



## COMPLIANCE OF IRON SUPPLEMENTATION DURING PREGNANCY AND FACTORS EFFECTING COMPLIANCE.

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## INTRODUCTION

Iron is an essential element and required for the appropriate functioning of hemoglobin. It is involved in oxygen transport, cytochromes, the mitochondrial electron transport chain and cellular metabolism. It is involved in important functions with catalases and peroxidases involved in redox reactions. Metallo-proteins also contain iron which is essential for DNA synthesis, steroid and hormones synthesis, cell proliferation, gene regulation and differentiation, neutrophil respiratory burst of phagocytosis and drug metabolism.<sup>1</sup>

In the same way, in pregnant women demand for iron increase evenly throughout gestation. The need for iron varies considerable during

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**ABSTRACT... Objectives:** This study aims at measuring compliance to iron supplements because iron deficiency anemia (IDA) is worldwide problem among pregnant women, so Iron supplements are advised usually in once daily regimen but compliance to iron supplements therapy is a major problem due to possible side effects and long-term duration of therapy. **Study Design:** Retrospective questionnaire-based study. **Setting:** Mola Bakhsh Hospitals, Sargodha, Pakistan, **Period:** From February to December, 2018. **Material & Methods:** This study was design to check compliance to iron supplementation during pregnancy and various factors related to directly and indirectly noncompliance to iron supplementation. A total of 267 pregnant females were recruited in study. Data was collected through a questionnaire translated in local language. On this basis sample population was divided into three groups compliant, partially compliant and non-compliant major factors associated with the prevalence of anemia and non-compliance to iron supplements were education, side effects, financial issues, forgetfulness, personal beliefs, disliking of pharmaceutical preparation etc. **Results:** After thorough analysis it was found that iron deficiency anemia is prevalent in about 64% of females in the third trimester. Improvement in Hb level in third trimester compared to 1<sup>st</sup> trimester was taken as parameter for measurement of compliance. **Conclusion:** side effects due these iron supplements and certain human habits act as hurdle to fight anemia during pregnancy and to eradicate these hurdles certain steps like education of women about anemia, its causes, health implication and imparting nutritional education with special emphasis to improve dietary intake of proteins and iron.

**Key words:** Anemia, Compliance, Hemoglobin, Iron Supplements, Pregnancy.

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each trimester of pregnancy. As menstruation stops during first trimester consequently iron requirements decrease, which shows saving of 0.56 mg Fe/d (160 mg/pregnancy).<sup>2</sup>

In second trimester, requirements for iron increase and continue during whole pregnancy. The hematologic changes lead to increase oxygen consumption by both mother and fetus. As pregnancy proceeds iron requirements for fetal development increase steadily in proportion to the weight of the fetus as, with most of the iron accumulating during the third trimester.<sup>3</sup>

Balance of iron can be maintained throughout the pregnancy if there are sufficient iron stores at the beginning of pregnancy. When a woman normally

takes an iron containing diet, a pre-pregnancy iron store of 300 mg may be enough to carry her pregnancy, If the diet contains less iron than optimal value than more iron store is needed.<sup>4</sup>

The World Health Organization (WHO) recommends that hemoglobin (Hb) preferably should be maintained at or above 11.0 g/dl, and it should not be allowed to decrease below 10.5g/dl during second trimester of pregnancy.<sup>5</sup>

In pregnancy anemia is one of the most serious health problems for both mother and child. It is associated with heart failure, reduced immune response, intrauterine growth retardation and maternal and perinatal mortality. Half of the pregnant women in developing countries are effected by anemia. There are many factors which cause anemia in pregnancy, the main causes are hemorrhage, nutritional deficiencies, infestations, infections, malaria, AIDS/ HIV infections, hemoglobinathies, sickle cell disease, and intestinal parasitosis.<sup>6</sup>

According to Health Survey and Pakistan Demographics 2006-07, maternal mortality was revealed to be high with 276 deaths per 100,000 live births as compare to 1 in 8,000 in the developed countries. Among 89 Pakistani women one dies due to the complications of child birth.<sup>7</sup>

Strategies to prevent anemia in pregnancy in developing countries usually focus on iron and folic acid supplementation in antenatal care, malaria chemoprophylaxis and also anthelmintic treatment may have beneficial results. Main problem with iron supplementation during pregnancy is compliance, due to various factors women often fail to take the iron supplements regularly as advised by their health care professionals and leads towards high prevalence of anemia in pregnant mothers. This reveals the importance and need to study the factors which effect compliance of iron supplements.<sup>9</sup>

Therefore, the objectives of the study were to

1. Determination of frequency of iron deficiency anemia in pregnant females in Sample Population of Sargodha district.

2. To correlate the level of compliance and adherence to the iron supplements and its influence over the hemoglobin levels of the pregnant women.
3. Major factors affecting compliance.

