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22. Association between Anaemia and Body Mass Index among Adolescent Girls

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Abstract

There are various stages in human life and one of the most vital stages is adolescence. Adolescence is a period of rapid physical growth, with a corresponding increase in nutritional requirements to support the increase in body mass and to build up stores of nutrients. The present study was conducted to assess the prevalence of anaemia and the association of anaemia and Body Mass Index among selected adolescent girls. Results indicated that overall prevalence of anaemia was 69%.The prevalence of mild, moderate, and severe anaemia was 33%, 34% and 2%, respectively. There was a mild positive correlation between BMI and anaemia. The respondents had poor knowledge about the dietary sources of iron. Very few respondents had awareness about the normal haemoglobin levels and the consequences of anaemia.

Keywords: Adolescent girls, Haemoglobin levels, Anaemia, Anthropometric measurements, Body Mass Index.

Introduction

Adolescence is a beautiful period of life. It is generally considered as the healthy period of life. It is a transitional period which requires special attention and protection. Adolescence is marked by many physical as well as psychosocial transformations. The term "Adolescence" represents a hyper anabolic phase of growth, mediated by normal factors and characterized by peek velocities of growth (Gopalan1989).Adolescence, a period between 10-19 years of age, signifies physical growth, biological growth, sexual maturation and social transition (WHO, 2002).It accounts for one fifth of the world's population and around 21% of population in India (243 millions). It is the transitional period between childhood and adulthood. During this period individual move towards physical and psychological maturity, and economic independence and acquire their adult identity.

Adolescence is termed as a phase of "Stress and Strom". This is a crucial stressful yet fascinating period in an individual's life. Adolescence, the second decade of life (10-19 years) is a period of rapid development when young people acquire new capacities and are faced with
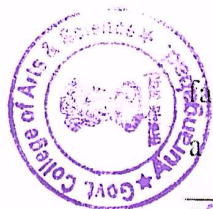
many new situations. The rapid growth that occurs in adolescence demands extra nutritional requirements. Growth during adolescence is faster than at any other time in an individual's life except the first year. Good nutrition during adolescence is critical to cover the deficits suffered during childhood and should include nutrients required to meet the demands of physical and cognitive growth and development, provide adequate stores of energy for illnesses, and prevent adult onset of nutrition-related diseases. Adolescence is also a time of mental and psychological adjustment, a situation of being no longer a child, but not yet an adult either.(WHO).If adolescents are well nourished; they can make optimal use of their skills, talents and energies today, and be healthy and responsible citizens and parents of healthy babies tomorrow. Transition from childhood to adolescence creates special nutritional needs for growth and development that have to be provided through proper eating habits and dietary pattern(Geckle 2016).McNaughton et al (2008) reported that establishing proper dietary habits in adolescence decreases the risk of morbidities such as under nutrition, being overweight or obese, and micronutrient deficiencies and also prevents the risk of developing other chronic illness such as hypertension, diabetes, and cardiovascular diseases.

Adolescent girls, a crucial segment of the society, constitute nearly one tenth of Indian population.In girls, adolescence is a distinctive period of transition from girl hood to woman hood. In the developing countries, the girls constitute a more vulnerable group especially where they are traditionally married at an early age and are exposed to greater risk of reproductive morbidity and mortality. Adolescent girls are more vulnerable to malnutrition. In general adolescent girls are the worst sufferers of the ravages of various forms of malnutrition because of their increased nutritional needs and low social power (Chaudhary et.al.2003).Adolescent girls are particularly vulnerable to malnutrition as they are growing faster. Adolescent girls also need additional requirements of iron up to fifteen per cent to compensate the physiological loss. To support for increase growth, spurt and meet the bodies increased demand for iron during menstruation they need extra protein, iron and other micronutrients. Onset of menarche is a predominant physiological change that requires physical, psychological as well as social adjustment in the young girls. In the initial years following menarche, many girls encounter irregular menstrual cycle and also experience other physical problems such as acne, weight gain etc. Optimal nutrition during these years is considered to be of prime importance in maintaining good health. The foundation of adequate growth and development is laid before birth and continues during the early growth in adolescence. The next generation also gets affected when women are undernourished during adolescence or later in adulthood.

