CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.847749

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

PREVALENCE OF ANEMIA AND THE RISK FACTORS INVOLVED IN PREGNANT WOMEN OF QUETTA VALLEY.

Hina Hameed[1*], Zahid Mehmood[1], Khalid Mehmood[1], Ashif Sajjad[1], Jamshiad Hameed[2], Farhan Faisal[1], Hamza Zahid[3], Mariam Salim[4].

[1]Institute of Biochemistry, University of Balochistan, Quetta.
[2]Helpers Eye Hospital.
[3]Bolan Medical College.
[4]Sheikh Zayed Hospital, Quetta.

Abstract:

Objective: To find the prevalence of Anemia in pregnant females of Quetta Valley and to identify the risk factors involved in causing anemia

Introduction: Anemia is a major health issue in the developing world, especially in the females of fertile age. Many studies show that the incidence is increasing day by day. Anemia in pregnant women poses a grave danger to the physical and mental health of the growing fetus.

Patients and Methods: A sample size of four hundred pregnant females was taken and interviewed. The study was conducted in the public-sector hospital of Quetta. Demographic data was collected on the specially designed Performa and the blood sample was taken for the estimation of hemoglobin levels and ferritin levels. Data was analyzed on SPSS 11.

Results: In our study, we found that 96% of pregnant females had anemia of varying severity, the majority being moderately anemic. Analysis of demographics showed that anemia was more prevalent in younger (mean age was 32.5 years) and underweight females. Poor socioeconomic status was a contributing factor in anemia (p-value <0.05). Analysis of the risk factors showed that mud eating was common among those with severe anemia (p-value <0.05). Multiple and frequent pregnancies, beetle nut consumption and excessive tea intake were associated with low hemoglobin levels, p-value was found highly significant. ~~We~~ It was found that 50% of the females had low ferritin levels resulting in iron deficiency anemia.

Conclusion: Consumption of balanced healthy diet and iron supplementation during pregnancy can prevent anemia in many females.

Keywords: *Anemia, Iron Deficiency, Serum Ferritin.*

Corresponding author:

Hina Hameed,
Institute of Biochemistry,
University of Balochistan,
Quetta.
E-Mail:hinahameed76@gmail.com

QR code

Please cite this article in press as Hina Hameed et al, ***Prevalence of Anemia and the Risk Factors Involved In Pregnant Women of Quetta Valley****, Indo Am. J. P. Sci, 2017; 4(08).*

INTRODUCTION:

Anemia is the deficiency of RBCs or decrease haemoglobin concentration in the blood. Anemia is most common in females due to the monthly physiological loss in the form of menstruation, increased demands in pregnancy, history of multiple pregnancies, conditions causing menorrhagia and most commonly dietary deficiencies resulting in iron deficiency anemia.

Anemia can occur due to decrease in the number of RBCs, low levels of haemoglobin in red blood corpuscles, or reduced red blood cell volume [1,2]. In anemia, the RBCs ability to provide adequate oxygen to body tissues is reduced. Detailed estimations of hemoglobin, serum ferritin concentration, serum iron levels and total iron-binding capacity (TIBC) enumerate the details of extent and type of anemia in any individual [3].

Anemia as per WHO:

Hb level below 7g/dl is called Severe anemia

Hb levels between 7.0 - 9.9 g/dl is Moderate anemia

Mild anemia if it ranges between 10 – 11.9 g/dl.

Normal Hb level ranges between 12 -15 g/dl.

Iron deficiency is the major cause of anemia. Other less common factors contributing towards the global burden of anemia are folate deficiency, vitamin B12 deficiency and anemia of chronic disease [1 ,4 ,5].

The main reason for anemia in pregnancy in Pakistani mothers is deficiency of the adequate amount of iron in the diet leading to decreased iron stores in the body, which is the main ingredient of haemoglobin. During pregnancy as part of the preparation for fetal development and increased maternal body demands, erythroid hyperplasia of the marrow occurs, and RBC volume and number increases. A disproportionate increase in plasma volume, almost double the usual amount, as compared to cellular components, results in hemodilution (hypervolemia of pregnancy). Hematocrit decreases to about 34% during late single pregnancy and to 30% during late multifetal pregnancy. These two events clearly show that physiological anemia is the result of combined effect of hemodilution and negative iron balance. Thus, during pregnancy, anemia is defined as Hb < 10 g/dL (Hct < 30%). All those females with hemoglobin concentration of < 11.5 g/dL at the onset of pregnancy should be treated prophylactically with iron therapy because subsequent hemodilution usually reduces Hb to < 10 g/dL. Despite hemodilution, oxygen carrying capacity of blood remains normal throughout pregnancy. Hematocrit usually returns to normal immediately after delivery of fetus. Anemia occurs in every third of women during the 3rd trimester [6].

