PREVALENCE OF IRON-DEFICIENCY ANEMIA IN PREGNANT WOMEN OF RURAL AND URBAN AREAS OF BALOCHISTAN, PAKISTAN

Shabana Rafique[1], Hina Alam[2], Zubaida Umar[3*], Maryam Shoaib[4], Samiullah Khan[1], Syed Inayatullah[1]

[1]Department of Biotechnology, Balochistan University of Information Technology, Engineering and Management Sciences (BUITEMS), Quetta, Pakistan

[2]Department of Gynecology, Pakistan Institute of Medical Sciences, Islamabad, Pakistan

[3]Department of Pharmacology, Bolan Medical College, Quetta, Pakistan

[4]Department of Gynecology and Obstetrics, Sandeman Provincial Hospital, Quetta, Pakistan

*Corresponding Author: Dr. Zubaida Umar. E-mail: d.zebaumar@gmail.com

Abstract

Anemia in pregnant women is a major public health problem even in developing and developed countries. The purpose of this study was to determine the prevalence of anemia in pregnant women by hematological analysis in the population of Balochistan. Over-all of 167 women were selected from the rural and urban areas of Balochistan, Pakistan, and were examined by a detailed questionnaire and blood samples were analyzed to determine hemoglobin concentration (Hb) and hematological indexes were monitored. The mean hemoglobin for urban areas were 12.277±2.164 and 10.880±1.581 for a rural group with (p=<0.001*) in the pregnant females of Balochistan. The mean age of the rural group was 26.221±6.753 and the urban group 26.370±6.617 respectively. The RBC counts for urban areas were 4.760±0.557 and 4.393±0.744 from the urban group with a significance level of (p=<0.001). The mean MCHC was 33.031±1.800 g/dl; from urban areas and 32.428±2.205 from the rural areas were statistically significant. The mean MCV) for both groups was 79.906±8.050fl and 76.093±11.43. The MCH were 26.516±3.388 pg and 25.701±4.95828.5 from both groups correspondingly. Most of the subjects in both groups were multi-gravity

Keywords: *Anemia, Iron Deficiency Anemia, Hemoglobin*

INTRODUCTION

Anemia is one of the most common diseases associated with malnutrition, affecting more than a quarter of the world's population is a low concentration of hemoglobin in the human blood (1). One billion people around the world are prevailed with nutritional anemia or being iron deficient. The prevalence of anima globally is around 56%, with a range of 35–75% depending on geographic location (World Health Organization 1992). In South Asia prevalence of anima is higher, reflecting a comprehensive large percentage due to dietary deficiency (2). Numerous causes have been connected with the threat of anemia in pregnancy, e.g. nutritional status, socioeconomic variables, culture, age, educational background, fertility rate, pregnancy interval, contraceptive use (3). The level of hemoglobin concentration less than 7.0 g/dL is considered as severe, between 7.0 to 9.9 g/dl is considered as moderate anemia, and from 10.0 to 11g/dL is considered as mild anemia during the pregnancy (2–4). In developing countries, a major cause of mortality and morbidity of pregnant women is considered to be anemia and has both maternal and fatal consequences (1). Iron Deficiency Anemia (IDA) has significant impacts on both fetal and maternal health as it interferes with normal intrauterine development and impairs oxygen supply by the placenta to the fetus, leading to perinatal fetal death. Anemia was associated with preeclampsia (31%) and maternal sepsis., and increased preterm labor (28.2%) (4). Anemic patients have alike clinical sign and symptoms irrespective of the cause. Examination of the morphology of red blood cells using a microscope helps diagnose anemia in regions where fully automated hematological analysis are less available (5).

This cross-sectional study was carried out to show the characteristics of pregnant women suffering from anemia compared to the hemoglobin levels in rural and urban areas of Balochistan, Pakistan.

