

A study on prevalence of anaemia by haemoglobin estimation in female students in an arts college and its correlation with their body mass index

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Abstract

Background: Anaemia affects nearly 1.62 billion people globally. In India, 53.2% of non-pregnant women and 50.4% of pregnant women were found to be anaemic as per the National Family Health Survey 2016. Young females require micronutrients in appropriate amount for effective erythropoiesis. Further, it is also necessary for physique of individual. Physique can be estimated by Body mass index. College going female students of 18 to 22 years are prone for certain lifestyle modifications, changes in dietary habits, screen time, sleep time commonly influenced by peer group. **Aim:** The present study was planned to assess the prevalence of anaemia in female students in an arts college and correlate it with BMI. **Materials and methods:** In an arts college in Chengalpattu, a Cross sectional study was done with written informed consent on 440 female students after IEC approval. 18 to 22 years female students were included and students- suffering from any acute/chronic illness, not willing to participate were excluded. A basic questionnaire regarding socio-demographic profile and medical history was collected. Anthropometric measurements were recorded and BMI calculated. Haemoglobin in g/dl was estimated by Cyan meth Haemoglobin method. WHO Criteria for anaemia was used for detecting grades of anaemia in them. Parameters were analysed using SPSS 21.0 version. **Results:** 61.81% students were anaemic. 40.9% - underweight, 39.09% - normal BMI and 20% - obese. Significant association between haemoglobin and BMI was obtained. (χ^2 - 16.02, p value – 0.0003) **Conclusion:** College going female students are vulnerable for anaemia because of faulty life style habits in present era.

Key words: anaemia, body mass index

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Introduction

Anaemia is a global public health problem affecting both developing and developed countries. It has major consequences for human health as well as social and economic development¹. Anaemia is not a single disease but a group of disorders in which haemoglobin concentration of blood is below the normal range for the age and sex of the subject.

General clinical manifestations of anaemia are generalized muscular weakness, tiredness, easy fatigability, breathlessness, palpitation and tachycardia. Reproductive system involvement occurs in females in the form of menstrual disturbances such as amenorrhoea or menorrhagia.

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Nutritional anaemia is a threat in India and it can affect all age groups. Various socio-demographic characteristics like age, sex, socio economic status, dietary habits and infections tend to be etiological factors for nutritional anaemia². Iron deficiency anaemia is a common type prevailing till date in developing countries. Proportion of anaemia due to Iron deficiency differs by population group, geographical areas and burden of infectious diseases³. It can affect growth, mental concentration and influence immune functions. India carries the highest burden of disease despite having Anaemia control programme for 50 years. Global prevalence of anaemia in 2010 is 32.9%.

Anaemia in women during pregnancy could influence on mother's life which is reflected by maternal mortality rate. It is a health indicator which alerts a country for providing better health services to the beneficiaries. Studies regarding prevalence of anaemia in pregnant women are abundant in literature. But, prevalence of anaemia in college students was noted by few authors worldwide^{4, 5}. In India, the prevalence of anaemia is high as shown by National Family Health Survey in which 53.2% of non-pregnant women were found to be anaemic. The attributed reasons are poor intake of iron rich foods, poor hand hygiene, chronic blood loss due to hookworm infestations, malaria and socioeconomic status^{6, 7}. A massive shift from traditional diets rich in grains, fruits and vegetables to modern diets rich in fat, sugar and salt have occurred in Tamil Nadu. This along with decreased levels of physical activity have resulted in many health-related comorbidities and complications⁸. College going female students of age 18 to 22 years tend to follow certain life style habits such as skipping of breakfast, avoid eating fruits and vegetables, fond of junk foods and fast foods. They have prolonged screen time and altered sleep patterns. All these factors influence their weight which is reflected in their body mass index. Similarly, nutritional inadequacy resulting from above said factors can result in

anaemia. Both are dangerous because physical inadequacy might influence their education and academic performances. Hence, the present study was planned to assess the prevalence of anaemia in them who are the future mothers and correlation of haemoglobin with their Body mass index.

Materials and Methods

A cross sectional analytical study was conducted with 30 healthy volunteers as the control group and 30 type 2 diabetic individuals as the study group. The duration of study was 6 months.

A Cross sectional study was conducted with written informed consent in 440 female students in an Arts college at Chengalpattu by department of physiology, Government Chengalpattu Medical College after Institutional Ethics Committee approval. 18 to 22 years females were included in the study. Candidates not willing to participate in study, Individuals suffering from any acute or chronic illness were excluded. A basic questionnaire regarding socio-demographic profile, screen time, sleep time, no of snacks/vegetables/fruits serving per day – 0/1/2/3 and menstrual history – age at menarche, regular or irregular menstrual cycles, duration and amount of flow was received from the study participants. Anthropometric measurements – Height, Weight, Hip circumference and Waist circumference were measured and noted. After performing clinical examination, haemoglobin in g/dl was estimated by Cyan meth Haemoglobin method. WHO Criteria for Anaemia was used for detecting grades of anaemia in them

GRADES OF ANAEMIA	HEMOGLOBIN in g/dl
Normal	≥ 12
Mild	11 – 11.9
Moderate	8 – 10.9
Severe	< 8

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Body mass index (Quetlet index) was calculated with the formula, weight in kg divided by square of height in meters. International Obesity Task Force Classification of BMI for Asia- Pacific region (2000) was followed for categorization.

Haemoglobin in g/dl, Height in cm, Weight in kilogram, Body mass index in kg/m² were the parameters taken and were analysed using SPSS 21.0 version.

