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Prevalence and Awareness of Nutritional Anemia among Under Graduate and Post Graduate Dental Students in Ghaziabad, India - A Cross-Sectional Study

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Abstract

Introduction: Anemia is a significant public health problem affecting both developing and developed countries and has major consequences for human health as well as social and economic development. Dental students, coming from the different socioeconomic background, form a vulnerable population that suffer anemia due to their irregular stressful schedules and erratic mealtimes.

Aim: The present study aims to estimate the prevalence and knowledge of anemia among dental students and to assess the correlation between their hemoglobin levels and Body mass index.

Methodology: A descriptive Cross-sectional study was conducted among 450 dental students. A pre-validated questionnaire comprised of three domains - demographics, Hb level & BMI, and knowledge & attitude, respectively was used to collect the data. The correlation between Hb level and BMI was assessed using Pearson correlation test and the awareness of anemia among undergraduate and post graduate students were assessed using chi-square analysis. Any p value ≤ 0.05 was considered statistically significant.

Results: Out of 450 dental students, 401 students provided the entire data and completed the questionnaire. Based upon the severity of anemia, about 20% (68) had mild anemia, and 7.2% (27) had moderate anemia while 2.7% (11) students reported to have severe anemia. The correlation between hemoglobin level and body mass index among the Study participants was analysed using Pearson correlation and found to be statistically significant ($p\leq0.05$). The knowledge and attitude towards anemia was seen to be significantly higher among post graduate students when compared with undergraduates ($p\leq0.05$).

Conclusion: The findings of the present study suggests that the dental students are having a better knowledge level about anemia. Also prevalence of anemia was observed high and closely related to the nutritional status. So, the students should be motivated and educated about the importance of a balanced diet, nutritional supplements. **Keywords:** Body mass index, Dentistry, Hemoglobin, Nutritional anemia, Students

Introduction

Anemia is a significant public health problem affecting both developing and developed countries and has major consequences for human health as well as social and economic development. ^{[1], [2]} According to World Health Organization (WHO), globally, 1.62 billion people are affected by anemia, which corresponds to 24.8% of the entire population. ^{[3],[4]}

The consequences of anaemia, as yet un-quantified, are thought to be enormous including a significant drain on health care, educational resources and labour productivity, reduced physical and mental capacity of large segments of the population. ^{[5],[6]} Anemia is defined by the World Health Organization (WHO) as a condition where haemoglobin present in blood is less than normal due to deficiency of one or more essential nutrients, regardless of the cause of such deficiencies. ^{[7],[8]} The burden of anemia varies according to a person's age, sex, altitude, and pregnancy.^{[9],[10]}

Globally, Nutritional anemia is the most common cause of anemia and Iron Deficiency Anemia is one of its forms. ^[9] According to the World Health Organization/World Bank Ranking, iron-deficiency anemia is the third leading cause of disability-adjusted life year for females aged 15– 44-year-old. ^{[11],[12]} Iron deficiency anemia has many etiologies, but the primary causes are impairment of iron absorption in the gut, loss of blood or haemorrhage and parasitic diseases which cause blood loss and contribute to the cause.^{[13],[14]} Micronutrient deficiencies, including vitamins A and B12, foliate, riboflavin, and copper can increase the risk of anemia. ^[15] Usually, deficiency of iron develops gradually and does not have clinically apparent symptoms until anemia becomes severe.^{[16],[17]}

According to World Health Organisation (WHO), anemia is responsible for about 1 million deaths a year, and three-quarter of it occurs in Africa and South-East Asia and out of these South Asian countries prevalence of anemia is highest in India. ^{[18], [19]} Moreover, prevalence of anemia is high in all the states of India. ^[20] It is highly observed (ranging between 80 and > 90%) in preschool children, adolescent girls, pregnant ladies, people with chronic disease, and lactating women. As per National Family Health Survey (NFHS 3), about 55% of Indian women are anemic. ^{[20],[21]}

