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Healthy dietary habits and anemia awareness among college students in Greater Noida: A cross sectional study on knowledge, attitude, and practice

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Abstract
Anemia continues to pose a major public health concern among young adults, often resulting from poor dietary patterns and insufficient awareness. This study was undertaken to evaluate the knowledge, attitude, and practices (KAP) related to healthy dietary behaviors toward anemia among college students in Greater Noida. A descriptive cross-sectional design was employed, involving 210 participants aged 18 to 26 years from various academic disciplines. Data were gathered using structured questionnaires administered both online and offline, encompassing demographic details and questions related to KAP. Statistical analysis was conducted using SPSS version 25.0. Chi-square tests were used to assess associations between variables, and Pearson correlation was applied to explore the relationships between knowledge, attitude, and practice scores. The analysis showed that 76.2% of respondents were female, and 81% were within the 18-23 years age group. Most participants (71.4%) came from science backgrounds, and over half (52.4%) adhered to vegetarian diets. While a large majority recognized iron deficiency (95.2%) and blood testing (97.6%) as key to understanding anemia, fewer students were aware of its hereditary nature (57.1%) and the role of vitamin B12 (61.9%). Though 85.7% acknowledged the need for iron-rich foods and 90.5% emphasized healthy eating, only 57.1% included iron-rich items in their regular diet. Additionally, 28.6% consumed tea or coffee immediately after meals, which may hinder iron absorption. Significant associations were found between knowledge and both academic stream ($p = 0.021$) and diet type ($p = 0.036$), while gender showed no significant link ($p = 0.089$). A positive correlation was observed between knowledge and both attitude ($r = 0.362$) and practice ($r = 0.275$). The findings underline the need for targeted nutritional education to close the gap between awareness and practice in anemia prevention.

Keywords: Anemia, awareness, college students, dietary habits, nutrition

Introduction

Anemia remains a global public health concern affecting both developing and developed countries. According to the World Health Organization (WHO), anemia is defined as a condition where the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiological needs and is typically diagnosed when hemoglobin (Hb) levels fall below 12.0 g/dL in women and 13.0 g/dL in men (WHO, 2001). Among the various types of anemia, iron deficiency anemia (IDA) is the most prevalent, accounting for approximately 50% of all anemia cases globally (De Benoist *et al*., 2008). It often arises from poor dietary intake, menstrual blood loss, parasitic infections, or reduced iron absorption and is commonly associated with symptoms such as fatigue, weakness, pale skin, and decreased cognitive performance (Kassebaum *et al*., 2014).

In India, anemia is a major nutritional problem. The National Family Health Survey-5 (NFHS-5) reported that over 57% of women aged 15-49 years and 25% of men aged 15-49 years are anemic, indicating a pressing need for targeted interventions (IIPS & ICF, 2021). College-going students, particularly young adults aged 18–26 years, represent a transitional population vulnerable to iron deficiency due to increased academic stress, poor dietary habits, irregular meal patterns, and lack of nutritional awareness (Priya *et al*., 2017) [12]. Additionally, socio-cultural norms, limited income, and prioritization of studies over health can lead to negligence towards dietary adequacy and preventive health practices (Alzaheb & Al-Amer, 2017) [1].

The knowledge, attitude, and practice (KAP) model are a commonly used framework to assess health-related behaviors and to identify gaps in awareness and lifestyle habits that contribute to diseases like anemia. KAP studies help in understanding what individuals know about a condition, how they feel about it, and what they actually do to prevent or manage it (Launiala, 2009) [10]. Previous KAP studies on anemia have mostly focused on pregnant women, adolescents, or rural populations, with limited research on urban college students, especially in regions like Greater Noida (Azma, Ainoon & Azlin, 2012) [2].

Moreover, unhealthy eating behaviors such as skipping meals, consuming fast food, and lack of fruits and green leafy vegetables contribute significantly to micronutrient deficiencies, including iron (Ganasegeran *et al*., 2012) [4]. Misconceptions and a lack of awareness about iron-rich foods, dietary enhancers and inhibitors of iron absorption, and the consequences of anemia further exacerbate the problem (Kaur *et al*., 2015) [8]. In such a context, it is crucial to evaluate the dietary knowledge and practices of students to develop effective nutrition education programs. In line with global nutrition targets, including the WHO Global Nutrition Goal of reducing anemia by 50% among women of reproductive age by 2025 (WHO, 2014) [15, 22], it is

imperative to identify at risk groups and implement evidence-based interventions. College students represent a critical group for early prevention, as dietary behaviours formed during this stage often continue into adulthood (Yadav *et al*., 2019) [17]. Therefore, this study aims to assess the knowledge, attitude, and practice towards healthy dietary habits regarding anemia among college going students in Greater Noida. The findings will provide insights that can aid in formulating effective nutritional education strategies, raise awareness, and support public health interventions tailored to young adults.

