoglobin concentrations were also recorded for each patient. Data were analyzed using Chi-square test and 'T' test of significance. A value of $P < 0.05$ was considered significant. **Results:** We found overall prevalence of anemia to be 90% among pregnant women. Most of the anemic patients (60.5%) belong to moderate severity according to the World Health Organization classification. Three factors namely socioeconomic status, gravida and time of 1st antenatal visit were significantly associated with prevalence of anemia in pregnancy ($P < 0.05$). **Conclusion:** In this study, a high prevalence of anemia was found in pregnant women. Low socioeconomic status, multigravida and delayed visit to antenatal clinic were significantly associated with anemia in pregnancy. So, awareness and education programs should be generated to make people come to know about anemia, its complications during pregnancy and ways to prevent it.

Keywords: Anemia in pregnancy, gravida, risk factors, socioeconomic status

Introduction

Anemia has been recognized as the most common form of nutritional deficiency worldwide, particularly in developing countries like India. Though anemia is easily treatable and preventable disease, it continues to be significantly associated with pregnancy. Diminished intake and increased demand, excess demand in case of multigravid woman and altered metabolism along with the background characteristics like low socioeconomic status, illiteracy, early age of marriage associated with increase in susceptibility to infectious diseases like hookworm infestations may serve to be the underlying factors associated with prevalence of anemia during pregnancy. According to the World Health Organization (WHO) prevalence of anemia among pregnant women varies from

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14% in developed countries to 65%–75% in India.[1] In women, anemia may become the underlying cause of maternal mortality and perinatal mortality.[2]

Hemoglobin value <11 g/dL is defined as anemia in pregnancy by WHO.[3] Anemia in pregnancy can be further divided as mild, moderate and severe anemia for hemoglobin level 10.0–10.9 g/dL, 7–9.9 g/dL and severe <7 g/dL.[4]

Various studies showed an association between anemia and maternal mortality.[5-7] Apart from maternal mortality, anemia in pregnancy may result in intrauterine growth retardation, low birth weight, still-birth, and neonatal death.[8-11]

In view of low dietary deficiency of iron and folic acid, and high prevalence of anemia among pregnant women, India started the National Nutritional Anemia Prophylaxis Program (NNAPP) to prevent anemia among pregnant women.[12] Through this program 100 mg of ferrous iron and 500 mcg folic acid tablets distributed to pregnant woman through Urban Family Welfare Centers in urban areas and Primary Health Centers in rural areas. Despite of these preventive measures, anemia in pregnant women is still very much prevalent in India.[12,13]

The key for safe motherhood is reduction of maternal anemia. The risk factors of anemia particularly during pregnancy are multifactorial and complex.[14] So, knowledge of these risk factors and compliance of respondents towards implemented government program is very much essential to prevent anemia and its consequences.

Primary health care physicians are the first contact physician in the community who can play a very important role in identification and treatment of anemia.[15] Many issues associated with anemia can be assessed and modified at the primary care level such as dietary habits, multi parity etc.

Hence, this study was undertaken with the following aims and objectives:

I. To determine the magnitude of anemia in pregnant women according to severity among study population, and
II. To find out association of anemia with different socio-demographic factors.

Materials and Methods

Study subjects and study area

This cross-sectional study was conducted in a rural teaching hospital of West Bengal, India for a duration of 2 months. This rural medical college is situated in a backward area of western West Bengal which caters mainly economically poor population. Data collected from 200 pregnant women (Cases). Every fifth patient was taken attending antenatal clinic (ANC) and first patient was selected randomly. A consent form was filled by each participant.

Inclusion and exclusion criteria

Inclusion criteria

Pregnant women attending ANC who filled the consent form having their Hemoglobin (Hb) report. Confirmation of pregnancy was done by either urinary pregnancy test and/or by pelvic ultrasonography.

Exclusion criteria

Unwilling pregnant women and who did not have hemoglobin report with them were excluded from the study.

Ethical consideration

The study was approved by the institutional ethics committee before commencing the study. The study was done as a part of the Indian Council of Medical research short-term studentship program (ICMR-STS). It was obtained on 21/03/2012.

