Original Article

Prevalence of anemia during pregnancy in district Faisalabad, Pakistan

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Abstract
The present study was designed to estimate the prevalence/frequency of anemia during pregnancy in women of district Faisalabad, Pakistan and its association with iron-rich diet and socio-economic status of patients. Blood samples of 100 randomly selected pregnant women of age group (17-40) years were analyzed. The overall prevalence rate of anemia was 75%. Anemia was found to be prevalent in third trimester (89.3%) as compared to the second (8%) and first (27%) trimester of pregnancy. Out of the 75 anemic patients, only 10 (13.3%) were having iron rich dietary habits while 65 (86.7%) were having poor dietary habits. The socio-economic factors (age, monthly income) showed non significant correlation between anemic and non anemic pregnant women. Present investigation revealed high prevalence of anemia and the majority of them were of the moderate (hemoglobin: 8.1 -9.9 g/dl) type (33%).
Key words: Anemia, pregnant females, Iron-deficiency, Faisalabad

INTRODUCTION

Anemia is generally defined as decrease in hemoglobin concentration or red blood cells (RBCs) in blood than normal. According to World Health Organization (WHO), anemia during pregnancy is defined as the hemoglobin concentration <11 g/dl, and in case of severe anemia hemoglobin concentration is less than 7g/dl, is a universal problem (Lao and Pun, 1996; Cunningham *et al.*, 2001; Bashiri *et al.,* 2003; Marhatta, 2007). Globally there may be more than 2,000 million people with hemoglobin (Hb) below the WHO norms (WHO, 1992). It is a particularly common condition among pregnant women, especially in developing countries, where more than half of them may be anemic (UNCF, 2001). The Asia has the highest rates of anemia in the world (WHO, 1992). About half of the worlds, anemic women live in the Indian subcontinent and 88% of them develop anemia during pregnancy. This high rate in developing countries is due to malarial and parasitic infections which results into chronic blood losses and decreased iron intakes (Wu *et al.*, 2002). The maternal deaths (56%) are caused by anemia. Anemia may be hereditary or acquired caused due to infections

and nutritions. If the diet does not contain enough protein, iron, vitamin B12 and folic acid and many other mineral and vitamins which are required for the hemoglobin production and RBCs formation, there are chances of occurrence of nutritional anemia. Iron is an essential requirement for hemoglobin production, red blood cells protein which helps in transporting oxygen to the other cells of our body (Scholl, 2005).

Iron deficiency anemia (IDA) was considered to be one of the most vital factors of anemia (WHO, 2002). It is predictable that around 2.15 billion individuals suffer from IDA (FAO/WHO, 1992). Some consequences of IDA are growth retardation, exercise intolerance, behavioral changes and abnormal thermogenesis. Several factors are involved which causes IDA amongst women including dietary deficiency (reduced iron intake) or gastrointestinal disturbances such as hyperemesis or diarrhea; frequent, multiple or numerous pregnancies in such cases there are less iron stores in women having short period (less than two years) between their pregnancies or those from low socio-economic communities; chronic infections of urinary tract; chronic or acute blood loss, *e.g.,* bleeding hemorrhoids,

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ante-partum or postpartum hemorrhage, menorrhagia (heavy periods) (Abu-Hasira, 2007).

The symptoms of anemia are: fatigue, weakness, palpitations, low blood pressure, shortness of breath, looking pale, light headedness and of those of severe anemia are: change in stool color, chest pain, heart attack, rapid heart rate, fainting, spleen enlargement, jaundice (UNCF, 2001). Mostly the prevalence of anemia is higher in pregnant women, as during pregnancy there is 50% increase of blood amount than normal. So more iron is required to produce more hemoglobin for additional blood. As there is an increased baby's iron demands during second and third trimesters but unfortunately most women start pregnancy without having sufficient iron stores to meet those demands (BCMAB, 2009). According to Population Action International (PAI) publication, requirements of iron in pregnancy are: 1st Trimester 0.8mg daily in first trimester, 4-5mg daily in second trimester and 6mg daily in third trimester. It is almost impossible to get enough iron from the diet during the 3rd Trimester, which means that the mothers iron stores will be utilized to meet the increased demands. For a normal pregnancy of an average sized female, total requirements of iron are approximately 1000mg (Khan *et al.*, 2007).

