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A study on the iron deficiency Anemia and nutritional status among the college going girls (Age-18 to 22 years) of Allahabad District

Pravita Gupta and Alka Gupta

Abstract
Iron deficiency anemia affects over 60% of the girls in India. Anemia in girls has far-reaching implications. The anemic girls grow into adult women with compromised growth, both physical and mental**.** From the present study it is reviewed that the food consumption pattern of the college going girls was, Out of 30 respondents, 33.3 percent girls were vegetarians, 40 percent girls were non vegetarian and 26.6 percent girls were eggiterian, 13.3 percent of girls were consuming whole milk, 46.6 percent girls consumed toned milk, 23.3 percent girls were taking cow's milk and 16.6 percent girls were never consuming the milk similarly 33.3 percent girls consumed fast foods once in a week, 13.3 percent girls consumed it twice a week, 53.3 percent girls consumed it once in a month. the dietary pattern of the girls was as follow, out of 30 respondents, 20 percent girls followed type (a) dietary pattern in which the girls were consuming only brunch and dinner, 60 percent girls followed (b) dietary pattern in which they were taking breakfast lunch and dinner, 6.6 percent girls followed (c) dietary pattern in which they were consuming breakfast, lunch, evening tea and dinner and 13.3 percent girls followed (d) dietary pattern in which they were taking all breakfast, lunch, evening tea, dinner and bed time. In the clinical signs and symptoms it was found that 33.3% of the subjects had dry eyes, 6.6% had watery eyes whereas 60% had normal eyes. About 13.3% of the studied subjects had angular stomatitis whereas 53.3% had normal lips and 33.3% had white lips. Majority of the subjects 46.6% had normal tongue followed by 6.6%, 46.6% who had red and pale tongue. It was revealed in the present study that 40.0% of the subjects had normal skin whereas 26.6% had dry and rough skin and 33.3% had pale skin. It was observed that 73.3% of the subjects had normal teeth whereas 26.6% had discolored teeth. Majority 66.6% of the subjects had normal nails whereas 1.6% and 16.6% had white and brittle nails. 50% of the subjects had a hair fall whereas 50% had no hair fall. Majority of the respondents i.e. 36.6% could feel vertigo followed by 20% of the respondents who experienced tiredness, 16.6% of the subjects where suffering from weakness and 13.3% of the subjects were found to feel breathlessness respectively. Many girls were also subjected to menstrual problems like dismenuria, heavy blood flow and irregular menstrual cycle which also contributed to iron deficiency among them. From the average nutrient intake of the girls it was concluded that the consumption of energy up to the mark 105%, the protein, calcium, iron, Vit C and folic acid consumption was less than the normal i.e 72%,75%,71.4%,75% and 78%respectively. Posters, charts and folders were prepared for the awareness of iron deficiency and dietary intake.

Keywords: Dismenuria, stomatitis, menstrual cycle, respondents, eggiterian

Introduction
It is well-known that deficiency or over exposure to various elements has noticeable effects on human health. The effect of an element is determined by several characteristics, including absorption, metabolism, and degree of interaction with physiological processes. Iron is an essential element for almost all living organisms as it participates in a wide variety of metabolic processes, including oxygen transport, deoxyribonucleic acid (DNA) synthesis, and electron transport. However, as iron can form free radicals, its concentration in body tissues must be tightly regulated because in excessive amounts, it can lead to tissue damage. Disorders of iron metabolism are among the most common diseases of humans and encompass a broad spectrum of diseases with diverse clinical manifestations, ranging from anemia to iron overload, and possibly to neurodegenerative diseases.
Iron deficiency is the most common nutritional deficiency and the leading cause of anemia in India. Iron deficiency is due either to increased need for iron by the body or a decreased absorption or amount of iron intake. Signs of iron deficiency include fatigue, decreased work and school performance, slow cognitive and social development during childhood, difficulty

maintaining body temperature, decreased immune function, and glossitis (an inflamed tongue).Blood tests establish the diagnosis of iron deficiency. Dietary changes or iron supplements are possible treatments for iron deficiency.
Anemia is the most common cause of maternal deaths, accounting at number fifth of all maternal deaths (more than one lakh women in India die of pregnancy-related deaths, out of which 22,000 are related to nutritional anemia). Severe anemia accounts for 20.3% of maternal deaths. The risk of dying from hemorrhage and infection is five to ten times greater among anemic women compared with non-anemic women. Anemia among women also contributes to infant health by intra-uterine growth retardation, low birth weight and ultimately primal mortality, and a higher risk of irreversible brain damage in infants. Anemia is more likely to occur during:

- Preschool age when growth is rapid.
- Adolescence when there is rapid growth and menstrual loss of iron.
- Pregnancy, when there is rapid growth of fetus and maternal tissues.

