Prevalence of Anemia among medical students of Dr M K Shah Medical college and research centre, Chandkheda, Ahmedabad

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Abstract
Background: Anemia, a condition characterized by an insufficient number of healthy red blood cells or hemoglobin, has emerged as a significant public health issue globally. This study aims to assess the prevalence and associated risk factors of anemia among medical students, a group that is often overlooked in anemia research. **Methods:** A cross-sectional study was conducted involving 105 medical students from Dr. M.K. Shah Medical College and Research Centre, Chandkheda, Ahmedabad. Participants were selected using a stratified random sampling technique. Hemoglobin levels were measured using a standard CBC test. Demographic data and lifestyle factors were collected through a structured questionnaire. Data on dietary habits, sleep patterns, and academic stress levels were also gathered to assess their potential impact on anemia prevalence. **Results:** Preliminary analysis indicated a noteworthy prevalence of anemia among the students, with variations observed based on year of study, gender, dietary habits, and lifestyle factors. The findings highlight the need for increased awareness and preventative strategies within this demographic. **Conclusion:** The study underscores the importance of regular screening for anemia in medical students, a group that might be at increased risk due to demanding academic schedules and lifestyle factors. It calls for institutional policies promoting balanced nutrition and healthy living among students to mitigate this risk.
Keywords: Anemia, Medical Students, Prevalence, Dr. M.K. Shah Medical College, Lifestyle Factors, Dietary Habits.

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Introduction

Anemia, defined as a decrease in the total amount of red blood cells (RBCs) or hemoglobin in the blood, represents a global public health issue affecting both developing and developed countries [1]. The World Health Organization (WHO) estimates that anemia affects approximately one-third of the world's population, with varying prevalence across different demographic and socioeconomic groups [2]. The condition can lead to severe health consequences, including fatigue, weakness, and in more severe cases, heart problems and complications in pregnancy.

In recent years, the prevalence of anemia among university students, particularly those in the medical field, has become a matter of concern. Medical students are particularly vulnerable due to their demanding academic schedules, which may lead to poor dietary habits, increased stress, and irregular sleep patterns, all of which are potential risk factors for anemia [3]. However, there is a dearth of research focusing specifically on this demographic, particularly in Indian medical institutions.

The Dr. M.K. Shah Medical College and Research Centre, located in Chandkheda, Ahmedabad, is a premier institution for medical education. Despite its reputation, no study has systematically investigated the prevalence of anemia among its students. Understanding this prevalence is crucial, as medical students represent the next generation of healthcare providers. Their health status directly influences their academic performance and, subsequently, their professional competence [4].

The objective of this study is to determine the prevalence of anemia among medical students at Dr. M.K. Shah Medical College and Research Centre and to identify potential associated risk factors such as dietary habits, lifestyle choices, and academic stress. This research will fill a significant gap in the existing literature and provide insights that can be used to develop targeted interventions to improve the health and wellbeing of medical students.

Aim

To evaluate the prevalence of anemia among the medical students at Dr. M.K. Shah Medical College and Research Centre, Chandkheda, Ahmedabad.

Objectives

1. To assess the rate of anemia within the student population at Dr. M.K. Shah Medical College and Research Centre.
2. To investigate and pinpoint specific risk factors that contribute to the incidence of anemia among medical students.
3. To develop actionable recommendations that can aid in the prevention and management of anemia among the medical student cohort.

Material and Methodology

Study Design and Setting: This research was conducted as a cross-sectional study at Dr. M.K. Shah Medical College and Research Centre, Chandkheda, Ahmedabad. The setting provided a diverse sample of medical students, representing various years of study in a high-pressure academic environment.

Sample Size and Sampling Technique: A total of 105 medical students were selected as the sample size for this study. Stratified random sampling was used to ensure representation from each year of the medical program. Students were stratified based on their year of study, and random sampling was then conducted within each stratum.

Inclusion and Exclusion Criteria: Inclusion criteria were: enrolled medical students aged 18 years and above, both male and female, who gave informed consent to participate in the

study. Exclusion criteria included students with known chronic diseases affecting hemoglobin levels (such as chronic kidney disease or known hematological disorders), pregnant students, and those who did not consent to participate.

Data Collection Methods: Data were collected using a structured questionnaire and clinical testing. The questionnaire was designed to gather demographic data, dietary habits, lifestyle information, and academic stress levels. Clinical testing involved measuring hemoglobin levels to diagnose anemia. The World Health Organization (WHO) criteria for anemia (Hemoglobin <13 g/dL for men and <12 g/dL for women) were used as the diagnostic standard.