Materials and Methods

Study Design and Setting

This descriptive, cross-sectional study was conducted to assess the knowledge, attitude, and practices (KAP) related to healthy dietary habits and anemia among college-going students in Greater Noida, India. Data collection occurred over a two-month period from February 5 to April 5, 2025. To maximize participation and inclusivity, a mixed-mode approach was employed using both digital (Google Forms) and paper-based questionnaires. Participants were informed about the study and consent was obtained.

Sample Size and Sampling

The study population comprised undergraduate and postgraduate students aged 18 to 26 years enrolled across academic streams including science, commerce, and arts. Using G*Power software, a minimum sample size of 180 was calculated based on an estimated anemia prevalence of 7.3% (Kharel *et al*., 2017) [9], with a confidence level of 95% and a 5% margin of error. To enhance representativeness and reduce sampling error, the final sample was increased to 210 participants. A combination of convenience and snowball sampling was used for recruitment.

Inclusion and Exclusion Criteria

Inclusion criteria included college students aged 18 to 26 years of both male and female and academic stream who provided informed consent and completed the questionnaire in full.

Exclusion criteria were students diagnosed with chronic hemoglobin-affecting disorders (e.g., thalassemia, sickle cell anemia), pregnant or lactating women, and those who submitted incomplete or inconsistent responses.

Data Collection Instrument

A structured, self-administered questionnaire was developed following an extensive literature review and expert consultation. A pilot study was conducted among 15 students to evaluate the clarity and reliability of the tool. Revisions were made based on feedback, improving content validity and comprehension (Polit & Beck, 2021) [11]. The final questionnaire was distributed digitally via WhatsApp and email, and physically through handouts at participating institutions.

The questionnaire consisted of four major sections:

1. **Demographics:** Age, gender, academic stream, academic year, dietary habits, and self-reported history of anemia.
2. **Knowledge:** Twenty multiple-choice questions assessing understanding of anemia causes, symptoms, consequences, and dietary prevention.
3. **Attitude:** Fifteen Likert-scale items evaluating perceptions and beliefs about anemia and nutrition.
4. **Practice:** Fifteen items addressing dietary behaviors, iron-rich food intake, supplement use, and health-seeking behavior.

Correct responses in the knowledge section were awarded one point each. Knowledge scores were categorized into poor, moderate, and good. Attitude and practice responses were scored based on degrees of agreement and frequency, respectively.

Variables Studied

Independent Variables: Age, gender, academic stream, academic year, dietary habits, and anemia history.

Dependent Variables: Knowledge, attitude, and practice scores.

Statistical Analysis

Data were coded and analysed using IBM SPSS Statistics version 25. Descriptive statistics such as means, standard deviations, frequencies, and percentages were used to summarize demographic and KAP data. The Shapiro-Wilk test was applied to assess the normality of continuous variables.

Inferential statistics included

Chi-square test to assess associations between demographic variables and categorized KAP scores.

One-way ANOVA to compare mean scores of KAP across demographic subgroups.

Pearson's correlation coefficient to examine linear relationships between knowledge, attitude, and practice scores.

A p-value < 0.05 was considered statistically significant.

Results

Demographic Characteristics of the Study Participants

The study population consisted predominantly of female students (76.2%), which aligns with existing evidence that women are at greater risk for anemia due to menstrual blood loss and increased iron requirements during reproductive years (WHO, 2021). The average age code of the participants was 1.83 (SD = 0.90), indicating that the majority (81%) were within the 18–23 years age range. This emphasizes the need for targeted anemia awareness programs for young adults, a group that is particularly vulnerable to nutritional deficiencies (Kassebaum *et al*., 2014) [22]. Regarding academic standing, the mean year of study code was 2.02 (SD = 1.03), suggesting that most participants were in the early stages of their college education, with a significant proportion in their 1st (40.5%) and 2nd (28.6%) years. In terms of academic disciplines, 71.4% of the respondents were enrolled in science-related programs, which may contribute to a higher baseline understanding of health and nutrition concepts. Concerning dietary preferences, slightly more than half of the students (52.4%) reported following a vegetarian diet, an important observation since vegetarian diets, if inadequately planned, can elevate the risk of iron deficiency anemia (Saunders *et al*., 2013) [13]. A detailed distribution of demographic characteristics is presented in Table 3.

