

## Pregnancy associated iron deficiency anemia from selected rural areas of Sargodha-Punjab, Pakistan

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### Abstract

#### **Objective:**

Anemia during pregnancy is a frequent medical problem that contributes to increased maternal and fetal morbidity. Current work was planned to investigate the iron deficiency anemia associated with pregnancy.

#### **Material and Methods:**

A total of 150 pregnant females with different trimester and different history of gravidity were selected from different rural areas of Sargodha District, Punjab-Pakistan. A questionnaire was completed and blood samples were collected from all subjects to determine the concentration of Hemoglobin, serum Iron and Total iron binding capacity.

#### **Results:**

Study results revealed that prevalence of iron deficiency anemia is more significant ( $p < 0.05$ ) during second trimester with Hemoglobin concentration ( $9.1 \pm 1.7$  g/dL), iron ( $29 \pm 5.1$   $\mu$ g/dL) and TIBC ( $367 \pm 91$   $\mu$ g/dL) as compared to first and third trimester. Furthermore, the results showed that prevalence of iron deficiency anemia is 89% with hemoglobin  $< 11.0$  g/dL; of which mild anemia was 47 % (Hb 9-11 g/dL), moderate anemia 33% (Hb 7-8.9g/dL), severe anemia 08% (Hb  $< 7$  g/dL) and only 11 % pregnant female have hemoglobin  $> 11$  g/dL.

#### **Conclusion:**

It could be concluded that iron deficiency anemia is significantly associated with progression of gestational period which is more prevalent in rural areas of Sargodha. Further, this condition can be controlled by improving the socioeconomic status of local population, by encouraging the intake of iron rich foods as well as with iron supplementation.

**Key Words:** Anemia, iron deficiency, pregnancy, rural areas

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## **INTRODUCTION**

Anemia from Greek word Anaimia, meaning “with no blood”. It is a condition in which either there is a decreased erythrocytes number or their oxygen-carrying capacity in compromised to fulfill the normal functioning of the body. Anemia is usually common in women predominantly at the time of pregnancy and is the usual risk factor for the life of both the mother and fetus. There is association of anemia with increased pre-eclampsia (31.2%), pre-term labour (28.2%) and maternal sepsis (Abbaspour et al., 2014; MMWR Recomm. 1998). Anemia during pregnancy is mild when hemoglobin concentration is between 10.0-11.0 g/dL, moderate when Hb concentration is 7.0-9.9 g/dL and severe when the concentration of hemoglobin is <7.0 g/dL (Agarwal et al., 1991; Allen et al., 2000). About 75% of the anemia cases are caused due to iron deficiency and has an array of associated contributing factors including genetic, nutritional, infectious diseases, abortion, multiparity and frequent labour (MMWR Recomm 1998; Barrett et al., 1994; Barton et al., 1994). Taking foods that are deficient in iron and the reduced bioavailability of administered iron required during pregnancy are the major causes of iron deficiency (Blumberg et al., 1994.) The iron requirement become six to seven folds high during early to late pregnancy (Brabin et al., 2013).

In developed world as well as in developing countries like Pakistan, Iron Deficiency Anemia (IDA) during pregnancy is a well-reported concern of the healthcare practitioners. Globally around 1.62 billion people are anemic and amongst which 56 million are pregnant women (Barrett et al., 1994). In developing countries, the frequency of iron deficiency anemia is 40-80%. In Pakistan, anemia was reported in 29-50% of child bearing women living in urban areas (Cantor, A. G., et al. 2015). Incidence of anemia due to iron deficiency varies in child bearing women of Multan (76%), Karachi (64%) and Lahore (73%) reported in published studies (De Benaze et al., 1989; Garn et al., 1981; Hemminki et al., 1978). The differences in the reported prevalence rate might be due to varying characteristics of the target population. In spite of its known effect on population, there is scarcity of availability of data on the deficiency of micronutrients. Spot identification of high-risk individuals, like women of child-bearing age who might be at risk of getting anemia in near future and probing into the causative factors is need of the hour in third world countries like Pakistan. In countries like Pakistan, the role of socio-cultural barriers for woman cannot be ignored as socio-cultural setup create severe challenges for women. Hence, the present study was planned for the determining the prevalence of iron

deficiency anemia in child bearing women of Sargodha district.

