Original Research Paper

Volume-9 | Issue-10 | October - 2019 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Physiology

PREVALENCE OF ANAEMIA, OBESITY AND ITS EFFECTS ON ACADEMIC PERFORMANCE AMONG MEDICAL STUDENTS

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ABSTRACT

BACKGROUND: Anaemia is one of the most commonly recognized nutritional disorders and is still a major public health problem affecting millions of people all over the world, causes decreased physical and mental activity and also lowers intellectual performance. Adolescence is a vulnerable period in the human life cycle for the development of anaemia. Trend of fast food habit which is quite unhealthy, more popular in young population is giving rise to either under-nutrition or over-nutrition.

METHODS: The total sample size of the study was 150 subjects. Hb is estimated with Sahli's method The cutoff hemoglobin level below 12.0 gm% was considered anaemia. The mean hemoglobin among student was 13.2gm % with standard deviation of 2.10. BMI was calculated by formula. Academic performance is observed. Statistical data was entered in Microsoft excel and was analysed using SPSS 16.0 version and chi square test for association.

RESULTS: Anaemia prevalence was 28% among medical students. Out of total 150 students 42 students were found anaemic and out of which prevalence of anaemia was higher among female students (45%) than male students (14.5%). Majority of students had Mild grade of anaemia. Prevalence of anaemia among normal weight was 47.6% followed by underweight 40.5%, and 12.% in pre-obese. The 73% of anaemic students scored less than 50 percent marks in examinations.

CONCLUSIONS: Anaemia is prevalent in literate population like medical students, inspite of having good knowledge about balance diet and nutrition and oriented to its ill effect on health. BMI shows higher prevalence of anaemia among normal weight, followed by under-weight and pre-obese. As Anaemia is also associated with lower intellectual performance, the preventive programs and policies of the country can focus on this age group in professional educational institutes in same line with school health program, the cause of anaemia should be sought and treated in the upcoming doctors.

KEYWORDS : Prevalence, Anaemia, Haemoglobin, BMI, Medical Students, Academic Performance.

INTRODUCTION:

Most common nutritional problem faced by developing countries like India is anaemia which is defined as low level of haemoglobin in blood or low RBC count. [1,2] The economic and social consequences of anaemia, as yet un-quantified, are thought to be enormous including a significant drain on health care, reduced physical and mental capacity of large segments of the population. Anaemia results from nutrition related causes, inflammatory or infectious diseases, worm infestations and from blood loss. Iron deficiency anaemia resulting from inadequate intake and low absorption of dietary iron is the common anaemia in India. [3,4,]

The medical student also come under the vulnerable group that suffer anaemia because of long schedule of studying in college, clinical postings, and other curriculum activities. Their living in the hostel or as day scholars away from parents and families was reflected upon their diet habits and had a significant reflection upon the prevalence of anaemia among the studied group, and also appropriate nutrition requirements increase significantly during certain period of life, thus placing individuals during these periods at greater risk of deficiency. Adolescence or early adulthood is one of the most vulnerable periods in human life cycle when nutritional requirement increases due to the growth spurt.[5]

Medical students are vulnerable to nutritional anaemia because of their sedentary lifestyle to complete the syllabus, less time for physical exercise and improper diet habit (5). Nutritional deficiencies leading to anaemia could have detrimental effect on health on future doctors and health care providers of India.[6] Screening for the detection of anemia is important in order to identify the at-risk population as well as to determine the treatment modality in individuals. Haemoglobin estimation is common test which is used to check general nutritional status and physical wellbeing. Along with under nutrition, there is a rapid increase in non communicable risk factors such as obesity and overweight.[7,8]

A few studies were done to know the association between anaemia and BMI. The study had shown 8% female students were anaemic in Himalayan Institute of Medical Sciences and also found a negative association between Hb and Body mass index (BMI) whereas study in medical students of Amritsar had shown a positive correlation of haemoglobin with grades of BMI in both boys and girls but none of the correlation was up to significance level of <0.05.[9,10]

A Few studies have been conducted on anaemia, obesity & academic performance in the vidarbha region and little is known about association between anaemia and BMI and exam performance among medical college students. Keeping this in mind present study is done to find out prevalence of anaemia, obesity and academic performance in medical undergraduates and tried to find out correlation between the these.

