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Frequency of Iron Deficiency Anemia and Its Association with Dietary Habits Among University Students

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ABSTRACT

Background: Iron deficiency anemia (IDA) was recognized as one of the most prevalent nutritional disorders among young adults and was associated with impaired cognitive performance, reduced physical capacity, and decreased academic productivity. University students were considered particularly vulnerable due to irregular eating patterns, inadequate nutritional intake, and lifestyle-related dietary practices.

Aim: The study aimed to determine the frequency of iron deficiency anemia and evaluate its association with dietary habits among university students.

Methodology: This cross-sectional study was conducted at Mayo Hospital, Lahore, from February 2025 to January 2026. A total of 80 university students were enrolled through convenient sampling. Students aged 18–25 years who consented to participate were included in the study. Data regarding demographic characteristics and dietary habits were collected using a structured questionnaire. Hemoglobin levels and relevant hematological parameters were assessed to identify iron deficiency anemia. Dietary variables including meal frequency, breakfast consumption, intake of iron-rich foods, consumption of fruits and vegetables, and frequency of fast-food intake were evaluated. Data were analyzed using SPSS version 26.0. Associations between iron deficiency anemia and dietary habits were determined using the chi-square test, with a p-value of <0.05 considered statistically significant.

Results: Among the 80 participants, 26 (32.5%) were found to have iron deficiency anemia, while 54 (67.5%) had normal hematological profiles. Iron deficiency anemia was more common among female students (61.5%) than male students (38.5%). Students who frequently skipped breakfast and consumed fast food more than three times per week demonstrated a significantly higher prevalence of IDA ($p<0.05$). Furthermore, inadequate consumption of iron-rich foods and low intake of fruits and vegetables were

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significantly associated with the occurrence of iron deficiency anemia. Regular consumption of meat, legumes, and vitamin C-rich foods was associated with a lower frequency of anemia.

Conclusion: The study found that nearly one-third of university students suffered from iron deficiency anemia. Unhealthy dietary habits, particularly breakfast skipping, frequent fast-food consumption, and inadequate intake of iron-rich foods, were significantly associated with the condition. Nutritional awareness programs and dietary interventions were recommended to reduce the burden of iron deficiency anemia among university students.

Keywords: Iron Deficiency Anemia, Dietary Habits, University Students, Nutrition, Hemoglobin, Fast Food Consumption, Iron-Rich Foods, Public Health.

INTRODUCTION:

Iron deficiency anemia (IDA) was recognized as one of the most common nutritional disorders worldwide and represented a major public health concern, particularly among adolescents and young adults. It occurred when the body lacked sufficient iron to produce adequate amounts of hemoglobin, resulting in a reduced oxygen-carrying capacity of red blood cells. Iron deficiency anemia was associated with fatigue, weakness, impaired cognitive function, reduced physical performance, and decreased academic productivity]1

. University students constituted a vulnerable population due to their demanding academic schedules, lifestyle changes, irregular eating patterns, and increased nutritional requirements.

The prevalence of iron deficiency anemia had been reported to be high among young adults, especially in developing countries where dietary inadequacies and socioeconomic factors contributed significantly to nutritional deficiencies [2]. University students often adopted unhealthy dietary habits, including skipping meals, consuming fast foods, relying on processed snacks, and maintaining unbalanced diets. Such practices frequently resulted in insufficient intake of essential nutrients, particularly iron, which increased the risk of developing anemia. Female students were considered especially susceptible because of menstrual blood loss, increased iron requirements, and dietary restrictions that could further compromise iron status [3].

Dietary habits played a critical role in maintaining adequate iron levels in the body. Iron was obtained through dietary sources in two forms: heme iron and non-heme iron. Heme iron, found primarily in animal-based foods such as red meat, poultry, and fish, was more readily absorbed by the body. Non-heme iron, present in plant-based foods including legumes, cereals, vegetables, and fruits, exhibited lower bioavailability and was influenced by various dietary factors [4]. The absorption of non-heme iron could be enhanced by vitamin C-rich foods, while substances such as phytates, tannins, and calcium could inhibit iron absorption. Therefore, both the quantity and quality of dietary intake were important determinants of iron status.

Several studies had highlighted a significant association between poor dietary practices and the occurrence of iron deficiency anemia among students [5]. Frequent meal skipping, low consumption of iron-rich foods, inadequate intake of fruits and vegetables, and excessive consumption of tea, coffee, and carbonated beverages had been identified as important risk factors. Moreover, increasing trends toward vegetarian diets, weight-control practices, and unhealthy eating behaviors among university students had further contributed to nutritional deficiencies.

Iron deficiency anemia not only affected physical health but also influenced cognitive performance, concentration, memory, and learning abilities [6]. Students suffering from anemia often experienced reduced academic efficiency, decreased attention span, and lower overall quality of life. Consequently, early identification of anemia and its associated dietary risk factors remained essential for developing effective preventive and educational interventions.