About 75% of anemias diagnosed during pregnancy are due to iron deficiency. Lower socio-economic conditions in developing countries predisposes to anemia [7]. Repeated pregnancies is another contributing factor. Low levels of dietary iron and chronic gastrointestinal blood loss due to Hook worm infestation and red blood cell destruction by malarial parasites are also causes of anemia. Folic acid deficiency may lead megaloblastic anemia in pregnancy.

Anemia affects both mother and fetus. It leads to retardation in fetal growth, ill development and intrauterine death. The major factor in growth retardation is the release of placental stress hormone which increases ACTH and cortisol and inhibit insulin like growth factor, responsible for multiplication of the cells essential for fetal development. Anemia and hypoxia causes an abnormal invasion of trophoblast and releases hypoxia inducible factor which results in abnormal growth of fetus. Adverse effects on the body of pregnant female are cardiovascular compromise, decline in physical and mental functions, immune disbalance, fatigue and increased chances for the transfusion of blood in the post-delivery period [8].

In Pakistan, the prevalence of anemia is higher because of the low dietary intake of iron and folic acid. Other contributing factors are poor hygiene and genetic predispositions which may lead to infections and infestation [9]. Assessing that the absorption of iron is 8% in pregnant woman, their dietary intake will meet only 30-45% of the requirement. Absorption of iron can be altered from 1% to 40% by balancing the diet with the mixture of inhibitors and enhancers. This clearly indicates that changing the food pattern, bioavailability of iron can be regulated easily [10].

Foods with abundant quantities of vitamin C, lactic acid, citric acid, fructose and peptides from animal sources increases the solvability of the iron and helps in its absorption. They are the enhancers [11,12]. There are many examples from plant kingdom which enhances iron solubility, such as guava, amla and citrus variety [13]. Evidence shows that certain vegetables such as cabbage, potatoes, green leafy vegetables and cauliflower also promotes iron absorption [10].

Factors that inhibit absorption of iron in the body are oxalate, polyphenol, phyt, phosphate, calcium and zinc containing compounds. These elements make a bond with iron, converting it to be less soluble. They also hamper iron absorption by competing for iron binding sites [11,12]. Dairy produce like milk and cheese are the rich sources of calcium and can interfere with iron absorption [13].

Therefore, looking at the severity of damage caused by anemia, which is a potentially manageable condition, we aimed to find out the prevalence of anemia and the risk factors involved in causing anemia in the females of Quetta valley of Pakistan

MATERIALS AND METHODS:

The study was conducted in the tertiary care hospital of Quetta. Four hundred pregnant females between age 19 to 45 years, were interviewed and the data was recorded on the predesigned Performa. Only those pregnant females were included who were in their second and third trimester of pregnancy. Blood samples were taken through venipuncture in both seasons i.e. winter (December 2015) and summer (July 2016) for complete blood count and serum ferritin levels. Malarial parasite was checked in the samples of those females where the history was suspicious. Stool samples of females were taken to check worm infestation.

For blood sample testing Kit Method was used. The basic principle of Kit method is as follows,

Conversion of hemoglobin into methemoglobin,

1) Potassium ferricyanide + Hemoglobin → Methemoglobin

Followed by reaction of potassium cyanide with methemoglobin which converts it into cyanmethemoglobin

2) Potassium cyanide + Methemoglobin → cyanmethemoglobin.

Worm infestation was checked by history and then in suspicious individuals, stool test was performed to look for the worms or their eggs. Smoking, Mud eating, obstetrical history and menstrual history, beetle nut chewing, family history of thalassemia was recorded by history taking.

Some patients were already on iron supplementation.

