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IRON DEFICIENCY ANAEMIA AND ITS PREDISPOSING CAUSES AMONG WOMEN UNDERGOING ANTENATAL CHECKUP AT A TERTIARY CARE HOSPITAL IN ALLAHABAD

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ABSTRACT

Background: Anaemia is a major health problem affecting about 50% of pregnant women and associated with poor pregnancy outcome.

Objective: To know the prevalence of iron deficiency anemia in pregnancy and its determinants

Method: A hospital based cross sectional study was carried out among 400 pregnant women aged >16 years &≤ 45 years with singleton pregnancy attending antenatal care clinic at a tertiary care hospital in Allahabad over a period of 1 year 8 months.

Result: About 75% of pregnant women were anaemic (Hemoglobin level < 11mg/ml) with about 14.5% being severely anaemic. Moderate anaemia was most common. A significant difference ($p<0.001$) was observed between anaemic and non-anaemic pregnant women with respect to educational status, socioeconomic status & parity of women. Proportion of anaemic women was higher in age groups <20 years, joint families, women with vegetarian diet. History of menstrual irregularities and prolonged cycles (length of flow >6 days) was reported in significantly higher proportion of anaemic women as compared to non-anaemic women.

Conclusion- Intensive Information Education & Communication on prevention of anaemia and economic upliftment of women, along with delayed 1st pregnancy, adequate gap between successive childbirth is the key to reducing anaemia in pregnancy and its impact.

Keywords: Iron Deficiency Anaemia, women, antenatal, tertiary care hospital

INTRODUCTION

Anaemia (i.e. Hb <11 g/dl) is a major health problem that affects 25-50 percent of the population globally and about 35-75% pregnant women in developing countries.[1-2]. As per National Family Health Survey-3, prevalence of anaemia was found to be around 57.9% among pregnant women in India[3].

During pregnancy the risk for developing iron deficiency anaemia is highest, because of expansion of blood volume and demand of the growing foetus. During pregnancy, approximately 990 mgs of iron is required. In terms of daily needs, this approximates 4-6 mg/d in second trimester and 6-8 mg/d in third trimester. Iron deficiency is one of the most important cause of nutritional anemia in pregnancy. In India, Iron deficiency anaemia affects an estimated 50 % of the population[4]. It is a major risk factor for poor pregnancy outcome and is responsible for about 20% of all maternal death in India. Iron deficiency anaemia results in in-

creased risk of premature delivery and low birth weight. Iron deficiency in late pregnancy also results in poor iron stores in the fetus.

Prevalence of iron deficiency anaemia in pregnancy in Indian subcontinent has been found to be dependent on factors such as maternal nutrition, maternal age, parity, socio-economic background and iron intake[5]. A recent study by Noronha *et al. r*eported maximum and minimum prevalence rates of anaemia during pregnancy to be 80% and 18% respectively. The maximum and minimum prevalence of severe anomia affecting pregnant women was 20% and 2.7%. Young age, poor educational status and socio economic status, poor birth spacing and lack of compliance to iron and folic acid supplementation were the major risk factors. It showed anaemia was prevalent from mild to severe degree with substantial variations across trimesters.[6]

Given its wide prevalence among pregnant women, knowing the regional prevalence of iron deficiency anemia and its determinants is an important issue with wide impact. This study was done to assess the prevalence of iron deficiency anemia in pregnancy and its determinants to pave way for better management of pregnancy.

METHODOLOGY

The present study is a hospital based cross sectional study carried out among pregnant women attending antenatal care clinic at a tertiary care hospital in Allahabad. The study was carried out over a period of 1 year 8 months (May 2011- Dec 2012). Pregnant women aged >16 years &≤ 45 years with singleton pregnancy were enrolled for the study after taking informed consent. Cases suffering from any chronic illness (e.g. chronic liver disease, renal disease etc), known cases of anaemia due to any cause, cases with haemoglobinopathy, subjects on vitamin B12, Folic acid supplementation were excluded.