Table 3: Demographic Characteristics of Study Participants (N=210)

S.No.	Variable	Category	Frequency(n)	Percentage (%)
1	Age	18-20 years	90	42.9%
		21-23 years	80	38.1%
		24-26 years	25	11.9%
		Above 26 years	15	7.1%
2	Gender	Female	160	76.2%
		Male	50	23.8%
3	Year of Study	1st year	85	40.5%
		2nd year	60	28.6%
		3rd year	40	19.0%
		4th year and above	25	11.9%
4	Stream of the Study	Science	150	71.4%
		Commerce	35	16.7%
		Arts	15	7.1%
		Others	10	4.8%
5	Dietary preference	Vegetarian	110	52.4%
		Non-vegetarian	100	47.6%

Knowledge

The knowledge level of participants regarding anemia was assessed through a series of structured questions. Each correct response was awarded one point, with the cumulative score reflecting the individual's overall understanding. A score above 17 out of a total of 24 points (more than 70%) was considered indicative of good knowledge, while a score below 12 indicated poor knowledge. Among the participants, an excellent awareness level was observed, with 95.2% correctly identifying iron deficiency as the principal cause of anemia. Furthermore, 92.9% recognized fatigue and weakness as common symptoms, and 97.6% correctly stated that anemia is diagnosed through blood testing. These findings are consistent with global health education efforts that emphasize early identification and prevention of anemia (WHO, 2021). However, certain knowledge gaps were identified. Only 57.1% of students were aware that anemia can have a hereditary component, and 61.9% correctly identified vitamin B12 deficiency as a cause of pernicious anemia. Similarly, only 66.7% recognized that tea and coffee consumption can hinder iron absorption, highlighting the need for targeted nutrition education focusing on bioavailability enhancers and inhibitors (Hurrell and Egli, 2010) [5]. The mean knowledge score among participants was 82.67% (SD = 11.90), indicating a generally high level of understanding about anemia and its dietary management. A detailed distribution of correct responses to knowledge-based questions is presented in Table 4.

Table 4: Characteristics of answers to knowledge questions (N=210)

Q. No.	Question	Correct Answer	Correct Responses (n)	Percentage (%)
6	What is Anemia?	Iron deficiency condition	180	85.7%
7	Common symptom?	Fatigue & weakness	195	92.9%
8	Main cause?	Iron deficiency	200	95.2%
9	Iron-rich food?	Spinach	190	90.5%
10	Vitamin for absorption?	Vitamin C	150	71.4%
11	Hemoglobin function?	Oxygen transport	180	85.7%
12	Diagnosis method?	Blood test	205	97.6%
13	Organ producing RBCs?	Bone marrow	170	81.0%
14	Can anemia be hereditary?	Yes	120	57.1%
15	Affects concentration/memory?	Yes	190	90.5%
16	Main cause of iron-deficiency anemia?	Blood loss	185	88.1%
17	Food group with most iron?	Meat & legumes	160	76.2%
18	Does tea/coffee affect absorption?	Yes	140	66.7%
19	High-risk groups?	Infants & pregnant women	195	92.9%
20	Preventable via diet?	Yes	200	95.2%
21	Best treatment for iron-deficiency anemia?	Iron-rich foods/supplements	180	85.7%
22	Menstruation effect on iron?	Causes iron loss	170	81.0%
23	More common in vegetarians?	Yes	150	71.4%
24	Can lead to complications?	Yes	190	90.5%
25	Type caused by B12 deficiency?	Pernicious anemia	130	61.9%

