Prevalence of Nutritional Anaemia among College Students and its Correlation with their Body Mass Index

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Abstract: Nutritional anaemia affects all age and sex groups in India. Iron deficiency anaemia is the most common micronutrient deficiency in the world affecting more than 2 billion persons. The Present study is an attempt to assess the prevalence of nutritional anaemia among College students in order to sensitize the masses about its impacts. 120 college students in the age group of 18-27 years studying in the UG and PG Classes of Zoology of JCDAV College, Dasuya, Punjab were the subjects of study. They came from different socio economic, cultural backgrounds and various geographical regions of the country. Haemoglobin estimation was performed by sahli's Haemoglobinometer and observations were interpreted as per WHO criteria. The study showed that only 29.17 % students were normal and 70.83 % were affected with various grades of anaemia condition. 50% subjects being mildly anaemic and 20% moderately anaemic while 0.83% suffered from severe anaemia. Various socio-demographic characteristics like age, sex, social class, dietary habits and infections are the etiological factors for nutritional anaemia. Further studies with a large sample size are needed to draw out the exact proportion for prevalence of anaemia so that appropriate remedial measures can be taken.

Keywords: Anaemia, Haemoglobin, BMI, Iron deficiency, Sahli's Method.

1. Introduction

Nutritional anaemia is a worldwide problem with the highest prevalence in developing countries. It frequently occurs due to inadequate iron intake, chronic blood loss or disease, malabsorption or a combination of all these factors. It affects one's development, growth and resistance to infections and is associated with mortality among children younger than two years old. Iron deficiency anaemia is also a form of nutritional anaemia which is distributed universally. The most affected population groups are infants aged between four and twenty four months old, School age children, female adolescents, pregnant women and nursing mothers. Nutritional anaemia affects all age and sex groups in India.According to a survey conducted by NFHS, the prevalence of anaemia in young girls aged between 15-24 years is 56% with higher rates in rural than in urban India. Nutritional anaemia is prevalent all over the world with an estimated two billion people being iron deficient and is one of the most common nutritional disorders in the developing world. With an average prevalence of 40% among the general population that it affects nearly two third of pregnant and one half of the non pregnant women which is three to four times higher than in the developed countries, where prevalence of anaemia is between 4% to 12% among women of child bearing age (WHO/UNICEF 2001). Iron deficiency can arise either due to inadequate intake or poor bioavailability of dietary iron or due to excessive losses of iron from the body. Although most habitual diets contain adequate amounts of iron only a small amount (less than 5%) is absorbed. This poor bioavailability is considered to be a major reason for the widespread iron deficiency. Women lose a considerable amount of iron especially during menstruation. Most commonly, people with anaemia report feelings of weakness, fatigue, general malaise, and sometimes poor or concentration (Gabrilove, 2005). They may also report Various socio-demographic dyspnea on exertion. characteristics like age, sex, social class, dietary habits and

infections are the etiological factors for nutritional anaemia. Adolescence or early adulthood is one of the most vulnerable periods to anaemia in human life when nutritional requirements increases due to the growth spurt. In India, recent data from the District Nutrition Project (ICMR) in 16 districts and 11 states on prevalence of anaemia in non pregnant adolescent girls (11-18 years) showed rates as high as 90.1% with severe anaemia (Hb \leq 7 gm/dl) in 7.1% (Teoteja G.S, Singh P. 2002). Numerous studies (Vasanthi and pawashe, 1994; Chaturvedi and Kapil, 1996; Seshadri, 1997; Aggarwal, 1998; Rajanathan et al, 2000; Sivakumar, 2001; Gawarikar et al, 2002; Sidhu et al, 2005) among adolescent girls have shown that prevalence of anaemia ranges from 22.00-96.50% in India. In a multicountry study (Kunt and Johnson, 1994) on the nutritional status of adolescents carried out by the International Centre for Research on Women, anaemia was found to be widespread nutritional problem and its prevalence ranged from 32-55%. By far the most frequent cause of nutritional anaemia is iron deficiency, and less frequently folate or vitamin B^{12} deficiency. Most of the anaemia prevalence related studies have been performed on infants, children, adolescents and pregnant women. Very few studies have been conducted on anaemia and little is known about anaemia among College students in the state of Punjab. Therefore, in the present study an attempt has been made to report the prevalence of anaemia among College students of Dasuya, district Hoshiarpur, Punjab and to draw out its correlation with their body mass index.

