PREVALENCE OF ANEMIA AMONG UNIVERSITY OF PESHAWAR STUDENTS

Muhammad Tahir Khan, Tasleem Akhtar, Mussarat Niazi

PMRC Research Centre,
Department of Pathology,
Khyber Medical College & Khyber Girls Medical College Peshawar - Pakistan

ABSTRACT

Objective: *To evaluate prevalence of anemia in male and female students of the university of Peshawar.*

Methodology: *This was a cross-sectional study conducted on 262 males and 259 females' students. The students were recruited from different Departments of Peshawar University through a convenience sampling procedure after taking informed consent. Students were interviewed and screened for the presence of anemia. Information was collected about socio-demographic background like age and sex on pre-designed questionnaire. Blood specimens were collected in EDTA vacutainers and analyzed by using Hematolgy Analyser Huma Reader Plus. The data was analyzed by using computer software package SPSS version 10.0.*

Results: *The mean age of the students was 21.9 ± 2.3 years. Out of 521 participating students anemia was prevalent in 4/262 boys (1.5%) and 62/259 girls (23.9%) students. Mean hemoglobin (P < 0.001), hematocrit (P < 0.001) and MCH (P < 0.01) were significantly different in men and women. No significant difference was observed in other hematological parameters among the two groups of students.*

Conclusion: *The prevalence of anemia among girls is high as compared to boy's student. This warrants further study on a larger sample of healthy college students to validate these findings and to safeguard the health of these future mothers.*

Key words: *Anemia, Hematological parameters, University students, Peshawar*

INTRODUCTION

Anemia is defined as a decrease in hemoglobin (or hematocrit) level from an individual's baseline value. Iron deficiency is the most prevalent nutritional problem worldwide; an estimated 2.15 billion individuals are anemic because of iron deficiency. Nutritional anemia though global in occurrence, is more of a concern in the developing countries because of the high prevalence in these regions. Most affected are children and women in the developing world[1].

Progressive stages of iron deficiency can be evaluated by different measurements such as ferritin, transferring saturation, hemoglobin and hematocrit. The most commonly used screening methods for the presence of iron deficiency in a population are the measurements of hemoglobin or hematocrit concentration for the presence of anemia[2]. These measurements are relatively simple and cheap, can be carried out under field conditions, and values below a certain cut-off point indicate or define that anemia is likely to exist. Because iron deficiency is often the most common cause of anemia, the presence of anemia is also used as a screening tool for iron deficiency. Although other iron-related tests are required for the confirmation of iron deficiency, it is reasonable to assume that a population with high anemia prevalence is likely to also have a high prevalence of iron deficiency[3,4].

Iron deficiency is common in Pakistan, and it is important to estimate the problem adequately. The present study was designed to evaluate the prevalence of anemia in the male and female students of University of Peshawar, Pakistan.

METHODOLOGY

The subjects were selected among male and female students of the University of Peshawar,

using a convenience sampling procedure. The volunteers were recruited by distributing a written announcement about the research. Potential subjects were first questioned with the use of a pre-coded questionnaire. A total of 262 male and 259 female students between 16-31 years of age were interviewed and screened for the presence of anemia in different Departments of Peshawar University. Information was collected about socio-demographic background like age and sex. After establishing that the potential subjects did not suffer from any obvious illnesses, blood was collected from each student, who had given informed consent. The data was collected in a period of two months.

Blood samples were drawn by veni-puncture by professional staff into a 3 mL vacutainers tube with EDTA. Hemoglobin (Hb), hematocrit (Hct), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell count (RBC) white blood cell count (WBC) and platelet count were determined by using Hematology Analyzer; Huma Reader Plus, France.

For hemoglobin, the cut-off criterion indicating anemia was the WHO cut-off of 12 g/dL for females and 13 g/dL for males[2]. Hematocrit was considered to be abnormal at values $< 36\%$ for females and $< 41\%$ for males[5]. RBC for males was considered[5] normal in the range of $4.2–5.8 \times 10^3/\text{mm}^3$ and for females, $3.6–5.6 \times 10^3/\text{mm}^3$. The cut-off values for the red blood cell indices were as follows[5]: MCV < 80 fL, MCH < 27 pg and MCHC < 32 g/dL, whereas WBC values $< 3.4 \times 10^3/\mu\text{L}$ or $> 11.5/\mu\text{L}$ was judged to be abnormal[6].