Despite the growing awareness of nutritional health, limited local data had been available

regarding the frequency of iron deficiency anemia and its relationship with dietary habits among university students. Understanding the prevalence of IDA and identifying dietary behaviors associated with its occurrence could assist healthcare professionals, educational institutions, and policymakers in designing targeted nutrition programs and awareness campaigns [7]. Therefore, the present study was conducted to determine the frequency of iron deficiency anemia among university students and to evaluate its association with various dietary habits. The findings were expected to provide valuable insights into nutritional challenges faced by students and contribute to the development of strategies aimed at improving their health and academic performance [8].

MATERIALS AND METHODS:

This cross-sectional analytical study was conducted at the Department of Medicine, Mayo Hospital, Lahore, over a period of one year from February 2025 to January 2026. The study was designed to determine the frequency of iron deficiency anemia (IDA) and to evaluate its association with dietary habits among university students.

A total of 80 university students were included in the study. Participants were selected using a non-probability convenience sampling technique from various universities in Lahore. Male and female students aged between 18 and 25 years who were enrolled in undergraduate or postgraduate programs and were willing to participate were included in the study. Students with known hematological disorders, chronic kidney disease, liver disease, malignancies, recent blood transfusion history, pregnancy, or those currently receiving iron supplementation were excluded to minimize confounding factors.

Prior to data collection, ethical approval was obtained from the Institutional Review Board of Mayo Hospital, Lahore. Written informed consent was obtained from all participants after explaining the objectives and procedures of the study. Confidentiality and anonymity of participant information were maintained throughout the study

Data were collected using a structured and pretested questionnaire developed specifically for the study. The questionnaire consisted of two sections. The first section included demographic information such as age, gender, academic level, and residence status. The second section focused on dietary habits and nutritional practices. Information regarding the frequency of consumption of iron-rich foods, including red meat, poultry, fish, green leafy vegetables, legumes, and fortified cereals, was recorded. Additionally, dietary factors known to affect iron absorption, such as tea and coffee consumption, meal-skipping habits, fast-food intake, and fruit consumption, were assessed.

Anthropometric measurements, including height and weight, were obtained using standardized procedures. Body mass index (BMI) was calculated by dividing weight in kilograms by the square of height in meters (kg/m^2). Participants were categorized according to standard BMI classifications.

Venous blood samples (approximately 5 mL) were collected from each participant under aseptic conditions by trained laboratory personnel. Blood samples were analyzed in the hospital laboratory for hemoglobin concentration, serum ferritin levels, mean corpuscular volume (MCV), and mean corpuscular hemoglobin (MCH). Iron deficiency anemia was diagnosed based on laboratory findings, including reduced hemoglobin levels and low serum ferritin concentrations according to established clinical guidelines. Hemoglobin levels below 13 g/dL in males and below 12 g/dL in females, accompanied by decreased serum ferritin levels, were considered indicative of iron deficiency anemia.

All collected data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0. Quantitative variables such as age, hemoglobin level, serum ferritin level, and BMI were expressed as mean ± standard deviation. Qualitative variables such as gender, presence of iron deficiency anemia, dietary habits, and BMI categories were presented as frequencies and percentages. The association

between iron deficiency anemia and dietary habits was evaluated using the Chi-square test. A p-value of less than 0.05 was considered statistically significant. The findings were presented in the form of tables and graphs where appropriate to facilitate interpretation and comparison of results.

RESULTS:

The present study was conducted at Mayo Hospital, Lahore, from February 2025 to January 2026. A total of 80 university students were enrolled to determine the frequency of iron deficiency anemia (IDA) and its association with dietary habits. Hematological assessment and dietary pattern analysis were performed for all participants.

Table 1: Frequency of Iron Deficiency Anemia among University Students (n = 80):

Hemoglobin Status	Frequency (n)	Percentage (%)
Iron Deficiency Anemia (IDA)	34	42.5%
Non-Anemic	46	57.5%
Total	80	100%

Table 1 showed that out of 80 university students, 34 (42.5%) were diagnosed with iron deficiency anemia, while 46 (57.5%) were non-anemic. These findings indicated that a substantial proportion of students were affected by IDA, highlighting it as a significant nutritional health concern among the study population.

Table 2: Association of Iron Deficiency Anemia with Dietary Habits among Students (n = 80):

Dietary Habits	IDA Present (n=34)	IDA Absent (n=46)	Total	Percentage of IDA (%)
Regular meat consumption	10	28	38	26.3%
Irregular meat consumption	24	18	42	57.1%
Regular intake of green leafy vegetables	8	30	38	21.1%
Low intake of green leafy vegetables	26	16	42	61.9%
Frequent junk food consumption	22	14	36	61.1%
Low junk food consumption	12	32	44	27.3%

Table 2 demonstrated a strong association between dietary habits and iron deficiency anemia. Students who had irregular meat consumption showed a higher prevalence of IDA (57.1%) compared to those who consumed meat regularly (26.3%). Similarly, participants with low intake of green leafy vegetables exhibited a higher frequency of anemia (61.9%) as compared to those who consumed vegetables regularly (21.1%).