RESULTS:

In this study a total of four hundred pregnant women of age (19 – 45 years) were included. The median age of patients participated in this study was 32.5 years. This shows that majority of the patients were young. Body mass index was also calculated. Most of the patients were obese (table-1) 37% followed by normal body mass index in 31% of the females. Few females were found underweight i.e. 16%. The education status was also recorded of the patients and found that one forth, 26% had matriculation (10 grade) and another 25% attended high school (12 grade). Only 17% of the patients were uneducated (table 1). The reason for good educational status of patients in the presented data is that the uneducated population usually does not attend antenatal clinics or prefer home deliveries.

While analyzing the obtained data, it was found that 61% of the females were house wives and 39% were working women (table-1). Majority of the patients in the present study were Pathans 31% and Punjabis 46%. Out of the sample population 68% belongs to urban region while 32% came from the rural areas. We analyzed the red blood count was carried out for all patients and it was found that 69% had low red blood cell count while 31% had normal levels. On analyzing the economic status of these patients, it was found that 51% of patients belong to middle class families while 31% of females came from poor families. Analysis of serum Ferritin levels showed that 50% of the females had normal ferritin levels while 50% had lower values. The above-mentioned variables were also analyzed according to the severity of anemia, which is presented in (table 1).

The present study, it was found that majority of the anemic patients belong to the younger age group 29.6 years. By comparing the BMI of patients to the degree of anemia, it was evident that most of the anemic patients 16% were underweight and 27% have normal BMI while, patients who had normal hemoglobin levels or are mildly anemic were overweight and/or obese. The above-mentioned results were highly significant with 0.001 p value. By analyzing the education status of the patients, it was found that a strong relationship between anemia and academic levels of the patients were existed. Majority of the anemic females 52% were uneducated or had education up to matriculation, while 24% were graduated, which showed significant p value. The study population belongs to different ethnic groups with different cultural values which can have effect on their dietary habits and life styles, but in the present study no significant difference in ethnic groups with respect to anemia was found. Similarly, employment status of the patients has no significant impact on their hemoglobin levels. Distribution of study population in urban and rural parts of Quetta valley did not showed significant difference when the two strata were compared in terms of anemia.

The present study it was found that socioeconomic status was inversely related to the anemia. Poor subjects were found to be more anemic as compared to those who were from middle class or upper class which shows p-value 0.000. Females who had low hemoglobin levels also had decreased RBC count and low ferritin levels and p-value was found to be significant for both variables.

Table 1: Demographic and Anthropometric characteristics of pregnant women of Quetta valley

Characteristics	Characteristics	%
BMI	Underweight	16
	Normal	31
	Overweight	16
	Obese	37
Qualification	Uneducated	17
	Metric	26
	Non-Metric	14
	High School	25
	Graduate	18
Occupation	House Wife	61
	Teacher	19
	Office worker	12
	Maid	8
Ethinicity	Pathans	31
	punjabi	46
	Baluch	8
	persian	9
	sindhi	6
Address	Urban	68
	Rural	32
RBCs Count	Very low	7
	Low	62
	Normal	31
Socio-economic Status	Poor	31
	Middle class	51
	Upper class	18
Ferritin Levels	Low	50
	Normal	50

By analyzing the data studied population showed that 96% of the females were anemic with varying Severity among them 13% severe, 63% moderate and 20% had mild anemia while Only 4% had normal levels of hemoglobin. (table-2) fig.1&2

Table 2: Frequency of Anemia in pregnant females of Quetta Valley

		Frequency (n= 400)	Percentage (%)
Anemic	**Severe**	52	13%
	Moderate	252	63%
	Mild	80	20%
Normal		16	04%

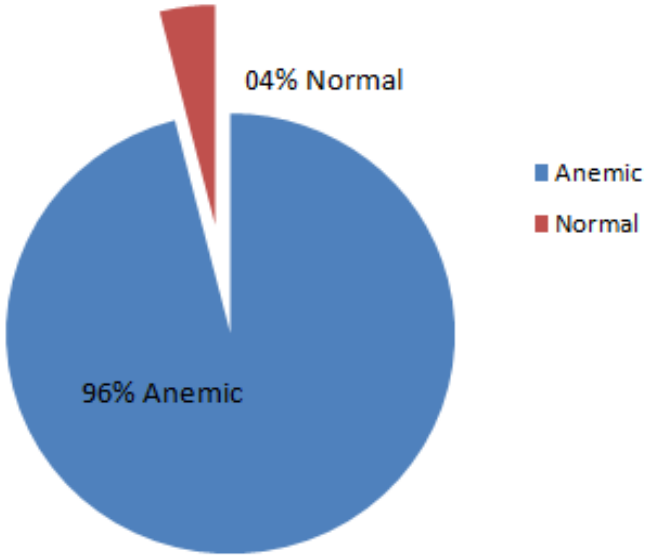

Fig 1: Pie chart showing Distribution of Anemia in a pregnant population of Quetta Valley