MATERIALS AND METHODS

A cross-sectional study was conducted from Aug. 2016 to April 2017 among first-year MBBS students between the ages of 17 to 21 years studying at Govt. medical college, Akola, Maharashtra. A total of 150 students with 67 (45%) females and 83 (55%) males were enrolled in the study. Ethical committee approval was taken before the start of the study and informed consent was obtained from the students.

A detailed clinical history was taken from them for any presenting symptoms regarding anemia, and physical examination was done to look for pallor, icterus, edema, hyper pigmentation, lymphadenopathy, bleeding spots and signs of vitamin deficiency. The systemic Physical examination was done to rule out any systemic abnormality. For hemoglobin measurement, blood was drawn by finger prick with lancet after sterilization of the site with 70.0% alcohol. The hemoglobin test was done by using Sahli haemometer. The color comparison was done in the natural light. With each subject verbal consent was taken before drawing a blood sample. The test was done in the Physiology hematology laboratory as a routine practical. World Health Organization's Guideline was used for interpretation and classification of anemia, the cutoff hemoglobin level below 12.0 gm% was considered as anemia. Any anaemia was defined as Hb<12 g/dl1. Mild, Moderate, and Severe anaemia was defined as Hb below 10-11.9 g/ dl, 7-9.9 g/dl, and 7 g/dl respectively.[11]

Height and weight of the subjects were recorded. Height was taken with the help of measuring tape to the nearest 0.1 cm. The weight was recorded to the nearest 0.5 kg using portable weighing machine and

wearing minimum clothing. Body mass index (BMI) was computed by using the standard equation.

BMI= Weight (in kg)/Height^2 (in meters).

BMI is age and sex independent and a known epidemiological marker of nutritional status of adolescents. International obesity task force (IOTF-2000) has proposed the standards for adult's obesity in Asia and India as follows: A cut off point of 18.5 kg/m^2 is used to define thinness or acute under nutrition and a BMI of 23 kg/m^2 indicates over nutrition. A BMI of over 25 kg/m^2 refers to obesity.[12]

CRITERIA FOR NUTRITIONAL STATUS OF STUDENTS ACCORDING TO BMI:

BMI	Nutritional status
>23 kg/m^2	Over nutrition
18.5-23 kg/m^2	Adequate nutrition
<18.5 kg/m^2	Under nutrition

It is a simple index for weight for height used to classify underweight, overweight and obesity.

- Underweight <18.50
- Normal range 18.50-24.99
- Overweight >25.00
- Pre-obese 25.00-29.99
- Obese >30.00

BMI values are age- independent and same for both sexes.

At the end of the every year before final university examination, the internal assessment exam was conducted in department and as the passing exam requires 50 percent marks the data of students performance who scored less than 50 percent and more than 50 percent marks was thus collected .

The collected data was analyzed statistically by SPSS Version 16. with chi square test for association between the parameters .

RESULTS

The total sample size of the study was 150 medical students. The age of the studied population ranged from 17 years to 21 years. There were 67 (45%) female and 83 (55%) male students admitted in Govt Medical College of Vidarbha region in Maharashtra.

Table 1: Overall prevalence of Anaemia among medical student

Parameters	Males	Females	Total
Anaemia Present	12 (8 %)	30 (20%)	42 (28%)
Anaemia Absent	71 (92%)	37 (80%)	108 (72%)
Total	83	67	150

The overall prevalence of Anaemia was 28.0% among medical students and among male students prevalence was 8% whereas in female it was 20%. (Table 1)

Table 2: Sexwise distribution of Anaemia among medical student

Parameters	Males	Females
Anaemia Present	12 (14.5%)	30 (45%)
Anaemia Absent	71 (85.5%)	37 (55%)
Total	83	67

Anaemia was more prevalent in female students than male students. Out of 67 female students 30(45%) were anaemic, while Out of 83 male students 12 (14.5%) were anaemic (Table 2).

