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## Research Article

# Correlations of adherence to iron supplements and prevalence of anemia in antenatal women

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## ABSTRACT

**Background:** The prevalence of anemia in pregnant women has remained unacceptably high worldwide despite the fact that routine iron supplementation during pregnancy has been almost universally recommended to prevent maternal anemia. The major problem with iron supplementation during pregnancy is compliance. The objective of this study was to correlate iron supplements compliance among pregnant women and incidence of anemia during pregnancy.

**Methods:** A Prospective observational study was conducted over a period of nine months from August 2015 to April 2016 in the department of obstetrics and gynecology, Bharati Hospital and Research Center, Pune. Pregnant women more than 14 weeks who attended antenatal care unit were enrolled in this study. Data for compliance was collected by two methods - first by personal interview as well as looking for the empty iron tablet strips. Pregnant women were followed till the date of delivery and maternal outcome were noted.

**Results:** Our results show that 64% were strictly compliant, 33% with partially complaint and 3% with non-complaint with iron supplements. The mean Hemoglobin concentration of pregnant women who strictly complies with iron supplements were 11.6 g/dl where the non-compliant and partially complaint to iron supplements were 9.7 g/dl. The prevalence of anemia was found to be more in partial and non-compliant to iron supplements (13% p value <0.001).

**Conclusions:** Anaemia, low haemoglobin levels were found more in non-complaint and partially complaint pregnant women. The findings from our study highlighted that antenatal health and a nutritional intervention program for pregnant women is needful.

**Keywords:** Pregnancy Outcome, Knowledge, Awareness, Compliance of iron supplementation

## INTRODUCTION

Iron deficiency in pregnant women influences the quality of life and productivity of mother and fetus. Iron requirements increase notably during the second half of pregnancy because of the expansion of the red blood cell mass and the transfer of increasing amounts of iron to both the growing fetus and the placental structures. The degree to which these increased requirements can be met

depends on the size of iron stores at the start of pregnancy and on the amounts of dietary iron that can be absorbed during pregnancy.

This amount of absorbed iron needs cannot be met from food iron even if iron fortification is in place. The fact that iron deficiency anemia frequently develops in pregnancy indicates that the physiologic adaptations are often insufficient to meet the increased requirements. As

a result, iron supplementation during pregnancy is a common practice throughout the world.<sup>1</sup>

Iron supplementation regimens in pregnancy vary depending on the characteristics of the population. In developed countries most women enter pregnancy with normal hemoglobin concentrations and variable amounts of stored iron. In contrast, large numbers of women in developing countries are anemic at the onset of pregnancy. Moreover more than one third of Indian women have a body mass index (BMI) <18.5 kg/m<sup>2</sup>, reflecting chronic energy and micronutrient deficit.<sup>2</sup> Prenatal iron supplementation is not compulsory in many industrialized countries and the recommended dose is often small (30 mg ferrous iron daily), but has been as high as 240 mg/d in developing countries, for example, India. In 1989 the World Health Organization (WHO) recommended universal supplementation of all pregnant women with 60 mg ferrous iron twice daily in populations where gestational anemia is common and once daily in populations where overall iron nutrition is better.<sup>1</sup>

Side effects from iron absorption are significant in pregnancy, and include nausea, diarrhoea and/or constipation. It is probably more important to avoid iron supplementation in early pregnancy if these side effects are significant. So the purpose of our study is to correlate between adherence to iron supplements and prevalence of anemia in pregnant women.

## METHODS

Prospective observational study was conducted over a period of Nine months from August 2015 to April 2016 in the department of obstetrics and gynecology, Bharati Hospital and Research Centre. Pregnant women attending antenatal care unit who were more than 14 weeks and above and accepted to participate in this study were included in this study. Pregnant women less than 13 weeks, high risk pregnancies, pregnant women with haemolytic anemia, hemoglobinopathies, multi-fetal pregnancy, non-consented and pregnant women who planned delivery outside Bharati Hospital were excluded from study. Ethical approval was obtained for the study from the ethics committee of Bharati Medical College and Research centre, Pune. Pregnant women were recruited from August to October 2015. The data collected during recruitment phase was the demographic information, obstetric history, past medical history, medication history, knowledge about iron supplements and knowledge about iron importance in pretested, semi-structured proforma. The study subjects were followed till the date of delivery. Compliance to iron supplements was assessed from 20 weeks to 36 weeks of pregnancy. The monitoring of subjects' compliance was done monthly through an inventory of the remaining iron tablets left in the strip. The strips returned by them during the pre-natal check-up were collected for the counting and recording of any remaining iron tablets in the strip.