A sample of 375 was calculated, taking the prevalence of anaemia among pregnant women in India as 57.9% (As per NFHS-3), with 95% confidence & 5% absolute precision using the formula $3.84pq/d^2$. A predesigned structured schedule was used to record general information, obstetric/ menstrual /medical/dietary history and general /systemic & obstetric examination findings.

Venous blood was obtained from the anti-cubital vein with a sterile 20-gauge, 1-inch needle and transferred partly into a test-tube containing EDTA anticoagulant and partly to a sterile tube for separation of serum. Simultaneously peripheral blood smears were prepared with fresh blood. Sample was transported as early as possible to the laboratory for processing in cold container. Haemoglobin estimation was done by Automated Analyser. Serum Iron and Total iron binding capacity were estimated by IRON AND TIBC KIT *(*Ferrozine method) from fasting blood sample.[7]

A subject was considered to have iron deficiency anaemia, if haemoglobin level was below 11g/dl with Serum Iron level <30 ug/dl and/or serum TIBC>400 ug/dl. Subjects confirmed to have iron deficiency anaemia were classified as mild, moderate & severe as per WHO recommendations.[8] The subjects were followed up till the outcome of pregnancy. Data collected was analysed in terms of mean, standard deviation, chi square test & ANOVA using MS-Excel software and SPSS 21 trial version.

RESULTS

Table 1 shows the anaemic status of pregnant women. A total of 400 women, who attended the antenatal clinic and delivered at the study site were enrolled in the study. About 75% of pregnant women were found to be anaemic (Hemoglobin level < 11mg/ml) with about 14.5% being severely anaemic. Haemoglobin level ranged from 4.5 to 13.5 mg/ml with a mean of 9.51±2.07 & serum iron µg/dl ranged from 10.3 -85.4, with a mean of 41.10 ± 20.6. Among the anaemic women majority had moderate anaemia. Serum Iron levels ranged from 10.3 to 85.4 µg/dl with a mean of 41.10±20.57. A total of 164 (41%) women had Serum Iron levels <30 µg/dl.

Table 1: Prevalence of Anaemia among pregnant women

Characteristic	Women (%)
Non-Anemic	100 (25)
Anemic (Hb <11 g/dl)	300 (75)
Mild (Hb- 10.0 to 10.9 g/dl)	114 (28.5)
Moderate (Hb-7.0 to 9.9g/dl)	128 (32)
Severe (Hb -<7.0 g/dl)	58 (14.5)

Table 2: shows the major contributory factors in the development of anaemia. Proportion of anaemic women was higher in age groups <20 years (12.3%) and 31-35 years (22.7%). However, no significant association was observed between age and occurrence of anaemia in pregnancy.

Prevalence of anaemia was found to be higher among illiterate women. While only 7% of non-anaemic women were illiterate and educated upto primary level, this proportion was 36% in anaemic women. In contrast, only 34% of anaemic women were educated upto higher secondary or above as

compared to 77% of non-anaemic women. A statistically significant difference (p<0.001).was observed between anaemic and non-anaemic pregnant women with respect to educational status.

A significantly higher proportion of anaemic women belonged to joint families (88%) as compared to non-anaemic women (58%).

A statistically significant difference (p<0.001) was observed between anaemic and non-anaemic pregnant women with respect to socioeconomic status. Higher proportions of anaemic women (31%) were from lower socioeconomic class as compared to non-anemic women (1%). In contrast. Only 8.7% of anemic women were from upper middle and upper classes as compared to 50% of non-anemic women.

The proportion of anaemic women preferring a non-vegetarian diet (18%) was lower as compared to non-anemic women (24%). However, no significant difference was observed between anaemic and non-anaemic women with respect to preference for non-vegetarian diet.