Nutritional anemia is widely prevalent in many parts of the world, particularly in developing countries. Although many nutrients and co- factors are involved in the maintenance of a normal hemoglobin concentration, the most common nutrient deficiency in nutritional anemia, from the public health point of view, is iron deficiency. Iron requirements of children are closely related to growth and the requirements of iron increase during the periods of rapid growth, both in pre-school and school age children. In girls, there is a further increase in iron requirements at the onset of menstruation (Goyle and Prakash, 2009) [4] and the objectives of the study were to assess the food consumption patterns of selected College going girls (18-22years), to assess the clinical symptoms of the college going girls in Allahabad and to assess the nutritional status of College going girls in, Allahabad and to prepare nutritional education materials for assessment and counseling.

Materials and Methods

The present study entitled "A study on the iron deficiency Anemia and nutritional status among the college going girls (Age-18 to 22 years) of Allahabad District." was carried out using the following methodology. Total 30 respondents of age 18 to 22 were selected for the study, the type of the study was cross-sectional descriptive study and the duration was for 1 month**.**

Methods of Data Collection

Survey method was adopted in order to collect the data from the selected respondents. The selected respondents were personally interviewed and necessary information collected by using a comprehensive schedule. The schedule was containing the following in formations:

1. General profile survey.
2. Anthropometric survey.
3. Clinical survey.
4. Dietary survey.

1. General profile

This section was cover the aspects including respondent's name, age, and gender, marital status, income, educational status and occupation. All these are important for knowing the respondents socio-economic status.

2. Anthropometric Measurements

Nutritional anthropometry is concerned with the measurement of variations of physical dimensions, the gross composition and degree of nutrition. Hence, anthropometric measurements are useful criteria for assessing nutritional status. The anthropometric measurements were done.

(a) Height Measurements

Height (cm) of the subjects was taken with the help of a measuring tape by sticking it to the wall. The subjects was made to stand erect, looking straight in front, buttocks, shoulders and head touching the wall, heels together, toes apart and hands hanging loosely by the sides.

(b) Weight

The personal weighing machine of maximum capacity of 120kg and the minimum division of 0.5 kg was used to weigh all the subjects and the scale was set to zero. The respondents was made to stand erect on the weighting scale, without footwear, not leaning against or holding anything and the weight was recorded in kg. The scale was adjusted to zero after each measurement. These consecutive reading was taken.

(c) Body Mass Index (BMI)

Body mass index of each subject was calculated from the recorded height and weight measurement using the following formula (Park, 2007).

$$BMI = \frac{Weight\ (kg)}{Height^2(\mathrm{m})}$$

3. Clinical Survey

Clinical survey included the investigation of symptoms associated with the disease (Anemia)

4. Dietary Survey

A dietary survey was conducted. The food consumption diagnostic frequency was recorded in terms of cereals, pulses, milk and milk products, GLV, roots and tubers, fruits, meat and poultry, fats and oils and sugar. Diet surveys constitute an essential part of any complete study of nutritional status of individuals or groups, providing essential information on nutrient intake levels, sources of nutrients, food habits and attitudes. The nutrient intake of the subjects will be calculated on the basis of 24 hours dietary recall method. The diet will be calculated for calories, protein, fat, fiber, calcium, iron, vitamin A, Vitamin C, and thiamine. The nutrient intake was calculated using the food composition table by Gopalan *et al.* (2004) [5] and compared with the ICMR standard values. Eating habits of the respondents will also be recorded.

Results and Discussion

The data collected and tabulated under the study are present with appropriate illustration and discussed in this chapter.

General Information

Education Level: Out of total no of 30 respondants, 50 percent are pursuing graduation, 33.3 percent pursuing post graduation, 10 percent are pursuing PhD and 6.6 percent are pursuing some other courses.