Indian government has been taking steps from time to time to tackle the problem of anaemia in community. National programme for prevention of nutritional anaemia was launched by government during the 4th five year plan through which Iron and Folic acid tablets was distributed to pregnant women and young children in age group 1-12 years. But, still the prevalence of anaemia is high as indicated by above cited national surveys and various researchers.^{[20],[21]}

Dental students, coming from the different socioeconomic background, form a vulnerable population that suffer anemia due to their irregular stressful schedules and erratic mealtimes. ^{[22],[23]} Long-schedule of studying in college, clinical postings, other curriculum activities, meal skipping, eating away from home, snacking and fast food consumption predispose them to dietary deficiencies. Also, chronic blood loss due to changes in menstrual pattern, worm infestation etc., thus further increase their chance of being anaemic. ^[24] Some studies also revealed that along with under nutrition, obesity is also associated with anaemia in adults. ^{[25],[26]}

There is paucity of study regarding the association of anaemia with BMI among dental students in northern India and so the present study was conducted among dental students to assess their nutritional and haemoglobin status. The primary objective of this research was to estimate the prevalence of anemia among dental students and to assess the correlation between their haemoglobin levels and Body mass index. The secondary objective was to assess the basic knowledge level of dental students regarding anemia.

Objectives

- 1. To estimate the prevalence of anemia among students in a dental college in Ghaziabad.
- To assess the correlation between haemoglobin levels and Body mass index of dental students.
- 3. To assess the basic knowledge of anemia among dental students.

Methodology

A descriptive Cross-sectional study was conducted among 450 students of dental college in Ghaziabad. The study included all the undergraduate students, interns and postgraduate students. Students with bleeding disorders, history of hematological disorders and those who had underwent major surgery in the recent past were excluded from the study. Confidentiality of participants was strictly maintained. The ethical clearance for the study was obtained from the institution review board of the college and the informed consents were taken from all the participants.

The questionnaire was pretested on 25 participants who were requested to report any questions which they could not understand. Cronbach's alpha value enabled to measure the internal consistency of the questionnaire and the value was found to be 0.84 which indicates high. The subjects in the pilot study were not included in the main study.

Data collection

A pre-validated questionnaire was used to collect the data. It comprised three domains - demographics, Hb level & BMI, and knowledge & attitude, respectively. Knowledge and attitude of dental students regarding anaemia was recorded using Yes / No dichotomous scale.

Subjective parameters

Age was recorded same as from the birth-date recorded in the official documents of participants. Standing height was recorded without shoes on a wall mounted measuring tape to the nearest of centimetres (<5 mm and >5 mm). Weight was recorded without shoes on a weighing machine with a least count of 500 g. Basal metabolic index (BMI) was calculated by the formula: BMI = weight (in kg)/height (m²).

International obesity task force has proposed the standards for adult obesity in Asia and India, according to which a cut-off point of 18.5 kg/m² is used to define thinness or acute under nutrition while a BMI of 23 kg/m² indicates overweight and a BMI of over 25 kg/m² is referred to as obesity.

Physiological parameters

Haemoglobin was measured using the spectroscopy method using the standard protocol. The measured values

were tabulated and compared to the standard values of grading anaemia according to WHO guidelines with <12 gram% of haemoglobin considered as anaemic (WHO 1975) while values of haemoglobin of 10.0–11.9 gram%, 7.0–9.9 gram%, and <7 gram% were noted as Grade 1 (mild) anaemia, Grade 2 (moderate) anaemia, and Grade 3 (severe) anaemia, respectively.

Statistical Analysis

The data were compiled and tabulated in Microsoft Excel spreadsheet and were subjected to frequency distribution analysis using the Statistical Package for the Social Sciences software (SPSS) 21.0 (SPSS Inc., Chicago, IL, USA). The correlation between Hb level and BMI was assessed using Pearson correlation test and the awareness of anemia among undergraduate and post graduate students were assessed using chi-square analysis. Any p value ≤ 0.05 was considered statistically significant.

