CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

Available online at: http://www.iajps.com Research Article

TO EXAMINE THE ROLE OF IRON SUPPLEMENTATION DURING PREGNANCY: A CROSS SECTIONAL STUDY

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Article Received: January 2020 **Accepted:** February 2020 **Published:** March 2020

Abstract:

Background: *Anemia is one of the most widely known nutritional deficiencies for the duration of pregnancy in underdeveloped countries. It is a risk factor for preterm delivery and consequent low birth weight new born, and subsequent ill effects on neonate and infant health. Further research and enough data in different setting is required for determining the extent to which maternal anemia might contribute to maternal morbidity, mortality and impact on pregnancy outcomes.*

Objective: *The aim is to assess the effects of iron supplements on pregnancy outcomes.*

Study Design: *Cross-sectional study in which women delivered in hospital were questioned for history of intake of iron supplements during ante-natal period and new born was examined for any adverse effects of iron deficiency anemia.*

Place and Duration: *This study was conducted at Holy Family hospital Rawalpindi for the duration of one year from December, 2018 to November, 2019.*

Results and Discussion: *400 respondents were included in study that was regular in attending ante-natal clinic in the hospital during different gestational period. No significant adverse effects/outcomes were seen in women and newborn irrespective of frequency of iron supplementation already taken during these gestational periods. Conclusion: Majority of the newborn delivered full term and without any complication of pregnancy in this study as well as most of them had normal birth weight. This finding is linked with intake of iron supplements taken by majority of pregnant women during antenatal care. Incidence of low birth weight new born, abortion (spontaneous & therapeutic) and fetal deaths were almost negligible.*

Keywords: *Iron, Anemia, Hemoglobin, Pregnancy outcome.*

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Please cite this article in press Aqsa Iqbal et al., ***To Examine The Role Of Iron Supplementation During Pregnancy: A Cross Sectional Study,*** *Indo Am. J. P. Sci, 2020; 07(03).*

INTRODUCTION:

According to the World Health Organization, the lack of red blood cells or hemoglobin affects 1.62 billion individuals (25%), and pregnant ladies accounts for 56 million of the totals. People have now realized that iron deficiency causes serious health issues especially in women of fertile age, pregnant and lactating as well as infants and young children.

Iron deficiency is one of the commonest micronutrient deficiencies worldwide and it affects over two billion people approximately. Women are more likely to suffer from the deficiency of iron than men and its dominance rises during pregnancy. Through the period of second and third trimester, iron needs show a noticeable increase. It is very vital to have a good amount of iron reserves and iron supplements before pregnancy as absorbed iron needs cannot be fulfilled at that pregnancy from just food iron or iron supplementation during pregnancy.[1] A healthier and better lifestyle is observed if pregnant women with anemia are treated by iron supplements.[2]

Comparing the delivery status of anemic and non-anemic women, we come to see that anemic women tend to have a higher risk of pre-term delivery. In all anemic cases, the gestational weight gain (for gestation age) was found to be inadequate.[3] The purpose of the study is to examine the role of iron supplementation during pregnancy on birth outcomes.

Anemia during pregnancy has been related with several adverse perinatal outcomes like prematurity, low birth weight, and maternal and perinatal mortalities.[4] Haemoglobin criterion of < 11.0 g/dL is considered to fall in the anemia category. Serum Ferritin (SF) value under 12.0 ng/mL were as classified as iron deficiency according to WHO and US Centers for Disease Control and Prevention recommendations.[4] A U-shaped curved represents the relation between maternal hemoglobin (Hb) and poor birth outcomes with increased risk observed at both ends of Hb spectrum.[5] The American College of Obstetricians and Gynecologists recommend universal anemia screening and targeting iron supplementation for pregnant women who are found to be anemic. European Union guideline also advise taking iron supplements daily in the second-half of pregnancy.[5] According to these UK guidelines, iron supplementation should only be considered for women with Hb concentrations < 11 g/dL in the first trimester or Hb concentrations <10.5 g/dL at 28 weeks of gestation.[5] During pregnancy, the expansion of plasma volumes, rise in erythrocyte mass as well as the need to improve and promote growth and development of fetal-placental unit makes the preferred amount of iron to escalate.[6] Iron is actively transported from the mother to the fetus through the placenta as iron is vital a lot of enzymes and hemoproteins that are essential for normal function of all cells. Roughly 80% of fetal iron is obtained in the last trimester of pregnancy in humans.[7]