METHODOLOGY

AREA OF STUDY AND DESIGN

The current study was performed and conducted in the 03different hospitals of Quetta city like Gillani Hospital-Satellite Town-Quetta, Al-Khair Hospital, Zarghoon Road-Quetta, and Government Sandeman Provincial Hospital Jinnah Road-Quetta. In this study, a total of 167 women were enrolled of which 86 were pregnant women from urban areas and 81 belonged to the rural areas of Balochistan, Pakistan. The subjects were interviewed by a standard and comprehensive questionnaire that contain subjects name, age, residence, education, husband's occupation, socio-economic status, ethnicity, sign and symptoms like (fatigue, headaches, breathlessness, palpitation, pallor, tachycardia, and smoothness of tongue were also recorded) gravidity, para, and dietary intake regarding usage of vegetable, meat, fruits, bean, tea, coffee, and dairy products, etc.

Based on age, subjects were divided into three groups: 18 to 25 years, 26 to 40 years, and > 40 years. Based on socio-economic status, subjects were also distributed into 03 classes: Upper class with once-a-month income more than 100,000/-, Middle class with (40,000 to 100,000/)and Poor class with monthly income less than 40,000/-. According to the Level of education, data was classified as Illiterate, Primary, Matriculation, Intermediate, Graduate, and Postgraduate.

COLLECTION OF BLOOD SAMPLES AND LABORATORY INVESTIGATION

03 ml of venous blood was withdrawn randomly from the vein with 5.0 ml disposable syringe and was transferred to the EDTA (Ethylene Diamine Tetracetic) treated tubes to prevent the coagulation of blood.

Blood samples analyzed in the laboratory through Hematology Cell Counter (Sysmex-KX) were Hemoglobin, RBC (Red Blood Cell Count), MCV, MCH & MCHC (Red Cell Indices), PCV or HCT (Packed Cell Volume), RDW (Red Cell Distribution Width) and PLT (Platelets Count).
After the blood collection test tubes were marked with codes and immediately taken to the laboratory for investigation.

DATA ANALYSIS

The data was examined by the statistical software like SPSS version 16. Some of the data related to study was expressed in the form of percentages. The P value < 0.05 was measured as statistically significant.

RESULTS

For the analysis of IDA, 200 women blood samples were taken from which 34 were non-IDA (19 rural areas and 14 from urban areas). The study included only iron deficiency anemic pregnant women and their general characteristics are summarized in (table: 01). From the rural group 17 (20.98%) individuals had Hemoglobin level <10 g/dL, 27 (33.33%) had a hemoglobin values of 10 to 10.9 g/dl, in comparison with an urban group where the above range was calculated 12 (13.95%) and 9 (10.46%) for urban group respectively. The result shows that the majority of the individuals from rural groups have decreased levels of hemoglobin as compared to the urban group from the normal range. The WHO anemia and non-anemic are defined as having hemoglobin levels below 11.0 g/dl and those women whose hemoglobin level was >11.0 g/dl at all times during pregnancy respectively. Based on gravidity in both groups, most of the individuals were Multi gravidity and their frequency in the rural group was 78 (96.29%) and 82 (95.34%) were in the urban group. Based on maternal age data were classified into three groups 15-25, 26-35, and 36-45. Most of the participants were from the 1st and 2nd category in the rural group including 43 (53.08%) and 25 (30.86%) respectively. On the other hand, the urban group also has most of the patients from the above-motioned age

Table I. General Characteristics of IDA pregnant women residing a rural and urban areas

Characteristics	Rural n=81	Percentage %	Urban n=86	Percentage %
Hemoglobin				
<10	17	20.98	12	13.95
10-10.9	27	33.33	09	10.46
11-11.9	15	18.51	14	16.27
12-12.9	17	20.98	07	8.13
>13	05	6.17	44	51.16
Gravidity Primi-gravidity	3	3.70	4	4.65
Multi gravidity	78	96.29	82	95.34
Maternal Age				
15-25	43	53.08	48	52.32
26-35	25	30.86	22	25.58
36-45 and above	13	16.04	16	22.09
Education				
None	42	51.85	26	30.23
Primary	20	24.69	29	33.72
Secondary	08	9.87	06	6.97
Intermediate	09	11.11	13	15.11
Graduate	02	2.46	09	10.46
Post Graduate			03	3.48
Using Iron Supplement				
Yes	42	51.85	59	68.60
No	39	48.14	27	31.39
Scio-economic status				
Upper class	07	8.64	07	8.13
Middle Class	59	72.83	67	77.900
Lower Class	15	18.51	12	13.95

groups comprised of 48 (52.32%) and 22 (25.58%) respectively. According to the literacy majority of the participants were illiterate consist of 42 (51.85%) were from the rural group and 48 (30.23%) were from the urban group. More than 50% of the individuals were taking iron supplements from both groups. Based on socio-economic status, most of the participants were from the middle class including 59 (72.83%) from rural and 67 (77.90%) were from the urban group (Table I).