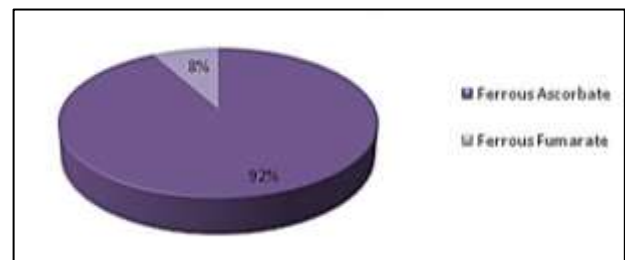
Definition of compliance to iron supplementation was adapted from the study from 'Riyadh, Saudi Arabia'.<sup>2</sup> Thus, assessment of compliance depended on the participants' questionnaire responses about their use of iron supplementation during the preceding 4 months of pregnancy. Supplementation compliance was divided into one of three categories:

- Strictly compliant
- Partially compliant
- Non-compliant.

Pregnant women who reported regular use (once daily) for the preceding 4 months of pregnancy and not missing any dose per week were considered as strictly complying with supplementation guidelines. Pregnant women who followed iron supplementation guidelines regularly but for <4 months or irregularly for 4 months were considered as partially compliant. Pregnant women who admitted to using iron supplementation for <1 month or who had not used iron supplementation at any time during the preceding 4 months of pregnancy were considered non-compliant. Haemoglobin levels were extracted from the medical records for the first antenatal visit (before 13 weeks' gestation) and follow up visit. Findings were described by using proportions and percentages. Chi square test was performed to determine association of compliance level and incidence of anemia during pregnancy.

## RESULTS

The highest numbers of pregnant women were in the age group of 23-27 years (49.0%). Out of 100 pregnant women, 64% were Multigravida, 63% have done primary schooling, 87% were homemaker and 63% were vegetarian (Table 1). Out of 100 pregnant women 92% were prescribed with Ferrous ascorbate and 8% were prescribed with Ferrous fumarate (Figure 1).



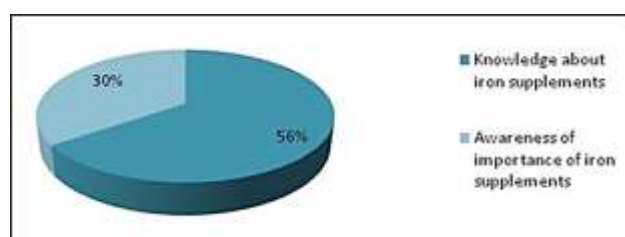
**Figure 1: Prescription pattern of iron preparations.**

The 56 % pregnant women had good knowledge of iron supplementation in pregnancy, whereas 30% had awareness about importance of iron supplements (Figure 2). The overall compliance towards consumption of Iron supplements was 64.0% (Figure 3). The mean haemoglobin of pregnant women complaint to iron supplements were 11.6 mg/dl and partially and non-compliant were 9.7 mg/dl (Table 2). The main reason for

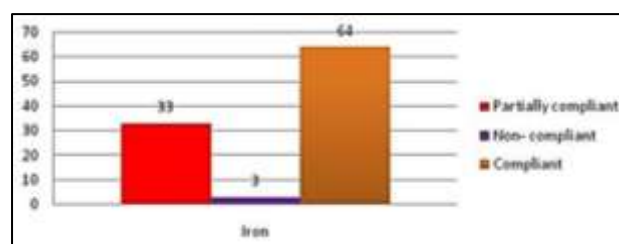
noncompliance to the iron supplement was vomiting (48.8%), nausea (44.4%) followed by forgetfulness (30.50%) (Figure 4). The correlation between patients' socio-demographic and compliance to iron supplements indicated that higher prevalence of compliance among the age group of 18 - 22 years (73.3 %), primigravida (75.0%), graduate (63.3%), homemakers (62.1%), who live in urban area (67.7%) and women with knowledge about iron supplements (Table 3).

**Table 1: Socio-demographic characteristic of pregnant women.**

Characteristics	Number of pregnant women	Percentage (%)
<b>Age (years)</b>		
18-22	30	30
23-27	49	49
28-32	16	16
>32	5	5
<b>Gravida</b>		
Primigravida	36	36
Multigravida	64	64
<b>Education</b>		
No schooling	1	1
Primary schooling	63	63
Graduate	30	30
Post-graduate	6	6
<b>Employment status</b>		
Employed	13	13
Homemaker	87	87
<b>Dietary habits</b>		
Vegetarian	63	63
Mixed	37	37



**Figure 2: Frequency distribution of knowledge among study objects about supplement.**



**Figure 3: Frequency of distribution of compliance of study population with iron supplements.**

**Table 2: Co-relation of compliant to iron supplements and maternal outcomes.**

Characteristics	Compliant	Partially compliant and non-compliant
<b>Maternal outcome</b>		
Mean Hb (mg/dl) during pregnancy	11.6	9.7
	<b>Number of pregnant women</b>	
Anemia during pregnancy	2	13
	<b>P value</b>	
	<0.001*	



