Original Research Article

High-Risk Screening for Anaemia among Pregnant Women and Its Correlation with Socio-Demographic Factors in Urban Areas of Northern India

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ABSTRACT

Background: Anaemia is one of the most important micronutrient deficiency disorder in India. Our community is still facing this challenging issue despite various efforts for running nutritional programmes by Government of India. Studies from urban areas of the State, Uttar Pradesh regarding anaemia during pregnancy are very few whereas the consequences are much more.

Objectives: To estimate the prevalence of anaemia among pregnant women and its association with the various socio-demographic determinants in urban areas of Kanpur.

Methodology*:* Cross-sectional study having total participants of 207 pregnant women was interviewed by pretested questionnaire followed by testing haemoglobin level in blood through Sahli's haemoglobinometer and collected data were analyzed using SPSS Version 21.0 & Microsoft Excel 2007.

Result: Out of 207 pregnant women 163 were anaemic.

Conclusion: A high prevalence of anaemia was observed which is 78.7%. Marriage and first pregnancy during adolescent age group, antenatal registration and iron folic acid supplementation during pregnancy were detected significant parameters contributing anaemia. Close monitoring and further evaluations must be needed for the existing nutritional health programmes.

Keywords: Anaemia, Pregnant women, Screening, Socio-demographic factors, urban areas.

INTRODUCTION

Anaemia is one of the most important micronutrient deficiency disorders not only in India but globally. It is an indicator of micronutrient malnutrition leading to poor health status among all age group particularly vulnerable to high risk group such as pregnant women. Our community is still facing this challenging issue despite various efforts for running nutritional programmes by Government of India. Studies from urban areas of the State, Uttar Pradesh regarding anaemia during pregnancy are very few although the consequences are much more. It has been estimated that globally anaemia is the third largest contributor to total disability-adjusted life years (DALYs) especially among women in reproductive age group (15–49 years). [1] Anaemia is a condition in which the number and size of red blood cells, or the haemoglobin concentration falls below an established cut-off value, consequently impairing the capacity of the blood to transport oxygen around the body. Anaemia reduces individual's well-being, cause fatigue and lethargy, and impairs

physical capacity and work performance and overall quality of life.

According to World Health Organization (WHO), hemoglobin level below 11 g/dl is labeled as anaemia during pregnancy and classified as mild (10.0-10.99 g/dl), moderate (7.0-9.9 g/dl), and severe (less than 7.0 g/dl) anaemia. The same criteria are used for diagnosing anaemia in pregnancy. [2] According to WHO, in developing countries the prevalence of anaemia among the pregnant women averages 56%. [3] According to another study, 52% of pregnant women in the developing world are affected [4] whereas in developed regions, it has been reported to be only 18%. [5] The data observed from National Family Health Survey-4 (NFHS-4) suggests that anaemia is widely prevalent in all age group and particularly high among the vulnerable group such as pregnant women aged 15-49 years, estimated to be around 50.3 %. [6] A study conducted among 7 states by Nutrition Foundation of India in the year 2006 had concluded that prevalence of anaemia among pregnant women was 84%. [7]

Anaemia increases the risk of maternal and neonatal adverse outcomes. There is a substantial amount of evidence showing that maternal anaemia during pregnancy can be associated with an increased risk of intrauterine growth retardation, low birth weight, preterm delivery, perinatal mortality and maternal mortality as well. [8-12] Worldwide it is estimated that about 20 percent of maternal deaths are caused by anaemia, additionally anaemia is responsible partly for 50 percent of all maternal mortality. [13] In a study having ten year audit, nearly 15% maternal mortality was found owing to anaemia. [14] Studies in India demonstrated that the high proportions of maternal deaths are due to anaemia in pregnant women. [15] Maternal anaemia are associated with risks of intrauterine growth retardation, short for gestational age, impaired motor and neurocognitive development of infants as well as preeclampsia, fatigue resulting in low productivity in pregnant mothers. [16,17] Following maternal anaemia, children suffering from anaemia may have numerous defects such as poor psychomotor development, performance, coordination, language development, psychological and behavioral impacts leading to impaired attention, feeling of insecurity, hyperactivity etc. [18]

MATERIALS AND METHODS

The present cross- sectional study was conducted among 207 pregnant women selected through house to house survey conducted among the systemic randomly selected families registered with urban field practice areas comprising of population about 34000, department of Community Medicine, Rama Medical College and Research Centre, Kanpur from April 2016 to March 2017.