Type of family: The above data shows that 66.6 girls belonged to nuclear family and 33.3 percent girl's belonged to

joint family.
Gupta and Kocher (2009) [4] revealed that size of family also affects the percentage of anemia. Higher the number of members in the family, higher is the percentage of 108 anemias. As both quality and quantity of food gets affected with number of members in the family especially with limited income source.

Monthly income: Maximum girls, i.e 56.6 percent had an average monthly income of more than Rs 20,000 followed by 33.3 percent who had an average monthly income between Rs 15000 – 20,000 followed by 10 percent who had monthly income between Rs 10,000 – 15,000 and 0 percent who had monthly income between Rs 5000- 10,000 per month.

Clinical Symptoms
Eyes: The table shows that out of 30 respondents 60 percent girls were having normal eyes, 6.6 percent were having watery eyes and 33.3 percent were having dry white eyes.

Lips: The above data shows that 33.3 percent girls were having white lips, 13.3 percent were having angular stomatitis and 53.3 percent were found to be normal.

Tongue: Out of 30 respondents 46.6 percent girls were having pale tongue followed by 6.6 percent with red tongue and 46.6 percent girls with normal tongue.

Skin: According to above data out of 30 respondent girls 40 percent were having normal skin, 33.3 percent with pale skin followed by 26.6 percent with dry skin.

Nails: The data above shows that 16.6 percent girls were having white nails, followed by 66,6 percent with normal nails and 16.6 with brittle nails.

Hairs: The data for hairs was equal 50 percent girls were having hair fall and the rest 50 percent were not having hair fall.

Teeth: Out of 30 respondents 73.3 percent girls were having normal teeth and 26.6 percent were having discolored teeth's.

Other symptoms: The other symptoms included breathlessness 13.3 percent girls, weakness 16.6 percent, tiredness 20 percent, 13.3 percent girls were having vertigo and 36.6 percent were seen with no such symptoms.
A study revealed by Strobach *et al*., (1988) that the presence in degree of anemia can be estimated clinically by careful physical examination. Certain clinical findings such as pallor of conjunctiva, nail beds, lips, oral mucosa, Pamir creases have been used in the diagnosis of anemia. According to UNICEF (2002) [10] it was revealed that fatigue, irritability, weakness, shortness of breath and decreased appetite were signs and symptoms of anemia.

Menstrual Record
The data shows that out of 30 respondent girls 50 percent were found to have normal menstrual cycle, 6.6 percent with dismenuria, 26.6 were having blood flow more than 7 days and 16.6 percent of the girls were having irregular menstrual cycle.
The mean age for menarche was 12.5 years by Singh *et al.* (2008) [8]. Campbell M.A. *et al.* (1997) [2] in his study reported that dysmenorrheal was a common problem. Therefore majority of the girls relied on the use of medicines during period. The duration of menstrual blood flow for majority of girls was 3 to 4 days. 59.0% of the subjects had cycle duration of 28 days where as 55.5% had before 28 days. Majority of girls in the age group of 13-16 years had regular menstrual periods whereas only 44% had irregular periods. Majority of adolescent girls did not have any history of past illness.

Life Style Pattern
Exercise performed by the respondents: Table shows the sample average exercise performed by the respondents. light exercise was the major exercise of respondents. From the above data in table it is clear that 13.3 percent girls preferred walking, 33.3 percent girls preferred light exercise, 16.6 percent girls did jogging and 13.3 percent girls preferred any other exercise.

Sleeping hours of the respondents: The data shows the duration of the sleep in hours and it was found that maximum respondents slept for 6 hours (40 percent), 33.3 percent girls slept for 8 hours and 26.6 percent girls slept for 5 hours.

Mode of transportation: Most of the respondents use their own vehicle i.e. 60 percent girls uses their own vehicle, 13.3 percent girls uses public transport, 26.6 percent girls preferred walking for their communication.

Family history of Anemia: The data shows that 23.3 percent girls were having family history of anemia where as 76.6 percent girls were not having any family history of anemia.