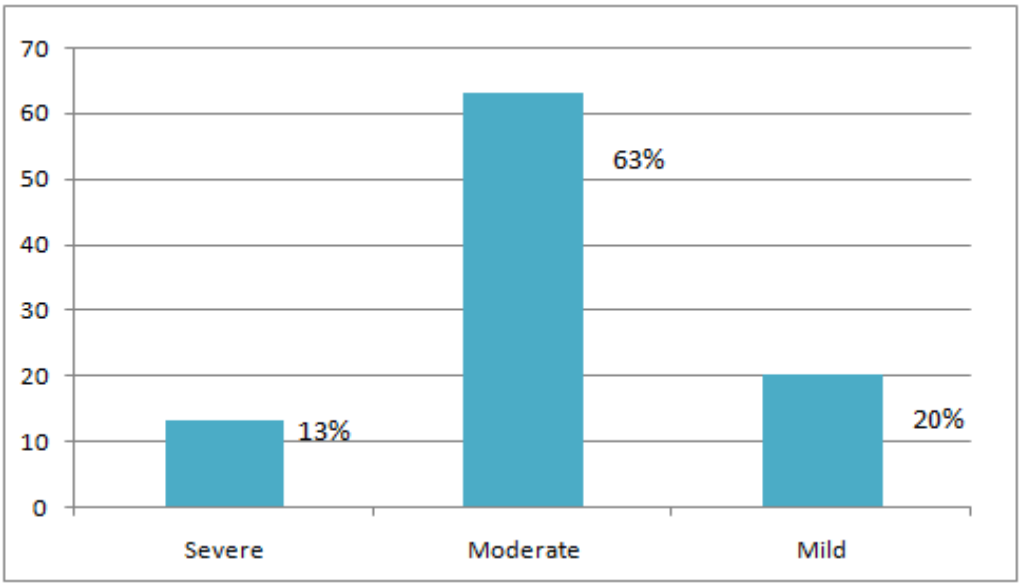

Fig 2: Bar chart showing the distribution of severity of Anemia in study population

Table 3: Demographic and Anthropometric characteristics of pregnant women of Quetta valley according to anemia status

Characteristics	Normal n=16(%)	Mild Anemia n=80(%)	Moderate Anemia n=252(%)	Severe Anemia n=52(%)	P value
Hemoglobin g/dl	13.07 ± 0.35	10.6 ± 0.51	8.92 ± 0.89	5.09 ± 1.01	
Age	36.0 ± 4.5	36.55 ± 3.45	31.14 ± 6.05	29.62 ± 5.10	0.730
BMI					
Underweight	0(0)	0(0)	40(15.87)	24(46.15)	
Normal	0(0)	16(20)	100(39.68)	8(15.38)	0.001
Overweight	4(25)	20(25)	24(9.52)	16(30.76)	
Obese	12(75)	44(55)	88(34.92)	4(7.69)	
Qualification					
Uneducated	0(0)	8 (10)	48(19.04)	12(23.07)	
Metric	0(0)	12(15)	92(36.50)	0(0)	
Non-Metric	0(0)	0(0)	28(11.11)	28(53.84)	0.000
High School	8(50)	28(35)	52(20.63)	12(23.07)	
Graduate	8(50)	36(40)	32(12.69)	0(0)	
Occupation					
House Wife	12(75)	40(50)	160(63.49)	32(61.53)	
Teacher	4(25)	24(30)	40(15.87)	8(15.38)	0.269
Office worker	0(0)	16(20)	32(12.69)	0(0)	
Maid	0(0)	0(0)	20(7.93)	12(23.07)	
Characteristics	Normal n=04(%)	Mild Anemia n=20(%)	Moderate Anemia n=63(%)	Severe Anemia n=13(%)	P value
Ethinicity					
Pathans	8(50)	20(25)	84(33.33)	16(30.76)	
punjabi	8(50)	48(60)	104(41.26)	20(38.46)	
Baluch	0(0)	4(5)	24(9.52)	4(7.69)	0.398
persian	0(0)	8(10)	28(11.11)	0(0)	
sindhi	0(0)	0(0)	12(4.76)	12(23.07)	
Urban	12(75)	60(75)	176(69.84)	24(46.15)	
Rural	4(25)	20(25)	76(30.15)	28(53.84)	0.322
Religion					
Muslim	12(75)	68(85)	224(87.30)	28(53.84)	
Hindu	0(0)	0(0)	12(4.76)	12(23.07)	0.035
Christian	4(25)	12(15)	16(6.34)	12(23.07)	
RBCs Count					
Very low	0(0)	0(0)	0(0)	28(53.84)	
Low	0(0)	32(40)	192(76.19)	24(46.15)	0.000
Normal	16(100)	48(60)	60(23.80)	0(0)	
Socio-economic					
Status	0(0)	0(0)	84(33.33)	40(76.92)	
Poor	0(0)	40(50)	152(60.31)	12(23.07)	0.000
Middle class	16(100)	40(50)	16(6.34)	0(0)	
Upper class					
Ferritin Levels					
Low	0(0)	16(20)	132(52.38)	52(100)	0.000
Normal	16(100)	64(80)	120(47.61)	0(0)	

