

## Estimation of Hemoglobin Level among Different Age Groups in SBK Women's University Quetta

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**Abstract:** Deficiency of hemoglobin in red blood cells causes Anemia which is one of the most common health issues of the planet. Most common class of anemia is Iron Deficiency Anemia in which the iron content is fewer. Anemia mainly occurs in women. Taking this in to consideration estimation of hemoglobin level among different age groups of students and faculty in SBK Women's University Quetta Pakistan was carried out. Blood samples from 212 women of different age groups (17-50 years) were collected and analyzed using Cyanmethemoglobin method. To see the impact of nutrition on hemoglobin, information from students and staff, were gathered through a Questionnaire. The results revealed that 0.47% had severe anemia while 14.62% had moderate and 45.75% had mild anemia. The remaining had normal values of hemoglobin. The age groups below 20 years and above 45 years were found to be most affected by anemia. Fewer intakes of fruits, vegetables and meats are the main cause of anemia, while some anemic patients had heavy bleeding in menstruation and a few had gastrointestinal diseases.

**Key words:** Iron Deficiency Anemia • Cyanmethemoglobin • Nutrition

### INTRODUCTION

Hemoglobin (Hb) is a complex protein that consists of heme group (iron) and globulin protein. Function of hemoglobin is to move oxygen to the body with the help of blood. It also carries carbon dioxide to the lungs from different parts of the body.

There are three main types of anemia; the first one is Blood Loss Anemia. The second type of anemia occurs when the erythrocytes get demolished, it is known as Hemolytic Anemia. The third and the most common class of anemia is Iron Deficiency Anemia [1]. About 50% of people in the world contain insufficient iron in their body due to which they are anemic and the main root of this anemia is lack of nutrition [2]. Insufficiency of folic acid or vitamin B<sub>12</sub> is also creating Iron Deficiency Anemia [3]. Iron plays an important role because many enzymes in human body are made up of iron and iron also exists in the hemoglobin [4]. The reason of Iron deficiency anemia (IDA) is fewer intakes of iron, poor digestion and nutritional problems [3]. IDA is most common in females,

especially in pregnant women [5] and in those who have heavy blood loss in menstruation cycle. When the level of hemoglobin is low it results in many symptoms like fatigue, weakness and poor defense system [2]. Nutritional deficiency of iron, not only produces anemia but also causes immunological disorders, dysfunction of neurons and also demolishes work capacity. Insufficient intake of iron also generates some severe metabolic disorders and brings changes in behavior. During pregnancy if iron deficiency occurs, it causes cognitive shortage [5]. By adding iron rich foods in diet and taking iron supplements especially in pregnancy and in menstruation periods can overcome the hemoglobin level to defeat the anemia [2].

Effects of bad nutrition on pregnancy from Egypt revealed that most of anemic pregnant women belonged to low socioeconomic class who do not practice healthy diet like irregularity of meals infrequency of breakfast with low consumption of red meat, vegetables and fruits as well as the beans & mushrooms which are rich sources of folic acid [6]. Anemia is more commonly found in

underdeveloped and developing countries. Developing countries like India [7] reported that undernutrition, low standard of living and age are main causes of anemia in pregnant women.

A study was conducted in Indonesia to see the influence of multiple micronutrient supplementations for maternal anemia. The results revealed that mean Haemoglobin levels increased significantly after the supplementation of multiple micronutrient whereas iron folic acid supplement did not increase significantly, at the same time serum ferritin levels in both groups did not increase significantly. Therefore it is difficult to overcome anemia in pregnant women[8]. It has been reported that Egyptian child bearing female has shown both plants and liver sources of iron can enhance levels of serum anemia indices, which increase the ratio of Hemoglobin, iron and ferritin in serum [9].

It has been found that malarial infections are more severe in pregnancies and especially in first pregnancy and are one of major cause of anemia in pregnancy. Low hemoglobin levels were found in 70% of primigravid mothers, 45% of multiparae and 22% of the central group[10].

A hemoglobin analysis of children attending schools with canteens in Abidjan showed that the prevalence of anemia ( $Hb < 11.5$  g/dl) was 30.3% with 33.3% of males and 29.1% for girls [11]. A study in Bangladesh, among garment factory workers showed that 11% males while 77% females were found to be anemic in this study [12].

As compared to males, females are more vulnerable to cause anemia. Aim of this study is to evaluate the hemoglobin level in women of Quetta valley and determine the different aspects by which anemia occurs. The women of Quetta have less awareness about anemia and their Hemoglobin level, so this study offered an opportunity to the women to get their hemoglobin checked and to know about hemoglobin deficiency and get awareness about the balanced diet.