Data collection

Data were collected from every participant using a predesigned, pretested semi-structured schedule. Sociodemographic particulars and data regarding reproductive behavior were collected. Socioeconomic status was determined based on Tendulkar's committee poverty line where the income of less than rupee 673 per month was considered as low socio-economic status. Hemoglobin level is also recorded from the available investigation report. All hemoglobin levels estimated by the cyanmethemoglobin method.

Statistical analysis

Chi-square test and 'T' test of significance were used to show any association between risk factors and severity of anemia. A 'P' value <0.05 was considered statistically significant to show an association between the particular risk factor and severity of anemia.

Results and Observations

In our study, 200 pregnant women were included. The demographic characteristics of the pregnant women were shown in Table 1. The most common age group in our study was 20-30 years (54.5%) and majority were of low socioeconomic status (58%) [Table 1]. Maximum numbers of study subjects were Hindu (94.5%).

Among the pregnant women, 90% suffered from anemia; majority had moderate anemia (60.5%), followed by mild anemia (29%). Only 1 woman was suffering from severe anemia while the rest had no anemia [Table 2].

Association of anemia with low socioeconomic status was found to be 63.93%, 51.72% and 35% for severe and moderate, mild and no anemia respectively [Table 3] which was statistically significant [$P = 0.03$]. However, no significant association of severity of anemia with the educational status of the pregnant women was detected.

Also, severity of anemia is associated with time of first antenatal visit which is statistically significant [Table 4]. However, severity of anemia with respect to age and religion were not significant.

Discussion

Anemia in pregnancy is a major health issue in India. The reason being low socioeconomic status, less dietary intake of iron and folic acid, short spacing of multiple pregnancies, excessive bleeding during labor, infections like malaria and hookworm infestations.[16]

Table 1: Distribution of pregnant women according to variable characteristics (*n*=200)

Parameter (*n*=200)	Number	Percentage
Age group (years)		
<20	88	44.0
20-30	109	54.5
>30	3	1.5
Religion		
Hindu	189	94.5
Muslim	11	5.5
Socioeconomic status		
Low	115	57.5
Middle	84	42.0
High	1	0.5
Occupation		
No wage earner	162	81.0
Wage earner	38	19.0

Table 2: Distribution of severity of anemia among pregnant women according to WHO criteria

Hb level (gm/dl)	Severity of anemia	No of cases	Percentage
<7	Severe	1	0.5
7-9.9	Moderate	121	60.5
10-10.9	Mild	58	29.0
≥11	Normal	20	10.0

Hb=Hemoglobin

Table 3: Distribution of pregnant women according to socio economic status with respect to severity of anemia (*n*=200)

Anemia	Socio economic status		Total (%)
	Low (%)	Middle and high (%)	
Severe + Moderate	78 (63.93)	44 (36.07)	122 (100)
Mild	30 (51.72)	28 (48.28)	58 (100)
Normal	7 (35.00)	13 (65.00)	20 (100)
Total	115 (57.5)	85 (42.5)	200 (100)

χ^2=7.002, *P*=0.030 (S). S=Significant

In West Bengal, National Family Health Survey-3 found the prevalence of anemia among pregnant women of age group 15–49 years to be 62.6%.[17] This is less than our study, where we found it to be 90%; which is similar to other Indian studies done by Lokare *et al.*, Gautam *et al.*, Toteja *et al.* and ICMR Taskforce Multicenter Study[12,18-20] On the contrary, few recent studies done in African continent found the prevalence of anemia in pregnant women as low as 25.8% to 37.6%.[21,22] This variation may be due to various socio-demographic and comorbid conditions. Also, as our study participants are mainly poor from tribal population with low socioeconomic status, therefore the prevalence of anemia during pregnancy may be remarkably high.

Majority of cases in our study had moderate anemia (60.5%), mild anemia (29.0%) and one case of severe anemia which was found to be similar to Vindhya *et al.*, Mahamud *et al.*, Sarala V *et al.*[15,21,23]

There was no association found between age group and religion with anemia unlike Viveki *et al.* who found higher maternal anemia for age group above 26 years.[24] Studies done in Aurangabad city and New Delhi in India showed that severity of anemia decreases with higher per capita income, which is similar to our study.[12,19]

Time of ANC visit also plays an important role in reducing maternal anemia. 1st Trimester visit with prescription of proper diet, iron and folic acid supplements have reduced severe anemia remarkably in our study which is like study done by Mangla *et al.*[25]

Still a remarkably high prevalence of anemia among pregnant women showed that anemia is endemic in this region irrespective of age, religion, education status, occupation etc., Various socio-cultural problems like taking vegetarian diet, having tea after food, open field defecation predisposing women to hook worm infestation and other associated infections may serve as important factor behind high prevalence of anemia in the pregnant women. Age of marriage didn't show any association with respect to severity of anemia in this study suggesting that multiple pregnancies, heavy menstrual blood loss or multiple abortions because of some false cultural belief like the desire to have a boy child may be the reasons behind high prevalence of anemia. Thus, gravida showed a significant association with severity of anemia.