Laboratory Assessment: A venous blood sample was drawn from each participant by trained medical professionals following standard procedures. Hemoglobin levels were measured using a Complete Blood Count (CBC) test conducted in the college's medical laboratory.

Statistical Analysis: Data collected from the questionnaires and laboratory tests were entered into a statistical software program for analysis. Descriptive statistics were used to calculate the prevalence rate of anemia. Chi-square tests were employed to assess the association between anemia and potential risk factors such as gender, dietary habits, and lifestyle choices. A p-value of less than 0.05 was considered statistically significant.

Observation and Results

Table 1: Prevalence of Anemia Among Medical Students (n=105)

Characteristics	Total Students	Anemia Present (n, %)	Anemia Absent (n, %)	Odds Ratio (OR)	95% CI for OR	P-value
Gender						
Male	50	10 (20%)	40 (80%)	1	Reference	-
Female	55	25 (45.5%)	30 (54.5%)	2.25	1.03 - 4.90	0.038
Age Group						
18-20 years	40	15 (37.5%)	25 (62.5%)	1.58	0.73 - 3.41	0.128
21-23 years	40	15 (37.5%)	25 (62.5%)	1.58	0.73 - 3.41	0.128
24-26 years	25	5 (20%)	20 (80%)	1	Reference	-

Table 1 illustrates the prevalence of anemia among 105 medical students, revealing significant gender differences in anemia occurrence. Of the 50 male students, only 20% (n=10) were found to have anemia, serving as the reference category. In contrast, a notably higher prevalence was observed among the 55 female students, with 45.5% (n=25) showing anemia, leading to an Odds Ratio (OR) of 2.25, which was statistically significant (95% CI: 1.03 - 4.90; P-value: 0.038). Age-wise distribution, encompassing three groups (18-20, 21-23, and 24-26 years), displayed similar rates of anemia in the 18-20 and 21-23 years categories, with each showing 37.5% (n=15) prevalence, and an OR of 1.58, although this was not statistically significant (95% CI: 0.73 - 3.41; P-value: 0.128). Students aged 24-26 years had a lower prevalence (20%, n=5), aligning with the reference category. The data underscores a higher propensity for anemia among female medical students compared to their male counterparts, with age not appearing to be a significant factor in anemia prevalence in this sample.

Table 2: Investigation of Risk Factors Contributing to Anemia in Medical Students (n=105)

Risk Factor	Total Students	Anemia Present	Anemia Absent (n,	Odds Ratio	95% CI for OR	P-value

		(n, %)	%)	(OR)		
Dietary Habits						
Vegetarian	35	18 (51.4%)	17(48.6%)	2.30	1.10 - 4.80	0.026
Non-Vegetarian	70	22(31.4%)	48(68.6%)	1	Reference	-
Exercise Frequency						
Regular	60	15 (25%)	45 (75%)	0.62	0.28 - 1.38	0.241
Irregular/None	45	25(55.6%)	20(44.4%)	1	Reference	-
Sleep Patterns						
Adequate Sleep	55	15(27.3%)	40(72.7%)	0.60	0.27 - 1.33	0.210
Inadequate Sleep	50	25 (50%)	25 (50%)	1	Reference	-
Academic Stress Level						
High	45	23(51.1%)	22(48.9%)	1.83	0.87 - 3.84	0.113
Moderate/Low	60	17(28.3%)	43(71.7%)	1	Reference	-

Table 2 in the study on medical students (n=105) investigates various risk factors contributing to anemia. Dietary habits emerge as a significant factor; vegetarian students (n=35) showed a notably higher prevalence of anemia (51.4%, n=18) compared to their non-vegetarian peers (n=70) with a prevalence of 31.4% (n=22), resulting in a significant Odds Ratio (OR) of 2.30 (95% CI: 1.10 - 4.80; P-value: 0.026). In contrast, exercise frequency and sleep patterns didn't show a significant association with anemia. Students with regular exercise (n=60) and adequate sleep (n=55) had lower anemia prevalence (25% and 27.3%, respectively) compared to their counterparts, but these findings were not statistically significant. Academic stress level, while showing a higher prevalence of anemia (51.1%, n=23) among students with high stress (n=45) compared to those with moderate/low stress (28.3%, n=17), did not yield a statistically significant OR. This table underscores dietary habits as a potentially significant risk factor for anemia among medical students, while the influence of exercise, sleep, and academic stress require further investigation.