After performing basic demographic analysis, the risk factors that contribute to the development of anemia were also analyzed and the results are showed in table 4.

Balanced diet plays a vital role in providing essential nutrients like iron which is a major factor in the formation of hemoglobin. Data presented in Table -4 shows that many of the participant females who had severe or moderate anemia were not consuming a balanced diet. While 40 (76.92%) of the females were in severe anemia group and 92 (36.50%) in the moderate anemia group were not on the balanced diet. The above results showed significant p-value which means that the balance diet has a major contributing factor.

In Pakistan, the number of pregnancies per female is another important issue. Females are not on the balanced diet and frequent pregnancies add extra burden to them. In the present study, the result shows that it is also a contributing factor for developing anemia in the studied population. In severe anemia group, all females 52 (100%) had more than two pregnancies while in moderate group 216(85.71%) also had more than two pregnancies and showed significant p-value.

Another important factor Mud eating also called as Pica disorder was also analyzed this habit is commonly found in pregnant females. The same pattern as mention above was found regarding the habit of mud eating the participants 36(69.23%)were in severe anemia group and 64 (25.39%) were in moderate anemia group, the relationship to the severity of anemia showed significant p-value. Beetle nut chewing or Gutka consumption is another contribution factor in anemia. In the present study, it was found that 28(53.84%) patients in severe anemia group and 64(25.39%) patients in moderate anemia group were habitual in using beetle nut which contributing their anemia status.

Quetta is basically a cold weather area. The winters are longer than the summers, which led to ~~the~~ more tea/caffeine consumption. Tea and caffeine are known for their potential harmful effects. Many essential elements and minerals do not get absorbed if they are consumed with tea. In the present study strong relationship between excessive tea consumption and anemia was found as presented in table 4. 48(92.30%) females in severe anemia group and 204(80.95%) females in moderate anemia group confirmed excessive tea consumption in their history. The participants were also asked whether they received iron supplementation. None of the females with severe anemia gave history of iron supplementation. In moderate anemia group 144(57.14%) females never took iron supplements. P- value was found very significant.

The linear regression of all risk factors was performed to find and to omit confounders. In regression analysis, it was found that, body mass index (0.008), socioeconomic status (0.002), number of pregnancies (0.000), excessive tea intake (0.000), family history of thalassemia (0.009) and iron supplementation has significant relation to anemia. While it was also observed that mud eating (0.087) and beetle nut chewing (0.069) has some but not strong impact on anemia. The values of analysis are shown in the table 5.