Sample Size:
During pilot study, 17 pregnant women were found to be anaemic among 20, and 85% prevalence was assumed. The sample size was calculated using the following formula:

$(4\ p\ q)\ /\ L^2$, where p represents the prevalence i.e., 85%

$q = 100 - p = 100 - 85 = 15$; L is the allowable error (considered as 6% of the prevalence).

$(4 \times 85 \times 15) / (85 \times 6 /100)^2 = 200$. In the actual study, 207 pregnant women were selected.

The pregnant women were interviewed using pre structured, pretested interview schedule following a written consent. A demographic profile relating to their age at marriage and first pregnancy, registration to the health institution and intake of iron folic acid supplements in the present pregnancy were collected. Following this, hemoglobin estimation was done by Sahli's acid haematin method on the spot. Anemia was classified as per WHO criteria. Hemoglobin below 11 g/dl is labeled as anemia during Pregnancy. Mildly and moderately anaemic pregnant mothers were given Iron supplements whereas severely anemic

pregnant women were taken to Rama Medical College Hospital, Kanpur for further management.

Statistical Analysis

The collected data was compiled and tabulated using Microsoft Excel 2007 and then analyzed using SPSS Version 21.0. Group comparisons were done by Chi-square test. P-value less than 0.05 were considered significant.

RESULTS

Table 1: Frequency Distribution and percentage of pregnant women according to grading of anaemia

Grading of anaemia	Frequency		Percent	Prevalence of anaemia
Normal	44		21.3	
Mild anaemia	58		28.0	
Moderate anaemia	90	163	43.5	
Severe anaemia	15		7.2	
Total	207		78.7	78.7 %

Among 207 selected study subjects, 163 pregnant women were found to be anaemic. The overall prevalence of anaemia was 78.7% [Table: 1]. Among them, 58 (28%), 90 (43.4%), 15 (7.2%) were with mild, moderate and severe anaemia, respectively. It was found that majority of the antenatal women were moderately anaemic (43%). [Pie chart: 1]& [Table: 1].
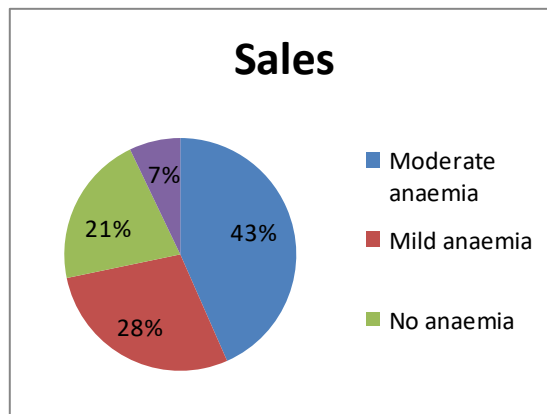
Pie Chart 1: Percentage of pregnant women according to grading of anaemia

Table 2: Distribution of anaemic pregnant women according to various socio-demographic parameters:

Age at marriage (Yrs)	Presence of anaemia		Total	Prevalence	
	Yes	No			P-value: 0.027
<20	68 (86%)	11 (14%)	79 (100%)	32.8%	χ^2: 18.81
20-25	77 (70%)	32 (29%)	10(100%)	37.2%	CI (95%): 2.13±0.15
26-30	18 (100%)	00 (0%)	18 (100%)	08.7%	OR : 0.18
≥31	00 (0%)	01 (100%)	01 (100%)	0.0 %	
Total	163(78.7%)	44(21.3%)	207(100%)	78.7 %	
Age at first pregnancy					
<20	38 (95%)	2 (5%)	40 (100%)	18.3%	P-value: 0.004
20-25	81 (72 %)	31 (27%)	11(100%)	39.1%	χ^2: 28.62
26-30	41 (85 %)	7 (15%)	48 (100%)	19.8 %	CI (95%):
≥31	03 (34 %)	4 (66%)	07 (100 %)	01.5 %	2.06±0.13
Total	163 (78.7%)	44 (21.3%)	207 (100%)	78.7 %	OR : 0.90
Registration at health institution					
No	27 (100%)	0 (0%)	27 (100%)	13.0%	P-value: 0.021
Yes	136(75.4%)	44 (24%)	180(100%)	65.7%	χ^2: 9.74
Total	163(78.7%)	44(21.3%)	207(100%)	78.7%	CI (95%): 1.69±0.04 OR : 0.15
Intake of Iron supplements					
No	32 (82%)	7 (18%)	39 (100%)	15.4%	P-value: 0.000
Occasional	46 (82%)	10(18%)	56 100%)	22.2%	χ^2: 30.8
Irregular	68 (87%)	10 (13%)	78(100%)	32.8%	CI(95%): 1.98±0.03
Regular	17 (50%)	17 (50%)	34(100%)	8.2%	OR : 1.45
Total	163(78.7%)	44(21.3%)	207(100%)	78.7%	

This study represents that proportions of adolescent marriages were about 38%, among them 86% were anaemic during the present pregnancy. 70% study subjects were found anaemic among those married at 20 yrs of age or above (P-value: 0.027, χ^2: 18.81) [Table: 2]. Meanwhile, the proportion of pregnant women having their first pregnancy during adolescent age were about 19 %, and among them 95 % were accounted as anaemic during the current pregnancy. Additionally, around 72% found to be anaemic among those having their first pregnancy at age between 20-25 yrs (P-value: 0.004, χ^2: 28.6) [Table: 2]. Thus both marriage and first pregnancy at adolescent

age seem to be associated with high prevalence of anaemia averaging 90%. Differences in the prevalence rates among the various age group were found to be statistically significant values respectively (P-value: 0.027; P-value: 0.004) in the study sample whereas to determine probability in the study population, the 95%Confidence interval were estimated respectively as 2.13±0.15 and 2.06±0.13 respectively.

In the population group In the present study, 14% of the respondents were remained unregistered and almost all of them were found to be anaemic. (P-value: 0.021, χ^2: 9.74 CI (95%):1.69±0.04) [Table: 2] 50% respondents with regular consumption of prescribed doses of iron supplements are found to be anaemic whereas more than 80% have been reported to be anaemic among those who are absolutely denying or either occasional or irregular intake of iron supplements. (P-value: 0.000, χ^2: 30.8, CI(95%): 1.98±0.03) [Table: 2]

DISCUSSION

Our present study revealed the overall prevalence of anaemia among pregnant women as 78.7% [Table: 1]. This result is found to be less than that of prevalence of anaemia during pregnancy in India, as per data of DLHS-3 (District Level Household and facility Survey-3), 2005, which had been estimated as 87%. [19] This high prevalence of anaemia is observed as similar to the earlier studies by Khan et al at rural communities attached with RHTC, Rama Medical College, Ghaziabad (January 2014) (80%), [20,21] by Piyush et-al (Jan - Mar 2014) at Index Medical College, Hospital (62.7%), [22] by Singh et al (2009) at Deharadun (65.5%). [23] "Indian Council of Medical Research (ICMR) Task Force Multicenter Study" revealed that the overall prevalence of anaemia among pregnant women from 16 districts was 84.9%. [24]