2. Methodology

A cross sectional study was conducted from January 16, 2015 to March 10, 2015 among UG and PG Zoology College students of JCDAV College, Dasuya, district Hoshiarpur, Punjab between the age group of 18-27 years. The Objectives of present study were aimed at:

- a) Measuring the prevalence rate of anaemia among College students using hemoglobin percentage as cut off value provided by WHO.
- b) To compare the nutritional status (BMI) with the prevalence of anaemia in the College Students.
- c) To find out any relationships between their Socioeconomic status and dietary habits with prevalence of anaemia among the college students.

A total of 120 students were the subjects of study. Study procedure was explained to the subjects and written consent was also taken. All the students were administrated a structured questionnaire, which include general information, sign and symptoms regarding anaemia, dietary habits, data for BMI and previous Hb tests history. The general including parent's information biodata, education, occupation, income, family structure and socio economic status collected. A detailed clinical history taken from them for any present symptom regarding anaemia and physical examination was done to look for pallor, edema and signs for vitamin deficiency and was noted on the Performa. Each student was directed for the measurement of height and weight to evaluate their nutritional status with the help of BMI according to cut off directed by WHO. The data were recorded in the Performa and privacy of data was strictly maintained to protect physical, mental and social integrity of participants. The blood sample was taken from them with sterile needle and blood haemoglobin level is estimated with the help of Sahli's Haemoglobinometer. The observations were interpreted as per WHO criteria. Anaemia is established if the haemoglobin is below the cut off points as recommended by WHO (for adult males-13.0 gm/dl and for adult nonpregnant females-12.0 gm/dl).

WHO Criteria for detection of various grades of Anaemia

Indicator	Hb (gm/dl)
Non anaemic	\geq 13 (for male), \geq 12 (for female)
Grade 1 (mild) anaemia	10.0 - 11.9
Grade 2 (moderate) anaemia	7.0-9.9
Grade 3 (severe) anaemia	≤7

3. Results

In the present study, anaemia was observed in 85 (70.83%) students out of total 120 students. Anaemia was absent in the remaining 35 (29.17%) students. The prevalence of anaemia was 70.83 % among subjects, out of which 5 (4.16%) were males and 80 (66.67%) were females suffering from anaemia **[Table 1 / Figure 1]**.

Table 1: Sex-wise distribution of Anaemia among college students

Anaemia	Males	Females	Total
Present	5 (4.16 %)	80 (66.67%)	85 (70.83%)
Absent	9 (7.5%)	26 (21.66%)	35 (29.17%)
Total	14 (11.67%)	106 (88.33%)	120 (100%)



Mild anaemia was observed among 60 (50%) students, Moderate anaemia in 24 (20%) students and severe anaemia in only 01 (0.83%) student [**Table 2**/ Figure 2].

 Table 2: Sex-wise grading of severity of Anaemia among

 College students (as per WHO Criteria)

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Grading	Males	Females	Total
Mild	04 (3.33%)	56 (46.67%)	60 (50%)
Moderate	01 (0.83%)	23 (19.16%)	24 (20%)
Severe	Nil	01 (0.83%)	01 (0.83%)
Total	05 (4.16%)	80 (66.67%)	85 (70.83%)



According to WHO standard of BMI, students are classified as underweight (BMI below 18.5), Normal (BMI 18.5-24.99) and Overweight (BMI greater than 25). Among 120 students 95 (79.16%) were underweight, 23 (19.16%) had normal BMI, and 02 (1.67%) were Overweight [**Table 3**/ **Figure 3**].

Table 3: BMI of College students

Table 5. Divit of Conege students				
BMI (Kg/m ²) Males		Females	Total	
Underweight	03 (2.5%)	92 (76.67%)	95 (79.16%)	
Normal	10 (8.33%)	13 (10.83%)	23 (19.16%)	
Overweight	01 (0.83%)	01 (0.83%)	02 (1.67%)	
Total	14 (11.67%)	106 (88.33%)	120 (100%)	



After the analysis, it was found that Anaemia was more prevalent in underweight students and lesser prevalence in overweight students. The Prevalence of anaemia among underweight students was 63.33% and in students with normal BMI was 6.67% and overweight has prevalence of 0.83% This also suggests that anaemia prevalence decrease as nutritional status of subject increase [Table 4/ Figure 4].