## METHODOLOGY

A retrospective cohort study conducted in Mola Bakhsh Hospital in which total 267 pregnant women took part that were in first and third trimester of pregnancy. Exclusion criteria followed women that were in 2<sup>nd</sup> trimester and those having pregnancy or other hematological complications. Study defined compliance as the adherence of pregnant women the practice of taking of iron supplements on daily basis. Lab findings of Hemoglobin level were compared with standard value Hemoglobin level byWHO.<sup>8</sup>

Collection of data from the respective subjects was carried out with the help of an interview based questionnaire consisted of variables such as socio-demographic parameters, knowledge about anemia, prevalence of anemia and factor affecting compliance. Assessment totally relied upon the response of subjects to the questionnaire and depiction of results was carried out in the form of tables and graphs. Prevalence of anemia among the subjects was categorized as 1. Anemic in 1<sup>st</sup> trimester; 2. Anemic in 3<sup>rd</sup> trimester; 3. Non-anemic in 1<sup>st</sup> trimester; 4. Non-anemic in in 3<sup>rd</sup> trimester. In the results the assessment of supplementation compliance was categorized into one of the three groups i.e. partially compliant, Compliant and Non-compliant.

## RESULTS AND DISCUSSIONS

The main results from the analysis were presented in tables and graphs given below.

### Subject Demographic Data

A total of 267 pregnant females form Mola Bakhsh Hospital Sargodha took part in study. All of the participating females were in the 1<sup>st</sup> and 3<sup>rd</sup> trimester. With respect to age the population was divided into three groups, group 1 includes patients with less than 25 years of age including 25.46% of sample population, group 2 patients with 25-35 years of age include 52.80% and

group 3 subjects with age greater than 35 years includes 21.72% of the population.

11.98% of the subjects were found to be educated higher than intermediate while most of the population 58.05% was under intermediate and 29.96% were found to be under primary or illiterate. Only 30 out of 267 females were found to be working in different professional fields while most of the females i.e. 88.76% said that they are house wives. A detailed review of patient demographic data is shown in Table-I.

Various parameters were studied in population to determine the cause of anemia in pregnancy and non-compliance to iron supplements. After the adjustment of other factors one factor shown to have a significant association with the compliance was age. In this study 25.46% of population was under 25 years of age out of which 64.7% was found anemic.

Women having more than 25 years of age were more compliant to iron supplements than women with younger age (<25 years). Elder women may have more concern for their health and pregnancy outcomes as having more experiences in the prevention and treatment of Iron Deficiency Anemia (IDA). This judgment was parallel to the study of P. Mithra in India that elderly and middle women were slightly more compliant than younger women (P. Mithra 2013) and also this finding is consistent with the study done in Ethiopia.<sup>10</sup>

Next factor which effect compliance is Education, it was seen that the women which were more educated had more concern about their health and compliant to iron supplementation therapy as compare to illiterate women. Family Income also plays important role in compliance, the women which belongs to low income families were less compliant to iron supplement therapy as compare to women which belongs to rich families, the possible reason for this may be affordability of supplements.

Out of 267 females 60.67% were found anemic throughout the pregnancy that indicates the prevalence of anemia in Sample population. The

World Health Organization estimates that 58% of pregnant women in low-income countries are anemic.<sup>2</sup> None of the sample population was found to be suffering from any chronic disease. Data reveals that 78.27% of patient population visit antenatal clinic regularly. 64.04 % of total patient population were found to be anemic at the end of their 3<sup>rd</sup> trimester, 39.32% of population show fluctuating Hb during their pregnancy. None of the female was found to be suffering from any pregnancy related complication like pre-eclampsia, gestational diabetes mellitus, oligohydramnios, intrauterine growth retardation etc. Iron deficiency anemia (IDA) is one of the common nutritional deficiencies worldwide, which affects over two billion people worldwide according to World Health Organization.<sup>3</sup>