If we consider in terms of grading of anaemia, the present study revealed that among 163 anaemic pregnant women, only 58 (28%) were mildly anaemic, 90 (44%) moderately anaemic and only 15 (7%) were suffered from severe anaemia. It was found that majority of the antenatal women were moderately anaemic (43%) [Table:1], similar to earlier studies. [20,21] In an another study conducted by Judith et al in Udupi district, India, in the year 2008, overall prevalence of anemia found to be significantly less i.e. 50.1 %. Among which mild, moderate and severe anemia were estimated to be 63.5%, 35% and 1.5% respectively. [25] Results of one more study by Shah et al in 2012, showed that among 51 anaemic pregnant women, 9 (18 %) were mildly, 30 (58 %) moderately, 12 (34 %) severely anaemic. [26] A study by Lokare et al at Aurangabad city in the year 2012 , the estimated prevalence of anemia was significantly higher, 87.2% among which mild, moderate and severe anemia were 25%, 55% and 8% respectively. [27] Other Indian study by Sharma et al in 2013, reported that among 66 anaemic pregnant women, 40.92 % had mildly, 54.54 % moderately, and 4.54 % were severely anaemic. [28] A study by Prashant et al in 2017, Prevalence of anemia among pregnant women estimated as 72.75%; among which mildly, moderately and severely anemic mothers were 33%, 37% and 2% respectively. [29]

Regarding marriages during adolescent age, 86% were anaemic during the current pregnancy. 70% study subjects were found anaemic among those married at 20 yrs of age or above (P-value: 0.027, χ^2 : 18.81) [Table: 2]. Another study relating to age at marriage, conducted by Judith et al in Udupi district, India, in the year 2008, 60% pregnant women were anaemic amongst those married at age 18 years or below, which showed a slight declining pattern with increasing age at marriage, like averaging 50% among pregnant women married at age 19 or more. [25] Other study by Prashant et al in the year 2017, the mean age at marriage was 19.71+-2.073 years and subsequently the prevalence of anemia estimated as 72.75%. [29] Regarding age at first pregnancy in the present study,

proportion of pregnant women having their first pregnancy during adolescent age were about 19 %, and among them 95 % were accounted as anaemic during the current pregnancy. Additionally, around 72% found to be anaemic among those having their first pregnancy at age between 20-25 yrs (P-value: 0.004, χ^2: 28.6) [Table: 2]. Thus both marriage and first pregnancy at adolescent age seem to be associated with high prevalence of anaemia averaging 90%. Differences in the prevalence rates among the various age group were found to be statistically significant values respectively (P-value: 0.027; P-value: 0.004). In the study by Judith et al in the year 2008, estimated prevalence of anaemia was 55% among those getting pregnant first time at age before the completion of 21 years, and it was slightly reduced to 48% among those having the same at 21 or more years. [25] Another study by Prashant et al in 2017, the mean age at first pregnancy was 21.17+-2.479 years, and prevalence of anemia estimated as 72.75%. [29] Therefore, it could be said that with advancing age, the prevalence of anemia during pregnancy declines. Adolescent girls are at higher risk for developing anaemia as iron needs are high in adolescent girls owing to the increased requirements for expansion of blood volume resulting to the adolescent growth spurt and the onset of menstruation. [30] This is because there are impaired fulfillment for extra demand of nutrition for their own growth in addition to the nutritional needs during pregnancy. That is why, adolescent mothers are at increased risk to get anaemia. [31, 32]

The registration of pregnancy was inversely related to the presence of anaemia. The whole respondents (14%) who were unregistered, found to be anaemic. (P-value: 0.021, χ^2: 9.74) [Table: 2] According to the study conducted by Siddiqui et al in 2017, 43% of pregnant women had registered their pregnancy with ANM, 58% had taken nutrition advice at least once from either doctor or ANM, but only 17% had received supplementary nutrition. [33] A study by Idowu et al in Africa in the year 2005 shows that Women attending Traditional Birth Attendants for antenatal care were found to be more anaemic (81.2%) (Even at various trimesters of pregnancy) than those attending the hospitals (72.5%) (P<0.05). [34] Owing to lack of significant symptoms during pregnancy, firm belief over trained birth attendants or local dais, their traditional attitude, lack of transport facilities and financial support in families were the major reasons given by these women to have a negligent attitude towards booking themselves as well as irregular antenatal checkup.