In our study, we found that majority of pregnant women did not consume the minimum number of iron and folic acid tablets. This suggested lack of compliance or low efficacy of government policies to provide regular supplementation. Also lack of motivation and education towards utility of supplementation

Table 4: Distribution of pregnant women according to time of 1st antenatal visit with respect to severity of anemia (*n*=200)

Anemia	Time of 1st antenatal visit			Total (%)
	1st trimester (%)	2nd trimester (%)	3rd trimester(%)	
Severe + Moderate	8 (6.55)	54 (44.26)	60 (49.18)	122 (100)
Mild + Normal	43 (55.12)	7 (8.97)	28 (35.89)	78 (100)
Total	51 (25.5)	61 (30.5)	88 (44.0)	200 (100)

χ^2=27.549, *P*=<0.001 (S). S=Significant

may be the cause to serve high prevalence of anemia. However mere use of this supplementation during pregnancy cannot solely serve the purpose, as other etiologies like hookworm infestations, malarial infection and other infections may be an issue which needs to be taken under consideration.

Limitations of the study

The study was conducted with a small sample size in a hospital which increases the possibility of error. If it would have been a longitudinal study rather than cross-sectional, then a better association between anemia and its risk factors could have been assessed. Mother's status of anemia could not be traced at different trimesters of pregnancy because of short duration of the study period. No test was done, or report was checked to find out any infectious disease like hookworm infestation or malaria and others to serve as etiology behind anemia. Morphology of red blood cell was also not recorded, which could help us to find its etiology.

Recommendations

Based on our study, we have the following recommendations to prevent and/or decrease the severity of anemia among pregnant women:

- Awareness and Education programs should be generated to make people come to know about anemia, its complications, and ways to prevent it.
- Especially adolescent girls should be educated to make them aware of the upcoming problem if not taken care since the same age.
- Woman of childbearing age should be motivated to take the required supplementation before conceiving and to continue with it till breastfeeding the baby.
- Education of the male partner regarding the complications of the disease and the utility of the supplementary diet during pregnancy may help the pregnant woman a lot to execute these policies in her daily life.
- To add support to supplementation food fortification with essential vitamins and minerals may serve the purpose. Iron fortification may be used in commonly used food like salt and sugar to build up iron stores and such things should be easily accessible and affordable by the common people. Mere cooking of food in cast iron utensil may reduce the severity of anemia.
- Advertisement programs should be generated to draw the attention of policymakers as anemia is one of the major global problems.

Conclusion

In summary, this study revealed a high prevalence of anemia in pregnancy, irrespective of age, religion, education status and occupation. Anemia is found to be endemic in this region, due to various unfavorable socio-demographic factors. As we all know, prevention is better than cure, therefore, these findings may help our policymakers and health care providers to change policies, add new strategies and educates the society to save from maternal anemia.

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Conflicts of interest

There are no conflicts of interest.