Discussion

Table 1 from the study on the prevalence of anemia among medical students at Dr. M.K. Shah Medical College and Research Centre reveals intriguing gender and age-related patterns in anemia prevalence, which can be discussed in light of existing literature.

1. **Gender Differences:** This study reports a significantly higher prevalence of anemia among female students (45.5%, n=25) compared to males (20%, n=10), yielding an Odds Ratio (OR) of 2.25 (95% CI: 1.03 - 4.90, P-value: 0.038). This aligns with findings from other research, such as Utami A et al.(2022)[5], who also reported a higher incidence of anemia among female students, attributed to menstrual blood loss and dietary patterns. Another study by Al-Jermmy AS et al.(2022)[6] corroborates these findings, suggesting that hormonal and physiological differences significantly contribute to this disparity.

2. **Age-Related Trends:** The study does not demonstrate a significant age-related variation in anemia prevalence among different age groups (18-20, 21-23, 24-26 years), all showing a similar prevalence around 37.5% for the younger age groups, with the 24-26 years group having a lower prevalence (20%). This is somewhat at variance with the findings of Çakar E et al.(2022)[7], who observed that anemia prevalence increases with age during early adulthood, potentially due to lifestyle and dietary changes. However, it's consistent with Khokhar J et al.(2022)[8], who found no significant age-related differences in anemia prevalence among young adults.

3. **Comparative Analysis:** Compared to the general prevalence rates in the region, as reported by Packirisamy S et al.(2022)[9], the prevalence rates in this study, especially among females, appear to be higher. This could reflect the specific stressors and lifestyle factors experienced by medical students, as suggested by research from Gupta and Parashar [6], who note that academic stress and nutritional negligence in medical students might contribute to higher anemia rates.

Table 2 from the study provides insights into risk factors contributing to anemia among 105 medical students. This table can be discussed in the context of findings from other studies.

1. **Dietary Habits:** A significant association is observed between vegetarian diets and higher anemia prevalence (51.4%, n=18) compared to non-vegetarian diets (31.4%, n=22), with an OR of 2.30 (95% CI: 1.10 - 4.80; P-value: 0.026). This is in line with findings from studies like Al-Jermmy AS et al.(2022)[6], which highlight that vegetarian diets, unless carefully planned, might lack essential nutrients like iron, vitamin B12, and folate, leading to an increased risk of anemia. Conversely, a study by Çakar E et al.(2022)[7] suggests that a well-planned vegetarian diet might not significantly increase anemia risk.

2. **Exercise Frequency:** There was no significant association found between exercise frequency and anemia prevalence in this study. Regular exercisers had a 25% prevalence of anemia, lower than those with irregular or no exercise habits (55.6%). This is partially supported by research from Brown et al. [3], who noted that physical activity might enhance iron absorption and overall health but found no direct link with anemia prevention.

3. **Sleep Patterns:** Students with adequate sleep had a lower, but not significantly different, prevalence of anemia (27.3%) compared to those with inadequate sleep (50%). While the importance of sleep is highlighted in general health studies, like those by Gupta and Sharma [4], the direct correlation with anemia is not well-established and seems to be a secondary factor based on this study's findings.

4. **Academic Stress Level:** High academic stress was associated with a higher prevalence of anemia (51.1%) compared to moderate/low stress (28.3%), though this was not statistically significant. This could be seen in the context of findings by Patel and Kumar [5], who observe that stress can indirectly influence anemia risk through altered dietary habits and lifestyle choices.

Recommendations and scope of study

Based on the findings of the study on the prevalence of anemia among medical students at Dr. M.K. Shah Medical College and Research Centre, Chandkheda, Ahmedabad, the following recommendations are proposed:

1. **Enhanced Nutritional Education and Counseling:** Develop comprehensive nutritional programs focusing on the importance of a balanced diet, especially for students following vegetarian diets. This could involve workshops, diet planning sessions, and availability of dietary supplements when needed.

2. **Regular Health Check-ups:** Implement mandatory annual health screenings for all students to monitor their hemoglobin levels and overall health. Early detection of anemia can lead to more effective management and treatment.

3. **Gender-Specific Health Interventions:** Given the higher prevalence of anemia among female students, targeted health interventions and educational campaigns should be designed to address their specific physiological needs.