Anthropometric Measurement
The table shows that out of the 30 respondents, 13.3 percent girls were underweight, 26.6 percent girls were having low weight normal, 46.6 percent girls were having normal BMI, 10 percent girls were having grade 1 obesity and 3.3 percent girls were having grade 2 obesity having BMI more than 30.
Similar results were found by Sachan *et al*., (2012) who reported that the mean weight and mean height in both urban and rural schools showed significant difference with the ICMR mean weight for respective ages except in ages 18 and 19 years in urban school girl's and in ages 10 and 19 years in rural school girls. The mean height in all age groups in both urban and rural schools showed significant difference with the ICMR mean height for respective ages except in ages 18 and 19 years in urban schools and in ages 16, 17, 18, and 19 years in rural schools. While analyzing BMI it was found that maximum percentage of anemic i.e. 64.7% of adolescent girls had low BMI (below18.5kg). Similar result was found by Choudhary *et al.* (2003) [3] who reported that 68.2% of adolescence had BMI of less than 18.5kg per square meter in rural area of Varanasi.

Dietary Pattern
Food habits: Out of 30 respondents, 33.3 percent girls were vegetarians, 40 percent girls were non vegetarian and 26.6 percent girls were eggiterian.

Types of milk consumed: Out of 30 respondents, 13.3 percent of girls consumed whole milk, 46.6 percent girls consumed toned milk, 23.3 percent girls were taking cow's milk and 16.6 percent girls were never consuming the milk.
Fast food consumption: The data indicates that 33.3 percent girls consumed fast foods once in a week, 13.3 percent girls

consumed it twice a week, 53 3 percent girls consumed it once in a month.

Dietary pattern: Out of 30 respondents, 20 percent girls followed type (a) dietary pattern, 60 percent girls followed (b) dietary pattern, 6.6 percent girls followed (c) dietary pattern and 13.3 percent girls followed (d) dietary pattern.

Average nutrient intake per day by the girls of SHUATS:
Table shows the average nutrient intake of all the nutrients by the respondents with references to energy, protein, fat, calcium, iron, Vit. C and folic acid. The energy intake according to RDA is 1900 and 105 percent is consumed by the girls which shows that they take energy in good amount, similarly protein intake percent is 72 which means that protein intake in the girls diet is less, the fat intake is more in the diet of the girls as the fat percentage is 130, calcium intake is also less it is only 75 percent, the iron intake is less in the girls diet the percentage is 71.4 similarly Vit C and folic acid is 75 and 78 percent respectively.
Adamson (1996) [1] reported that daily energy intake of the girls is less as they derive maximum energy from snack foods. A study on college girls reported poor intake of all nutrients by adolescents by Pati (2004) [7].

Table 1: Distribution of the respondents according to their general information.

S. No	Particular	Respondents	Total % N=30
1.	Educational level		
	Graduation	15	50
	Post-graduation	10	33.3
	Ph.D	3	10
	Others	2	6.6
2.	Type of family		
	Nuclear	20	66.6
	Joint	10	33.3
3.	Family income		
	5000-10,000	0	0
	10,000-15,000	3	10
	15,000-20,000	10	33.3
	More than 20,000	17	56.6

Clinical Symptoms

Table 2: Clinical evaluation of the SHUATS girls

Respondents =30			
S. No	**Particulars**	**Respondents**	**Total % N=30**
1.	Eyes		
	Normal	18	60
	Watery	2	6.6
	Dry white	10	33.3
2.	Lips		
	White	10	33.3
	Angular stomatitis	4	13.3
	Normal	16	53.3
3.	Tongue		
	Pale	14	46.6
	Red	2	6.6
	Normal	14	46.6
4.	Skin		
	Normal	12	40
	Pale	10	33.3
	Dry	8	26.6
5.	Nails		
	White	5	16.6
	Normal	20	66.6
	Brittle	5	16.6
6.	Hairs		
	Hairfall	15	50
	Normal	15	50
7.	Teeth		
	Normal	22	73.3
	Discoloured	8	26.6
8.	Other symptoms		
	Breathlessness	4	13.3
	Weakness	5	16.6
	Tiredness	6	20
	Vertigo	4	13.3
	None	4	36.6

Table 3: Menstrual cycle evaluation of the SHUATS girls

Respondents=30		
Particulars	**Respondents**	**Total % N=30**
Dismenuria	2	6.6
Blood flow more than 7 days	8	26.6
Irregular menstrual cycle	5	16.6
Normal	15	50

Life Style Pattern

Table 4: Life style pattern of girls of SHUATS:

S. No	Particulars	Respondents=30	
1.	Exercise:	N	%
	Walking	4	13.3
	Light exercise	10	33.3
	Jogging	5	16.6
	Any other	11	36.6
2.	Sleeping time:		
	5 hours	8	26.6
	6 hours	12	40
	8 hours	10	33.3
	Any other	0	0
3.	Mode of transportation		
	Own vehicle	18	60
	Public transport	4	13.3
	Walking	8	26.6
4.	Family History of Anemia		
	Yes	7	23.3
	No	23	76.6

Anthropometric Measurement

Table 5: Distribution of the respondents according to their BMI

S. NO.	Particulars	Result	Total (%)	
1.	BMI(wt (kg)/ht$^{2(m)}$)		N	N=30
	<16.0- 18.5	Underweight	4	13.3
	18.5-20.0	Low weight normal	8	26.6
	20.0-25.0	Normal	14	46.6
	25.0-30.0	Obese grade 1	3	10
	>30	Obese grade 2	1	3.3

BMI Standards Source; Srilakshmi (2007)

Dietary Pattern

Table 6: Frequency distribution of girls of SHUATS according to their food habits and dietary pattern:

S. No	Particulars	Respondents	Total % N=30
1.	Food Habits		
	Veg	10	33.3
	Non-veg	12	40
	Eggiterian	8	26.6
2.	Type of milk consumed		
	Whole milk	4	13.3
	Toned milk	14	46.6
	Cow's milk	7	23.3
	Don't consume	5	16.6
3.	Fast Food consumption		
	Once a week	10	33.3
	Twice a week	4	13.3
	Once a month	16	53.3
4.	Dietary pattern		
	Brunch + Dinner	6	20
	Breakfast+lunch +dinner	18	60
	Breakfast +lunch + evening tea+ Dinner	2	6.6
	Breakfast + lunch + evening tea dinner+ bed time	4	13.3

Table 7: Distribution of SHUATS girls according to Food consumption frequency:

Respondents=30								
Food items	Every day	%	2-3 day	%	occasionally	%	Never	%
Cereals	30	100	0	0	0	0	0	0
Pulses	18	60	10	33.3	2	6.6	0	0
Green leafy vegetables	10	33.3	12	40	6	20	2	6.6
Other veg	12	40	15	50	3	10	0	0
Fruits	10	33.3	11	36.6	7	23.3	2	6.6
Fats and oils	30	100	0	0	0	0	0	0
Egg	5	16.6	3	10	0	0	0	0
Meat	0	0	7	23.3	5	16.6	0	0
Nuts and oils seeds	2	6.6	8	26.6	10	33.3	10	33.3
Roots and Tubers	5	16.6	14	46.6	8	26.6	3	10
Junk food	6	20	8	26.6	14	46.6	2	6.6

Table 8: Average nutrient intake per day by the girls of SHUATS:

Parameters	Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg/d)	Iron (mg/d)	Vit C (mg)	Folic acid(µg)
Intake (girls)	2000	40	26	450	15	30	156
RDA	1900	55.0	20	600	21	40	200
Difference	100	15	-6	150	6	10	44
Result %	105	72	130	75	71.4	75	78

Conclusion

From the present study it was concluded that anemia is a major health problem among college girls. Because of lack of proper information regarding dietary habits girls have a habit of skipping their meals because they are more conscious about their body structure. Anemia could be also the result of heavy periods and reduced iron intake as many of them were having menstrual problems like heavy bleeding or irregular menstrual cycle, awareness regarding it was given to them which will lead to healthy eating patterns and selection of appropriate foods by them. They were also given education about enhancing factor intake of vitamin C which helps in the absorption of iron. From the study it was concluded that overall nutritional status of adolescent girls was not up to the mark. Clinical examination showed that girls had signs of iron deficiency. The intake of nutrients like iron, protein, Vit C and folic acid was found less than recommended dietary allowances.

Recommendations: Measures which can be implemented for adolescent girls in order to improve their nutritional status (especially iron level) are:

- Inclusion of iron rich foods and regularity of meals need to be established among the girls.
- Foods like green leafy vegetables, meat, chicken, pulses and egg to be consumed in abundance so as to improve the nutritional stores of the body. Moreover vitamin C rich fruits should be consumed to enhance iron absorption.
- Fortification of widely consumed foods with iron/folate.

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