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PREVALENCE OF ANEMIA IN STUDENTS OF NOWSHERA MEDICAL COLLEGE: A CROSS-SECTIONAL STUDY FROM NOWSHERA

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ABSTRACT
Objective: To determine the prevalence of anemia in young students aged 17-24 years at Nowshera Medical College, Nowshera
Materials and Methods: The study design was a cross-sectional, descriptive study conducted in the Department of Physiology, Nowshera Medical College, Nowshera from June 2019 to November 2019. The participants were recruited in the study through random, consecutive sampling. Total 124 students of Nowshera Medical College; Nowshera aged 17-24 years. After obtaining informed consent; the participants were subjected to measurement of height, weight, BMI, and venous blood sampling for estimation of Hemoglobin level for diagnosis of anemia as per WHO criteria.
Results: The mean hemoglobin concentration of 14.59 gm/dL. Of the total 124 participants, 7.3 % (n=9) were found to be anemic. Anemia was comparatively more prevalent in females and the anemic students had a comparatively lower mean BMI as compared to non-anemic participants but the correlation between anemia, gender, and body mass index was statistically insignificant.
Conclusion: The prevalence of anemia was only 7.3 %, in sharp contrast to expectations and no statistically significant difference was noted among genders.

Keywords: Anemia, Young adults, Association between anemia and BMI, Nowshera Medical College.

INTRODUCTION

From a functional perspective, anemia refers to a reduced red cell mass to deliver adequate oxygen to peripheral tissues[1,2]. In practical terms, however; a fall in blood hemoglobin concentration below an age-specific and race-specific threshold or cut-off is conventionally used to identify anemia[1,3]. The proposed WHO thresholds or cut-offs for diagnosis of anemia take into account the physiologic variations in different age groups, genders, and races. For instance, in the 15-19 years age group, WHO recommends a cut-off value of Hb < 13 grams/dL and <12 grams/dL for diagnosis of anemia

in males and females respectively[1]. There is, however; a considerable debate over the appropriateness of WHO criteria in different countries and ethnicities.

Anemia irrespective of underlying etiology, commonly manifests as chronic fatigue, loss of appetite, headache, irritability, and poor concentration[4,5]. In addition, anemia causes other health-related issues more noticeable in specific age groups e.g. delayed development of normal motor functions in infants, increased risk of low birth weight or premature babies in pregnant women, and poor academic and work performance due to chronic fatigue and effects on memory in school going children and adults[5,6].

The World Health Organization (WHO) recognizes anemia as a major public health concern and one of the leading non-communicable diseases, particularly affecting low and lower-middle-income countries especially rural populations, the poor, and illiterate[7]. As per recent WHO statistics, anemia is estimated to affect half a billion women 15–49 years of age and 269 million children 6–59 months of age worldwide[7]. Globally, it is estimated that 40% of all children aged 6–59 months, 37% of pregnant women, and 30% of women 15–49 years of age are affected by anaemia[7].

Pakistan too, being a developing country exhibits alarming proportions of anemia. According to the National Nutritional Survey of Pakistan (NNS) 2018, over half of children under five years of age (53.7 %) and adolescent girls (56.6 %) are anemic and anemia affects about 41.7 % of women of reproductive age[8]. According to available data, 20.9% of the Pakistani population comprises young adults aged 15-24 years. This age group deserves special attention not only because they represent our future growth and prosperity but also because they have special health and nutritional needs and the degree to which this generation responds to the challenges of tomorrow relies heavily on optimal health and development throughout adolescence[10]. While anemia has been an area of considerable research in Pakistan, the very high productivity of this age group and the overall impact of anemia on physical and academic performance necessitates an evaluation of anemia in this specific age group.

The study aimed to determine the prevalence of anemia in young students aged 17-24 years at Nowshera Medical College, Nowshera

MATERIALS AND METHODS
Study Design and Setting
This cross-sectional, descriptive study was conducted at Nowshera Medical College, Nowshera, from June 2019 to November 2019.
Study Population
The study involved 124 students aged 17-24 years at Nowshera Medical College, Nowshera.
Sampling Method
A total of 124 students were enrolled through random, consecutive sampling.
Ethical Considerations
Approval for the study was obtained from the institutional research ethics committee. Informed written consent was secured from all participants before their inclusion in the study.