Results

Table 1: Demographic	data	of the	Study	participants
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Demographic Data		Number	Percentage
Gender	Male	137	34.2%
	Female	264	65.8%
Educational	1 st year	76	19%
Qualification	students		
	2 nd year	74	18.5%
	students		
	3 rd year	78	19.5%
	students		
	4 th year	6	1.5%
	students		
	Interns	81	20.1%
	Post	86	21.4%
	graduates		
Place of stay	Day	34	8.5%
	scholar		

	Hosteller	367	91.5%
Type of diet	Vegetarian	145	36.2%
	Non-	256	63.8%
	vegetarian		
Mean Age		22.11 ± 4.0	007

Table	2:	Distribution	of	Study	participants	according	to
Severi	ty o	of Anemia					

Hemoglobin	Indicator	Frequency	Percentage
(g/dl)			
≥12	Nonanemic	281	70.1%
10.0-11.9	Grade 1	80	20%
	(Mild)		
	Anemia		
7.0-9.9	Grade 2	29	7.2%
	(Moderate)		
	Anemia		
Less than 7	Grade 3	11	2.7%
	(Severe)		
	Anemia		

Table 3: Prevalence of Anemia amo	ong Students belonging
to different Nutritional level (BMI)	

Anemi	Underweight	Normal	Overweight	Obese	Total
а					
Present	29	59	30	11	120
	(5%)	(14.7%)	(7.5%)	(2.7%)	(29.9%)
Absent	36	195	35	15	281
	(9%)	(48.6%)	(8.7%)	(3.8%)	(70.1%)
Total	56	254	65	26	358
	(14%)	(63.3%)	(16.2%)	(6.5%)	(100%)

Table 4: Correlation between Hb and BMI among th	ne
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Study participants

Correlation		Pearson	P Value
Between	HB	Correlation	
And BMI		0.150	0.003**

Correlation is significant at 0.05 level (2-tailed)

 Table 5: Comparison of Knowledge and Attitude factors regarding Anemia among the undergraduate students and post graduate students (Chi square)

Knowledge		Total Stu	Students Under		Graduate	Post	Graduate	Р
		(N=358)		Students	Students (N=315)		Students (N=43)	
		Yes	No	Yes	No	Yes	No	
1.	Do you think anemia is a health	333	68	253	62	80	6	0.005^{**}
	problem?	(83%)	(17%)	(80.3%)	(19.7%)	(93%)	(7%)	
2.	Do you have history of any	29	372	27	288	2	84	0.047**
	chronic illness?	(7.2%)	(92.8%)	(8.6%)	(91.4%)	(2.3%)	(97.7%)	
3.	Would you seek medical	334	67	254	61	80	6	0.006**
	attention if you suspect anemia?	(83.3%)	(16.7%)	(80.6%)	(19.4%)	(93%)	(7%)	
4.	Would you increase	337	64	255	60	82	4	0.001**
	consumption of green leafy	(84%)	(16%)	(81%)	(19%)	(95.3%)	(4.7%)	
	vegetables if prescribed for							
	anemia?							
5.	Would you be willing to take	332	69	252	63	80	6	0.005^{**}
	iron tablets if prescribed for	(82.8%)	(17.2%)	(80%)	(20%)	(93%)	(7%)	
	anemia?							
6.	Do you have breakfast	311	90	243	72	68	18	0.704
	regularly?	(77.6%)	(22.4%)	(77.1%)	(22.9%)	(79.1%)	(20.9%)	
7.	Do you have multivitamins	57	344	47	268	10	76	0.438
	regularly?	(14.2%)	(85.8%)	(14.9%)	(85.1%)	(11.6%)	(88.4%)	

The study was conducted among 450 dental students among which 401 students provided the entire data and completed the questionnaire given to them . The response rate was 89.1%.

