Original Research Article

Anemia in pregnancy: A case control study from India

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ABSTRACT

Background: According to the World Health Organization (WHO) in pregnancy hemoglobin (Hb) less than 11gm/dL refers to be anemia. Anemia is the most common nutritional deficiency affecting the pregnant women. In India prevalence of anemia in pregnant woman is about 65% to 75%. Anemia during pregnancy causes negative and harmful effects on mother as well as on child. Anemia increases the risk of maternal and perinatal mortality. India had the highest prevalence of anemia in pregnancy. The Highest number of anemic pregnant women in the world are in India. So the present study was planned with aim to study the anemia in pregnant women.
Materials and Methods: The present case-control study was carried out in Department of Physiology at Rural Medical College Loni in Ahmednagar district of Maharashtra. The study was approved by Institutional Ethical Committee. Total 644 subjects were recruited for the study. 161 non-pregnant women were taken as control and 483 pregnant women were taken as the cases. Hemoglobin measurements of the pregnant woman was done by Sahali's method. Hb concentration of <11 gm/dL taken as anemia.
Results: The prevalence of anemia in pregnant and non-pregnant women were 62.93% and 82.60% respectively.
Conclusion: Pregnant as well as non-pregnant women in India are at high risk of developing anemia. The various national programmes aimed at prevention of anemia reduced the prevalence as well as severity of anemia during pregnancy.

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1. Introduction

In pregnancy, hemoglobin (Hb) less than 11gm/dL is considered as anemia.[1] Anemia is very common in the pregnant women. In developed countries, the prevalence of anemia is 14%. But in developing countries it is as high as 51%. In world around 32.4 million pregnant women were anemic. Most of these women were from countries in Southeast Asia and Africa. In India during pregnancy prevalence of anemia is around 65% to 75%.[2,3]

In developing countries many factors are responsible for such high prevalence of anemia during pregnancy. The dietary deficiencies of micronutrients like iron, folate, vitamins A and B12. The high prevalence of parasitic infections like malaria, hookworm and chronic infections like Tuberculosis (TB) and Human Immune-deficiency Virus (HIV) also contribute to anemia in pregnant women.[4–6]

Anemia during pregnancy causes negative and harmful effects on mother as well as on child. Anemia increases the risk of maternal and perinatal mortality. Some studies have

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shown that 23% of maternal deaths in developing countries are related to the anemia during pregnancy.[7]

India is most affected country in the world with the highest prevalence of anemia. Highest number of anemic pregnant women in the world are in India.[8,9] It is the important public health problem leading to high maternal and infant mortality.[10,11]

So the present study was planned with aim to study the anemia in pregnant women from Ahmednagar district of Maharashtra.

2. Materials and Methods

The present case-control study was carried out in Department of Physiology at Rural Medical College Loni in Ahmednagar district of Maharashtra.

The study was approved by Institutional Ethical Committee via letter no. PMT/PIMS/RC/2012/25.

Total 644 subjects were recruited for the study. 161 non-pregnant women were taken as control and 483 pregnant women were taken as the cases. The pregnant women further divided in to $1^{st} 2^{nd}$ and 3rd trimesters.

Following inclusion and exclusion criteria applied for the selection of subjects for the study.

Informed written consent was taken from participant before enrollment in the study.

2.1. Inclusion criteria

All healthy pregnant and non-pregnant women of age group 20-40 years.

Subject who gave written informed consent.

2.2. Exclusion criteria

All pregnant and non-pregnant women below 21 years and above 40 years.

Subject with any prior history of blood transfusion.

Subjects with history of any chronic diseases like Diabetes, Hypertension, Chronic Obstructive Pulmonary Disease (COPD) Rheumatic Heart Disease (RHD).

Subjects who denied written informed consent.

2.3. Data collection

The demographical data comprising age, height and weight was obtained through interview.

Hemoglobin measurement of the pregnant woman was done by Sahli's method.

Hb concentration of <11 gm/dL taken as anemia.

Anemia was classified based on the WHO criteria:[12]

Hb concentration of 10-10.9 gm/dL taken as mild anemia.

Hb concentration of 7-9.9 gm/dL taken as moderate anemia.

Hb concentration of < 7 gm/dL taken as severe anemia.

2.4. Data analysis

Data was pooled and tabulated for analysis using MS-Excel sheet. Data analysis done by SPSS version 23. The data was presented as Mean and SD.

3. Results

The Table 1 shows the demographic characteristics of the study population. The Age, height, weight in both pregnant and non-pregnant women and week of gestation in pregnant women are given in the above table.

Table 2 shows the mean hemoglobin in pregnant and non-pregnant women.

Table 3 shows the prevalence of anemia among pregnant and non-pregnant women.

Table 4 shows percentage ofmild, moderate and severe anemia according to WHO classification in pregnant and non-pregnant women.