Table II shows the signs and symptoms of the participants. All these qualitative variables were calculated in percentage. All the participants were interviewed and their answers were recorded through a proper questionnaire. Breathlessness was reported in 22.75% of females 21.55% of women complained of

Table II. Percentage of subjects with sign and symptoms of anemia

Symptoms	N=167	Percentage %
Breathlessness	38	22.75
Palpitation	36	21.55
Pallor	36	22.75
Loss of concentration	35	20.95
Feeling tired	62	37.12

palpitation. Facial pallor was found in 22.75% of females. 20.95% of females reported lack of concentration or loss of concentration. Tiredness or fatigue was reported by 37.12% of females.

Table III representing the comparative analysis for total blood picture parameters between rural and urban groups. All the quantitative variables were expressed in mean ± standard deviation (SD) and the significance level $P<0.05$ were considered as statistically significant. The mean age of the participants from the rural group was 26.221±6.753 as compared to urban group 26.370±6.617, while there was no significant relationship between these two groups. Among rural and urban pregnant women 17 (20.98%) has Hb level <10g/dl, 27 (33.33%) has Hb level (10-10.9g/dl) and 15 (18.51%) has Hb level (11-11.9g/dl) in rural group. On the other hand, 12 (13) has Hb level (<10g/dl), 9 (10.46%) has Hb level (10-10.9g/dl) while Hb level (11-11.9g/dl) was found in 14 (16.26%) in urban group. These all individuals were defined as anemic according to WHO. The level of RBC, and HCT in the urban group was calculated as 4.760±0.557 and 37.560±5.213 in comparison with the rural group 4.393±0.744 and 33.773±4.075 respectively. All these parameters were statistically highly significant $P>0.001$ between these two groups. The MCV, and MCHC also show significant relationship $P<0.05$ with the mean value of 79.906±8.050 and 33.031±1.800 in the urban group and 76.093±11.43 and 32.428±2.205 for the rural group. Table IV displays the effects of diet and nutrition frequency on anemia incidences among pregnant females in rural and urban areas.

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Table III. Comparative Cross Sectional Statistical Analysis of Hematological Parameters

Characteristics	Urban n=86 Mean +SD	Rural n=81 Mean +SD	P Value
Age (year)	26.221±6.753	26.370±6.617	0.88
RBC (10^6/ul)	4.760±0.557	4.393±0.744	0.001*
HB (g/dl)	12.277±2.164	10.880±1.581	0.001*
HCT (%)	37.560±5.213	33.773±4.075	0.001*
MCV (fl)	79.906±8.050	76.093±11.43	0.013*
MCH (Pg)	26.516±3.388	25.701±4.958	0.214
MCHC (g/dl)	33.031±1.800	32.428±2.205	0.054

* Statistically Significant

Abbreviations used RBC (Red Blood Cell), MCHC (Mean Corpuscular Hemoglobin Concentration), HCT (Hematocrit), MCH (Mean Corpuscular Hemoglobin) and MCV (Mean Corpuscular Volume)

Table IV. Dietary nature of anemic pregnant women

Dietary Nature	Frequency	n=167	Percentage %
Meat	Don't consume	47	28.1
	Use 2-3 times monthly	74	44.3
	Use weekly	46	27.5
Leafy vegetables	Use weekly	100	59.9
	Use daily	67	40.1
Beans	Use 2-3 times monthly	1	0.6
	Use weekly	155	92.8
	Use daily	11	6.6
Fruits	Use 2-3 times monthly	5	3.0
	Use weekly	76	45.5
	Use daily	86	51.5
Dairy products	Don't use	1	0.6
	Use 2-3 times monthly	11	6.6
	Use weekly	25	15.0
	Use daily	130	77.8