One of the most common health concerns among adolescent girls in our country is under nutrition and anaemia. Iron deficiency and anaemia have profound negative effects. It is the major cause of maternal morbidity and mortality. Poor nutrition, worm infestation and menstrual abnormalities are some of the important factors responsible for this. Anaemia is the most widespread nutritional deficiency in the world, affecting no less than two billion people. It is caused primarily by iron deficiency manifest in acute symptoms, especially among adolescent girls. At menarche, teenage girls need 10% more iron than boys of the same age because of blood loss in menses. Poor families often fail to provide the extra iron intake needed for those adolescent girls who will also have a heavy workload in the home. In addition, there is the possibility of sex discrimination in interfamilial food distribution in some families with girls having a smaller share than boys.

Objectives

1. To assess the dietary pattern of adolescent girls.
2. To assess the Body Mass Index by measuring the height and weight of the selected adolescent girls.
3. To assess the prevalence of anaemia by measuring the blood haemoglobin levels of the
4. selected adolescent girls.
5. To study the association of body mass index and haemoglobin level.

Material and Methods

Hundred urban adolescent girls age 12-15 years were selected randomly for this study. A self-structured questionnaire was developed to assess demographic profile, age when menarche was achieved, food habits, and knowledge about anaemia. Food frequency questionnaire (FFQ) was used to collect the food intake related information. Height and weight of the subjects were measured by the standardized methods. Body Mass Index (BMI) was calculated using Formula. Haemoglobin was measured by Sahli's method using the Sahli's Haemoglobinometer. The measured haemoglobin values were tabulated and compared with the standard values of grading of anaemia. Anaemia was categorised as Normal (>12 gm/dl), mild (10-11.9 gm/dl), moderate (7-9.9gm/dl), severe (<7 gm/dl). The data were analysed by suitable statistical methods.

Results

In the present study it was observed that the age of the adolescent girls ranged from 12 to 15 years. The mean age was 13.5± 1.5 years, 91% were living in the nuclear family, with monthly income > Rs. 30,000. Majority of them (86%) were vegetarian. Most of the respondents had (76%) two meals per day (i. e. lunch and dinner) and only 24% subjects had 3 meals per day. The educational level of the parents reveal that majority (88%) of the parents of the respondents

were educated up to graduation level. 92% respondents expressed that their relationship with their parents was based on respect and love, 8% respondents were afraid of their parents. Majority of the girls came from nuclear families (82.1%) and had small family size (50%) of one to four members.

The Food Frequency Questionnaire of the respondents revealed that 100% of subjects were consuming rice and wheat daily and other cereals such as jowar, bajra were consumed occasionally. 52% of the subjects were consuming pulses daily.13% of the respondents were consuming green leafy vegetables daily. Very few adolescent girls (9 %) were consuming fruits daily, rest of them were consuming once or twice in a week or even once or twice in month. Though 14% of the respondents were non-vegetarian, the frequency of consuming non vegetarian food was very less i.e. once or twice in month. Milk consumption was very less among the adolescents only 9 % were consuming milk daily. The respondents did not like milk. All the respondents were consuming fats and sugars daily. Other food items like ice-cream, chocolates, carbonated beverages, soft drinks, packed fruit juices, potato chips, samosa, burger and cake were consumed by 57 % respondents once a week, followed by 28% who consumed these food items occasionally .

All the respondents had attained menarche and the mean age of menarche was 12.5± 1.5years. 7.2% girls had history of heavy menstrual bleeding. Majority of the girls faced problems during menstrual periods such as pain in lower abdomen (86.6%), backache (65.7%), and body ache (42%). It was noticed that 82% respondents knew that anaemia is a health problem. Out of 82 respondents only 46 told that anaemia is due to deficiency of iron. Only 22% of girls were aware about the sources of Iron. Very few girls had awareness about the normal haemoglobin levels and the consequences of anaemia. Only 32% of respondents knew that tiredness, weakness, decreased work capacity were some of the consequences of anaemia. Table 1 shows prevalence and grades of anaemia among respondents. The overall prevalence of anaemia was 69%.The prevalence of mild, moderate, and severe anaemia was 33%, 34% and 2%, respectively. Only 31% adolescent girls had normal haemoglobin levels. The mean haemoglobin level was 10.7± 2.06 gm. /dl.

