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Prevalence of Anemia and Hematological Profile among the Engineering Students in Nawabshah, Pakistan

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Abstract

Thecurrent study's aim to determine the incidence of Iron deficiencyanemia and hematological profile among the engineering students at QUEST University. Blood sampleswere collected with the help of the venepuncture method from engineering students in EDT bottles to investigate hematological variables and iron deficiency anemia.Prevalence of anemia was found in 16.3% (n=37) students.Anemia prevalence was found higher in female participants 24.6% (n=17) than male participants 12.7% (n=20). Mild<11 g/dL and moderate <10 g/dLanemia was 89.2%, and 10.8%, respectively.Female particpants were found with a higher prevalence of anemia than male participants.This research brought to light the issue of anemia of engineering students. Further tests on a greater sampling size should be done to determine the cause and to alleviate this issue.

Introduction

A large global public health epidemic, with 43 percent prevalence in developing and9 percent prevalence in industrialized countries, is anemia. (F.Habibzadeh 2012). It impacts individuals at all levels of life, but small children and pregnant women are especially vulnerable, with lower cognitive and physical development as well as higher mortality and morbidity risk(Khaskheli et al. 2016).

The most common cause of anemia is vitamin B12, folic acid, and iron deficiency. There are several other reasons for anemia like thalassemia, sickle cell, malaria, lead, age, gender, low household income, low maternal level of education, cancer, achlorhydria, and hemolytic anemia. The most frequent source of anemia is IDA(Al-Zabedi et al. 2014). People who make up two billion of the global population have been found to have anemia with a prevalence of 50 percent of the recorded, WHO estimated in 2001, with WHO reporting two billion suffering from the disease (U. WHO 2001).

In developed countries, Iron deficiency is yet the dominant source of micronutrient insufficiency(Hashizume et al. 2003), resulting from a long-term negative iron deficit. Iron deficiency anemia usually progresses rapidly. Anemia does not manifest clinical signs and symptoms until it reaches an acute level(Shill et al. 2014a).

Iron Deficiency Anemia in the young age group can be triggered by a rise or fall in iron intake, iron malabsorption, chronic blood loss, parasitic infection, or breastfeeding, both of which affected

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academic performance, learning disabilities, and job capacity (Oski 1993; Shill et al. 2014a). Weak physical, behavioral, and educational performance in children with strong IDA relationships can persist into adulthood, resulting in low job quality, which influences macroeconomic profitability(Al-Zabedi et al. 2014).

For persons, living in urban and rural areas throughout the Middle East zone, the estimated incidence of IDA differs from seventeen to seventy percent amongstchildren of preschool, 12.6 to 50 percent children of the school, 14–42% among teens, and 11 percent to more than 54 percent among pregnant women(Al-Zabedi et al. 2014; K. Bagchi 2004; Musaiger 2002).In Pakistan, the prevalence of anemia in the university of Peshawar was 1.5% male students and 23.9% female students(Khan, Akhtar, and Niazi 2010). Another study reported that 33.4% of medical students of Faisalabad were found to be anemic(Jawed et al. 2017).

The present study's goal is to find out how common anemia amongst theadolescent students at the Quaid-e-Awam University of Engineering, Science, and Technology (QUEST) Nawabshah, Pakistan.

MATERIALS AND METHODS

Two hundred twenty-seven students were recruited from different departments of QUEST, Nawabshah, Pakistan. This cross-sectional study observed the prevalence of anemia. The study's principal goal was described to all students in full and then written formal consent was acquired.A self-administered questionnairewas filled by all participants including demographic information. Students who were already taking iron supplements for IDA were excluded from the research.The results of the studyfound by blood samples were collected in Ethylenediaminetetraacetic acid 3 ml vacuum tube with the help of a venepuncture procedure from venous blood. Blood samples were run in a semi-automated Medonic CA 620 hematologyanalyzer by a laboratory technologist to obtain a complete blood count (CBC) test for hematology variables. The reference range of anemia for maleswas<12.9 gm/dl and for females was<11.9 gm/dl according to the criterion of WHO for Hb(W. H. O. WHO 2016).
Statistical data was entered and analyzed in SPSS 24.0 version. P-value was obtained with the help of t-test and Chi-Square.