4. Discussion

The present case-control study was carried out in Department of Physiology at Rural Medical College Loni in Ahmednagar district of Maharashtra.

Total 644 subjects were recruited for the study. 161 non-pregnat women were taken as control and 483 pregnant women were taken as the cases. (Table 1)

In the present study the prevalence of anemia in pregnant women was 62.93%. (Table 3) Similar higher prevalence of anemia in pregnancy was observed by other researchers. The prospective study conducted from March 2013 to January 2015 in Kolar taluka of Karnataka by Suryanarayana R, et al The study also find that prevalence of anemia increases with increase in period of gestation but it was not significant we also doesn't found any significant relation in anemia and period of gestation.[3,13]

In contrast to the present study, very high prevalence of anemia was observed in pregnancy by other researchers. Agarwal et al found 84% prevalence of anemia in pregnancy and Gautam et al found 96.5% prevalence of anemia in pregnancy.[14,15]

In contrast to the present study, some other studies observed low prevalence of anemia in pregnancy. A study from Nepal by Marahatta Robserved 42.5% prevalence of anemia in pregnancy. A Tanzanian study by Grace Stephen et alobserved 18% prevalence of anemia in pregnancy which was much lower as compare to the present study.[16,17]

In the present study no any case of severe anemia observed in either pregnant or non-pregnant women. In pregnant women, prevalence of mild and moderate anemia was 228(75%) and 76(25%) respectively. (Table 4)

The data from National Family Health Survey (NFHS) 1, 2, 3 and 4 and District Level House hold Survey (DLHS) 2 and 4 showed that most of the pregnant women in India were in mild These findings indicated that there

Table 1: Demographic characteristics.

Parameters	Non-pregnant (N=161)	1st trimester (N=165)	2nd trimester (N=155)	3rd trimester (N=163)
	Mean± SD	Mean± SD	Mean± SD	Mean± SD
Age (years)	22.81±3.37	22.37±3.65	21.78±2.33	22.10±2.69
Height (cm)	154.99±4.81	154.99±4.82	155.41±5.05	155.26±4.95
Weight (Kg)	49.06±5.66	48.32±5.60	51.32±6.64	57.06±5.62
Week of Gestation	——	8.85±1.77	20.45±3.87	33.94±2.99

Table 2: Mean values of Hemoglobin (gm/dL)

Non-pregnant (N=161)	1st trimester (N=165)	2nd trimester (N=155)	3rd trimester (N=163)
Mean± SD	Mean± SD	Mean± SD	Mean± SD
12.63±0.46	11.27±0.38	11.28±0.31	11.28±0.32

Table 3: Prevalence of anemia in pregnant and non-pregnant women

	Non-pregnant (%)	1st trimester (%)	2nd trimester (%)	3rd trimester (%)
Anemia	133(82.60%)	103(62.42%)	98(63.22%)	103(63.19%)
Non-anemia	28(17.39%)	62(37.57%)	57(36.77%)	60(36.80%)
Total	161(100%)	165(100%)	155(100%)	163(100%)

Table 4: Anemia according to WHO classification

	Non-pregnant (%)	1st trimester (%)	2nd trimester (%)	3rd trimester (%)
Mild	58(43.60%)	76(73.78%)	70(71.42%)	82(79.61%)
Moderate	75(56.39%)	27(26.21%)	28(28.57%)	21(20.38%)
Severe	00	00	00	00
Total	133(100%)	103(100%)	98(100%)	103(100%)

was a significant reduction in the prevalence and severity of anemia in India.[18] Under the National Nutritional Anaemia Prophylaxis Programme (NNAPP) all age groups, children aged 6-59 months, 5-10 year, adolescents aged 10-19 year, pregnant and lactating women and women in reproductive age group are given iron and folic acid supplement daily for 100 days. According to NFHS-4 30.3% pregnant women taken full 100 day course of iron folic acid supplement. The effective implementation of the National Nutritional Anaemia Prophylaxis Programme (NNAPP) and The National Anemia Control Programme (N.ACP) are the main reasons for overall improvement of the anemia status in the pregnancy.[3,18]

The most striking result in the present study was high prevalence of anemia 133(82.60%) in non-pregnant women as compare to the pregnant women 304(62.93%). (Table 3). This indicate the effectiveness and impact of above programmes in pregnant women. But the negligence and less motivation among non-pregnant women may be resulted in such higher prevalence of anemia.

5. Conclusion

Pregnant as well as non-pregnant women in India are at higher risk of developing anemia. The various national programs aimed at prevention of anemia reduced the prevalence and severity of anemia in pregnancy. There is need of more attention towards non-pregnant women so that they can be prevented from developing anemia.

6. Conflict of Interest

None.

7. Source of Funding

None.

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