## MATERIALS & METHODS

### Place of Work:

This research work was performed in RHM Midh Ranjha Medical Centre, Tehsil Kotmomin, District Sargodha, Punjab-Pakistan. Female confirmed with pregnancy history were requested to participate in this study. RHM Midh Ranjha Medical Centre is providing health facilities to associated small rural areas including Takhat Hazara, Mohri Wal, Badar Ranjha, Chak Sulman, Kot Miyana, Chak Miyana, Badeen, Syed Nou etc.

### Plan of Work and grouping of patients:

In each case, clinical history was recorded and a questionnaire was prepared to get clinical history, age, sex, gravida-para history, history of trimester and socioeconomic status of selected subjects (n= 150). Patients with history of hepatitis B, C, HIV, tuberculosis and other infectious diseases were excluded. Blood samples were collected to perform the hemoglobin concentration (Cheesbrough, M. 2006), serum iron (SI) by chromazurol B (CAB) method (Garcic, A. 1979.) and serum total iron binding capacity (TIBC) using the method of Fairbanks and Klee, (Fairbanks VF, Klee GG. 1987).

The selected patients were classified into different groups to evaluate the progress of anemia associated with

pregnancy on the basis of age (Group 1= age upto 25 Years of old, Group 2= age > 25 years), Trimester as 1<sup>st</sup> trimester, 2<sup>nd</sup> trimester and 3<sup>rd</sup> trimester, Gravida-para history and severity of anemia.

### Statistical Analysis:

Collected data was presented as Mean  $\pm$  SD. Student t-test and Tukey test were used to evaluate the results statistically. P-values less than 0.05 were considered statistically significant results.

### Working definitions:

Anemia:

The anemia during pregnancy is defined as hemoglobin (Hb) < 10 g/dL.

Iron deficiency Anemia (IDA):

The iron deficiency anemia is defined as a low hemoglobin levels (< 10 g/dL), a low serum iron (<7.1  $\mu$ g/l) and a high total iron-binding capacity (>13.1  $\mu$ mol/l) (Clark, 2009).

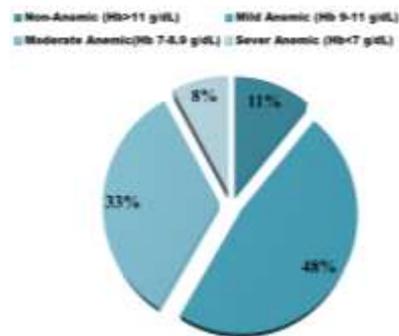
## RESULTS AND DISCUSSION

The results of the current study showed that 89% of the female patients are anemic due to iron deficiency; hence, females are more commonly affected with iron deficiency than males especially during child bearing age. The data is given in Figures 1-4 and Table 1-2.

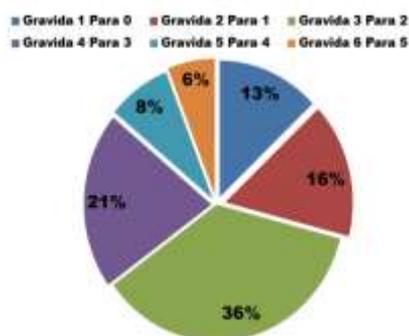
The Figure 1 shows the Pie-graph for the distribution of iron deficiency anemia in pregnant females. In our study, we found that only 11% women of child bearing age are free from anemia. It is reported that, there is higher risk of iron deficiency in women

*Pregnancy associated iron deficiency anemia from selected rural areas*

at puberty and menstruation. Moreover, during the 2<sup>nd</sup> and 3<sup>rd</sup> trimesters of pregnancy, the requirement of iron markedly increased because of high fetal and placental growth rates, and the expansion of maternal red cell mass. Consequently, anemia affects 50 to 70% of child bearing women in developing countries (Shams et al., 2017). Figure 2 shows the distribution of gravida and para among selected population.