Previous research conducted in Pakistan documented iron deficiency as the major cause of anemia during pregnancy (Karim *et al.*, 1994). According to Baig-Ansari (2008), anemia is highly prevalent in Pakistan. The current study was therefore designed to evaluate the frequency/prevalence of anemia during pregnancy in District Faisalabad women. The objectives of this study were intended to provide a basis for measures to improve the health of mothers and children.

MATERIALS AND METHODS

All pregnant women in the first, second and third trimester (total 100; 4 in 1st Trimester, 5 in 2nd Trimester and 91 in 3rd Trimester) in the age group (17-40) years, who attended the Usama Clinic and Allied Hospital, Faisalabad, were included in the study. The hospitals were daily visited for blood samples and data collected from April-June, 2011. The purpose, benefits and risks of the study were properly demonstrated to the voluntary participants before obtaining any information and blood sample collection. All information was collected by interviewing of pregnant women. All the women were informed that the information will be kept confidential and obtained data will be used only for research purpose. A questionnaire was prepared which included different parameters *i.e.,* socio-demographic characters, age, respondent and husband education and their occupation, income, family members, family type, gravid, parity, abortion, ante partum hemorrhage, menorrhagia, oligomennorhea, gestational week, iron supplements and history of number of diseases (jaundice, malaria, T.B, cardiac disease, uterus fibroids, renal diseases, blood hemorrhoids) and dietary history was recorded. Complete blood count (CBC) of the blood samples collected was conducted. The hemoglobin level also categorized into mild anemic (10.0-10.9), moderate anemic (8.1-9.9) and severe anemic (<8.00).

Blood samples were drawn and stored in tubes containing EDTA. CBC was performed on all samples by using CBC hematology analyzer SYSMEX KX-21. Blood test results and data obtained with the help of questionnaire specially designed for this purpose, were analyzed using software program SPSS. Frequencies and percentages were calculated and chi-square test was performed to investigate the significance in the association of the different variables. Correlations were considered significant if $P<0.05$.

RESULTS

The present study was to evaluate the prevalence/ frequency of anemia during pregnancy in Faisalabad. Hundred pregnant women during three months period from April to June 2011 were selected randomly. The age of the study subjects varied from 17 to 40 years. According to the blood picture, out of those 100, 75 were anemic and 25 were non-anemic (Fig. 1).
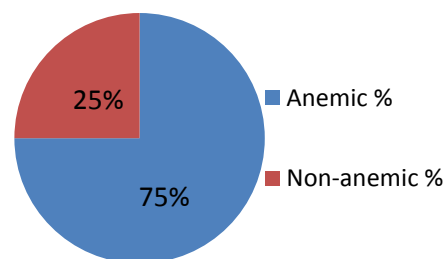

Figure 1. Percentage distribution of Anemia

Out of 75 patients, 24% were mild anemic, 33% were moderately anemic and 18% were severe anemic (Fig. 2).
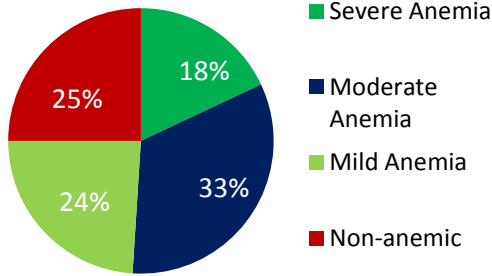

Figure 2. Frequency of anemia on the basis of hemoglobin level.