Out of the 401 study participants, 65.8% were females and 34.2% were males. 91.5% students were hostellers while 63.8% of the students were non-vegetarian and the rest were vegetarian. The mean age of the participants was 22.11 ± 4.007 [Table 1].

In our study, 29.9% of the participants were anemic. Based upon the severity of anemia, about 20% (68) had mild anemia, and 7.2% (27) had moderate anemia while 2.7% (11) students reported to have severe anemia [Table Prevalence of Anemia among Students belonging to different Nutritional level (BMI) is shown in Table 3. According to the study, 56 (14%) were underweight, whereas 65 (16.2%) were overweight and 26 (6.5%) were obese. Normal range of body mass index was documented in 254 (63.3%) of the study subjects. The correlation between hemoglobin level and body mass index among the Study participants was analysed using Pearson correlation and found to be statistically significant (p≤0.05) [Table 4].

A good awareness level was observed regarding knowledge that anemia is a health problem as 333 (83%) of the respondents said yes to the statement. Only 7.2% of the students were having chronic illness. 83.3% of the

Page **6**.

dental students responded that they will seek medical attention in case they suspect anemia. The percentage of people who were willing to take green leafy vegetables was found to be 84% while the percentage of people who were willing to take iron tablets if prescribed for anemia was found to be 82.8%. Among the study participants, 77.6% had breakfast and 14.2% had multivitamins regularly. The knowledge and attitude towards anemia was seen to be significantly higher among post graduate students when compared with undergraduates ($p \le 0.05$) but in case of intake of breakfast and multivitamins regularly, no significant difference was found [Table 5].

Discussion

Despite increased awareness and availability of better nutrition, anemia is still a major health issue concerning mainly the developing countries like India due to its high prevalence over here. ^{[5], [13]} Ironically, it is not restricted to rural and low socio economic status adolescents but shows increase prevalence in developed affluent societies. ^[5] Occurrence of anemia particularly in younger women not only affects her but also the future generation. Thus, identifying and treating this common condition becomes important.^[13]According to World Health Organization WHO, the prevalence of anemia in a population is best determined by using are liable method of measuring haemoglobin concentration.^[18] The present study was conducted to estimate the prevalence of anemia among dental students and to assess the correlation between their haemoglobin levels and Body mass index. The study also analyses the basic knowledge level of dental students regarding anemia.

According to the present study conducted among the 401 dental students, 65.8% were females and 34.2% were males. In a study by Subramaniyan K et al (2016) which was conducted among health science students of a private university in South India, 79.1% were females. ^[17] 91.5%

of the study participants in our study were residing at the hostel while the rest 8.5% were day scholars. In a study by Kannan B et al (2017), 54.7% of participants were residing with their parents while only the rest 45.3% were residing at the hostel. ^[23] According to the type of diet followed by the present study participants, 63.8% were non-vegetarian while the rest 36.2% were pure vegetarian and the result shows agreement with the study by Kannan B et al (2017) and Kalyanpur V et al (2017) among which 85.9% and 68.3% respectively were non-vegetarian. ^[13, 23] The mean age of the present study participants was found to be 22.11 ± 4.007. In a study by Subramaniyan K et al (2016), the mean age of participants was found to be 19.41±2.78 while, in a study by Jawed S et al (2017), the mean age was 19.92±0.93. ^{[17], [25]}

In our study, 29.9% of the study participants were found to anemic and the rest 70.1% were non-anemic and the result showed agreement with the study by Pandey S et al (2013) in which 30.2% were anemic and the rest 69.8% were non-anemic. ^[9] According to the severity of anemia, 20% had mild anemia, 7.2% had moderate anemia and 2.7% students had severe anemia in our study. In the study by Jawed S et al (2017) which was conducted among MBBS students, 25.8% were having mild anemia, 7.2% had moderate anemic and only 0.5% were severely anemic while, in the study by Subramaniyan K et al (2016) which was conducted among health science students, 24.7% were having mild anemia, 21.1% had moderate anemia and only 1.8% were severely anemic. ^{[25], [17]}