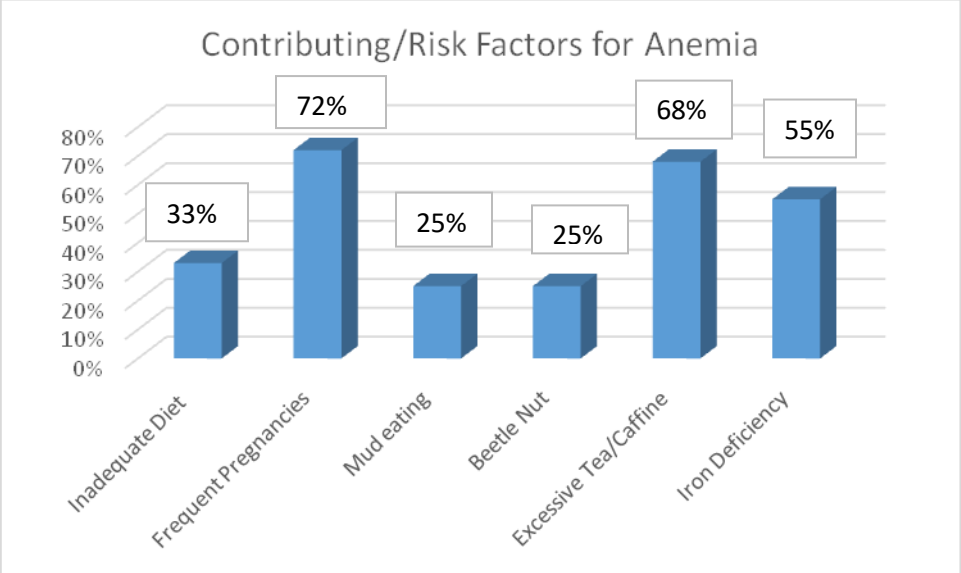

Fig 3: Contributing / Risk Factors in Anemia

Table 4: Contributing / Risk Factors in Anemia

Characteristics	Normal n=16(%)	Mild Anemia n=80(%)	Moderate Anemia n=252(%)	Severe Anemia n=52(%)	P value
Balanced Diet Yes No	16(100) 0(0)	. 80(100) 0(0)	160(63.49) 92(36.50)	12(23.07) 40(76.92)	0.000
Number of Pregnancies None Up to 2 3-4 >4	0(0) 16(100) 0(0) 0(0)	12(15) 48(60) 20(25) 0(0)	0(0) 36(14.28) 172(68.25) 44(17.46)	0(0) 0(0) 4(7.69) 48(92.30)	0.000
Mud Eating Yes No	0(0) 16(100)	0(0) 80(100)	64(25.39) 188(74.60)	36(69.23) 16(30.76)	0.000
Beetle Nut Chewing Yes No	0(0) 16(100)	0(0) 80(100)	64(25.39) 188(74.60)	28(53.84) 24(46.15)	0.009
Excessive Tea/Caffeine Yes No	0(0) 16(100)	20(25) 60(75)	204(80.95) 48(19.04)	48(92.30) 4(7.69)	0.000
Iron supplementation Yes No	16(100) 0(0)	56(70) 24(30)	108(42.85) 144(57.14)	0(0) 52(100)	0.000

Table 5: Contributing / Risk Factors in Anemia Linear Regression Analysis

Variables	Value of significance (p-value)
Qualification	0.718
Diet	0.399
BMI	0.008
Ferritin levels	0.152
SE status	0.002
Menstrual flow	0.114
No of pregnancies	0.000
No of miscarriages	0.721
Mud eating	0.087
Beetle nut chewing	0.069
Excess Tea caffeine	0.000
FH of thalassemia	0.009
HO malaria	0.883
Worm infestation	0.931
Iron supplementation	0.041

DISCUSSION:

There were two aspects of the present study. The first aspect was the prevalence of Hb deficiency among pregnant women; and second was to find the possible causes of Hb deficiency such as, diet, educational status, socioeconomic status and demographic.

In the present study, the prevalence of anemia among pregnant females was 96%, which is higher than that is reported in other studies conducted in Pakistan. In Lahore 70.5% [14], Karachi 24% [15], Faisalabad 75% [16]. The reason of the above mentioned high percentage could be the dilution of blood due to expansion of plasma by increased water retention during the second trimester and the sample for the present study were collected during late, second and early third trimester, In Most of the studies the time for sample collection was same as that of present study. In another study from Lahore the prevalence of anemia was 80%. A study from Quetta valley quotes that iron deficiency is the major cause of anemia in females of Quetta due to the inadequate amount of essential nutrients in their diets. By comparing the obtained data with other countries, it was found that anemia is a common issue in South Asian and African countries specially. A study conducted by [17] it was reported that the prevalence of anemia in India was found to be 88%, in Indonesia 74%, Tanzania 86% which were a bit close to the presented percentage while, in Philippines 48%, Nigeria 47% and Bangladesh 47% was less than the present study.