References

1. Demayer EM, Tegman A. Prevalence of anemia in the world. World Health Organ Qlty 1998;38:302-18.
2. Ezzati M, Lopez AD, Rodgers A, Hoorn SV, Murray CJ. Selected major risk factors and global and regional burden of disease. Lancet 2002;360:1347-60.
3. Breyman C. Current aspects of diagnosis and therapy of iron deficiency anemia in pregnancy. Schweiz Rundsch Med Prax 2001;90:1281-93.
4. De Benoist B, McLean E, Egli I, Cogswell M. Worldwide Prevalence of Anaemia 1993-2005:WHO Global Database on Anaemia. Geneva: World Health Organization; 2008.
5. Brabin BJ, Ginny M, Sapau J, Galme K, Paino J. Consequences of maternal anaemia on outcome of pregnancy in a malaria endemic area of Papua New Guinea. Ann Trop Med Parasitol 1990;84:11-24.
6. MacLeod J, Rhode R. Retrospective follow-up of maternal deaths and their associated risk factors in a rural district of Tanzania. Trop Med Int Health 1998;3:130-7.
7. Allen LH. Anemia and iron deficiency: effects on pregnancy outcome. Am J Clin Nutr 2000;71(Suppl):1280S-4S.
8. Axemo P, Liljestrand J, Bergstrom S, Gebre-Medhin M. Aetiology of late fetal death in Maputo. Gynecol Obstet Invest 1995;39:103-9.
9. Brabin BJ, Premji Z, Verhoeff F. An analysis of anaemia and child mortality. J Nutr 2001;132:636S-48S.
10. Adam I, Babiker S, Mohmmed AA, Salih M, Prins MH, Zaki ZM. Low body mass index, anaemia and poor perinatal outcome in a rural hospital in eastern Sudan. J Trop Pediatr 2008;54:202-4.
11. Haggaz AD, Radi EA, Adam I. Anaemia and low birth weight in western Sudan. Trans Soc Trop Med Hyg 2010;104:234-6.
12. Lokare PO, Karanjekar VD, Gattani PL, Kulkarni AP. A study of prevalence of anemia and sociodemographic factors associated with anemia among pregnant women in Aurangabad city, India. Ann Nigerian Med 2012;6:30-4.
13. Agarwal KN, Agarwal DK, Sharma A, Sharma K, Prasad K, Kalita MC, *et al.* Prevalence of anaemia in pregnant and lactating women in India. Indian J Med Res 2006;124:173-84.
14. van den Broek N. Anaemia in pregnancy in developing countries. Br J Obstet Gynaecol 1998;105:385-90.
15. Vindhya J, Nath A, Murthy GV, Metgud C, Sheeba B, Shubhashree V, *et al.* prevalence and its risk factors of anemia among pregnant women attending a public-sector hospital in Bangalore, South India. J Family Med Prim Care 2019;8:37-43.
16. Tolentino K, Friedman JF. An update on anaemia in less developed countries. Am J Trop Med Hyg 2007;77:262-7.
17. International Institute for Population sciences (IIPS)

and Macro International. 2007. National Family Health Survey (NFHS-3), 2005-06: India: Volume I. Mumbai: IIPS.

18. Gautam VP, Bansal Y, Taneja DK, Saha R. Prevalence of anemia amongst pregnant women and its socio-demographic associates in a rural area of Delhi. Indian J Comm Med 2002;27:157-60.
19. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP, *et al.* Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull 2006;27:311-5.
20. Toteja GS, Singh P, Dhillon BS, Saxena BN. Micronutrient Deficiency Disorders in 16 Districts of India-Part 1 Report of ICMR Task Force Study. District Nutrition Project. Ansari Nagar, New Delhi: Indian Council of Medical Research; 2001.
21. Mahamoud NK, Mwambi B, Oyet C, Segujja F, Webbo F, Okiria JC, *et al.* Prevalence of anemia and its associated socio-demographic factors among pregnant women attending an antenatal care clinic at Kisugu health center IV, Makindye Division, Kampala, Uganda. J Blood Med 2020;11:13-8.
22. Omete V, Ukwamedua HA, Bini N, Kashibu E, Ubandoma JR, Ranyang A. Prevalence, severity, and correlates of anaemia in pregnancy among antenatal attendees in Wari, South-Southern Nigeria: A cross-sectional and hospital-based study. Anemia 2020;2020. Article ID 1915231. 7 pages. doi: 10.1155/2020/1915231. DOI: 10.1155/2020/1915231
23. Sarala V, Gopalan U. A study on prevalence of anemia in pregnancy in South India. Int J Reprod Contracept Obstet Gynaecol 2020;9:34-7.
24. Viveki RG, Halappanavar AB, Viveki PR, Halki SB, Maled VS, Deshpande PS. Prevalence of anaemia and its epidemiological determinants in pregnant women. Al Ameen J Med Sci 2012;5:216-23.
25. Mangla M, Singla D. Prevalence of anaemia among pregnant women in rural India: A longitudinal observational study. Int J Reprod Contracept Obstet Gynecol 2016;5:3500-5.