**Figure 4: Factors influencing compliance level with iron supplementation.**

**Table 3: Association of compliance to iron supplements to its determinants among subjects.**

Characteristics	Complaint	Partially compliant	Non compliant
<b>Age (in years)</b>			
18-22 years	22	8	0
23-27 years	29	17	3
28-32 years	9	7	0
>32 years	3	2	0
<b>Gravida</b>			
Primigravida	27	9	0
Multigravida	36	25	3
<b>Education</b>			
No Schooling	0	0	1
Primary schooling	12	49	2
Graduate	19	11	0
Post-graduate	2	4	0
<b>Employment status</b>			
Employed	9	4	0
Homemaker	54	30	3
<b>Place of residents</b>			
Rural	5	8	0
Urban	58	26	3
Women have Knowledge of iron supplements	53	3	0

## DISCUSSION

Prenatal micronutrient supplementation is indicated for all pregnant women, because some nutrient requirements,

particularly iron and folic acid, are more difficult to achieve than others through food sources. For this reason, supplements with these nutrients are recommended in addition to improved diets. Taking into account supplements folate and iron intake was on average in accordance with recommendations however only around one third of all subjects met the demand for both nutrients. Most cases of anaemia during pregnancy are caused by iron deficiency; however, it is also associated with folate deficiency.<sup>3</sup>

Oral iron supplement treatment resulted into a significant progressive improvement in iron level in the pregnant women. The treatment with oral iron preparations improves availability of elemental iron for that improves anemia. In present study the ferrous ascorbate (92%). This finding were similar with the study conducted in Raja Rajeswari Medical College and Hospital (Basavaraj Bhandare) which showed that Ferrous ascorbate was the most commonly prescribed iron preparation (42%).<sup>4</sup>

We have assessed compliance of iron supplements during pregnancy. In our study, out of 100 pregnant women 64% were strictly compliant to iron supplements which were higher as compared to study in South India in which compliance was 58.1%. In another study in Egypt Esraa et al compliance to Iron pills found was 54%.<sup>5</sup>

The major barrier for noncompliance with iron supplement was Vomiting (52.7%), Nausea (44.4%), forgetfulness (30.5%) and this was in contrast with the results of study conducted in Ismailia, Egypt Esraa et al in which the major barriers to compliance to iron supplementation include constipation 76.1%, non-affordability 13.04% and forgetfulness 10.87%.<sup>5</sup> Another study conducted in Enugu, Southeastern Nigeria Ugwu, et al in which the major barriers to compliance to iron supplementation was gastrointestinal side effects of iron supplements (41.7%), non-affordability of iron supplements (28.3%) and forgetfulness (15%).<sup>6</sup>

The study shows that the incidence of anemia among subject who did not comply with the supplementation was significantly higher compared to complaint. 13% of pregnant women who did not comply with the supplementation were having anemia (p value <0.001). This was different with the study conducted in Malaysia Thirukkanesh S et al in which 84.5% women were anemic out of which 34.5% were compliant with iron supplements 50% women were non-compliant with iron supplement.<sup>7</sup> The study conducted in Sidi Bel Abbes Region, Algeria (Benali AI) showed that only 7% women were present with anemia.<sup>8</sup> Compliance with iron supplementation plays a major role in the prevention and treatment of iron deficiency anemia particularly among pregnant women whose iron requirement starts at the second trimester and progresses until the third trimester.

The correlation between patients' socio-demographic and compliance to iron supplements indicated that higher

prevalence of compliance among the age group of 18-22 years, primigravida (75.0%), and graduate, home makers. Education increases the knowledge which develops the awareness leading to increase in compliance with supplements and decrease the risk of poor health outcomes in both mother and their children like maternal and perinatal mortality.

In present study majority of pregnant women (99%) were educated while another study reported in the Wollega Zone, Ethiopia (Daba G) majority of respondents were illiterate (65.4%).<sup>9</sup> Majority participants in this study were multigravida. Multigravidas have higher risk of calcium and iron deficiency as with increasing parity decreases their iron and calcium status. In our study multigravida were found to be noncompliant to iron supplements. Also successive deliveries at short interval will make women more deficient.

Women who had higher knowledge of iron folate tablets were more likely to be compliant compared to those who had poor knowledge. The reason could be knowledge helps women to have a good awareness of benefits of taking iron tablets. This study showed that 56% women were having the knowledge of iron supplements out of which only 30% women were aware about iron supplements and this was different from a study conducted in Ismailia, Egypt Esraa et al and has revealed that the knowledge and awareness about importance of iron supplement was 95%.<sup>5</sup>

The study conducted in Malaysia Thirukkanesh S et al revealed that 3.4% women were not having the knowledge on supplement intake.<sup>7</sup> In regard to schooling, more educated patients were more adherent to iron supplements. Place of residence is important determinant where 67.7% patients of urban had shown higher rate of adherence compare to rural area. There is a significant relation between education, knowledge and compliance with the iron supplements.

## CONCLUSION

Overall compliance to iron supplement was 64.0%. The main factors associated with non-compliance to iron supplements were vomiting, nausea, constipation, stomach pain, forgetfulness and fasting. The haemoglobin concentration of pregnant women who complies with iron supplements is significantly higher than the non-compliant women. The prevalence of anemia was found to be more in partial and non-compliant pregnant women taking iron supplements. The findings from our study highlighted that antenatal health and nutritional intervention programs for pregnant women are needful.

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