Table 3 : Severity of Anaemia among Medical Student

Severity	Males	Females
Mild	12 (28.57%)	27 (64.28%)
Moderate	-	3 (7%)
Severe	-	-

Out of 150 medical students around 42 were Anaemic and Out of 42 anaemic students, 12 (28.57%) were males And 30 (71.42%) were females when compared to their own counterparts. Majority of students (92.8 %) had Mild grade of anaemia (i.e 64.28% in females + 28.57% in males). and 7% students had Moderate anaemia which was seen in girls only . None had severe anaemia. (Table 3)

Table 4 : Cross Tabulation of Anaemia and BMI (Nutritional Status)

BMI	Anaemia in Males		Total	Anaemia in Females		Total	X^2 P value
	Present	Absent		Present	Absent		
Underweight	3 (25%)	13	16	14 (47%)	11	25	11.01 (0.08) P> 0.05 NS
Normal Wt.	7 (58%)	43	50	13 (43%)	23	36	
Preobese	2 (17%)	15	17	3 (10%)	3	6	
Obese	-	-	-	-	-	-	
Total	12	71	83	30	37	67	

Among the Male anaemic students, about 58% were found Normal weight, 25% were Underweight and 17% were Overweight and none was obese. And among the Female anaemic students, about 43% were found Normal weight, 47% were Underweight and 10% were Overweight and none was obese (Table 4). On statistical analysis no significant correlation was found between anaemia and BMI nutritional status of medical students.

The overall prevalence of anaemia among Underweight was 40.5% and in students with normal BMI was 47.6%. Overweight anaemic students constitute 12% and obese none.

Table 5: Relation between Performance and Anaemia

Performance (Marks scored)	Anaemia in Males		Anaemia in Female		X^2 (P value)
	Present	Absent	Present	Absent	
Scored < 50 %	9 (75%)	18	22 (73%)	6	35.35 (0.0001) P < 0.05 Significant
Scored > 50 %	3 (25%)	53	8 (27%)	31	
Total	12	71	30	37	

Among the male anaemic students, about 75% scored less than 50 percent marks and 25% scored more than 50 percent marks. And among the female anaemic students, about 73% scored less than 50 percent marks and 27% scored more than 50 percent marks in examinations (Table 5) .

In the overall performance of anemic students, majority (73%) of them scored less than 50 percent marks while only 26% anemic students scored more than 50 percent marks in examinations. And in Non anemic students found opposite result, 22% scored less than 50 percent marks while only 78% non anemic students scored more than 50 percent marks in examinations. The present study showed that the risk of poor performance among anemic students was higher than non-anemic . On statistical analysis significant correlation was found between anaemia and academic performance of medical students.

DISCUSSION

In the present study the overall prevalence of Anaemia among medical students was 28.0% and among male students prevalence was 8% whereas in female it was 20% (Table 1). Anaemia was More prevalent (45%) in female students than male students (14.5%)(Table 2), which was statistically significant . Similarly Gargade et al [13] found prevalence of anaemia (29%) among medical students with more common among females (45%) than in males (5%). Pandey et al found [5] prevalence of anaemia 30% among medical students was higher among female medical students (47.37%) than males (18.96%). Kalyanshetti et al[14] found it to be 25.5% and prevalence of anaemia among females was 59%. Kaur et al[15] found prevalence of anaemia among undergraduate students was 35%, more prevalent among girls (44.8%)than the boys (17.6%). Some similar findings observed by Pal et al[16] and Metha et al[17]

In our study when we isolated only anaemic group then male and female variation found. We observed that out of 150 students 42 were anaemic. Out of 42 anaemic students, 12 (28.57%) were male and 30 (71.42%) were female, when compared to their own counterparts . Majority of students 92.8% had Mild grade of anaemia (i.e 64.28% in females + 28.57% in males). and 7% students had Moderate anaemia which was seen in girls only. (Table 3). Similar findings by Gargade et al [13] where Majority(86.2%) of students had mild grade of anaemia.

