



Evaluation of Nutritional Status of College Girl Students in terms of Haemoglobin levels and BMI

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Abstract

Background: Anemia is a condition that develops when blood lacks enough healthy red blood cells or hemoglobin. Due to high demands for the requirement of iron and other micronutrients as well loss of blood during menstruation, the college going girls of age group between 18 and 22 are at major risk of nutritional anaemia. On the other hand, change in life style habits and diet leads to the prevalence of obesity and being increased in developing countries worldwide.

Objective: The aim of the present study was to determine the levels of haemoglobin and Body Mass Index (BMI) for the college girls as this will help in assessing their health status with respect to anaemia and obesity.

Methods: 200 girl students of age group 18-22 years were evaluated for hemoglobin levels and 195 of the same students for their BMI levels.

Results: The haemoglobin levels ranged between 7.2 to 14.9 g/dL. The percentage of students with severe, moderate, mild and non-anaemia were 1.5, 18.5, 20.5 and 59.5% respectively. These results clearly suggested that 39% of the graduate girl students were having mild to moderate anemia and 1.5% girls were severely anaemic. The BMI values have shown that 55.38% students belonged to the normal weight category, 17.44% were underweight, 16.92% were overweight and 10.23% were obese.

Conclusion: This study has clearly shown that early detection and effective awareness programs are very much necessary to educate the college girl students in managing conditions like anemia, obesity and other related health complications.

Keywords: Anemia, college girls, BMI, Obesity.

INTRODUCTION

The report on Census of India, 2013 states that 57.4% of women in rural areas and 50.9% women in urban areas suffered from anemia during 2005-06¹. The share of anemic women across the age groups 15-19 years, 20-29 years, 30-39 years and

40-49 years is centered around 55% during the same period¹. Prevalence of anemia in India is among the highest in the world². It is obvious that India's contribution both to the prevalence of anemia in pregnancy and maternal deaths due to anemia is higher than warranted by the size of its population³.

The results of various reports have shown that over 70 percent of pregnant women and adolescent girls in India were anaemic⁴.

Recent results have shown that the rural population of India is suffering with anemia with majority of children <10 years, women after puberty, and older adults⁵. Inadequate dietary iron, folate intake due to low vegetable consumption, low B₁₂ intake and poor bioavailability of dietary iron from the fibre, phytate rich Indian diets are the major factors responsible for high prevalence of anaemia^{6,7}. Iron deficiency anemia adversely effect the immune status and morbidity from infections of all age groups, the use of energy sources by muscles and thus the physical capacity and work performance of adolescents and adults of all age groups⁸. During the first two trimesters of pregnancy, iron deficiency anaemia increases the risk for preterm labour, low birth weight and infant mortality⁹. Studies have shown that majority of university students, especially female, were anemic that might be aggravated by food habit and lack of awareness¹⁰. Non pregnant women aged less than 25 years are most affected by anemia whereas women's education and standard of living in the households have a vital role in reducing anemia¹¹.

Calculation of individual BMI from weight and height remains a valid tool for epidemiological studies on assessment of nutritional status and a large study on school children of age group 5-13 years have shown that 29.44% children were underweight while 0.78% children were either overweight or obese¹². Only 56.7% were found in the normal BMI range, 10% underweight, 24% overweight and 9.3% were obese in undergraduate medical students¹³.

Keeping in view of the alarming conditions of the above stated, it is necessary to bring awareness and educate the children, adolescents and at marriage levels, especially girls since they are at high risk, because of menstrual cycles. Inadequate care in the diet and exercise leads to problems of anemia varying from moderate to severe and overweight to obesity. These changes in their health status will ultimately affect their reproductive capacity and

leads to other life style disorders. In order to bring such kind of awareness in the college girls, the present study was designed to measure hemoglobin levels thereby understanding the prevalence of anemia, and to calculate BMI values, thereby knowing the body weight condition. These two parameters indicate the general health status and will help the girl students to become more health cautious and enable them for better management of their dietary habits and life style.