Most of the females 63% in this study had moderate anemia. By further stratifying these 63% females it was notice that most of the females 35% had Hb level of more than 9 gm/dl. Anemia among these females could be corrected if they were educated about the balanced diets in antenatal clinics and /or by using electronic and print media. Efforts should be made at government level also to lower the numbers of anemic females in our population. Iron supplementation along with B12 and folate should be provided to all females in antenatal clinics of all tertiary care health establishments.

In present study, Severe anemia was more prevalent in the younger age group. This is because of early marriages and early pregnancies. Another reason can be that these days, youngsters are less concerned about consuming balanced diets. Their diets usually contain more junk food than healthy portions. These young ladies should get guidance at high school levels about iron supplementation when they start menstruating so that despite pregnancy in early age they already have reserves of iron in their body to cope up with the requirements of pregnancy.

By analyzing the obtained data and inverse relation between BMI and anemia status was observed. Severely anemic females have lower BMI 46.15% as compared to those who were moderately anemic and those who had normal hemoglobin levels. Many among them were shorter as compared to the females in moderate and mild anemia group. The above mentioned results are consistent with the results of another national study by [9].

Hemoglobin levels of uneducated females were significantly lower as compared to educated ones. The reason could be better understanding of necessity of essential nutrients in the diet and the consumption of healthy and balanced diet among educated females as compared to the uneducated ones. Similar results were drawn by the other two national studies [18].

The employment status had no significant effect on anemia. These results are in consistent with the results by [9] The reason behind this is probably that very few among the present study population were employed. The people in the Quetta valley belong to those strata of society who tend to keep their wives in the safety and luxuries of home. Besides this data which was collected from a public sector hospital where antenatal clinics are held in the morning hours, when working women are usually at their jobs.

No significant difference among different ethnic groups in terms of anemia was found in the present study. This is probably because societies, cultures and dietary habits of different ethnic groups are merging into one another resulting in mixed patterns of dietary habits, similar dietary taboos and analogous cultural patterns [9]

During data analysis, it was found that socioeconomic status had a strong impact on the hemoglobin concentration, the p-value was highly significant. The poor population were more anemic 31% (32% severely anemic and 67% had moderate anemia). In the middle class group 51% had anemia (74.5% had moderate anemia while only 5.8% were severely anemic). This is probably because very poor people do not attend antenatal clinics and prefers home deliveries.

In present study, it was found that 50% of the studied population had low ferritin levels, which is consistent with the results of many national studies as iron deficiency anemia is the most prevalent of all anemias in Pakistani population [19, 20].

Risk factors responsible for anemia were also analyzed. Females with the habit of consuming balanced diet including meat, dairy and eggs had significantly higher hemoglobin levels as compared to those who were not careful about their diets. Other risk factors like consuming beetle nut, excessive tea and caffeine, more and frequent pregnancies all showed significant relationship with anemia.

Data regarding iron supplementation was also collected from the participants and the obtained results were Contrary to other study [9] it was found

that those females who were on prophylactic or therapeutic iron supplementation had better hemoglobin levels.

In linear regression analysis, body mass index and low socioeconomic status showed direct relation with the hemoglobin levels. Multiple pregnancies were associated with increased prevalence and severity of anemia. Family history of thalassemia or having a trait of thalassemia also showed significant risk of developing anemia during pregnancy. Excessive tea intake also showed significant results in terms of developing anemia. Analysis showed that iron supplementation has beneficial effects in correcting and preventing anemia in pregnant females.

CONCLUSION:

Iron requirements increase during pregnancy. Nature has its ways to mobilize iron stores of the body to meet the increasing demands during pregnancy. The high prevalence of anemia in the females of Quetta valley indicates that these ladies might have low reserves to start with or their diets were not meeting the increasing demands. So, it is essential that the levels of hemoglobin in females must be optimized during their fertility period. This can be done by the help of electronic and print media where they can educate females regarding the importance of balanced diets. Another thing which is needed desperately is to mobilize and educate females to attend antenatal clinics where anemia can be picked early in pregnancies to avoid harmful effects on the fetus. Secondly antenatal clinic staff can advise females to have adequate gap between pregnancies so that the body can get chance to replenish its lost iron stores. The study concluded that 50% of the females had iron deficiency anemia. Iron supplementation should be encouraged in pregnant females and girls during fertility age, so that the monthly loss of blood during menstruation can be replenished.

