

PREVALENCE OF ANAEMIA IN APPARENTLY HEALTHY STUDENTS OF AN INSTITUTE OF MEDICAL SCIENCES AT INDORE

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ABSTRACT

The study was undertaken to detect the prevalence of anaemia in 500 randomly selected students of the age group 17-22 years of both sexes from Sri Aurobindo Institute of Medical Sciences. The collected blood samples were subjected to cell counter for Hemoglobin, Red blood cell count, Packed cell volume and blood indices (Mean corpuscular volume, Mean corpuscular Hemoglobin concentration & Mean corpuscular hemoglobin). WHO cut-off values of 13gm% in males and 12gm% in females were used to find out the magnitude of anaemia. The haematological parameters in anaemics and nonanaemics were compared and the influence of factors like body mass index, diet pattern, history of menstrual cycle and mother's education on anaemia was studied. Statistical analysis was done by students t test and significance was depicted taking p value into consideration. The overall prevalence of anaemia was 20.2%, in females 29.5% and 4.3% in males. On comparing non anaemic and anaemic males significant difference between all the haematological parameters was observed ($p < 0.001$) except Total Red Blood Cell count and Red cell Distribution Width. Similarly anaemic and non anaemic females showed significant difference in all the parameters (p value < 0.001) except total RBC count. Significant association was also found between anaemia & educational status of mother.

Keywords- anemia, Diet, menstrual cycle, Body Mass Index, educational background of Mother.

INTRODUCTION

Anaemia remains a widespread public health problem with major consequences for human health as well as social and economic development all over the world. It is a critical health concern as it affects growth and energy levels. It is formidable health challenge in developing

countries and remains high inspite of national programmes to control the micronutrient deficiency. Prevalence of anaemia depends on certain factors like age, gender, pathological, environmental, educational and socioeconomic status. Anaemia is a late manifestation of nutritional deficiency of micronutrients like iron, folic acid and vitamin B₁₂ due to poverty, inadequate awareness about diet and chronic blood loss. It is also attributed to defective absorption of nutrients^[1] increase in demand due to rapid growth, pregnancy and infections. Anaemia can be screened by simple procedures like haemoglobin estimation using cut-off values of WHO as 13gm% in males and 12gm% in females.^[2] One's endurance capacity, maximal performance capacity, resistance to fatigue is dependant upon efficient O₂ transport which in turn depends on total amount of haemoglobin. It is important to ensure that satisfactory iron status is maintained in females of this age group before they go for pregnancy and lactation.^[3] In view of above present study was undertaken in apparently healthy students of Sri Aurobindo Institute of Medical Sciences to find out the prevalence of anaemia in them, to compare the haematological parameters in anaemics and nonanaemics and study the influence of factors like educational status of mother, body mass index, menstrual history in females & type of diet on anaemia.

MATERIAL AND METHODS

The present study was conducted in 500 randomly selected apparently healthy students of both the sexes of the age group 17-22 years. Permission was taken from the ethical committee before starting the work and then due consent was taken from the volunteers. They were asked to fill a proforma which included their personal details as well as information regarding their parent's

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education, type of diet vegetarian or mixed & history of menstrual cycles in females. Body Mass Index was calculated with the height & weight of the students. Family history was recorded to exclude genetic disorders like Thalassemia, Sickle cell anaemia and G6PD deficiency. All the volunteers were examined clinically to exclude any systemic disorder. Blood samples were collected in the morning hours between 8.30- 9.30 AM. Two ml of blood was drawn from each subject under aseptic precautions in EDTA tubes. The samples were processed for complete haemogram in sysmex cell counter. The parameters studied were Haemoglobin, Total Red Blood Cell count, (RBC), packed cell volume (PCV), Red cell Distribution Width (RDW) and Blood Indices Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH) Mean corpuscular hemoglobin concentration (MCHC). The criteria for anaemia was Hb <12gm% in females and <13gm% in males.^[2]

STATISTICAL ANALYSIS

Statistical analysis of the results obtained was done. Data was analyzed to obtain Mean and Standard Deviation. Difference in mean values was analyzed by unpaired student t test or chi-square test significance was depicted taking p value of ≤ 0.05 into consideration. Relationship between BMI and anaemia in males and females was calculated using p values.