A detailed review of all the results relating prevalence of anemia in pregnant females is shown in Table-II

#### **Factor affecting compliance in sample population**

Based on Hb status most of the population 86.51% was advised to use iron folate supplements throughout their pregnancy based on their Hb status either OD (66.29%), BD (30.71%) or TID (2.9%) therapy. Out of sample population 68.39% of subjects complains of having side effects due to iron supplements during pregnancy most common observed side effects were nausea vomiting (68.39%), diarrhea, constipation (40.50%), heart burn (21.51%) etc which sometime or very often leads to stop iron supplement therapy.

The side effect is repetitively considered as main problem affecting compliance. According to studies of Anil Bilimale et al, (2010) conducted in the side effects was reason for skipping doses of iron supplements among pregnant women by 27.0%, 20.2%, and 27.6%, respectively. Similar studies were completed in eight districts of four regions of Ethiopia and Amhara, an area of Ethiopia exposed that 63.3% and 54.4% of respondents respectively, missed iron supplement doses due to side effectsfear.<sup>10</sup>

One possible reason for non-compliance related to side effects in study may be due to lack of information about side effects in advance. Proper counseling can increase the psychological acceptance of pregnant women towards side effects of iron supplements.<sup>11</sup>

Patient knowledge about iron supplements and anemia was also considered, only 38.20% of population answer "yes" to question what is anemia. While 61.79% females do not know anything about anemia. More over 18.35% population complained of financial issue (low income) or nutritional status as a cause of their anemia.

This contradiction may be due to insufficient counseling of pregnant mothers and it could be improved through better counseling during the ANC visit by suggesting to women strategies to remember to take their tablets, for example, placing the tablets in a spot that they see every day. Because of consumption iron supplements there was fear of having big fetus in women which was obstruction to compliance with iron supplementation study done in Thailand.<sup>12</sup> But, in current study, none reported stopping of iron supplement therapy because of terror of having over weight fetus.

This may be due to differences in location of study subjects. Women who visited ANC regularly were more compliant to iron supplements as compared to women who did not visited or rarely visited ANC. These findings were similar with findings in Philippines.<sup>14</sup>

The most probable reason for this is that health professionals may guide women during their visits to ANC by discussing benefits of compliance and encourage them to take as prescribed dosage of supplements which assist mothers to be compliant. In current study, pregnant mothers which had good information about anemia were more compliant with iron supplement during pregnancy as compared to women who had poor understanding about anemia. These results were consistent with study in Vientiane, Nigeria, and Amhara region of Ethiopia.<sup>15</sup>

Knowledge may create good awareness to prevent and treat anemia during pregnancy by taking iron supplement regularly. These finding were consistent with the results of study completed in India (Haryana state), Cambodia, Sweden and Senegal.<sup>16</sup>

Another main cause of non-compliance was forgetfulness, 64% of sample population said that they frequently or sometime not remember to take the iron-folate supplements and this result is closer with the conclusion in Vientiane and India by 47.9% and 48.8%, respectively (S. Jasti 2007, P. Vongvichit 2003), but it is much more than the results in Ethiopia that was 16.7%.<sup>13</sup>

### **Relative Compliance Report**

After a thorough analysis of above data sample population was divided into three groups as compliant, partially compliant and non-compliant.

Women taking their medicines regularly having improving Hb status, and less anemic in 3<sup>rd</sup> trimester as compare to anemia in 1<sup>st</sup> trimester and these were placed in compliant group. While those who were not taking there iron supplements were without any improvement in Hb status and considered as non-compliant and those with fluctuating Hb, were named as partially compliant as shown in Figure-1.

The result revealed that 56.17% of pregnant mothers were compliant to the supplement, which is lower as compared with the study completed in regions of Ethiopia which was 74.9%<sup>13</sup> much higher than study completed in Amhara regions of Ethiopia which was 20.4% (B. Teye 2015).

The probable reason for this difference may be due to the time gap between studies, subjects and geographic locations.

### **Comparison of different factors effecting compliance**

A comparison of different factors associated with non compliance to iron supplementaion and anemia is shown in Figure-2.