According to the present study, 14% were underweight, 16.2% were overweight and 6.5% were obese whereas, normal range of body mass index was documented in 63.3%. In a study by Agarwal AK et al (2017) which was conducted among medical and para medical students, 21.51% were underweight, 16.86% were pre-obese, 6.98% were obese and the rest 54.65% were of normal weight

while, in a study by Kalyanpur V et al (2017) which was conducted among young female medical students, 24% were underweight, 11% were overweight, 13% were obese and the rest 52% were of normal weight. ^[5, 13]

Our study shows a statistically significant correlation between hemoglobin level and body mass index of the participants (p \leq 0.05) and the result showed agreement with the studies by Jawed S et al (2017) and Vibhute NA et al (2019).^[3,8]

In the present study, a good awareness level about anemia was observed among the participants since 83% regarded it as a serious health problem and in a study by Vibhute NA et al (2019), 97% participants was aware of the same. ^[3] 83.3% of the dental students in our study responded that they will seek medical attention in case they suspect anemia while 82.8% were willing to take iron tablets if prescribed for anemia. These results are in agreement with the study by Vibhute NA et al (2019) in which 90% of the study participants were willing to seek medical attention for anemia and to take iron tablets if prescribed. ^[3] The percentage of people who were willing to take green leafy vegetables was found to be 84% in our study and this was in agreement with the study by Vibhute NA et al (2019) in which 82.7% were willing for the same. ^[3] In a study by Hadaye R et al (2019) which was conducted among students of a tertiary care hospital of Mumbai city, a poor attitude of healthy eating was observed.^[8]

For ensuring the sustained release of energy, a nutritious breakfast that includes sugar, starch, protein, fat, fiber, vitamins, and minerals, especially iron and vitamin C is necessary. In our study, 77.6% had breakfast regularly and this shows similarity to the studies by Vibhute NA et al (2019) and Akhtar N et al (2018) among which 90.7% and 73.3% participants respectively had breakfast regularly. ^{[3],} ^[10] According to our study, 14.2% had multivitamins regularly and this was similar to the study by Vibhute NA

et al (2019) in which only 36% had multivitamins regularly. ^[3] The knowledge and attitude towards anemia was seen to be significantly higher among post graduate students when compared with undergraduates ($p \le 0.05$). In a study by Patharkar J et al (2016) which was conducted to compare and evaluate awareness about anemia and its complications among the undergraduate and postgraduate medical students, knowledge pertaining to anemia were more among the undergraduates (n=34), as compared to the postgraduate students (n=20) but the results were statistically significant (p <0.01) only in context to the knowledge pertaining to the treatment of anemia among the two groups. ^[27]

One of the main limitation of the present study is the smaller sample size due to which the study results could not be generalized to the whole population. Additional tests such as serum ferritin, serum iron and transferrin or total iron binding capacity (TIBC) which were required for diagnosis of iron deficiency anemia was not estimated in this study and this may be an another limitation.

Despite of adequate knowledge about anemia among the dental students, the hemoglobin level was noticed to be non-satisfactory. A significant association of hemoglobin with the body mass index was also observed from this study.

Conclusion

The findings of the present study suggests that the dental students are having a better knowledge level about anemia. Also prevalence of anemia was observed high and closely related to the nutritional status. Negligence of dental or medical students toward their anemic status despite the awareness of consequences of low Hb level is a serious cause of concern since they are the budding doctors of future generation. So, the students should be motivated and educated about the importance of a balanced diet, nutritional supplements. Moreover,

hostellite students should be made taken care of their diet and to reduce the consumption of junk foods in order to cater the problem of anemia. Furthermore, frequent screening of the students for the presence of anemia and regular health checkups has to be made mandatory in all educational institutions.

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