## MATERIALS AND METHODS

**Study Subjects:** In this study 212 blood samples were collected from the females of SBK Women's university Quetta, Pakistan for the estimation of hemoglobin level. Students of BS, M.Sc and the staff of different age groups ranged from 17-50 years donated their blood for this study voluntarily.

**Sample & Data Collection:** 2ml of venous blood sample was drawn and quickly transferred into a small test tube

having a cap and a small amount of EDTA as an anticoagulant. These samples were stored in the refrigerator at 4°C and the samples were analyzed within 24 hours[4]. Data regarding eating habits was collected from the donors through a questionnaire.

**Analysis:** All 212 samples were analyzed by Microlabe 300 by Cyanmethemoglobin method using a kit. A working solution of Drabkin's reagent was made by its dilution. 10µl of blood was taken in a test tube by micropipette and then 1000 µl of working reagent was added in it. All the samples were analyzed one by one by microlabe within 24 hours of blood collection.

## RESULTS

The data obtained for Hb levels was analyzed by SPSS 13.0 for Minimum, Maximum, Standard Deviation, Mean + SE and presented in Table 1.

Over all 212 samples were collected out of which 94 samples were taken from the First Age Group that ranged from 17-21 years (students of BS) and comprised 44.33% of the entire samples. 93 samples were taken from the Second Age Group ranged 22-25 years (students of Masters) and made 43.86% of entire population while 25 samples belonged to the Third Age Group ranged 26-50 (Teachers & staff of SBKWU) and comprises 11.79% of the entire population. The mean + SE Hb for the First Age Group (17-21 years) was  $11.36 \pm 0.156$  for the Second Age Group (22-25 years) was  $11.60 \pm 0.171$  and the Third Age Group (26-50 years) was  $11.6 \pm 0.292$ .

The mean value found in this study was 11.5, which was near to the lower limit of 12g/dl with a standard deviation of 1.568 as represented in Figure 1. The maximum values of Hb levels that lied between 10-14g/dl which comprises 79.42% and the most frequent values were 10g/dl and 11g/dl which comprise 22.64 and 23.11 respectively of the entire population are also obvious in Figure 1 & Table 2.

The low and normal Hb frequencies and their percentages are presented in Table 2, which showed that 83 samples out of 212 had a normal Hb level which comprises 39.14% of entire samples. Only one sample had very Low Hb level which is 7.7g/dl which considered as anemic. Total 129 samples out of 212 showed anemic disorder which comprises 60.83% of entire population. Most commonly low Hb levels were 10-11 g/dl comprises 22.64% - 23.11% respectively (Table 2). Only one student had severe anemia with low Hb level 7.7 g/dl.

Table 1: Statistical Analysis

Age Groups	N	MinimumHb	MaximumHb	Mean Hb Level	Std. Error	Std. Deviation
1 <sup>st</sup> (17-21)	94	7.70	14.60	11.3649	0.15633	1.51563
2 <sup>nd</sup> (22-25)	93	8.60	16.00	11.6065	0.17113	1.65035
3 <sup>rd</sup> (26-50)	25	9.30	14.60	11.6600	0.29212	1.46059