Table 2: Major contributory factors in the development of anaemia

Factors	Total (n=400) (%)	Non anaemic (n-100) (%)	Anaemic (n-300) (%)	χ^2	p value
Maternal age (Years)					
<20	42 (10.5)	5 (5.0)	37 (12.3)	10.770	0.056
21-25	57 (14.3)	17 (17.0)	40 (13.3)		
26-30	160 (40)	41 (41.0)	119 (39.7)		
31-35	84 (21)	16 (16.0)	68 (22.7)		
36-40	30 (7.5)	12 (12.0)	18 (6.0)		
>40	27 (6.8)	9 (9.0)	18 (6.0)		
Education					
Illiterate	47 (11.8)	5 (5.0)	42 (14.0)	65.910	<0.001
Primary	68 (17.0)	2 (2.0)	66 (22.0)		
Secondary	106 (26.5)	16 (16.0)	90 (30.0)		
Higher secondary	112 (28.0)	41 (41.0)	71(23.7)		
Graduate	67 (16.8)	36 (36.0)	31 (10.3)		
Family type					
Joint	322 (80.5)	58 (58.0)	264 (88.0)	43.00	<0.001
Nuclear	78 (19.5)	42 (42.0)	36 (12.0)		
Socioeconomic status					
Lower	94 (23.5)	1 (1.0)	93 (31.0)	127.31	<0.001
Lower Middle	124 (31.0)	43 (43.0)	81 (27.0)		
Upper Lower	106 (26.5)	6 (6.0)	100 (33.3)		
Upper Middle	62 (15.5)	38 (38.0)	24 (8.0)		
Upper	14 (3.5)	12 (12.0)	2 (0.7)		
Dietary preference					
Non-vegetarian	78 (19.5)	24 (24.0)	54 (18.0)	1.720	0.190
Vegetarian	322 (80.5)	76 (76.0)	246 (82.0)		

Table 3:- Occurrence of anaemia with respect to parity.

Parity	Total (n=400) (%)	Non anaemic (n-100) (%)	Anaemic (n-300) (%)	χ^2	P
0	100 (25%)	48 (52.0)	52 (17.3)	43.882	<0.001
1	163 (40.8%)	36 (36.0)	127 (42.3)		
2	96 (24.0%)	14 (14.0)	82 (27.3)		
3	35 (8.8%)	1 (1.0)	34 (11.3)		
4 or above	6 (1.5%)	1 (1.0)	5 (1.7)		

Table 4: Occurrence of Anaemia with regards to previous menstrual history

Previous Menstrual History	Total (n=400)	Non-Anemic (n=100)	Anemic (n=300)	χ^2	P
H/o Menstrual irregularities	34 (8.5)	1 (1.0)	33 (11.0)	9.643	0.002
H/o Short cycle (<21 days)	11 (2.8)	0	11 (3.7)	3.770	0.052
H/o long cycle (>35 days)	2 (0.5)	0	2 (0.7)	0.670	0.413
Length of flow <3 days	2 (0.5)	1 (1.0)	1 (0.33)	0.670	0.413
Length of flow >6 days	14 (3.5)	0	14 (4.7)	4.836	0.028

Table 3 shows the occurrence of anaemia with respect to parity status of women. Increasing parity was found to be associated with occurrence of anaemia. It was observed that 40.3% of anaemic women were para 2 or above as compared to 16% of non anaemic women while almost half (48%) of non-anaemic women were nulliparous as compared to 17.3% of anemic women. A statistically significant difference was observed with regards to the parity status of anaemic and non-anaemic women.

History of menstrual irregularities was reported in significantly higher proportion of anaemic women (11%) as compared to non-anaemic women (1%) (p=0.002). On exploring further, prolonged cycles (length of flow >6 days) was also found to be significantly associated with occurrence of anaemia (p=0.028).

DISCUSSION

Prevalence of iron deficiency anaemia among pregnant women attending the antenatal clinics in the present study was 75%. According to a WHO estimate the prevalence of iron deficiency anaemia in pregnant women in India has been reported to be ranging between 65-75%[9]. One of the reasons for this relatively high incidence in our findings could be the fact that our set up is a tertiary care set up where the facilities are availed generally by lower and middle income group patients. Most of the times these patient visit our facility after referral from primary or secondary healthcare service provider. It might be possible that most of these women would have been suspected of nutritional deficiency on the basis of physical and clinical examination and hence been referred to our facility, thus leading to a relatively higher prevalence of iron deficiency anaemia. The findings in present study are in accordance with the observations made by Agarwal et al where the prevalence of iron deficiency anaemia has been reported to be an average of 84% based on the data of seven states[10].