RESULTS

Out of 500 medical students who participated in the study 101 students were below the cut-off levels of haemoglobin as per WHO guidelines. Out of these 8 were males and 93 were females. The overall prevalence of anaemia was 20.2%. Genderwise analysis showed that 4.3% males and 29.5% females were anaemic as per WHO cut-off values of Hb.

Table 1 and Table 2 shows various haematological parameters of male and female anaemics and nonanaemics respectively. Statistically all values showed significant difference in male anaemics and non anaemics ($p < 0.001$), except total RBC count and RDW. All the values also showed significant difference in female anaemics and nonanaemics ($p < 0.001$) except total RBC count. On grading anaemia in mild, moderate & severe category,^[2] there were 23.8% anaemic females in mild

category, 5.3% in moderate & 0.3% in severe category. Out of 296 females having regular menstrual cycles 211 were nonanaemic & 85 were anaemic. Amongst nineteen females who had irregular cycles 8 suffered from anaemia 11 were nonanaemic (p value > 0.1). The difference was insignificant. When BMI- I < 18.5 was considered anaemia was more in females as compared to males ($p < 0.05$). Similarly in BMI –II i.e. in between 18.5-25 females were more anaemic as compared to males ($p < 0.0001$). As shown in table 5 as the level of Mother's education improved proportion of anaemia decreased. Prevalence of anaemia was 38% in students having non-educated or $< 8^{\text{th}}$ standard educated mothers, 38.2% in $< \text{SSC}$, 23.5% in between SSC & 12^{th} class and 14.3% in students having graduate or postgraduate mothers. Type of diet that is vegetarian or mixed diet showed insignificant association with anaemia. Amongst 274 vegetarians 56 were anaemic & 218 were nonanaemic. Out of 226 students taking mixed diet 45 had anaemia & 181 were nonanaemic. ($p > 0.1$)

Table No - 1 : Haematological parameters in male anaemics and nonanaemics

Parameter	Males anaemics 8 cases		Male Nonanaemics 177 cases		t value	P value
	Mean	SD	Mean	SD		
Hb gm/dl	12.64	0.27	15.40	1.14	-6.79	<0.001
Total RBC count millions/cumm	5.51	1.05	5.27	0.52	1.20	<0.2
PCV %	42.30	2.73	46.10	2.71	-3.86	<0.001
MCHC gm%	29.95	1.97	33.42	1.62	-3.82	<0.001
MCH pg	23.45	4.30	29.18	2.80	-5.47	<0.001
MCV cu \leq	78.09	11.30	86.98	7.26	-3.27	<0.01
RDW %	15.23	2.47	13.45	1.15	3.95	<0.2

* The above table shows mean values with their standard deviation for Hb, Total RBC Count, PCV, MCHC, MCH, MCV and RDW of 8 anemic males and 177 Nonanaemic males. Statistically all the values showed significant difference except total RBC Count and RDW.

Table No - 2 : Haematological parameters in Female anaemics and nonanaemics

Parameter	females anaemics 93 cases		Female Nonanaemics 222 cases		t value	P value
	Mean	SD	Mean	SD		
Hb gm/dl	10.76	1.12	13.18	0.79	-21.75	<0.001
Total RBC count million/cumm	4.52	0.49	4.57	0.36	-0.98	>0.2
PCV %	35.65	3.09	40.05	2.16	-14.38	<0.001
MCHC gm%	30.25	2.12	32.89	1.42	-12.83	<0.001
MCV cu \leq	78.72	9.34	87.42	5.58	-10.71	<0.001
MCV pg	23.92	3.70	28.77	2.38	-13.81	<0.001
RDW%	15.43	2.43	13.24	1.25	10.48	<0.001

*Above table shows the mean values with their standard deviation of Hb content, Total RBC Count, PCV, MCHC, MCH, MCV and RDW of 93 anaemic females and 222 Nonanaemic females. All the values were higher in Nonanaemic females as compared to anemic females except Total RBC count. On statistical analysis all values showed highly significant difference except Total RBC count.