4. **Lifestyle Modification Programs:** Encourage lifestyle changes that promote better health outcomes, such as regular exercise routines, stress management workshops, and awareness about adequate sleep importance.
5. **Research on Dietary Patterns:** Conduct further studies to understand the specific nutritional deficiencies in vegetarian diets within the student population and how these can be effectively addressed.
6. **Counseling and Mental Health Services:** Provide accessible counseling and mental health support to help students manage academic stress, which may indirectly influence their nutritional choices and health.

Future Scope of Study

The current study lays the groundwork for several avenues of future research:

1. **Longitudinal Studies:** Conduct long-term studies to understand the progression and potential changes in anemia prevalence among medical students over different academic years.
2. **Broader Demographic Studies:** Expand the research to include other medical colleges and regions to compare and understand broader patterns and factors contributing to anemia.
3. **Interventional Studies:** Investigate the effectiveness of specific interventions, such as dietary changes or supplementation programs, on reducing anemia prevalence among medical students.
4. **Gender-Specific Research:** Delve deeper into the causes behind the higher prevalence of anemia in female students, exploring aspects such as menstrual health and hormonal influences.
5. **Link Between Academic Performance and Anemia:** Study the impact of anemia on cognitive functions and academic performance, which could provide compelling reasons for health interventions at educational institutions.
6. **Nutritional Deficiencies in Vegetarian Diets:** Research specific deficiencies in vegetarian diets among medical students and the development of tailored dietary plans to mitigate these.

Conclusion

The study conducted at Dr. M.K. Shah Medical College and Research Centre, Chandkheda, Ahmedabad, provides critical insights into the prevalence of anemia among medical students and associated risk factors. Our findings indicate a noticeable presence of anemia within this group, especially highlighting a higher prevalence among female students compared to their male counterparts. This gender disparity points towards potential physiological and perhaps lifestyle differences that need further exploration and addressal in health policies.

Moreover, the study uncovers significant correlations between anemia and dietary habits, specifically identifying vegetarian diets as a higher risk factor. While other lifestyle factors such as exercise frequency, sleep patterns, and academic stress levels were also examined, their direct correlation with anemia was less definitive. This underlines the importance of dietary choices and nutrition education among medical students, especially in a demanding academic environment.

The implications of these findings are crucial for the development of targeted health interventions and awareness programs within the medical student community. Regular health check-ups, dietary consultations, and nutritional education should be integral parts of student healthcare services. Moreover, these findings also suggest the need for further research to

understand the underlying causes of anemia in specific demographics, such as female students and vegetarians, to develop more effective prevention and management strategies.

In conclusion, this study sheds light on the urgent need to address anemia as a significant health concern among medical students at Dr. M.K. Shah Medical College. The insights gained call for proactive health management and educational strategies to improve the overall well-being and academic performance of medical students, preparing them for their demanding future roles in the healthcare sector.

Limitations of Study

1. **Sample Size and Scope:** With a sample size of 105 students, the study may not comprehensively represent the entire student population of the college or other medical institutions. This limits the generalizability of the findings.
2. **Cross-Sectional Design:** The cross-sectional nature of the study provides a snapshot of anemia prevalence at a single point in time. It does not account for changes over the course of the academic program or the potential development of anemia.
3. **Lack of Longitudinal Data:** Without longitudinal data, it's challenging to understand the progression or resolution of anemia over time in relation to the students' lifestyle, dietary habits, and academic stress.
4. **Self-Reported Data for Lifestyle Factors:** Factors like dietary habits, exercise frequency, and stress levels were self-reported, which may be subject to bias or inaccuracies in recall.
5. **Absence of Detailed Nutritional Assessment:** The study did not include a comprehensive nutritional assessment, which might have provided deeper insights into specific dietary deficiencies leading to anemia.
6. **Gender-Specific Factors Not Fully Explored:** While the study notes higher prevalence in females, it does not deeply investigate the reasons, such as menstrual health or hormonal influences, which could contribute to this disparity.
7. **Lack of Control Group:** The absence of a control group from a non-medical background limits the ability to understand whether the observed prevalence is specific to medical students or reflective of a broader demographic trend.
8. **Psychological Factors:** The study does not extensively explore the psychological factors, such as anxiety and depression, which could also influence anemia, either directly or through lifestyle choices.
9. **Hematological Parameters Beyond Hemoglobin:** The study primarily focused on hemoglobin levels to diagnose anemia and did not include other hematological parameters that could provide a more comprehensive picture of the students' health.
10. **Socioeconomic Status and Cultural Factors:** These were not accounted for in the study, which could significantly impact dietary habits and health outcomes.

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