The mean red blood cell volume (mean corpuscular volume [MCV]) was used first to classify the anemic process as microcytic, normocytic, or macrocytic and its upper and lower limits are defined as Microcytic anemias (MCV, < 80 fL), Normocytic anemias (MCV, 80-100 fL) and Macrocytic anemias (MCV, > 100 fL)

The descriptive statistics was used for all variables. Quantitative variables like age and laboratory test were presented as mean $\pm$ SD. Qualitative data was presented in the form of frequencies along with the percentages. To test the significance of difference in the two groups comprising group one of male and group two of females, chi square test/fisher exact test was applied and p value was calculated. Level of significance chosen was < 0.05. The data was analyzed by using computer software package SPSS version 10.0.

RESULTS

The mean age of the sample was 21.9 ± 2.3 years. The highest number of male 208 (79.4%) and female 179 (69.4%) students both were in the age group of 21-25 years, while only 9 (3.5%) male students had age greater than 25 years (Table 1). All subjects belonged to the middle or high socioeconomic class.

Table 2 compares different hematological parameters among male and female students of university students. Mean hemoglobin ($P < 0.001$), hematocrit ($P < 0.001$) and Mean corpuscular hemoglobin ($P < 0.01$) were significantly different in men and women. No significant difference was noted in the mean values of RBC, MCV, MCHC and platelet count of male and female students.

Table 3 represents prevalence of abnormality of several iron status indicators in male and female students of the University of Peshawar. Men had a better hemoglobin status than women because only 4 (1.5%) male subjects were considered anemic (Hb < 13.0 g %), whereas 62 (23.9%) of the women were anemic and had hemoglobin concentrations < 12.0 g%. Abnormal hematocrit (< 36 %) was recorded in 36 (13.9%) of female students as compared to 0.4% in male students (hematocrit < 41 %). In the female students 60 (23.3%) had microcytic anemia (MCV < 80 fL[+])as compared to 46 (17.6%) in the male students. The difference in the two groups of male and female was non significant ($P > 0.1$). Low

Table 1: Age wise distribution of students in University of Peshawar

Age (years)	Male		Female	
	N	%	N	%
< 21	45	17.2	79	30.6
21-25	208	79.4	179	69.4
> 25	09	3.5	-	-

**Table 2: Hematological and biochemical characteristics
of students of University of Peshawar**

Indicator	Male (n=262) Mean $\pm$ SD (ranges)	Female (n =259) Mean $\pm$ SD (ranges)	% Changes	Student's t' test P value
Hb (g %)	15.19 $\pm$ 2.48 10.4-17.9	12.70 $\pm$ 1.54 7.6-16	19.6	0.0001
PCV (%)	46.49 4 +.19 33.1-54.1	39.49 $\pm$ 3.67 25.6-48.9	17.7	0.0001
RBC ($x10^3/mm^3$)	5.41 $\pm$ 0.82 3.85-7.84	5.35 $\pm$ 0.98 3.39-6.64	1.1	NS
MCV (fl)	84.09 $\pm$ 9.03 53-99	82.78 $\pm$ 8.49 52-98.2	1.6	NS
MCH (pg)	27.74 $\pm$ 3.05 15.6-34.8	26.83 $\pm$ 3.52 10.8-33.6	3.4	0.01
MCHC (g/dl)	32.12 $\pm$ 4.37 22.6-36	31.85 $\pm$ 4.06 20.7-35.7	0.8	NS
WBC ($x10^3/\mu l^3$)	6.87 $\pm$ 1.42 3.15-13.94	6.94 $\pm$ 1.81 2.25-13.6	1.0	NS
Platelet count (thousand/μl)	258.96 $\pm$ 78.88 42-611	249.77 $\pm$ 65.19 75-557	3.7	NS

NS= Not Significant

**Table 3: Prevalence of abnormality of several iron status indicators in
students of the University of Peshawar stratified by hemoglobin concentration**