DISCUSSION

Anemia is a general complication for pregnant women's in developing countries, and the consequences depend on the type of anemia (6). A recent study found differences in outcomes between physiological anemia and iron deficiency anemia during pregnancy. It is estimated that about a third of the world's population has iron deficiency anemia (7). It has been estimated that about one third of the world's

population suffers from iron deficiency anemia (IDA). Pregnant women are vulnerable to anemia owing to their higher iron demand than in any other group in any population. About 50% of pregnant women are anemic and most of these anemic patients have iron deficiency anemia. During pregnancy IDA can seriously affect the health of mothers and children. Therefore, it may increase maternal and infant mortality and morbidity (3). In the present study, the expected prevalence of anemia (IDA) in rural pregnant women was higher (86) than in the urban population (86). Although the differences were not statistically significant, we can realize that lifestyle changes and health mediations were favorable in urban areas. In some countries, the prevalence of anemia in pregnant women is defined as: United Arab Emirates 14%, Egypt 26%, Bahrain 33%, Jordan 35% (8). Studies in Pakistan and India have reported 80% to 90% anemia prevalence (9, 10). This study showed a higher incidence of anemia among the age group of 15-25 year and the 26-35 year and are classified as high-risk age groups. This study showed that the level of maternal education is an important risk factor for anemia development, as education greatly influences anemia through knowledge of health, socioeconomic status and occupation. To reduce the risk of IDA, iron supplementation is a common factor in the tropics (3). Other studies of anemia during pregnancy conducted in Ethiopia, Pakistan, Nepal, Vietnam and Malaysia did not consider the effect of well-being index (1, 11-13). This may be because the wealth index is calculated based on various household assets**.** (1). In the current study, the majority of anemic cases (IDA) 33.33% (27/81) and 10.46% (09/86) were mild anemic followed by 20.98% (17/81) and 13.95 % (12/86) from rural and urban area respectively were of the moderate type (HB <10 g/dl). The comparable condition was observed in Pakistan in which greater part of the cases had mild anemia (75.0%), severe anemia (0.7%) and moderate anemia (14.8%) (10). in the same way, report from India also showed (50.9%) moderate anemia, (30.17%) showed mild anemia and (18.9%) showed severe anemia respectively (14, 15). We also found higher anemia with low-income level (200-500Birr/month), increasing maternal age, illiteracy and rural residence. The risk of IDA was higher for illiterate pregnant women as compared to those women with some educational level and for income level 200-500 rupees/month as compared to rupees>800 /month respectively, A similar result of the study was reported in India (14). In 2009 the level of education was statistically allied with anemia (p = 0.005), as the study was conducted in China (16). Our hypotheses correlated to rural/urban location and socioeconomic status and anemia (IDA) were moderately been supported in the current study based on the standard of living index, we expected to find the highest prevalence of anemia in rural women, although the poorest rural and urban women both have the highest risk of ID (17-20).

Umar et al., (2015) found that anemia during pregnancy is very common and can be influenced by food intake, genetic factors, maternal health, and socioeconomic values. Schooling is also important as educated women know the importance of anemia and nutrition during pregnancy (6). The direct consequences of poverty leading to limited education; Malnutrition and low income are associated with poor health outcomes in developing countries. Another important issue in this region seems to be the poor reporting characteristics in published studies and the lack of standard frameworks for evaluating anemia.

CONCLUSION

Anemia is generally much prevalent universally and it occurs mainly during the pregnancy in females. The ages of the pregnant women's were in this study was ranged from 15-45 years. The ages of the pregnant women's were in this study was ranged from 15-45 years. On the basis of sign and symptoms, breathlessness, pallor were observed in 22.75% and palpitation observed in 21.55% females. The hematological values show that mean hemoglobin level in urban areas of Balochistan was 12.27 g/dl however in rural areas was observed 10.80 g/dl respectively. In this study almost 59% subjects were vegetarian.

Conflicts of interest:

The authors declare no conflict of interest.

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