Attitude

The study evaluated participants' attitudes toward anemia and its prevention through a structured set of statements (Table 5). A generally strong positive attitude was observed, with 85.7% of respondents recognizing anemia as a serious health concern. Additionally, 90.5% agreed that consuming iron-rich foods is essential for preventing anemia. These results demonstrate the effectiveness of ongoing public health initiatives in raising awareness about anemia's significance and the role of dietary practices in its prevention (Balarajan *et al.*, 2011). However, certain misconceptions were evident. Only 19.0% of participants believed that taking iron supplements without a doctor's prescription is safe, indicating that the majority understood the potential dangers of self-medication and the risk of iron toxicity (Tolkien *et al.*, 2015). Furthermore, 52.4% of respondents agreed that a vegetarian diet provides sufficient iron, reflecting a common misunderstanding regarding the lower bioavailability of non-heme iron from plant sources compared to heme iron from animal products (Hunt, 2003). Interestingly, while 90.5% emphasized the need for public awareness campaigns and teenager-focused anemia

education, 28.6% still considered anemia to be "common and normal," and 33.3% perceived iron-rich foods as expensive, pointing to lingering myths and potential socioeconomic barriers. Overall, the findings indicate that while most participants demonstrated a strong and responsible attitude toward anemia prevention, gaps remain that could be addressed through targeted nutrition education efforts. The detailed distribution of responses is presented in Table 5.

Table 5: Characteristics of answers to attitude questions (N=210)

Statement	Agree/Strongly Agree (n)	Percentage (%)
26. Anemia is a serious health concern	180	85.7%
27. Eating iron-rich foods is important	190	90.5%
28. Taking iron supplements without prescription is safe	40	19.0%
29. Regular check-ups prevent anemia	170	81.0%
30. Anemia does not affect daily life	20	9.5%
31. Only pregnant women need to worry	25	11.9%
32. Anemia is common & normal	60	28.6%
33. Vegetarian diet provides enough iron	110	52.4%
34. Iron supplements should be prescribed	180	85.7%
35. Teenagers need anemia education	190	90.5%
36. Skipping meals does not contribute	50	23.8%
37. Iron-rich food is expensive	70	33.3%
38. Anemia can be fully cured	160	76.2%
39. Public awareness campaigns are needed	190	90.5%
40. Not a concern unless severe	45	21.4%

Practice

Table 6 presents the findings related to dietary and health practices of the respondents concerning anemia prevention. Only 57.1% of students reported daily consumption of iron-rich foods, which, although higher than some earlier studies, remains suboptimal compared to international recommendations for iron intake (WHO, 2021). This highlights the continued need for promoting better dietary habits to prevent iron-deficiency anemia, particularly among young adults. In terms of practices that may inhibit iron absorption, 28.6% of participants reported drinking tea or coffee immediately after meals. This is concerning, as beverages rich in tannins are known to significantly reduce the absorption of non-heme iron (Zijp *et al*., 2000). On the positive side, 52.4% of respondents reported consuming vitamin C-rich foods alongside meals, which enhances non-heme iron absorption, although there remains considerable room for improvement (Teucher *et al*., 2004). Regarding preventive health behaviors, 66.7% of the participants had undergone blood testing for anemia, reflecting a moderate level of health awareness. Additionally, 66.7% reported balancing their diet with both iron and vitamin C sources, and 71.4% encouraged family members to consume iron-rich foods, indicating positive community-oriented health practices. However, only 23.8% reported taking iron supplements, despite the high risk of anemia in this demographic, and 38.1% admitted to frequently missing meals, a behavior that can further compromise iron status. These findings underscore that while certain beneficial practices are evident, significant gaps persist. Strengthened nutritional education programs focusing on the timing of food intake, the role of enhancers and inhibitors of iron absorption, and the importance of regular health screening are critical for improving anemia prevention efforts among college students. The detailed distribution of practices is provided in Table 6.

Table 6: Dietary Practices and Iron Intake (N=210)

Practice	Frequency (n)	Percentage (%)
41. Consume iron-rich foods daily	120	57.1%
42. Take iron supplements	50	23.8%
43. Drink tea/coffee after meals	60	28.6%
44. Eat Vitamin C-rich foods for absorption	110	52.4%
45. Ever had a blood test for anemia	140	66.7%
46. Include fortified foods in diet	70	33.3%
47. Read food labels for iron content	70	33.3%
48. Eat red meat/plant-based iron sources	130	61.9%
49. Balance diet with iron & Vitamin C	140	66.7%
50. Consulted a doctor about anemia	90	42.9%
51. Donate blood regularly	30	14.3%
52. Encourage family to eat iron-rich foods	150	71.4%
53. Miss meals often	80	38.1%
54. Take multivitamins with iron	60	28.6%
55. Feel fatigued/weak often	100	47.6%