Table No. 3 : BMI-I < 18.5 and anaemia in males and females.

	Male	Female	Total
Anaemic	3	24	27
Nonanaemic	27	56	83
total	30	80	110

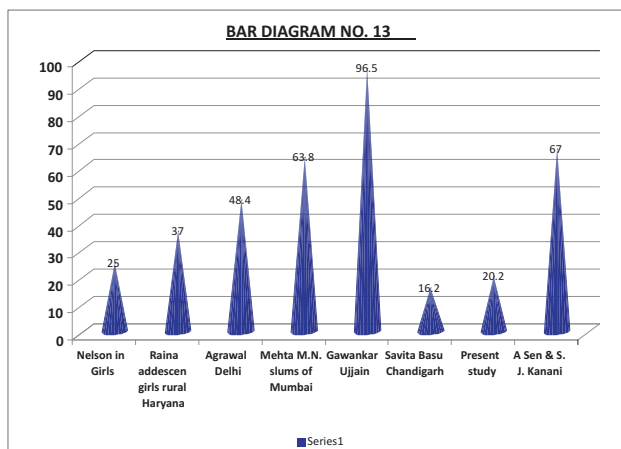
*For the BMI of 18.5 , females were found to be more anaemic ($p < 0.05$) than males.

TABLE No. 4 : BMI- II >18.5 & < 25 and anaemia in males and females

	Male	Female	Total
Anaemic	5	62	67
Nonanaemic	121	142	263
Total	126	204	330

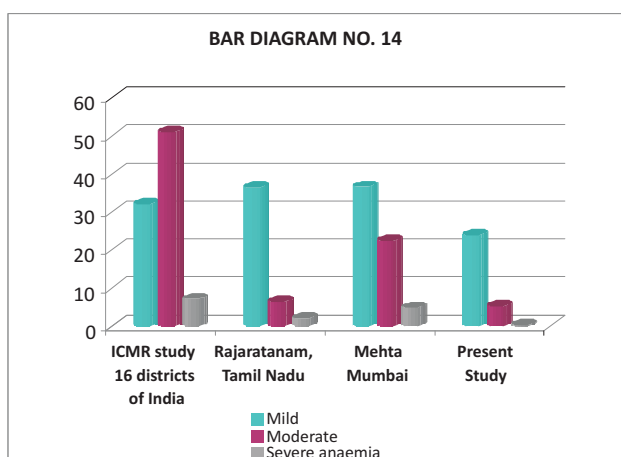
* For BMI in between 18.5 & 25 females were found to be more anaemic (p value < 0.001) than males

Comparison of prevalence of anaemia in various studies



Nelson in Girls	25
Raina adolescent girls rural Haryana	37
Agrawal Delhi	48.4
Mehta M.N. slums of Mumbai	63.8
Gawankar Ujjain	96.5
Savita Basu Chandigarh	16.2
Present study	20.2
A Sen & S. J. Kanani	67

Comparison of grading of anaemia in various studies



	Mild (%)	Moderate (%)	Severe (%)
ICMR	32.1	50.9	7.1
Rajaratnam	36.5	6.3	2.1
Mehta	36.6	22.4	4.8
Present study	23.8	5.3	0.3

TABLE NO. 5 : Educational status of mother and anaemia

Mother's education	Anaemics	Nonanaemics	Total	% Anaemics
No education or \leq VIII standard	8	13	21	38
\leq SSC	18	29	47	38.2
$>$ SSC & \leq 12 th	33	107	140	23.5
Graduate & More	42	250	292	14.3

*Table No. 3 shows comparison of mother's education with anemia. As the level of mother's education improved the proportion of anemia decreased.