RESULTS

The total number of engineering students was 227 recruited from different departments of QUEST. The age group of engineering students was 18 to 24 years with a mean of 21.0. One hundred fifty-eight (69.6%) were male students and sixty-nine (30.4%) were female students.
Prevalence of anemia was detected in 16.3% (n=37) students. Remaining 83.7% (n=190) students Hb reference range were normal.Anemia prevalence was found higher in female 24.6% (n=17) than male 12.7% (n=20), Table 1.

Table 2 shows, 18.4% (n=13), 5.8% (n=4) female studentshad mild and moderate anemia, respectively. No one had severe anemia.

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Table 1Gender-wise distribution of Anemia.

Status	Anemic		Non-Anaemic		Total	
	Number	%	Number	%	Number	%
Male	20	12.7	138	87.3	158	100
Female	17	24.6	52	75.4	69	100

Table 2 Grade wise distribution of Anemia

Variable	Male	Female
Normal Male Hgb > 13.0 g/dl Female Hgb > 12.0 g/dl	138 (87.3%)	52 (75.4%)
Mild 10 to 12 g/dl	20 (12.7%)	13 (18.4%)
Moderate 7 to 9.99 g/dl	0 (0%)	4 (5.8%)
Total	158 (100%)	69 (100%)

Table 3Haematologicalvaribles and BMI distribution on the basis ofAnemic and Non-Anemic students

Parameters	Anemic students	Non-Anemic students	P-value
WBC $\times 10^9$/l	7.5±2.0	7.0±1.5	> 0.05
RBC $\times 10^{12}$/l	4.8±0.7	5.0±0.6	< 0.05
Hb gm/dl	11.4±1.2	14.3±1.1	< 0.05
HCT %	33.3±3.7	41.6±4.2	< 0.05
MCV fl	70.9±10.3	83.1±7.0	< 0.05
MCH pg	24.4±4.2	28.7±2.8	< 0.05
MCHC gm/dl	32.9±0.6	32.9±0.7	> 0.05
PLT $\times 10^9$/l	279.1±50.3	243.5±61.1	< 0.05
MPV fl	9.7±1.2	9.8±1.1	> 0.05
BMI Kg/m^2	20.6±3.5	21.7±4.6	> 0.05

Table 3 shows a significant relation between RBCs, Hgb, HCT, MCV, MCH, and PLT in anemic and non-anemic students ($p<0.05$).

Table 4 Gender-wise comparison between Anemic and Non-Anemic students.

Parameters	Male			Female		
	Anaemic	Non-Anemic	P-value	Anemic	Non-Anemic	P-value
WBC $\times 10^9$/l	6.8±2.4	7.0±1.5	> 0.05	8.2±1.1	7.2±	< 0.05
RBC $\times 10^{12}$/l	5.0±0.7	5.2±0.6	> 0.05	4.5±0.5	4.6±	> 0.05
Hb gm/dl	12.1±1.0	14.7±1.0	< 0.05	10.6±1.1	13.1±	< 0.05
HCT %	35.6±2.4	43.3±3.4	< 0.05	30.7±3.2	37.1±	< 0.05

MCV fl	72.0±11.1	84.1±7.2	< 0.05	69.5±9.6	80.5±	< 0.05
MCH pg	24.6±4.6	28.8±2.9	< 0.05	24.1±3.7	28.6±	< 0.05
MCHC gm/dl	32.8±0.6	32.9±0.8	> 0.05	33.0±	32.9±	> 0.05
PLT $\times 10^9$/l	245.8±40.3	232.5±54.3	> 0.05	318.4±	272.6±	< 0.05
MPV fl	9.6±1.4	9.6±0.9	> 0.05	9.8±	10.4±	> 0.05

Table 4shows that Hgb, HCT, MCV, and MCH were significantly different between anemic and non-anemic male students while WBCs, Hgb, HCT, MCV, MCH, and PLT were significantly different from anemic females when compared to non-anemic females ($p<0.05$). Blood variable like WBCs, RBCs, Hgb, HCT, MCV, PLT, and MPV was significantly differenced among males and females ($p<0.05$).