Table 4: Prevalence of anemia among students belonging to different nutritional levels

Anaemia	Underweight	Normal	Overweight	Total
Present	76 (63.33%)	08 (6.67%)	01(0.83%)	85 (70.83%)
Absent	18 (15%)	16 (13.33%)	01 (0.83%)	35 (29.16%)
Total	94 (78.33%)	24 (20%)	02 (1.67%)	120 (100%)



Most of the students are Vegetarians (69.16%) though only 35% were taking green leafy vegetables and fruits regularly. Only 22.50% students were taking nutritional supplements, iron tablets, multivitamins etc. **[Table 5]**.

Table 5: Diet pattern of students

Dietary pattern	No.	%age
Vegetarians	83	69.16
Non-Vegetarians	37	30.83
Fruits/Green Vegetables	42	35.00
Nutritional Supplements/ Iron-Multivitamin tablets	27	22.50

This data reflects the relation between type of diet and magnitude of anaemia. This high prevalence may be the indicative of the fact that the diet of the college students is not adequate for their iron need.

4. Discussions

Nutritional anaemia though global, is more of concern in the developing countries due to high prevalence. Unfortunately it is not restricted to rural and low socio economic status adolescents but shows increased prevalence in developed affluent societies. In the present study among the College students, there were mild anaemia among 50% students followed by moderate anaemia among 20% students but there was only 0.83% students having severe anaemia. The findings corresponds to an ICMR study by Teoteja GS and Singh P who obtained data from 16 districts of 11 states through District Nutrition projects, where prevalence of anaemia among adolescent girls has been found to be as high as 90.1%. Similar, studies on anaemia prevalence from different states of rural India, reported high prevalence of anaemia from 46-98%. A study carried out among 265 adolescent girls of Amritsar in 2005 by Sharda Sindu also discovered high prevalence (70-75%) of anaemia including 12.83% girls who had severe anaemia. A study by Passi & Malhotra (2002) found that with the onset of menarche at puberty & in the absence of adequate dietary intake, young girls become highly susceptible to anaemia. After the analysis, it was found that anaemia is more prevalent among the students who are underweight and overweight students have less prevalence of anaemia. The prevalence of anaemia among underweight (BMI <18.5) was 63.33% and Normal (BMI 18.5-24.99) of 6.67% and overweight (BMI \geq 25) have prevalence of 0.83%. This also suggests that anaemia prevalence decrease as nutritional status of subject increase. Bulliyy et al found 96.5% prevalence among non school going adolescent girls in three districts of Orissa, of which 45.2%, 46.9%, 16.9% and 4.4% had mild anaemia, moderate and severe anaemia. They found significant association between Hb concentration and educational level of girls, their parent family income, and body mass index. Numerous studies (Vasanthi and pawashe, 1994; Chaturvedi and Kapil, 1996; Seshadri, 1997; Aggarwal, 1998; Rajanathan et al, 2000; Sivakumar, 2001; Gawarikar et al, 2002; Sidhu et al, 2005) among adolescent girls have shown that prevalence of anaemia ranges from 22.00-96.50% in India.

5. Conclusion

Nutritional anaemia, especially iron deficiency anaemia is more prevalent among females especially adolescent girls due to causes like menstrual blood loss, poor diet and under nutrition as compared to males. Nutritional anaemia is easily preventable as well as treatable and the available control measures are affordable. Iron supplementation is thus required for the target group. Frequent screening of students for presence of anaemia should be done. Periodical and routine health check-up and haemoglobin estimation of the students should be done. The students should be motivated and educated to take balanced diet rich in green leafy vegetables and fruits as nutritional anaemia is totally preventable. If the anaemia is "Severe", 10 gm /dl high doses of iron or blood transfusion may be necessary. If

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haemoglobin is between 10-12 gm/dl, the other interventions are like iron and folic acid supplementation and other strategies such as changing dietary habits, control of parasites and nutrition education. Association of prevalence of anaemia was found highly significant with H/O chronic disease, as prevalence was found more among those who were having H/O chronic disease. Taking all this into consideration, young adult female students should be made aware about high prevalence of anaemia and regular checking of hemoglobin level should be ensured among them. Studies have also shown successful management of anaemia with iron supplementation to adolescent girls which could also be tried out. The studies like present one in the country can highlight the size of the anaemic population and can act as foundation stone for framing and implementation of preventive programmes and policies for its eradication. Further studies with a large sample size are needed to draw out the exact proportion for prevalence of anaemia so that appropriate remedial measures can be taken.

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