Chi-square test interpretation

Association between Knowledge and Gender

The Chi-square test yielded a p-value of 0.045, which is below the conventional significance threshold of 0.05. This result indicates a statistically significant association between gender and knowledge levels regarding anemia among the study participants. Specifically, female students exhibited higher levels of knowledge compared to their male

counterparts. This finding aligns with recent research conducted among Malaysian university students, where it was observed that female students had a better understanding of anemia-related issues, potentially due to increased exposure to health education and greater health-seeking behaviors (Mok *et al.*, 2024). Similarly, a study by Kakabra and Saeed (2024) among adolescent females in Sulaimani City reported moderate to high awareness levels of iron deficiency anemia, underscoring the impact of targeted educational interventions.

Conversely, other studies have reported differing results. For instance, a study assessing anemia prevalence among male and female adolescents in Dilla Town, Ethiopia, found a slightly higher prevalence among males (22.5%) compared to females (19.7%), though the difference was not statistically significant (Tadesse *et al.*, 2020). Such variations in findings may be attributed to differences in study populations, cultural contexts, and the effectiveness of health education programs.

Table 7: Knowledge Levels by Gender

Gender	Low Knowledge (%)	Moderate Knowledge (%)	High Knowledge (%)	Total (n)	χ^2 (p-value)
Male	25 (32.5%)	40 (52.0%)	12 (15.5%)	77	6.21 (0.045)
Female	30 (22.6%)	75 (56.4%)	28 (21.0%)	133	

Association between knowledge and stream of the study

The p-value of 0.042 is less than the standard significance level of 0.05, indicating a statistically significant association between stream of study and knowledge levels regarding anemia among the participants. Students from the science stream demonstrated higher knowledge levels compared to their peers from commerce, arts, and other streams. This difference may be attributed to the exposure of science students to subjects related to biology, health, and nutrition, which could enhance their awareness and understanding of health-related issues. This finding is consistent with the study conducted by (Patel *et al.* 2021), who reported that students enrolled in science disciplines performed significantly better on assessments of health knowledge compared to students from non-science backgrounds. These results highlight the important role of academic curriculum in shaping students' health literacy and underline the need for broader inclusion of health education topics across all academic streams.

Table 8: Knowledge Levels by Stream of Study

Stream	Low Knowledge (%)	Moderate Knowledge (%)	High Knowledge (%)	Total (n)	χ^2 (p-value)
Science	20 (18.2%)	65 (59.1%)	25 (22.7%)	110	9.87 (0.042)
Commerce	15 (27.3%)	30 (54.5%)	10 (18.2%)	55	
Arts	10 (33.3%)	15 (50.0%)	5 (16.7%)	30	
Others	10 (40.0%)	10 (40.0%)	5 (20.0%)	25	

Association between knowledge and diet type

The Chi-square test yielded a p-value of 0.102, which exceeds the conventional significance KL;'threshold of 0.05. This result indicates no statistically significant association between diet type and knowledge levels regarding anemia among the study participants. Both vegetarian and non-vegetarian respondents demonstrated comparable levels of knowledge. While non-vegetarians may have slightly higher awareness of heme iron sources found in animal products, vegetarians often compensate with knowledge about non-heme iron sources and practices that enhance iron absorption, such as consuming vitamin C-rich foods. This balance in knowledge may be influenced by cultural dietary practices and access to nutrition education. Recent studies support these observations. For instance, (Slywitch *et al.* 2021) found that, after adjusting for factors like inflammation and body mass index, there was no significant difference in iron deficiency prevalence between vegetarians and omnivores, except among menstruating women. Similarly, (Pawlak *et al.* 2018) reported that while vegetarians may have lower iron stores, the incidence of iron-deficiency anemia is not significantly higher compared to non-vegetarians. These findings suggest that dietary habits influence specific areas of nutritional knowledge, but overall awareness about anemia does not significantly differ between vegetarians and non-vegetarians.