Discussion

The major reason foranemia is iron insufficiency anemia worldwide. Nutritionalanemiacommonly occurs due to little absorption of iron, disease or chronic blood loss, or insufficient intake of iron, orall of these reasons.One's growth, development, and aversion to infection are affected by anemia. Death related to anemia detects in children of less than two years (Queiroz and Torres 2000). Nutritional anemia is apopular type of anemia around the world. IDA mostly affected pregnant women, nurturing mothers, female adolescents, school-age children, and the infant's age group of 4 months to 24 months.

In the current study iron deficiency anemia prevalence was observed in 16.3% (n=37) students out of a total of 227 students. 12.7%of Students of Peshawar University were found with a prevalence of anemia(Habib et al. 2016). Previously studies observeda much higher prevalence of anemia53%, 55.3%, 30.4%, and 30.20% amongst the undergraduates of University of Sindh, Jamshoro, university students of Noakhali region, Bangladesh,University Students in Hodeida Province, Yemen, and Medical college, at Bilaspur, Chhattisgarh, respectively(Al-alimi, Bashanfer, and Morish 2018; Laghari et al. 2017; Pandey and Singh 2013; Shill et al. 2014b).

In this study, 24.3% were Females were found to be more anemic than males12.7%.Low Hb in females due to monthly menstrual blood loss, poor nutrition, dietary habits, and lack of mindfulness of iron deficiency anemia(Abalkhail and Shawky 2002)On the other hand, the data we've obtained reveals that girls have a higher rate of anemia than males; these findings are consistent with earlier studies, while the rate ofIDA amongst female students is significantlygreater than previous studies reported(Habib et al. 2016; Goswami, Sachdeva, and Sachdeva 2012).According to a study done at the University of Sindh, Jamshoro, female students had a greater frequency of anemia (80.37 percent) than male students (33.77 percent)(Laghari et al. 2017). Another study detected the anemia was more prevalent in females (23.9%) than males (1.5%)(Khan, Akhtar, and Niazi 2010). Menstruation and social customs are two big causes of anemia in females. Females prefer low-quality food or a deprived protein diet as compared to males. Sexes are the considerable difference between, 1 mg loss of iron per day and total body capacity is about 2 to 4 mg per day(Al-Sayes et al. 2011). Nevertheless, heavy blood flow during the menstrual cycle with a loss of 42 gm of iron causesanemia in females(Rowland and Kelleher 1989). A study reported severity anemia in 20.83%, 09.37% of students were found with mild and moderate anemia, respectively. These numbers were much higher than the current study.Our study indicatedMild anemia was observed among 14.5%of students, Moderate anemia in 1.8%of students, and no student was found in severe anemia.

Another study reported 20.8% of mild anemia and mild anemia was found in 9.4% of students among Medical students (Pandey and Singh 2013, 1).

A published study showed both subjects male and female in anemic and non-anemic the levels of Hgb, MCV, MCH, MCHC were significantly different (Waseem et al. 2015). These results matched with our current study results Hgb, HCT, MCV, and MCH were significantly different between anemic and non-anemic males while WBCs, Hgb, HCT, MCV, MCH, and PLT were significantly different from anemic females when compared to non-anemic females. In a previous study when anemic compared with non-anemic subjects Hgb, MCH, MCV, MCHC were significantly different.(Manjula et al. 2014)**.** Current study results show a significant relation between RBCs, Hgb, HCT, MCV, MCH, and PLT isanemic when compared with non-anemic students ($p<0.05$).

Conclusion

Female engineering students found with a higher prevalence of anemia than male engineering students. This research brought to light the issue of anemia of engineering students. Further tests on a greater sampling size should be done to determine the cause and to alleviate this issue. Furthermore, more hostile engineering students should pay attention to their food and be urged to eat nutritious meals to combat anemia.

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