Inclusion and Exclusion Criteria
Inclusion Criteria
• Students aged 17-24 years enrolled at Nowshera Medical College, Nowshera.
• Students who provided informed written consent to participate in the study.
• Students who were available and willing to undergo measurement of height, weight, BMI, and venous blood sampling.
Exclusion Criteria
• Students with a known history of chronic diseases or conditions that could affect hemoglobin levels, such as thalassemia, sickle cell anemia, or chronic kidney disease.
• Students currently undergoing treatment for anemia or other hematological disorders.
• Students who refused to provide written informed consent.
• Students who were absent or unavailable during the data collection period.

Data Collection
Participants' height, weight, and Body Mass Index (BMI) were measured and recorded on a pre-designed proforma.

Blood Sample Collection
Venous blood samples were collected in EDTA tubes by trained laboratory technicians.

Hemoglobin Measurement
The collected blood samples were analyzed for hemoglobin (Hb) measurement. As per WHO recommendations, Cut-off values of Hb < 13 grams/dL and <12 grams/dL were used for the diagnosis of anemia in males and females respectively.

Statistical analysis: Data was compiled and analyzed using SPSS version 22. Descriptive statistics were used for categorical variables and frequencies and percentages were presented in tables and charts. Variables with a p-value of less than 0.05 were declared as statistically significant.

RESULTS
The study analyzed data from 124 students at Nowshera Medical College, aged 17 to 24 years. Descriptive statistics showed that the mean age of participants was 20.70 years with a standard deviation of 1.426 years. Hemoglobin levels ranged from 9.10 g/dL to 17.70 g/dL, with an average of 14.5984 g/dL and a standard deviation of 1.68286 g/dL, indicating that most participants had hemoglobin levels close to the average.

The frequency of anemia was examined separately for male and female students. Among the 73 male participants, 4 (3.2% of the total) were found to be anemic, while 69 (55.6% of the total) were not anemic. In the female group, out of 51 participants, 5 (4.0% of the total) were anemic, and 46 (37.1% of the total) were not anemic. Overall, 7.3% of the students were anemic, while 92.7% were not.

Statistical analysis revealed a p-value of 0.284, indicating that the difference in anemia prevalence between males and females was not statistically significant. This suggests that there is no strong evidence to support a significant gender-based difference in the frequency of anemia among the students.

In summary, the study found that the prevalence of anemia among students at Nowshera Medical College was relatively low, with no significant difference between male and female students. This highlights the importance of routine anemia screening for all students, regardless of gender, to ensure early detection and appropriate intervention.

Table 1. Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age (Years)	124	17	24	20.70	1.426
Hemoglobin (g/dl)	124	9.10	17.70	14.5984	1.68286
Valid N (listwise)	124				

Table 2. Frequency of Anemia in males and females

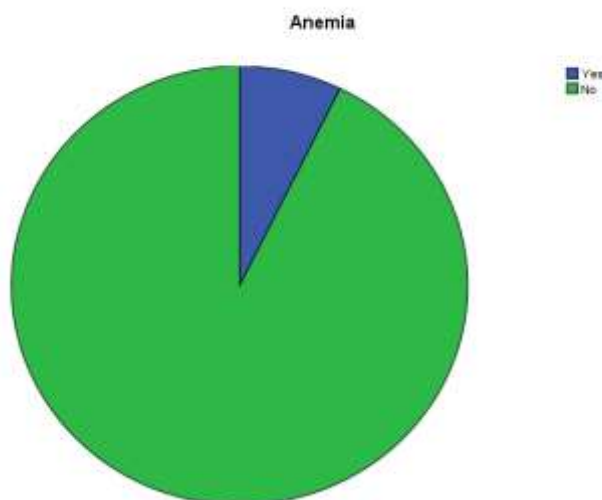|			GENDER		Total	P value
			Male	Female		
Anemia	Yes	Count	4	5	9	0.284
		% of Total	3.2%	4.0%	7.3%	
	No	Count	69	46	115	
		% of Total	55.6%	37.1%	92.7%	
Total		Count	73	51	124	
		% of Total	58.9%	41.1%	100.0%	