In the present study, the overall prevalence of anaemia among Normal weight was 47.6%, in Underweight 40.5% and in Overweight students 12%. Gargade et al[13] found similar finding of higher prevalence of anaemia among normal weight (55.2%), in underweight (27.6%), in overweight (13.6%) in obese (3.4%). While Metha et al [17]

found anaemia more prevalent among underweight students (63.33%) and overweight students(0.83%) & less in normal weight student's. Pandey et al[5] found prevalence of anaemia among underweight 60%, normal weight 27.5% overweight 12.5%.

In the present study, prevalence of anaemia among Normal weight Males was 58% followed by Underweight 25% and 17% in Preobese. And among the Female anaemic students, prevalence was about 43% in Normal weight, 47% in Underweight and 10% in Overweight and (Table 4). Pal et al[16] found higher prevalence among underweight males (62.5%), females (80.65%), among normal weight males (45.98%) females (62.67%) and overweight/obese males (19.05%) females (25.0%). Sinha et al [18] found prevalence of anaemia among undernourished women (76.06%) than normal weight (75.28%) in overweight women (66.67%).

Among the male anaemics, about 75% students scored less than 50 percent marks and 25% scored more than 50 percent marks. And among the female anaemic students, about 73% girls scored less than 50 percent marks and 27% scored more than 50 percent marks in examinations (Table 5). When seen the overall performance of anemic students, Majority (73%) of them scored less than 50 percent marks while only 26% anemic students scored more than 50 percent marks in examinations. And in Non anemic students found opposite result, only 22% scored less than 50 percent marks while maximum 78 % non anemic students scored more than 50 percent marks in examinations. The present study showed that the risk of poor performance among anemic students was higher than non-anemic.

Moreover, the previous studies showed that the risk of poor performance at school among anemic girls was 1.7 times higher than non-anemic girls. Similarly, studies conducted in Palestine, Saudi Arabia, and India showed that anemia had a negative effect on academic performance. This is most likely due to the fact that anemia is associated with reduced oxygen saturation of the blood supply to the brain, which is believed to cause silent cerebral infarction and result in mental impairment of adolescent school girls. The impairment of cognitive function might present as fatigue, memory and attention deficits, poor academic achievement, and/or decrement in problem-solving skills. [19-24]

CONCLUSION:

Anemia prevalence among medical students of first year batch in the medical college was 28%. Prevalence of anaemia was higher among female students compared to male medical students Majority of students had Mild grade of anaemia. Hence some more parameters along with nutrition also should be sought, underlying diseases to look for the cause of anaemia. BMI shows higher prevalence of anaemia among normal weight, followed by under-weight and pre-obese but no significant association was seen between the BMI and anaemia. The performance among anemic students was Lower than non-anemic and significant correlation was found between anaemia and academic performance of medical students.

This type of prevalence study can show the size of the problem i.e. iron deficiency without anaemia which is also called latent iron deficiency among unexpected population i.e. medical students, so anaemic students need iron supplementation. As Anaemia is also associated with lower intellectual performance, the preventive programs and policies of the country can target this age group particularly in professional educational institutes in same line with school health program, the cause of anaemia should be sought and treated in the upcoming doctors.

Although number of factors including health and nutritional status are some of the pottential factors play a role in influencing medical students educational achievements hence they should be encouraged to adopt healthy life style and dietary practices in order to maintain the good health . Periodically Anemia screening should be directed towards adolescent students . Also, iron and folic acid supplementation programs may help improve the academic performance of the students.

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