MATERIALS AND METHODS

Subjects and Study design

200 under graduate and post graduate girl students of the college with age group between 18 and 22 years were evaluated for hemoglobin levels. The students were made aware of the purpose of the study and taken their written consent. The measurement of Hb was relied on the services of a well-equipped clinical laboratory, using automated hematology analyzers which are reliable and accurate. This system is an automated blood cell counter which measures hemoglobin using non-cyanide method and was carried out by electrical impedance method. Criteria for anaemia among these students were accepted as haemoglobin value <12 gm/dl as per W.H.O. recommendations. For calculating BMI, height of students was measured using standardized steel anthropometric rod with parallel bar (accuracy ± 0.1 cm). Weight was measured with the electronic weighing scale (accuracy ± 10 g). The subjects were asked to remove their footwear and accessories before measuring their weights. Scales were calibrated after each measurement. Accuracy of weighing scale was verified from time to time against known weights. Body mass index (BMI) was calculated as body weight (in kilograms)/height (in meters) squared.

RESULT AND DISCUSSION

The hemoglobin cut-off values suggested by WHO are used to diagnose anemia in students and the cut-off values defining mild, moderate and severe anemia are presented in Table 1^{14, 15}.

Table 1: Haemoglobin levels to diagnose anaemia at sea level (g/dL)¹⁵

Population	Non-Anaemia	Anaemia		
		Mild	Moderate	Severe
Non-pregnant women (15 years of age and above)	12 or higher	11.0-11.9	8.0-10.9	lower than 8.0

The Graphical representations in figures 1 and 2 are clearly demonstrating that a major proportion of girl students of 39% (20.5 + 18.5) are having mild to moderate anemia and 1.5% girls are severely anaemic.

Results of haemoglobin levels in the present study are shown both in terms of percentage and number of students with severe, moderate, mild and non – anaemia in Table.2.

Table 2: Showing the number of girl students and the percentages with different levels of anemia ((g/dL).

	Severe < 8	Moderate 8-10.9	Mild 11-11.9	Non -Anaemia >12	Total
No.of students	3	37	41	119	200
% of students	1.5	18.5	20.5	59.5	100

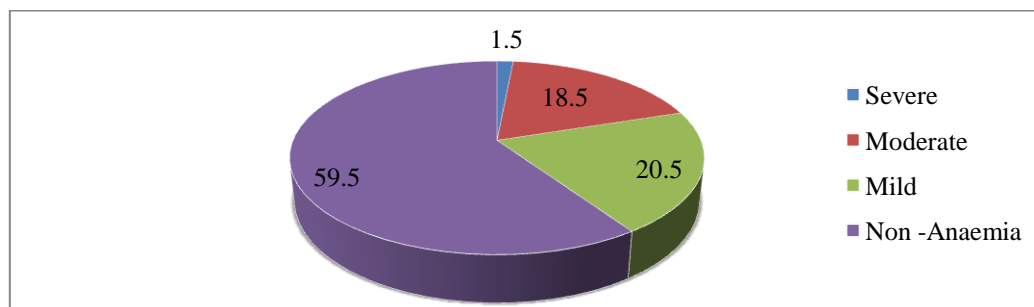


Figure 1: Graphical representation showing the percentage of college girl students with different levels of Anemia.

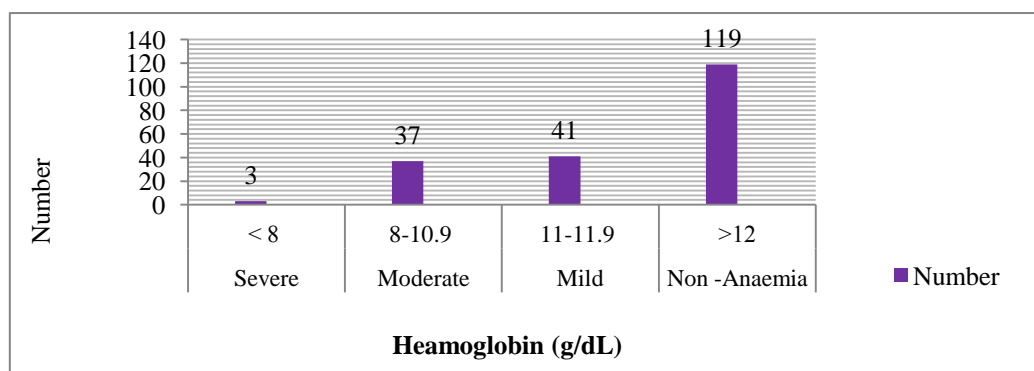


Figure 2: Graphical representation showing the number of girl students at each hemoglobin range and condition of anemia.