CLASSIFICATION	BMI Kg/m ²
Underweight	<18.5
Normal	18.5 – 22.9
Overweight	≥23
At Risk	23.0 -24.9
Obese I	25.0 -29.9
Obese II	≥ 30

Results

Table No: 1 - Prevalence of Anaemia

Haemoglobin	No of students	% of students
>12 g/dl	168	38.18%
< 12 g/dl	272	61.81%

Table No: 2 - Distribution of BMI

BMI	No. of students	Mean ± SD	% of students
Underweight	180	16.8±1.02	40.9%
Normal weight	172	20.3±1.34	39.09%
Overweight and Obese	88	26.1±3.47	20%

For statistical convenience, overweight, at risk, obese I and II were comprised as overweight and obese category.

Table No: 3 - Distribution of BMI in anaemic students

BMI	No. of anaemic students	% of students
Underweight	124	45.58%
Normal weight	84	30.88%
Overweight and Obese	64	23.52%

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Table No: 4 - Association between anaemia and BMI

BMI	Hb (< 12g/dl)		Hb (>12 g/dl)	
	N	%	n	%
Underweight (180)	124	68.88%	56	31.11%
Normal weight (172)	84	48.83%	88	51.16%
Overweight and Obese (88)	64	72.72%	24	27.27%

χ^2 - 16.02, df – 2, p value – 0.0003

Discussion:

Anaemia is the result of wide variety of isolated causes, but more often multiple factors coexist. Globally, the most significant contributor to the onset of anaemia is iron deficiency, so Iron Deficiency Anaemia and Anaemia are often used synonymously. Further, the prevalence of anaemia has often been used as a proxy for Iron Deficiency Anaemia. It is generally assumed that 50% of the cases of anaemia are due to iron deficiency¹.

In the present study, 61.81% students were found to be anaemic. This is similar to a study conducted in college going students of age 18 to 27 in Punjab where the prevalence of anaemia was 70.83 %². Similarly, 52.46% students were anaemic in a study conducted in a district in Rohtak by Verma⁹. Shill et al conducted a study in university students of Bangladesh which revealed 63.3% females were anaemic⁴.

In a study conducted in Yemen, the prevalence of anaemia in students of age group 20-22 years was 43.4% whereas 27.7% in 17-19 years and 28.9% in 23-25 years of age were also anaemic in their study⁵. This is similar to the present study results where the age group of study participants were 18 to 22 reflecting higher prevalence - 61.81%.

The In the present study, while considering the anaemic students, 45.58% were underweight, 30.88% were normal weight and 23.52% were

probable reason could be during late adolescence they would be still under care of parents. This is consistent with a study conducted on adolescent girls in Kerala where the prevalence of anaemia was found to be 21%⁷. Above 23 years they would have attained the mental maturity of decision making in all aspects including nutrition. In contrast, at the age of 20 to 22 years, the students tend to follow faulty habits influenced by their peer group.

Table – 2 shows 40.9% of students were underweight, 39.09% were in normal weight and 20% were overweight and obese in the present study. A study conducted in Chennai city in college students of age 17 to 21 years revealed 54.8% - normal weight, 26.9% - underweight 13.2% - overweight - and 5.2% - obese⁸. This is consistent with results of present study.

This signifies that college going female students need care and provision to nutrition which at present is missing. In contrast, in the study conducted by Mehta in Punjab, 79.16% were underweight, 19.16% had normal BMI and

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1.67% were overweight². The contradictory results in their BMI may be due to the difference in their staple food.

overweight and obese. This is contrast with the study in Bangladesh where 50.5% were found normal-weight, 31.4% were underweight and 18.1% were overweight. Further, overweight females were less anaemic than the students of underweight⁽⁴⁾. Though rice is the staple food in Tamil Nadu and Bangladesh, junk foods and avoiding breakfast in the study participants could be attributed for this contrast result. Table 3 shows the distribution of anaemic students based on their BMI.

Table 3 shows the distribution of anaemic students based on their BMI. This shows that still socio-economic burden plays a role in influencing nutritional status in students.

In underweight students, poor nourishment causes decreased iron stores causing anaemia. In overweight and obese students, up-regulated hepcidin expression is the probable reason. Hpcidin is a homeostatic regulator of iron metabolism. It is a known mediator of inflammation^{7, 10}. It downregulates the expression of ferroportin in intestinal enterocytes, macrophages and hepatocytes and hampers iron absorption and mobilization of iron from stores into circulation³.

Table – 4 reveals statistically significant association between haemoglobin levels and BMI. This is due to unavailability of iron in undernourished and decreased iron absorption in obese persons. This is consistent with a study done in first year medical and dental students in north Kerala¹⁰. Similarly, significant correlation of anaemia with BMI was observed in medical students in Karad, Maharashtra¹¹.

Many studies in literature show prevalence of anaemia in adolescent girls in southern and northern India and in individual states^{7, 12-15}.

The authors of the concerned studies^{7, 10, 13-15} stress the fact that schoolbased intervention and anaemia control programmes could efficiently cut down the risk of anaemia in them. Similarly, college going female students should also be given care so that their academic performances and future child bearing period will be uneventful.

Conclusion

Nourishment is reflected by haemoglobin level and BMI. Monitoring both in college going female students will improve the reproductive life as well as their mental capacity. Proper health intervention by awareness programmes, serial conduction of medical camps, food fortification and life style modifications can bring out this vulnerable group from danger in future.

Limitations of the study

Peripheral smear, Red blood indices and serum ferritin in study participants would have given complete picture of anaemic status in them.

Implications

This study points out routine medical camps for screening anaemia in college going female students is necessary.

Future scope of the study

Studies with larger sample size in both male and female students can give a better view of prevalence of anaemia in this age group.

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Conflict of interest: Nil

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