Maximum number of anaemic cases (32%) in present study had moderate anaemia. The prevalence of severe anaemia was least (14.5%). These findings are similar to the findings of Agarwal *et al.* who also observed prevalence of moderate anaemia to be maximum (50.9%) followed by mild (34%) and severe anaemia (7.3%) [10]. Studies from neighbouring countries also indicate that moderate category of anaemia is more common among pregnant women as compared to other categories. Taseer *et al.* in his work encountered only mild and moderate anaemia cases and no severe anaemia case. Majority of pregnant women with iron deficiency had moderate category of anaemia[11].

In the present study prevalence of anaemia was maximum in age group <20 years. The incidence of iron deficiency anaemia among adolescent girls in India has been reported to be about 65 to 75 percent[12]. Early marriage and teenage pregnancy complicates the things further[13]. Puberty menorrhagia, inadequate diet and growth spurt are other factors responsible for adolescence anaemia.

In our study, a significant association was observed between low educational & socioeconomic status of women and prevalence of iron deficiency anaemia during pregnancy. Iron deficiency anaemia was more common among those who were illiterate or educated only up to primary level. Association between anaemic status and socioeconomic strata also showed a similar trend with decreasing prevalence of iron deficiency anaemia with improvement in socioeconomic status. In our study 98.9% women in lower socioeconomic strata had iron deficiency anaemia as compared to 14.3% women in upper socioeconomic strata. These findings are in agreement with the findings of previous studies where lower socioeconomic strata were found to have higher risk of anemia[5]. Noronha et al. also found young age, educational status and socioeconomic status, poor birth spacing as the factors responsible for iron deficiency anaemia in pregnancy[6]. Women in lower socioeconomic strata have limited access to nutritious diet and they generally keep on normal diet and normal activity schedule despite in pregnant state. Ignorance, poverty and gender bias significantly contribute to this high prevalence.

In the present study prevalence of anaemia was higher amongst vegetarians (76.4%) compared to non-vegetarians (59.8%). It can be attributed to the fact that in India, most of the population is vegetarian and foodstuffs of Indian diet contain significant amount of phytates, phosphates, oxalates and tannates, which form insoluble complexes with iron and reduce iron absorption. In the event of pregnancy, the iron demands increase and the vegetarian diets are unable to fulfil the requirement, especially during the latter stages of pregnancy.

In the present study parity of women was significantly associated with occurrence of anaemia in pregnancy. It was observed that in nulliparous and primipara women (P0 and P1), the prevalence of iron deficiency anaemia was only 52% and 77.9% respectively as compared to 85.42% and 97.1% among Para 2 and Para 3 women. Higher parity and lower birth spacing have been shown to be contributory factors towards iron deficiency anaemia during pregnancy. Women having high parity have increased susceptibility to haemorrhage and thus greater risk of iron deficiency anaemia.[14] In a healthy pregnancy, hormonal changes lead to an

increase in plasma volume which causes reduction in haemoglobin level. Compared to the non pregnant state, every pregnancy carries an increased risk of haemorrhage before, during, and after delivery. Therefore, higher parity exposes women more frequently to risk of haemorrhage. In our study, history of menstrual irregularities, especially longer length of flow was also found to have a significant association with prevalence of iron deficiency anaemia during pregnancy.

CONCLUSION

Anaemia is very common in pregnancy in our region with about 3/4th of the women being anaemic and about 1/5th of anaemic women being severely anaemic. Joint family, low socioeconomic status, illiteracy, high parity & menstrual irregularities (prolonged cycles with length of flow >6 days) were important predisposing causes.

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