Parameters	Categories	No. of Subjects	Percentage (%)
Age (years)	< 25	68	25.46
	25-35	141	52.80
	35-45	58	21.72
Education	Primary/illiterate	80	29.96
	Intermediate	155	58.05
	University	32	11.98
Work Status	House wife	237	88.76
	Working	30	11.23
Family income	Low	49	18.35
	Moderate	180	67.41
	High	38	14.23
No. of live Children	None (primiparous)	36	13.48
	1-3	185	69.28
	>3	46	17.22

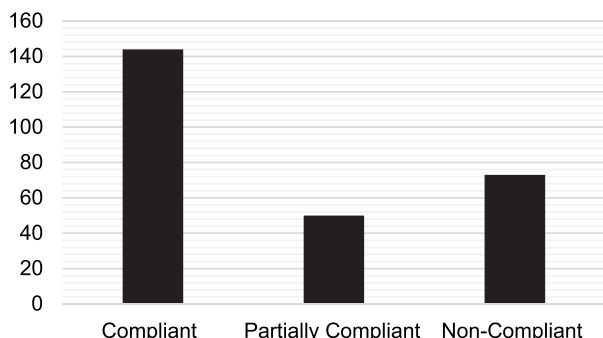
Table-I. Demographic characteristics of studied samples

		Patient population	Percentage
Anemic	1 <sup>st</sup> trimester	87	32.58%
	3 <sup>rd</sup> trimester	75	28.08%
Non-anemic	1 <sup>st</sup> trimester	47	17.60%
	3 <sup>rd</sup> trimester	58	21.72%
Anemic throughout		162	60.67 %
Fluctuating Hb		105	39.32%

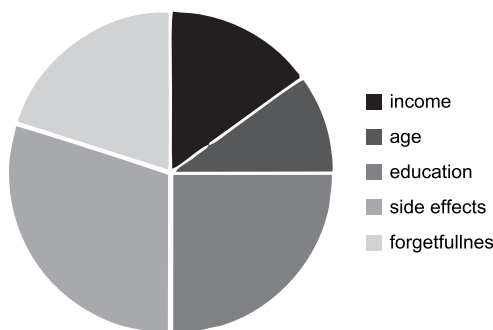
Table-II. Prevalence of anemia in sample population

Parameters		Patient Population	Percentage (%)
Regular Antenatal visit (out of 267)	Yes	209	78.27
	No	58	21.72
Recommended iron supplements (out of 267)	Yes	231	86.51
	No	36	13.49
Reported side effects (out of 231)	Yes	158	68.39
	No	73	31.39
Stoppage of therapy due to side effects (out of 158)	Never	60	37.39
	sometime	64	40.50
	Often	34	21.51
Iron supplement regimen (out of 267)	OD	177	66.29
	BD	82	30.71
	TID	8	2.99
Forgetfulness (out of 267)	Never	97	36.32
	Sometime	86	32.20
	often	84	31.46
Knowledge relating anemia (out of 267)	Yes	102	38.20
	No	165	61.79

Table-III. Intensity of factors affecting compliance



**Figure-1. Relative compliance report among studied population**



**Figure-2. Comparative depiction of different factors affecting compliance**

**CONCLUSION**

Nutritional or iron deficiency anemia during pregnancy continues to be a major health problem all over the world and iron supplements are used worldwide to tackle this problem. Unfortunately, side effects due these iron supplements and certain human habits act as hurdle to fight anemia during pregnancy To eradicate these hurdles certain steps need to be taken at individual and community level like education of the women as regards anemia, its causes and health implication. Imparting nutritional education, with special emphasis on strategies based on locally available food stuffs to improve the dietary intake of proteins and iron, administration of appropriate iron supplements and ensuring maximum compliance, universal antenatal care to pregnant women will help in combating this serious problem. Long term policies by government, non-government agencies and the community can be directed to formulate effective plans like eradicating anemia in pregnant women and adolescent girls.


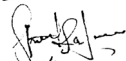



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1	Haroon ur Rashid	Manuscript proof reading and submission.	
2	Sheraz Saleem	Manuscript writing.	
3	Khan Muhammad Babar	Conception of idea.	
4	Khalid Mahmood	Questionnaire designing.	
5	Hina Younis	Data collection.	
6	Safirah Maheen	Interpretation & compilation of results.	