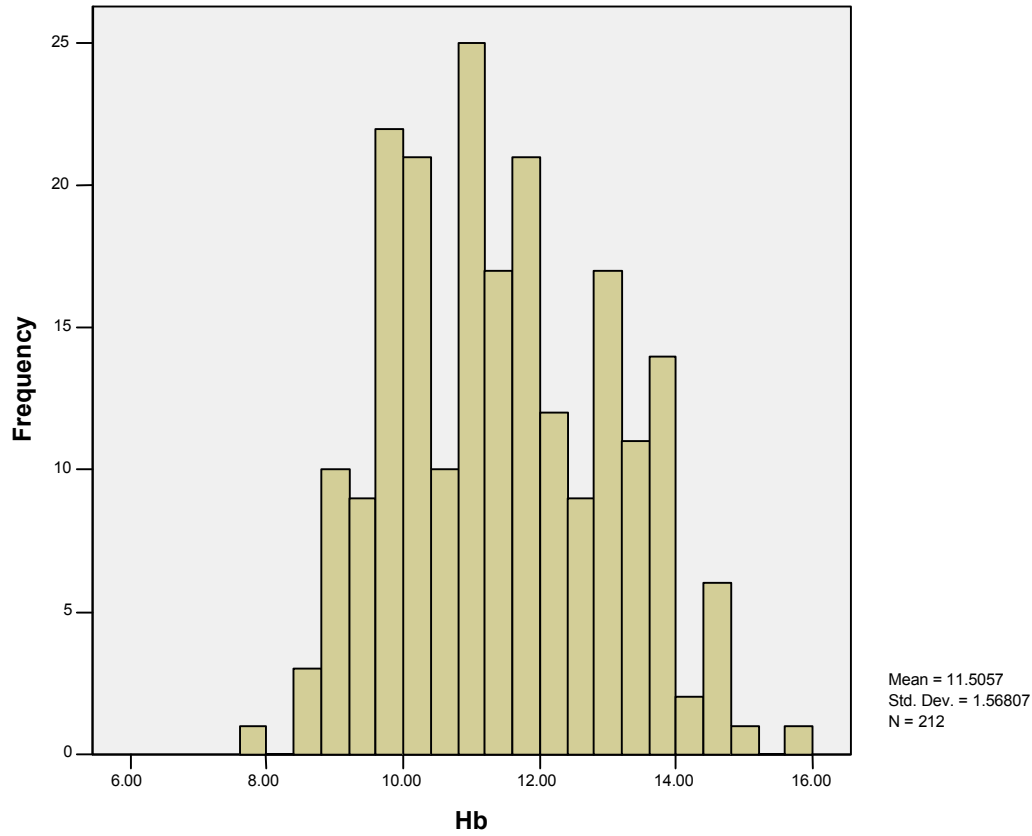


Fig. 1: Bar graph between hemoglobin & frequency

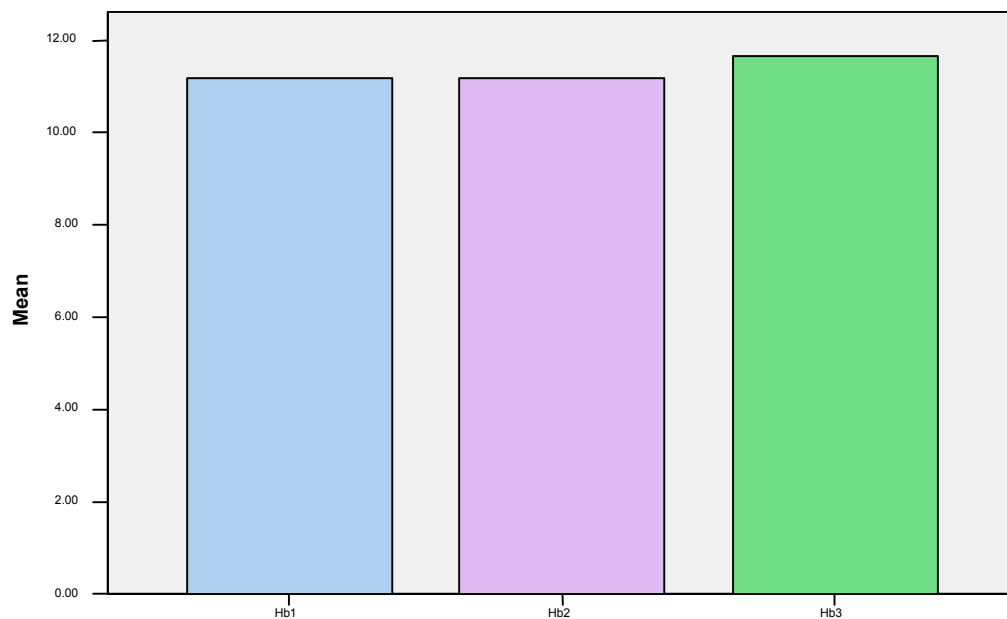


Fig. 2: Relationship between Hb levels mean with different age group

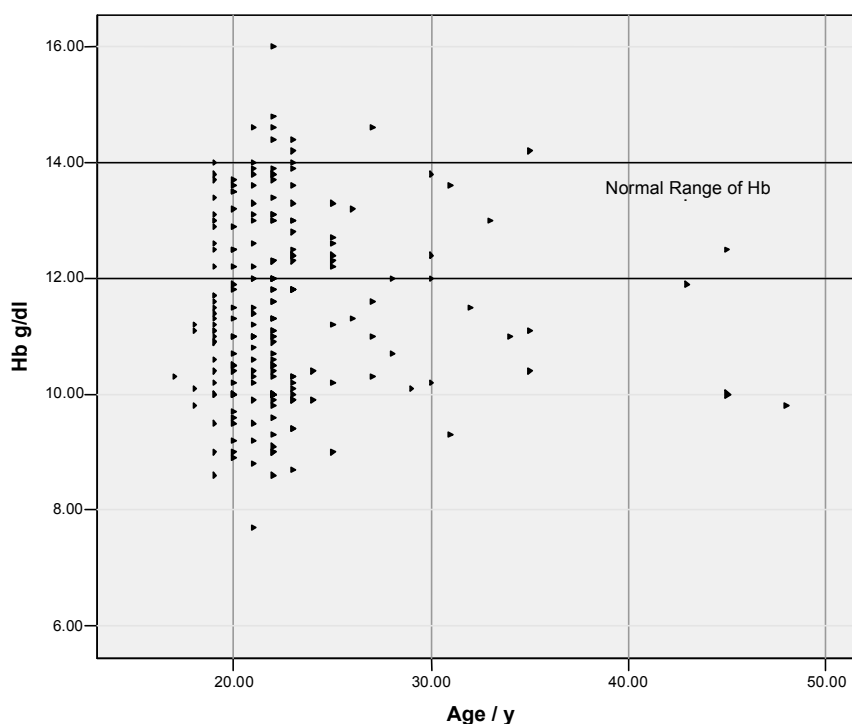


Fig. 3: Hemoglobin level among different age group of women 17-50 years

Table 2: Haemoglobin Frequencies

Low Hb Level	N	Percent
7.7	1	0.47%
8	5	2.35%
9	26	12.26%
10	48	22.64%
11	49	23.11%
Total	129	60.83%
Normal Hb Level	N	Percent
12	33	15.56%
13	37	17.45%
14	12	5.66%
15	0	0%
16	1	0.47%
Total	83	39.14%

Relationship between different age groups and mean of Hb values is presented in Figure 2. The mean Hb value is approximately considered as 11g/dl for First Age Group (17-21 years) and Second Age Group (22-25 years). While the Third Age Group (26- 50 years) had mean Hb value approximately 12g/dl. It is concluded from this data that the First and the Second age groups were found to have low Hb level, less than 12g/dl.

### DISCUSSION

The hemoglobin level of working women in different age groups were found between 7.7 to 16.0 g/dl, as shown

in Figure 3, while the normal range is from 12-16 g/dl. The overall study showed that the individuals who were 21-22 years old had high levels of Hb. It might be because in this age group women may get mature and have more awareness about balanced diet and nutrition. The most common values of Hb lied between the ranges from 10-14g/dl (Table 2). The low Hb level ranged 7.7-11g/dl. Their nutritional study (questionnaire) has shown that those women were anemic due to insufficient intake of iron rich food such as green leafy vegetables, red meat and meat organs (liver, kidney, brain are iron rich food), low intake of citrus foods which contain vitamin C help in iron absorption in jejunum and duodenum of small intestine. Also low intake of iron supplementation, heavy bleeding during menstrual cycle and iron blockers such as tea, coffee and colas frequently play a role in inducing anemia. These informations were gathered using a questionnaire filled by all the blood donors for this study.