More than 80% subjects have been reported to be anaemic among those who are absolutely lacking and either occasional or irregular intake of iron supplements as compared to 50% among prescribed iron user. (P-value: 0.000, χ^2: 30.8) [Table: 2] In randomised intervention studies conducted by Haider and Fernández-Gaxiola, Iron supplementation increases haemoglobin concentrations among those having baseline anaemia, by an average of 10·17 g/L for pregnant women [35] and by 8·64 g/L for non-pregnant women. [36] Imdad and Bhutta reviewed 30 selected studies and concluded that Iron supplementation during pregnancy significantly decreases the burden of anemia in pregnant women by 70 % and subsequently incidence of low birth weight by 20 %. [37] Conversely, study conducted by Zhou et al shows that routine iron supplementation in pregnancy has no effect on iron status of children at six months and four years of age. [17] Although the Centers for Disease Control and Prevention (CDC) recommends that all pregnant women begin a 30 mg/d Iron supplementation at the first prenatal visit, whereas the WHO suggests 60 mg/d of the same. However, British guidelines do not recommend Iron supplementation routinely in normal gestation. [38-40]

CONCLUSION

Still anaemia is a public health crisis. Curbing of anaemia is an important

component for women's health. Age at marriage and first pregnancy, registration to any health facility and consumption of iron folic acid supplements are the selected determinants that significantly contributing to the burden of anaemia according to this study. There is an inverse relationship established between anaemia and age at marriage and first pregnancy that status of anaemia declines remarkably with advancing age at marriage and first pregnancy and it is also statistically significant. Similarly, other variables like, registration to health facility followed by regularity of iron folic acid supplements also found accountable to anaemia and also statistically significant. .

We need focusing over the improvement of the general health status of pregnant women in our community not only at ante-natal, intra-natal and post-natal period but also prior to conception and even preferably to pre-marital stage. Apart from these activities, still we are facing with our traditional customs like child marriages or marriages during adolescent age group.

Recommendations

Consideration of grave consequences of anaemia, not only for individual level but focusing over intergenerational aspects of anaemia, which might adversely affect the efficiency and productivity of the country, there should be ideally an emphasis over high-risk group targeting especially to women in reproductive age group including adolescents paying an special attention at family level as well as at primary health care system. Since the morbidity and mortality rates associated with maternal and neonatal health are invariably high in developing countries, there is a great need for the identification of further more hidden determinants of anaemia and their corrections accordingly.

1. Nutrition interventions: Educating about foods having high iron bioavailability, including animal products for wide coverage of both haem and nonhaem iron sources.
2. Awareness about promotion of kitchen garden and cooking practices might be beneficial in preventing anaemia.
3. Promotion of fortification of staple foods and condiments.
4. Efforts should be made more towards adolescent health, delaying the age for nuptiality,
5. Registration to any health facility and consumption of supplementary iron doses as prescribed.
6. Iron supplementation with folic acid and other micronutrients especially ascorbic acids acting as iron absorption promoters.
7. Avoidance of iron absorption inhibitors like tannin, phytates etc. with iron rich sources or supplements.
8. Improving socio-economic status, maintaining sanitation,
9. Several strategies like Behavior Change Communications (BCC) and Information, Education and Communication (IEC), awareness about the facilities provided by government to the high risk group should be recommended by the active participation of our health workers team.
10. Close monitoring and further evaluations must be needed desperately for the existing health programmes like National Iron Plus Initiative (NIPI) as well as Twin Fortification.

Certainly, these measures would be more helpful for curbing this important challenging global health issue.

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