Figure 1: Frequency of anemia

DISCUSSION

Our study ended on a pleasant note by revealing a prevalence of 7.3 % among students of Nowshera Medical College, Nowshera with no significant difference among males and females. It was encouraging to witness a much lower prevalence of anemia despite an anticipated alarming proportion in view of the national statistics.

Globally, the prevalence of anemia is highly variable and influenced by a variety of factors including age, gender, race, ethnicity, poverty, illiteracy and marital status, and parity among the notable ones[7]. Medical students represent a highly educated segment of society and the youth age of the study population dictates comparison with studies on similar aged, educated, and mostly unmarried populations for logical inferences to be made.

Based on the findings of the National Health and Nutrition Examination Survey (NHANES) 2015-2020 data, Weyand AC et.al reported a 6.3 % prevalence of iron deficiency anemia among females of the somewhat comparable age group of 12-21 years[11]. They estimated only the prevalence of iron deficiency anemia, excluding other less common types. The inclusion of other types of anemia in their data analysis would have likely further increased the prevalence. Yet the restriction of the sample to females only essentially negated the impact.

Similarly, Zhu Z et. al estimated that the overall prevalence of anemia among adolescents aged 10-14 years in rural western China was 9.7 and 14.4 % among males and females, respectively[12]. Though our study population belonged to a bit higher age group, the results are comparable. The higher prevalence among females in the afore-mentioned study may be partly explained by a better understanding of and access to nutrition among our study population linked with older age and higher education status.

Our study revealed a prevalence of anemia (7.3 %) that is roughly comparable with the findings of Hammad M. et al who conducted a survey on women of childbearing age in five main cities of Pakistan and reported a prevalence of 12.9 % in the 15-30 years age group. The results (7.3 % vs 12.9%) may be considered comparable if the higher education and mostly non-marital status and the lower and thus healthier age group in our study population is taken into account.

Our results however; don't tally at all with the findings of a large, multicenter survey by Sajid M. et[13] al on college and university students in Khyber Pakhtunkhwa province of Pakistan, aged 18-28 years. They reported an overwhelming 58 % prevalence of anemia. The difference in prevalence is huge but can be partly explained by the generally higher socio-economic status of medical students (and thus having better nutrition and healthcare facilities) and the relevance of education that is health-centered in our study population.

Similarly, our study findings are in sharp contrast with the findings of the National nutritional survey of Pakistan (NNS) 2018, which reported that over 56.6 % of adolescent girls are anemic and anemia affects about 41.7 % of women of reproductive age[8]. National nutritional surveys everywhere tend to reflect the epidemiological aspect of a problem and thus, tend to pay attention to the under-privileged and neglected segments of the population. That could partly explain the disparity of results. Secondly, the aforementioned survey also covered older age groups with additional risk factors like illiteracy, poverty, and malnutrition. So comparison with a more literate, and privileged class of society seems illogical.

CONCLUSION
Our study at Nowshera Medical College found a low prevalence of anemia (7.3%) among students aged 17-24 years, contrasting with higher national rates. Importantly, no significant gender difference in anemia prevalence was observed. This highlights the need for continued health screening and targeted interventions despite the relatively advantaged status of this cohort. Future research should explore additional risk factors and nutritional influences on anemia to optimize health outcomes and academic performance among college students. Understanding local variations can guide effective public health strategies to address anemia in young adults.

LIMITATIONS OF THE STUDY
Our study population comprised of 1st and 2nd year MBBS students. Owing to their education level and generally higher socio-economic status lined with better access to healthcare and nutrition, our study population does not truly represent the general population in a similar age group. The results of this study, therefore, can't be generalized and applied uniformly to the general population. The target age group, however; represents a relative strength of our study.

Conflict of Interest(s): None

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