Further studies on larger scales are needed to make guidelines in order to help females of Pakistan to overcome this potentially curable and avoidable issue.

REFERENCES:

1.Balducci L, Ershler WB, Bennett J M. Anemia in the Elderly. New York, USA: Springer Science & Business Media. (2007).

2.Bridges K R, Pearson H A. Anemias and other red cell disorders. New York, USA: McGraw-Hill Medical. (2008).

3.Dallman P R, Yip R, Oski F. A. Iron deficiency and related nutritional anemias. In Nathan, D. G., and Oski, R. A. (Eds.). Hematology of infancy and childhood, Philadelphia: WB Saunders. 1992:413-450.

4.WHO & CDC. Assessing the iron status of populations. A joint report of a World Health Organization and Centers for Disease Control and Prevention/Technical Consultation on the Assessment of Iron Status at the Population Level. Geneva: World Health Organization. (2004).

5.Kraemer K, Zimmerman M B. Nutritional Anemia. Basel, Switzerland: Sight and Life Press. (2007).

6.Lara A.F, Anemia in pregnancy. march 2017. http://www.msdmannuals.com/ professional/gynecology-and-obstetrics/pregnancy-complicated by disease anemia in pregnancy.

7.Sifakis S, Pharmakides G. Anemia in pregnancy. Annals of the New York Academy of science. 2000; 900:125-136.

8.Breymann C. Iron deficiency and anemia in pregnancy: modern aspects of diagnosis and therapy. Blood Cells, Molecules and Diseases. 2002;29(3)506-516.

9.Ansari NB, Badruddin SH, Karmaliani R, Harris H, Jehan I, Pasha O. Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. Food Nutrition bulletin. 2008;29(2):132-139.

10.WHO, UNICEF & UNU. Iron deficiency anemia: assessment, prevention and control: a guide for programme managers. Geneva: United Nations International Children's Emergency Fund, United Nations University & World Health Organization. (2001).

11.Geissler TS, Powers H J. Human Nutrition. Edinburgh: Elsevier Churchill Livingstone. (2005).

12.Barasi M E. Nutrition at a glance. UK, USA & Australia: Blackwell. (2007)

13.Gibney MJ, Margetts BM, Kearney JM, Arab L. *Public Health Nutrition*. Oxford: Blackwell Science. (2007).

14.Ijaz T, Ullah M, Arshad S, Ashraf S, Munir S, Imran M, Ahmed F, Imran M, Fatima Z, Waqar BA. Prevalence of Anemia and thrombocytopenia in pregnant females of Lahore. Life sci-Int.J.2016;10(01):38-42.

15.Zehra T, Khan AR, Qadir F. Anemia in pregnancy a study of Karachi in a tertiary care centre. AJPCT. 2014;2(10):1224-1233.

16.Anjum A, Manzoor M, Manzoor N, Shakir AH. Prevalence of Anemia during pregnancy in district Faisalabad, Pakistan. Punjab Univ. J.Zool. 2015;30(1):015-020.

17.Barbin BJ, Hakimi M, Pelletier. An analysis of Anemia and pregnancy related maternal mortality. The Journal of Nutrition. 2001;131(2):604-615.

18.Gebre A, Mulugeta A. Prevalence of Anemia and Associated Factors among pregnant Women in north western Zone of tigray, Northern Ethopia. Journal of Nutrition and Metabolism. 2015;2015:1-7.

19.Shahani AR, Shahani S, Kazi N. Prevalence of Anemia during pregnancy in rural Sindh. ISRA. Medical journal. 2012;4(2):96-98.
20.Dreyfuss LM, Stoltzfus RJ, Shrestha Bj, Pradhan EK, Leclerq SC, Khatry SK, Shrestha SR, Katz J, Albonico M, West KP. Hookworms, Malaria and Vitamin A deficiency contribute to Anemia and Iron deficiency among pregnant women in the plains of Nepal. J. Nutr. 2000;130(10):2527-2536.