This study presented that Hb level ranged from 7.7-11g/dl was considered as low Hb level for adult women. Anemia is not caused only by iron deficiency but have multifractional factors. The causes of low Hb is inadequate iron intake which provides help in RBCs formation, insufficiency of B<sub>12</sub> and due to heavy bleeding in menstruation.

Iron supplements play important role to increase Hb level if iron requirement from nutrition is not satisfactory. Some important iron supplements included the proper

amount required like; folic acid 400mcg/day, Vitamin C 1000mg/day, vitamin B<sub>12</sub> 500 to 1000 mg/day, vitamin B<sub>6</sub> 50 to 100 mg/day and iron should be taken from 20 to 25 mg/day. All these play important role in RBCs formation which contains hemoglobin as proved that Hb levels increased significantly after the supplementation of multiple micronutrient [8].

A few women who belonged to third age group and had low Hb levels were found to be pregnant. As Hb is normally decreased with increase in pregnancy age, so more iron and folic acid and other nutrients are required. Malnutrition and irregularity of meals can also lead to anemia in pregnancy [6]. Therefore a balanced diet should be taken including both plants and animal sources of iron in order to increase Hb, Iron and Ferritin in serum [9].

**Recommendation:** Seminars or health care program on awareness about Hemoglobin should be arranged at college and university levels to give knowledge about the foods that are required to make Hemoglobin in the body.

It is important to give awareness about daily requirement of iron supplements to increase Hb level.

Iron ability is affected by some important factors known as iron blockers which are calcium, teas, colas and coffee, so further study should also be carried on to find out those iron blocker which commonly more effected iron ability due to which Hb level gets low.

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