Anemic and non-anemic pregnant females were categorized into two age groups 17-30 years and 30-40 years. Out of 75 anemic females 60 (80%) were in 1st group and 15 (20%) were in 2nd group. While out of 25 non-anemic pregnant females 24 (96%) were in 1st group and 1 (4%) in 2nd group. It was seen that the prevalence of anemia is higher in 17-30 years age group as compared to 30-40 years age group. (Table I). The correction between frequency of anemia and monthly income was non significant ($P>0.05$). Mostly anemic pregnant women showed monthly income up to 10,000. (Table II).

Table I: Frequency of anemic and non-anemic patients in different age groups.

No.	Age group (years)	Anemic (n=75)	Non-anemic (n=25)
1.	17-30	60 (80%)	24 (96%_
2.	31-40	15 (20%)	1 (4%)

(Chi-square = 3.571, P-value = 0.059)

Table II: Frequency of anemia on the basis of monthly income

No.	Monthly income	Anemia (n=75)	Non-anemic (n=25)
1	<5000	23 (30.7%)	5 (20%)
2	5100-10000	28 (37.3%)	12 (48%)
3	10000-15000	10 (13.3%)	4 (16%)
4	>15000	14 (18.7%)	4 (16%)

(Chi-square = 1.465, P-value = 0.69)

Table III: Distribution of patients on the basis of CBC parameters

No.	Variable	Range of variable	No. of patients n=100	Mean ± SD (Range)
1.	**MCV**	Low (<76 fl)	32	72.12±3.50 (62-76)
		Normal (76-96 fl)	68	83.16±5.03 (76.10-96.00)
		High (>76.96 fl)	Nil	Nil
2	**MCHC**	Low (<30%)	23	27.68±2.39 (20.70-29.90)
		Normal (30-35%)	66	32.47±1.28 (30.10-35.00)
		High (>35%)	11	35.75±0.50 (35.10-36.50)
3	**MCH**	Low (<20Pg)	9	18.29±1.76 (14.50-20.00)
		Normal (20-32Pg)	90	25.95±2.98 (20.20-31.50)
		High (>32Pg)	1	32.60±.00 (32.60-32.60)
4	**HCT**	Low (<40%)	97	30.22±4.54 (16.40-40.00)
		Normal (40-54%)	3	41.23±0.81 (40.30-41.80)
		High (>40-54%)	Nil	Nil
5	**WBC**	Low (<4/Cu.mmx10^3)	1	1.60±0.00 (1.60-1.60)
		Normal(4-11/Cu.mm x10^3)	72	8.14±1.57 (4.30-10.90)
		High (>11/Cu.mm x10^3)	27	14.55±3.50 (11.10-28.60)
6	**R.B.C**	Low(<4.5 Mill/Cu.mm)	91	3.75±0.50 (1.91-4.50)
		Normal (4.5-6.5Mill/Cu.mm)	9	4.85±0.29 (4.55-5.36)
		High (>6.5Mill/Cu.mm)	Nil	Nil

RBC: Red Blood Cell count, Hb: Hemoglobin, HCT: Hematocrit, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, WBC: White Blood Cells count.

Patients were distributed on the basis of CBC parameters. Out of 100 patients MCV was <76fl in 32 women and it was normal (76-96 fl) in 68. MCHC was <30% in 23 women, it was normal (30-35%) in 66 women and it was >35% in 11 women. MCH was <20Pg in 9 women, it was normal (20-32Pg) in 90 women and it was >32Pg in 1 women. HCT was <40% in 97 women and it was normal (40-54%) in 3 women. WBC was <4000/Cu.mm in 1 women, it was normal (4000-11000/Cu.mm) in 72 women and it was >11000/Cu.mm in 27 women. R.B.C was <4.5 Mill/Cu.mm in 91 women and it was normal (4.5-6.5Mill/Cu.mm) in 9 women. (Table III). During present study, out of 100 studied pregnant women, the No. of anemic women (75%) were significantly higher (P<0.001) than non anemic patient (25%). The other socio-economic factors showed non significant correlation between anemic and non anemic pregnant women (Table IV).

During present investigation, the studies women were interviewed about iron rich diet during pregnancy. . It was found that 25% females were not using eggs, 40% were not using meat and 50% were not having liver in their diet during pregnancy, which are rich source of iron. Mostly women take iron rich diets occasionally (Table V)

Table IV: Statistical comparison of anemic and non anemic pregnant women with their socio-economic status.