The percentage of girl students with non-anemic condition is only 59.5% which causes a concern about their health status. Our data is in correlation with the other reports as WHO database on global

prevalence of anemia and which has reported an overall prevalence of 25% where 65.5% of pre-school children, 48.2% of pregnant women and 45.7% of non-pregnant women were estimated to

have anemia¹⁶. Report by Saksham Kumar¹⁸ had also shown that 52.6 per cent of the college going girls are non anemic, whereas 45.1 per cent of college girls had 9-11% and 2.3 per cent had 6-8 gram percentage of hemoglobin. Overall the percentage of anemic students falls in the range of 40-47% of total category.

Body mass index or BMI is a means of representing a healthy weight for height. BMI can also be used

as a screening tool to determine the risk associated with health problems such as heart disease, diabetes, and cancer. BMI is used to broadly define different weight groups in adults 20 years old or older. The same groups apply to both men and women. Table.3¹⁸ provides the categorized weights of an individual based on their BMI values.

Table 3: Categorisation of Body Weight Based on Body Mass Index (BMI)¹⁸

Underweight	Normal weight	Overweight	Obese
BMI is less than 18.5	BMI is 18.5 to 24.9	BMI is 25 to 29.9	BMI is 30 or more

In the present study, the BMI values of girl students were also calculated and categorised into four groups as underweight, normal weight, overweight

and obese and these values are summarized in Table.4 and Figure.3

Table 4: BMI values in college girl students (%)

BMI values	Under weight	Normal weight	Overweight	Obese	Total
No. of students	34	108	33	20	195
% of students	17.44	55.38	16.92	10.23	100

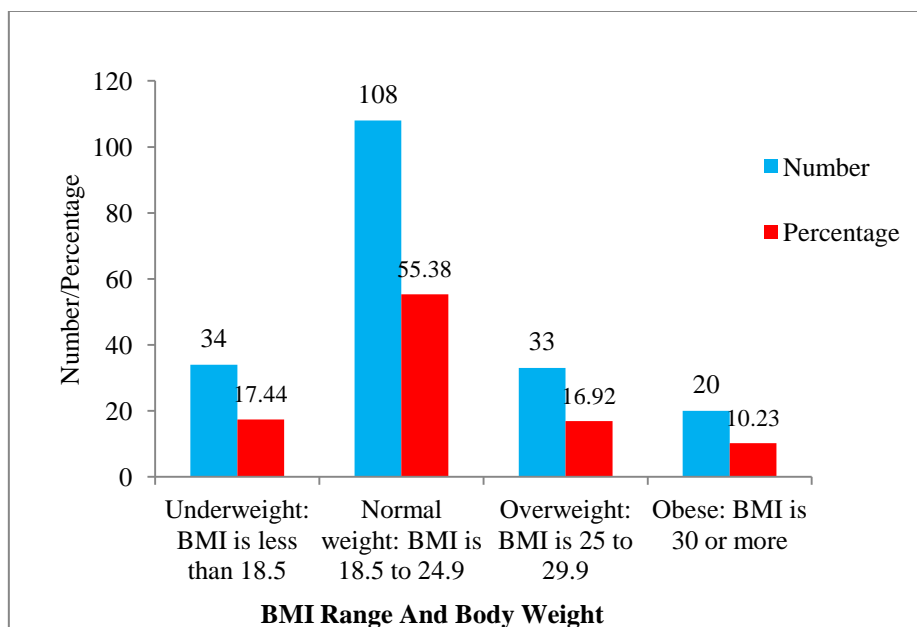


Figure3: Graphical representation of categorization of Body Weight Based on Body mass index (BMI)

The present study has shown that among all the college girl students observed, only 55.38% of students belonged to the normal weight category whereas the rest of the students were underweight,

overweight or obese. These results are in correlation with the results reported in female medical students as 56% were within the normal weight range¹⁹.

CONCLUSION

Adolescent girls and post adolescent girls apart from pregnant women are at major risk of nutritional anaemia particularly iron deficiency anaemia. Iron requirements increase dramatically due to expansion of the total blood volume, lean body mass, and their entry into the reproductive cycle soon after menarche. The problem of anaemia arises mainly due to lack of balanced and nutritious diet which forces them to get into anaemic condition over a period of time. Therefore, it is essential to improve nutritional status of a girl who further makes up the family and society, which is possible only by implementing health education, early detection and effective management of anemia, especially through diet. The present study also clearly emphasizes the need for implementing the above said measures at school and college levels as nearly 40% of girl students tested are under anemic state. BMI forage correlates with clinical risk factors for cardiovascular disease including hyperlipidemia, elevated insulin levels and high blood pressure. Nearly 13.5 % students under study are overweight and obese clearly shows the need for health education for these students.

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