Birth before 37 weeks of gestation is said to be the main cause of neonatal morbidity and mortality particularly in underdeveloped countries.[8] In the nutritional supply line the fetus lies at the end with maternal nutritional intake at one end and fetal tissue uptake at another end. There was an abrupt and acute increase in the occurrence of preterm birth during the World War II and Dutch famine due to starvation and famine.[8] Similarly, the nutritional condition is generally poor in Africa which has led to highest preterm birth rates in that region. As studies have predicted low hemoglobin level in early pregnancy causes an increased risk of low birth weight, preterm birth and perinatal mortality.[9] According to WHO iron-deficiency anemia (IDA) causes almost 20% of maternal deaths throughout the world.[10] There are different causes of anemia in female of reproductive age, that can be divided into IDA, anemia because of blood loss, anemia secondary to infection such as malaria and pernicious anemia. In fact, when maternal hemoglobin amounts are less than 11.5g/DL and even greater than 13.0 g/dL, the possibility of undesirable outcomes increases [5,10].

Pre-term delivery, low birth weight of the offspring and risk of maternal mortality in pregnant women is associated with iron deficiency anemia. It is worth mentioning that iron also serves as a nutrient for pathogens and iron supplementation may aggravate morbidity in areas with high burden of infections.[11] It is high unlikely that pregnant and child-bearing women meet their need of iron and other micronutrients through food alone.[12] Nonetheless, supplementation with folic acid and iron particularly, either prior to pregnancy or through the period of pregnancy, is recommended by numerous health organizations.[4,12] The stages towards IDA start with depletion of iron stores then it is followed by iron deficient erythropoiesis and eventually there is reduction on Hb concentration.[13]

METHODOLOGY:

This study was conducted on cross-sectional design. The respondents included in this study were parturient delivered in Holy Family hospital Rawalpindi. Sample size selected for the study was 400. Convenient sampling a type of non-probability sampling technique was used. Respondents having antenatal cards of this hospital were included in this study. These pregnant ladies were attending antenatal clinic regularly during different gestational period and normal vaginal delivery was conducted in the same hospital. The pregnant ladies with complication of pregnancy like ante-partum

hemorrhage, toxemia of pregnancy or co-morbidity were excluded. Female who were irregular for antenatal visits also excluded from study.

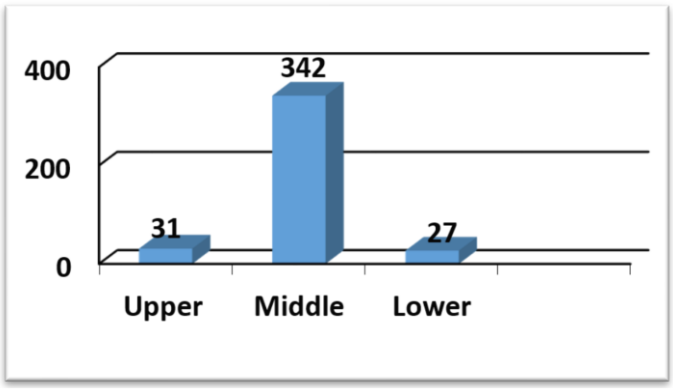
Data was collected through a close-ended questionnaire. Face to face interviews were conducted in the language the respondent understands. Ethical issues like informed consent and full explanation of study was strictly observed in each case. Interviews were conducted after the termination of pregnancy or abortion. Pregnancy outcomes, either abortion, full term healthy newborn, pre-mature, or still birth were recorded. Any congenital abnormality of newborn was also evaluated through physical examination.

The data was analyzed using SPSS 20. The quantitative variable like age was expressed as Mean ± SD and categorical variables were expressed as frequency, proportion and percentages, appropriate graphs was used to display the data. A P-value <0.05 was taken as statistically significant.

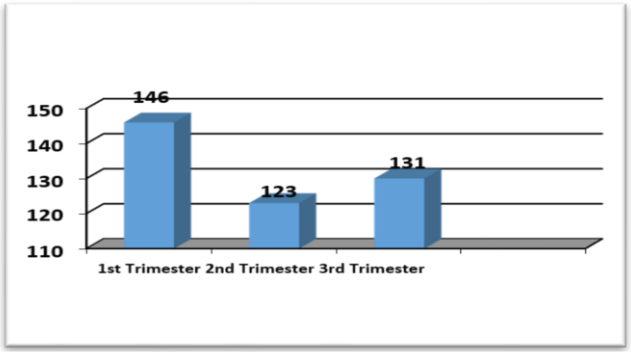
RESULTS:

Results are shown in the tables and graphs.