No.	Parameters	Type of patients	Mean±SD	Significance
1	Hb	Anemic (n=75)	8.93±1.49	<0.001
		Non-anemic (n=25)	12.22±0.98	
2	Age	Anemic (n=75)	26.23±5.45	>0.05
		Non-anemic (n=25)	25.60±3.55	
3	Gravida	Anemic (n=75)	3.23±2.19	>0.05
		Non-anemic (n=25)	2.68±1.68	
4	Parity	Anemic (n=75)	1.53±1.80	>0.05
		Non-anemic (n=25)	0.92±1.12	
5	Monthly income	Anemic (n=75)	11.43±10.74	>0.05
		Non-anemic (n=25)	14.66±19.84	

Here P>0.05, <0.01 and <0.001 means non significance, significant and highly significant, respectively

Table V: Schedule of iron containing diet

No.	Iron containing diet	Intake routine	Frequency of patients (n=100)
1	Egg	Nil	25
		Daily	7
		Weekly	11
		Occasionally	57
2	Meat	Nil	40
		Daily	3
		Weekly	30
		Occasionally	27
3	Liver	Nil	50
		Daily	0
		Weekly	5
		Occasionally	45

DISCUSSIONS

The present study was undertaken to study the frequency of anemia during pregnancy in district Faisalabad. Anemia during pregnancy continues to be a common clinical problem with high rates of prevalence (35 to 75%) in many developing countries (WHO, 1992). In India, prevalence rate of anemia was 88%, in Tanzania 86%, Nigeria 47%, Indonesia 74%, Philippines 48% and Bangladesh 47% (Barbin *et al.*, 2001). In the present study on the basis of blood picture of 100 pregnant women, 75% pregnant women were anemic and 25% non-anemic. Our findings are close to the figures findings in Lahore, where 80% were anemic and 20% were non-anemic (Khan *et al.*, 2007). In our

findings, the mild anemic women were 24%, moderate anemic 33% and severely anemic 18%. Majority of women had moderate anemia. The present results are in line with the finding of Rizwan *et al.* (2010).

In present study the mean age of the pregnant women was 26.07±5.04 years. A study from Karachi has reported a mean age of the pregnant women as 28.28±5.20 years (Taseer *et al.*, 2011). The present findings also closely resemble to the mean age of the anemic women which was 26.85±4.77 years as compared with 27.08±4.65 years in the non-anemic group (Lone *et al.*, 2004). The anemic and non-anemic pregnant females further divided on the basis of age into two groups' (17-30 and 30-40 years). Out of 75 anemic, 60 were in 1st group and 15 in 2nd group. While out of 25 non-anemic, 24 were in 1st group and 1 was in 2nd group. It was noticed that prevalence of anemia is higher in 17-30 years age group as compared to the 30-40 years age group. This finding is similar to the findings in Nigeria (Idowu *et al.*, 2005). In the present study 2.7% of the anemic pregnant ladies were in 1st trimester, 8% are in 2nd and 89.3% in 3rd trimester. High frequency of anemic patients in 3rd trimester may be due to increased demand of micronutrients during this period in the background of poor dietary habits (Mardones *et al.*, 2003; Rizwan *et al.*, 2010). It is also suggested that nutrition plays an important role in causing anemia during pregnancy. Screening of anemic patients, their proper treatment, and availability of fortified food (wheat flour with folic acid and iron), salt with iron and milk sugar to build long term iron stores, is the only key to reduce anemia. Cooking in cast iron utensils also helps improving iron contents in diet (Kapur *et al.*, 2002). The present investigation is done at district level with small sample size. Therefore further studies are needed to have findings representing the whole nation. Furthermore, lab scale studies are urgently required to find the specific causes of anemia in pregnant women especially in developing countries. The need of the day is to educate people especially pregnant women about their health by launching special health promotional programs and supplementation programs.

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