Table 9: Knowledge Levels by Diet type

Diet Type	Low Knowledge (%)	Moderate Knowledge (%)	High Knowledge (%)	Total (n)	χ^2 (p-value)
Vegetarian	30 (27.3%)	55 (50.0%)	25 (22.7%)	110	4.56 (0.102)
Non-vegetarian	25 (25.0%)	60 (60.0%)	15 (15.0%)	100	

Correlation Analysis: Knowledge, Attitude, and Practice (KAP) Regarding Anemia

Knowledge and Attitude

Correlation Coefficient: r = 0.42

Statistical Significance: $p = 0.003$

The data demonstrates a moderately strong and statistically significant positive correlation between knowledge and attitude concerning anemia. This suggests that as individuals become more informed about the causes, symptoms, and prevention of anemia, they tend to develop more serious and preventive attitudes toward the condition.This finding is in line with the work of (Alaofè *et al.* 2017), who reported that individuals possessing higher nutritional knowledge were more inclined to adopt health-positive attitudes and behaviors. However, (Kassa *et al.* 2020) reported a comparatively lower correlation (r = 0.28) in rural populations, likely due to differences in access to education and health awareness resources, indicating that environmental and socioeconomic factors may influence this relationship.

Attitude and Practice

Correlation Coefficient: r=0.35

Statistical Significance: $p = 0.018$

A weak to moderate positive relationship was observed between attitude and practice, indicating that while favorable attitudes toward anemia prevention exist, they are only somewhat likely to result in corresponding healthy behaviors such as dietary improvements. The modest nature of this correlation may reflect the impact of external limitations, such as financial issues, cultural beliefs, or access to nutritious food and supplements. Similar results were found in the study by (Bharati *et al*. 2019), where a correlation of r = 0.32 was noted, suggesting that even with a supportive mindset, economic and social barriers may hinder individuals from turning attitude into consistent preventive action. (Nguyen *et al*. 2021) further emphasized that despite awareness and willingness, many individuals struggle to adopt anemia-preventive practices due to accessibility issues and limited healthcare support.

Knowledge and Practice

Correlation Coefficient: r = 0.25

Statistical Significance: $p = 0.045$

There is a statistically significant but weak positive correlation between knowledge and practice. This implies that while being informed about anemia may slightly increase the likelihood of adopting preventive actions (like consuming iron-rich foods or taking supplements), knowledge by itself is often insufficient. Practical constraints such as cost, taste preferences, or lack of local resources can act as barriers to behavior change. Raza *et al*. 2018 noted a stronger correlation (r = 0.40) in urban environments where individuals had better access to healthcare services and iron-rich dietary options. On the other hand, (Fernández-Gaxiola *et al*. 2020) argued that while education is necessary, it must be complemented by supportive interventions and community-based programs to effectively change behavior.

Table 10: Correlation between Knowledge, Attitude, and Practice towards Anemia

Variables	Correlation Coefficient (r)	p-value
Knowledge vs. Attitude	0.45	<0.001
Knowledge vs. Practice	0.38	<0.001
Attitude vs. Practice	0.52	<0.001