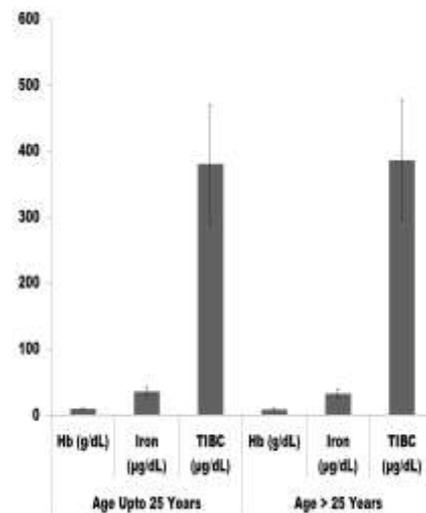


**Figure 1: Pie graph for the distribution of iron deficiency anemia in pregnant females**



**Figure 2: Distribution of Gravida, para among selected study population**

Majority of females during pregnancy and lactation do not get the required iron and hence, anemia due to iron deficiency is more common in child bearing women due to reduced iron intake in their diet. According to the 3<sup>rd</sup> National Health and Nutrition Examination Survey (1988 to 1994) conducted in USA, anemia due to iron deficiency is higher in children living at or below the poverty level. The most common risk factor in 37% of the cases was pregnancy. Pregnancy was found as the frequent risk factor for iron deficiency anemia reported in many studies. (Hameed et al., 2018).

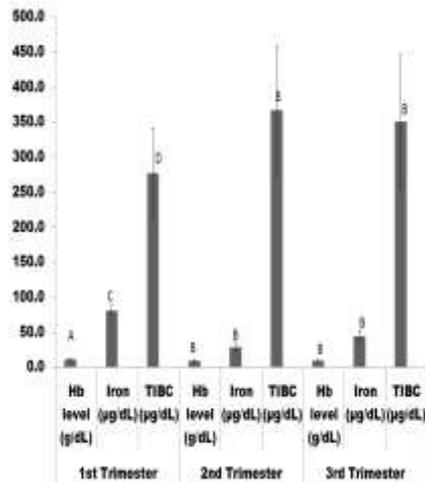


**Figure 3: Iron deficiency Anemia distributed among two age groups (Means ± SD)**

The Figure 3 shows the distribution of Iron deficiency Anemia among two age groups: first one up to 25 years of age

and second one beyond 25 years of age. Hb, serum iron contents and TIBC were estimated in the population under study. Interestingly we found that iron deficiency anemia was equally distributed among the both age groups. The Figure 4 shows the association of iron deficiency anemia at different trimester.

Thus, in current study it is found that nutritional inadequacy is the 2<sup>nd</sup> largest cause of anemia due to iron deficiency as the study population belongs to poor families with typically a single bread earner for a large number of dependent family members and have no any associated disease (Baig-Ansari et al., 2008).



**Figure 4: Association of iron deficiency anemia at different trimester.**

Alphabets represent the statistical results bar with different alphabets are statistically different while bars bearing the same alphabets are non-significant

revealed by pairwise study using Tukey test.

**Table 1: Student t-test to evaluate the pregnancy associated iron deficiency anemia**

Source	DF	Adj SS	Adj MS	P-Value
<b>Factor</b>	2	26.64	13.318	0.002*
<b>Error</b>	97	200.91	2.071	
<b>Total</b>	99	227.54		

\*Significant (p < 0.05), Non-significant (p > 0.05)

**Table 2: Student t-test to evaluate the pregnancy associated iron deficiency anemia and age of patients (Age upto 25 Years and Age > 25 years).**

Source	DF	Adj SS	Adj MS	P-Value
<b>Factor</b>	1	0.06	0.059	0.873
<b>Error</b>	98	227.48	2.321	
<b>Total</b>	99	227.54		

Significant (p < 0.05), \*Non-significant (p > 0.05)

## **CONCLUSION**

The study concluded that anemia due to iron deficiency is a common problem in people of Sargodha district. Females are most commonly affected due to poor nutritional status and the increased requirement of iron for normal physiologic functioning of the body particularly during pregnancy.

## **Conflict of interest**

Authors declare that there is no conflict of interest.

## **Ethical approval**

Ethical and other necessary approvals were taken from institutional Ethical Review Board of the Govt. College University Faisalabad, Pakistan.

## **Consent for Publication**

All the authors approved manuscript for publication.

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*Pregnancy associated iron deficiency anemia from selected rural areas*

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