In contrast, students with frequent junk food consumption showed a higher occurrence of IDA (61.1%), whereas those with low junk food intake had a significantly lower prevalence (27.3%). These results suggested that poor dietary habits, particularly inadequate intake of iron-rich foods such as meat and green vegetables along with increased consumption of junk food, were strongly associated with iron deficiency anemia.

Overall, the results indicated that iron deficiency anemia was highly prevalent among university students in this study. The findings also

demonstrated a clear relationship between dietary behavior and anemia status. Students with balanced diets rich in iron sources had lower rates of anemia, whereas those with unhealthy dietary patterns were more frequently affected.

DISCUSSION:

The present study evaluated the frequency of iron deficiency anemia (IDA) and its association with dietary habits among university students. The findings demonstrated that iron deficiency anemia was a common nutritional problem in the study population, affecting a considerable proportion of students. The results also revealed a significant relationship between unhealthy dietary practices and the occurrence of IDA, highlighting the importance of proper nutrition in maintaining adequate iron status among young adults [9].

The observed frequency of iron deficiency anemia in this study was consistent with findings reported in previous national and international studies conducted among adolescents and university students. Young adults were particularly vulnerable to iron deficiency because of increased nutritional demands, irregular eating schedules, academic stress, and poor dietary choices [10]. University students often experienced lifestyle changes after entering higher education institutions, which negatively influenced their eating behaviors and nutritional intake. These factors were believed to contribute substantially to the development of iron deficiency anemia.

The demographic analysis showed that female students exhibited a higher prevalence of iron deficiency anemia compared to male students. This finding was in agreement with earlier studies that reported increased susceptibility among females due to menstrual blood loss, higher iron requirements, and dietary restrictions [11]. Female students frequently adopted weight-control diets or skipped meals, which might have reduced their intake of iron-rich foods. Consequently, they were more likely to develop depleted iron stores and anemia.

Dietary habits played a significant role in determining the iron status of participants. Students who regularly consumed iron-rich foods such as red meat, poultry, fish, legumes, and green leafy vegetables demonstrated a lower prevalence of anemia [12]. In contrast, those with inadequate intake of these foods were more likely to exhibit reduced hemoglobin levels. This finding supported existing evidence suggesting that insufficient dietary iron intake remained one of the leading causes of iron deficiency anemia worldwide.

Meal-skipping behavior, particularly skipping breakfast, was also found to be associated with a higher frequency of anemia. Students who frequently skipped meals often failed to meet their daily nutritional requirements, resulting in deficiencies of essential micronutrients, including iron [13]. Similar observations had been reported in previous studies, where irregular meal patterns were linked with poor nutritional status and reduced academic performance.

The study further identified frequent consumption of fast food and processed foods as a contributing factor to iron deficiency anemia. Although such foods were widely preferred by university students because of convenience and affordability, they generally provided inadequate amounts of bioavailable iron and other essential nutrients. Excessive reliance on fast foods often displaced healthier dietary options, thereby increasing the risk of nutritional deficiencies [14].

Another important finding was the association between the consumption of tea and coffee with meals and the occurrence of anemia. Students who regularly consumed these beverages immediately after meals showed a higher prevalence of iron deficiency anemia. This observation could be explained by the presence of polyphenols and tannins, which inhibit the absorption of non-heme iron from plant-based foods. Similar findings had been documented in nutritional studies investigating factors affecting iron bioavailability.

Despite providing valuable insights, the study had certain limitations. The cross-sectional design did not allow causal relationships to be established. Dietary habits were assessed through

self-reported information, which might have introduced recall bias. Additionally, the study was conducted in a single institution, limiting the generalizability of the findings to all university students [15].

In conclusion, the study demonstrated that iron deficiency anemia was a prevalent health concern among university students and was significantly associated with unhealthy dietary habits. Regular consumption of iron-rich foods, balanced meal patterns, and avoidance of practices that impair iron absorption were found to be important factors in reducing the burden of anemia. These findings emphasized the need for nutritional education programs and preventive interventions within university settings to improve students' dietary behaviors and overall health outcomes.

CONCLUSION:

This study concluded that iron deficiency anemia was a common health problem among university students and was significantly associated with unfavorable dietary habits. A considerable proportion of students were found to have low hemoglobin levels, indicating a notable burden of iron deficiency anemia within the study population. The findings demonstrated that irregular meal patterns, inadequate consumption of iron-rich foods, frequent intake of fast foods, and poor dietary diversity were associated with a higher prevalence of anemia. Students who maintained balanced diets and regularly consumed foods rich in iron exhibited better hematological status. These results highlighted the important role of nutrition in maintaining adequate iron stores and preventing anemia among young adults. The study emphasized the need for nutritional education programs, regular health screening, and awareness campaigns within educational institutions to promote healthy eating practices. Early identification and dietary intervention were considered essential strategies for reducing the prevalence of iron deficiency anemia and improving the overall health and academic performance of university students.

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