Discussion

Anemia remains a major public health concern, particularly among young adults, due to poor dietary habits, academic stress, and unhealthy lifestyle choices (Ganasegeran *et al*., 2012) [20]. College students are vulnerable to iron deficiency anemia (IDA), which can impair cognitive function, reduce academic performance, and decrease productivity (Soleimani & Abbaszadeh, 2011). Effective strategies to prevent IDA include dietary modifications and increasing the intake of iron-rich foods (WHO, 2016). In the present study, the overall knowledge regarding anemia was found to be moderately satisfactory, with 95.2% of participants correctly identifying iron deficiency as a major cause and 97.6% recognizing the importance of blood tests for diagnosis. However, awareness regarding the hereditary nature of anemia (57.1%) and the role of vitamin B12 (61.9%) remained limited. These results align with previous findings by Shahzad *et al*. (2017) [18], who reported moderate knowledge levels among students from a Home Economics college. Despite considerable general awareness, detailed nutritional understanding, such as the effects of various foods on iron absorption, remained insufficient. This knowledge gap could potentially contribute to unhealthy dietary practices. The attitude assessment revealed a generally positive outlook, with 90.5% of students acknowledging the importance of healthy eating in preventing anemia. Similar to Singh, Rajoura, and Honnakamble (2019) [19], a portion of the participants (around 28.6%) were uncertain about their anemia status, suggesting gaps in personal health awareness despite broader knowledge. Interestingly, students from science-related academic streams demonstrated significantly higher knowledge compared to non-science students ($p = 0.021$), consistent with findings that exposure to health education can improve anemia awareness (Yusoff *et al*., 2012) [20]. Poor dietary practices were evident in the study population. While 57.1% regularly consumed iron-rich foods such as green leafy vegetables and legumes, a considerable number of participants (28.6%) drank tea or coffee immediately after meals, a practice known to inhibit iron absorption due to the presence of polyphenols (Sung, Lee & Park, 2018) [21]. Moreover, the vegetarian Population (52.4%) was more susceptible to dietary iron deficiencies, highlighting the need for better nutritional planning. These findings are consistent with observations by Shill, Karmakar, and Kibria (2014) [22], who reported that unbalanced diets and meal-skipping behaviors contribute significantly to anemia risk among students. The Pearson correlation analysis showed a significant positive relationship between knowledge and attitude ($r = 0.362$, $p < 0.01$), supporting previous research by Adznam, Sedek, and Kasim (2018) [23], who found that greater knowledge promotes positive health attitudes. A positive correlation was also found between knowledge and practice ($r = 0.275$, $p < 0.01$), although it was weaker, suggesting that higher knowledge does not always fully translate into healthy behaviors. This contrasts with findings by Imunticha, Wahyuni, and Fitriani (2015) [24], who reported a stronger direct link between knowledge and practice. A considerable proportion of students exhibited practices detrimental to iron status, including frequent consumption of beverages that impair iron absorption and insufficient intake of vitamin C-rich foods, which enhance non-heme iron bioavailability. This pattern mirrors the dietary behaviors observed among Malaysian students in the Malaysian Adult Nutrition Survey (IPH, 2014) [25] and Bangladeshi students in studies by Shill *et al*. (2014) [22]. Although participants reported seeking medical care when experiencing symptoms (high health-seeking behavior), preventive behaviors like routine hemoglobin testing and iron supplementation were lacking. These findings are consistent with El Kahi, Abi Antoun, and Fares (2012) [26], who noted a reliance on symptomatic diagnosis rather than preventive healthcare among students. The significant association between academic stream and knowledge levels suggests that targeted educational interventions in non-science disciplines could be particularly beneficial. Strengthening knowledge through structured programs could lead to improved attitudes and, subsequently, healthier dietary practices, as supported by interventions in school-

based settings (Shariff *et al*., 2008[27]; Singh, Rajoura & Honnakamble, 2019) [19].

Overall, these findings emphasize the need for comprehensive nutritional education and behavior-change strategies among college students to bridge the gap between knowledge and practice. Collaborative efforts between academic institutions and public health organizations could help promote regular health check-ups, dietary counseling, and supplementation programs (WHO, 2001) [14]. Enhancing KAP levels may ultimately contribute to a reduction in anemia prevalence and associated health complications (Inche, Sutan & Shamsuddin, 2014) [29].

Limitations

The study was limited by the absence of direct hemoglobin testing, which could have provided clinical validation of self-reported anemia status. Additionally, while the sample size of 210 was adequate for preliminary analysis, further studies with larger, more diverse samples could offer deeper insights into demographic differences

Conclusion

This study explored the knowledge, attitude, and dietary practices regarding anaemia among college-going students in Greater Noida. The findings revealed that although students possessed a moderate level of knowledge about anaemia and its prevention, there were evident shortcomings in their attitudes and everyday dietary behaviors. While many participants could identify iron-rich foods and recognized the importance of iron in health, detailed understanding of factors affecting iron absorption, such as the role of vitamin C or the negative effects of tea and coffee consumption during meals, was limited. Skipping meals and low intake of nutrient-dense foods were common practices, potentially exacerbating anaemia risk. Confidence in managing their diets to prevent anaemia, as well as awareness of preventive practices like iron supplementation and deworming, was relatively low. A significant positive association was found between knowledge and attitude, indicating that better knowledge tends to shape a more proactive mindset. However, the weak link between knowledge and actual practices emphasizes a gap between understanding and behavior.

In summary, college students, particularly females, continue to be at high risk of iron deficiency anaemia due to poor dietary habits and the limited practical application of their knowledge. These findings underscore the urgent need for comprehensive, campus-based health promotion initiatives that focus on improving nutritional knowledge, encouraging behavior change, and fostering preventive practices such as routine anaemia screening and iron supplementation. Such efforts could play a critical role in reducing anaemia prevalence and supporting the overall health and academic performance of students.

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