Indicator	Male (n = 262)		Female (n = 262)		P
	N	%	N	%	
Hb (g %) Abnormal Normal	4 258	1.5 98.5	62 197	23.9 76.1	0.0001
Hct (%) Abnormal Normal	1 261	0.4 99.6	36 223	13.9 86.1	0.0001
RBC ($x10^{-3}/mm^3$) Abnormal Normal	4 258	1.5 98.5	3 256	1.2 98.8	0.71
MCV (f l) < 80 $\geq$ 80	46 216	17.6 82.4	60 199	23.3 76.8	0.1
MCH (pg) < 27 $\geq$ 27	95 166	36.4 63.6	104 155	40.2 59.8	0.37
MCHC (g/dL) < 32 $\geq$ 32	83 179	31.7 68.3	83 176	32 68	0.92
WBC ($x10^{-3}/uL$) < 3.4 $\geq$ 3.4	14 248	5.3 94.7	7 252	2.7 97.3	0.1
Platelet count (thousand/μL) < 150 $\geq$ 150	10 252	3.8 96.2	21 238	8.1 91.9	0.03

platelet count < 150 thousand/L was noted in 21 (8.1%) female students against 10 (3.8%) male students. The difference in platelet count was significant (P < 0.03) when male students were compared with female students. No significant difference was observed in other hematological parameters among the two groups of students.

DISCUSSION

Anemia prevalence in this study population was much lower than the estimated prevalence for the whole Pakistani population. National Health Survey of Pakistan (NHSP)[7] depicts, that among women of child bearing age (15-44 years), the prevalence of anemia (Hb < 12.0g %) in Pakistani women was 38-51.5%. The prevalence of anemia ranged from 12% among urban young men of high economic status to 28% among rural young men of low economic status. According to NHSP, the prevalence of anemia in young women was 2 to 3 times higher than that in young men; there was an economic gradient but no urban–rural difference.

On the basis of the WHO cut-off points, in our study, the prevalence of anemia was 23.9% for women, whereas only 1.5% of the men were anemic. The lower prevalence of anemia for the women studied compared with the overall prevalence in Pakistan is not surprising considering the fact that subjects were university students and most of them came from a relatively high socioeconomic background. It was also to be expected that women would have higher anemia prevalence than men. This can most likely be ascribed to the 50% higher iron requirement of women than men due to monthly menstrual blood losses[8-9] and a lower energy and iron intake from food.

This study also confirms a universal finding that, in several parts of the world, even when considerable anemia and iron deficiency are prevalent among women, men do not suffer from iron deficiency because of their lower iron requirement. It seems that dietary iron intake is the main factor accountable for the anemia pragmatic among women[4].

A study conducted on students of Ayub Medical College reported that 8.4% of the male students and 73.7% of the, female students were iron depleted, while just 4.27% males and 8.42% females were anemic, suggesting that iron deficiency in absence of anemia is present in students of this area[10].

The prevalence of anemia (Hb <12g/dL) among female college students attending the University of Sharjah, UAE[11] was 26.7% and the majority (88.4%) of the 69 anemic students had mild anemia, whereas 7.2% were moderately anemic and 2.3% Emirati students were severely anemic (hemoglobin <7g/dL). About 15.9% of the anemia cases were microcytic (MCV <80fL) and 1.6% were macrocytic (MCV >96fL). The finding from this study are comparable to our study, where anemia (Hb <12.0 g %) and microcytic anemia (MCV <80 fl) was recorded in 23.9% & 23.6% of female students of Peshawar University, respectively.

Using the same, World Health Organization Hemoglobin Cut-Off Points for the detection of anemia, a study from Indonesia has reported[12] prevalence of 3.1% in male and 14.3% in healthy young students of the University of Indonesia, Jakarta, showing that these students have better anemic status as compared to students from our present study.

CONCLUSION

A high prevalence of anemia in 23.9% girl students warrants further study on a larger sample of healthy college students to validate these findings and to safeguard the health of these future mothers.

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Address for Correspondence:
Dr. Tasleem Akhtar
Senior Research Officer,
PMRC Research Centre,
Khyber Medical College Peshawar - Pakistan