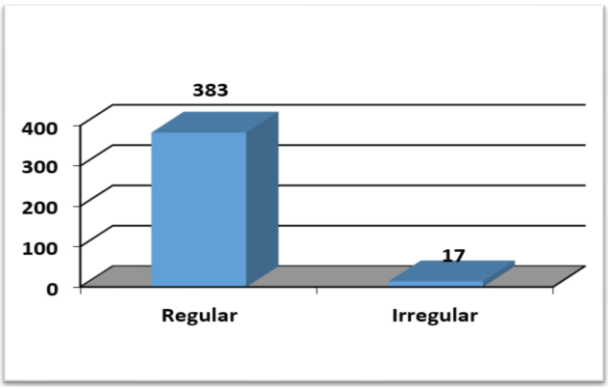
Graph No 01: Socioeconomic status



Graph No 02: Start of iron supplements



Graph No 03: Frequency of use iron supplements



Data Analysis Tables

Mean age = 26.45 years & Standard Deviation = 4.64 years (26.45±4.64 Years)

Table No 01: Start of Iron Supplements during Pregnancy				
Variable	**Description**	**Frequency**	**Percentage**	**P Value**
Start of Iron Supplements	1st trimester	146	36.50%	<0.001
	2nd trimester	123	30.80%	
	3rd trimester	131	32.75%	
P value (<0.001) is highly significant.				

Table No 02: Frequency of Intake of Iron Supplements				
Variable	**Description**	**Frequency**	**Percentage**	**P Value**
Frequency of use Iron supplements	Regular	383	95.75%	**< 0.001**
	Irregular/Withdrawal during Pregnancy	17	4.25%	
P value (< 0.001) is highly significant				

Table No 03: Clinical Sign & Symptoms

Variable	Description	Frequency	Percentage	P Value
Clinical sign & symptoms of anemia	No	254	63.50%	< 0.05
	Yes	146	36.50%	
P value (< 0.05) is significant.				

Table No 04: Hemoglobin Level of Respondents				
Variable	**Description**	**Frequency**	**Percentage**	**P Value**
Hemoglobin level during pregnancy	Above 11g/dl	366	91.50%	< 0.001
	Below 11 g/dl	24	6.00%	
P value (< 0.001) is highly significant.				

Table No 05: Pregnancy Outcomes				
Variable	**Description**	**Category**	**Frequency**	**Percentage**
Pregnancy Outcomes	Status of Delivery	Full term	349	87.25%
		Pre-term	044	11.00%
		Spontaneous abortion	002	0.50%
		Therapeutic abortion	002	0.50%
		Fetal Death	003	0.75%
	Birth Weight of new born	Normal	368	92.00%
		Low	32	8.00%

DISCUSSION:

In developing countries, stillbirth rates are approximately 45 per 1000 birth, infections may account for 50% of all stillbirths. In newborns in the developed world, the single most important cause of perinatal death is preterm birth.[14] It was also noticed in another study that the reported food intake in pregnant women does not meet national dietary intake recommendations for different micronutrients.[15] A study in Tanzania found that

increase in Hb was associated with reduced risk of perinatal and early infant mortality.[16] More than 20 million low birth weight (LBW) infants (15% of all births) are born worldwide annually.[17]

It is currently recommended by WHO that all pregnant women should receive prenatal supplementation with iron containing supplements, regardless of baseline Hb status. [4,17] Requirement of significant amount of iron balance during pregnancy period should increase due to stopping of menstrual bleeding. This large requirement of iron hence cannot be met with usual diet so iron supplementation must be continued during pregnancy.[18] In our study majority of the female have iron level more than 11g/dl that is the reason for less complication during pregnancy. A normal pregnancy requires an amount of 840 mg with greater need in the second half. The daily iron needs in the second half of the pregnancy are anticipated as 6.7 mg per day even increasing 10-12mg per day in the last month of pregnancy.[18]

It has been observed that small-for-gestational-age (SGA) of newborn is considered to have higher risk of still-birth due to high and low hemoglobin level during pregnancy.[18] However; these consequences of iron deficiency anemia can be prevented with appropriate iron treatment. Health authorities and food agencies should make sure the values of nutrients present in the foods in their food list and should be thoroughly advertised through print media and health education of masses.

CONCLUSION:

Majority of the newborn delivered full term and without any complication of pregnancy in this study as well as most of them had normal birth weight. This finding is linked with intake of iron supplements taken by majority of pregnant women during antenatal care. Incidence of low birth weight new born, abortion (spontaneous & therapeutic) and fetal deaths were almost negligible.

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