DISCUSSION

Nutritional anaemia though global in occurrence is more of concern in the developing countries because of high prevalence in these regions. Studies on prevalence of anaemia in the age group 17-22 years and specially boys are relatively few from developing countries. This age group is the most vulnerable to all kinds of nutritional morbidities due to increased demand and inadequate and improper dietary habits that is increased craze for junk foods.

The overall prevalence of anaemia was 20.2% (101 cases). Gender wise analysis showed the prevalence of 4.3% in males (8 cases) and 29.5% in females (93 cases). The findings of the present study are in consonance with 'Sabita Basu and Srikanta Basu'^[3] who reported overall incidence of anaemia in adolescents of Chandigarh as 16.2%, 23.9% in females and 7.7% in males. The prevalence of anaemia is slightly more in our study as Chandigarh is more developed as compared to Malwa region. The prevalence is less in our study as compared to 'Raina'^[6], 'Agrawa'^[7], 'Mehta M. N.'^[8], 'Gawariker'^[9], 'Kanani'

^[10] as they also included subjects from slums and rural areas. It is comparable to Nelson M who included subjects from Wembly district of London in his study^[11] (Bar diagram- 1)

On grading anaemia as per WHO criteria there were 23.8% females in mild category, 5.3% in moderate and 0.3% in severe category. All 8 males belonged to mild category. Comparison of grading of anaemia in females of other studies is shown in bar diagram 2. The proportion of severe and moderate anaemia in females in our study is less as the group belonged to urban and educated class while other studies included subjects from slums and rural areas as well.

The 'ICMR task force' in their study in 16 districts of India reported a prevalence of mild, moderate, and severe anaemia as 32.1%, 50.9%, and 7.1 % respectively^[12] 'Rajaratnam J.' reported prevalence of anaemia as 44.8% in adolescent girls of 13-19 years in Vellore district of Tamilnadu with severe anemia as 2.1%, moderate 6.3% and mild anemia as 36.5%^[4]. Mehta found 4.8% severe anemia, 22.4% moderate and 36.6% mild anemia in adolescents girls of slums of Mumbai. From the above observations we can speculate that the prevalence of severe and moderate anaemia in our study may be less because most of the subjects of the present study belonged to urban and educated class. In the present study on comparing menstrual disturbances with the occurrence of anemia no significant association was found which suggested that factors other than menstruation played role in anaemia. The difference in percentage of anemia with diet pattern in the present study was marginal (p value >0.1). 20.4 % in pure vegetarians and 19.9 % in those having mixed diet. This might also be due to similar food source for majority of the subjects as most of them were hostellers. These findings are in accordance with 'Nelson M'. and his associates who reported the overall percentage of anemia as 20.3 % in vegetarians and 20 % in non vegetarians in their study on iron deficiency anemia in adolescent girls from different ethnic background in Wembly district of south London^[11] There was marginal difference in prevalence of anaemia in relation to body mass index. which is in consonance with 'Rajaratnam J' et al.^[4] But when gender wise analysis of BMI and anaemia

was considered it showed that anaemia was more in females as compared to males in BMI – I < 18.5 (p value < 0.05) & BMI – II that is in between 18.5-25 (p value < 0.001).

Mothers being the backbone of childcare, nutrition and housekeeping as per Indian tradition and customs food taboos and superstitions prevailing in the society has a direct relation with their educational status. This has been reflected in our study in which we found the incidence of anemia to be high in subjects with illiterate or less educated mothers as compared to subjects of well educated mothers. This shows a positive relationship that as the level of mother's education improved the prevalence of anemia decreased (p value < 0.0001, Table No. 5). This is in agreement with 'Rajaratnam J.' et al who reported a significant association of anemia with mother's education (49.3 % with mother not educated or till 5th standard, 28.3 % when mother was educated from 6th to 8th and 33.3 % when education was more than or equal to 9th standard) in adolescent girls of rural Tamilnadu.^[4]

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