Table1: Categorization of Respondents on the basis of Hb %.(n=100)

S.No.	Categories of Anaemia on the basis of Hb%	Frequency	Percentage
1	Normal (>12 gm./dl)	26	26
2	Mild (10-12gm./dl)	23	23
3	Moderate (7-10 gm./dl)	49	49
4	Severe (<7 gm./dl)	2	2

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Table 2 reveals that the mean height of the subjects was 154.4±4.98, mean weight was 46.3 ±8.28 and mean BMI 19.5 ± 2.22 kg/m2.The nutritional status of the subject has been assessed with the help of classification of WHO according to BMI . It was found that 56 % of the subjects were normal, 42% underweight, 2% subjects were overweight.

Table 2: Anthropometric Measurements of the Respondents (n=100)

S.No.	Anthropometric Measurements	Mean ±SD
1	Height	154.4 ± 4.98
2	Weight	46.3 ± 8.28
3	BMI	19.5 ± 3.7

It is obvious from the Table 3 that 41.07 % respondents with normal BMI had mild anaemia, 8.93% had moderate anaemia and 50% respondents with normal BMI had normal haemoglobin levels. 4.76% respondents who were underweight had severe anaemia, 29% had moderate and 8% had mild anaemia.2% respondents who belonged to overweight category had mild anaemia.

Table 3: Body Mass Index (BMI) and Anaemia (n=100)

S. No.	BMI	Haemoglobin levels and Anaemia				Total
		Normal (>12 gm/dl)	Mild (10-12gm/dl)	Moderate (7-10 dm/dl)	Severe (<7 gm/dl)	
1	Normal	28 (50%)	23(41.07%)	05(8.93%)	---	56
2	Underweight	03(7.14%)	08(19.05%)	29(69.05%)	2(4.76%)	42
3	Overweight	--	02(100%)	--	--	02

Table 4 reveals the correlation between body mass index and the haemoglobin levels of the selected respondents. It is obvious that there is a mild positive correlation between the BMI and anaemia.

Table 4: Correlation of Body Mass Index and Anaemia

S. No.	Variables	Mean And SD	r
1	BMI	19.5 ± 2.22 kg/m2	0.28
2	Haemoglobin Level	10.7± 2.06 gm. /dl	

Discussion

The aim of the present study was to assess the prevalence of anaemia, knowledge regarding anaemia and association between body mass index and anaemia in the selected respondents. All the respondents had attained menarche and the mean age of menarche was

12.5± 1.5 years. 7.2% girls had history of heavy menstrual bleeding. Kaur et. al. (2001) reported that 60% of study participants were aware of anaemia as a health problem and sources of iron-rich foods. Srinivas and Mankeshwar (2015) reported that majority of participants (88.9%) had no knowledge regarding anaemia. In the present study 82% respondents were aware of anaemia as a health problem which shows that the participants had good knowledge regarding this health problem. The Food Frequency Questionnaire of the respondents revealed that 100% of subjects were consuming rice and wheat daily and other cereals such as jowar, bajra were consumed occasionally. 52% of the subjects were consuming pulses daily. Very few adolescent girls (9 %) were consuming fruits daily, rest of them were consuming once or twice in a week or even once or twice in month. The requirement for iron increases during the adolescence for girls due to rapid growth and menstrual losses. Green leafy vegetables are good sources of iron and calcium and are easily available and inexpensive source of many other nutrients other than iron. It was observed that only 13% of the respondents were consuming green leafy vegetables daily.

The overall prevalence of anaemia was 69%.The prevalence of mild, moderate, and severe anaemia was 33%, 34% and 2%, respectively. According to Srinivas and Mankeshwar (2015) the overall prevalence of anaemia was 78.3%. The prevalence of mild, moderate, and severe anaemia was 64.2%, 36.2% and 1%, respectively, which was higher than that reported in the present study (except for severe anaemia). The mean BMI was19.5 ± 2.22 kg/m2 .The nutritional status of the subject has been assessed with the help of classification of WHO according to BMI. It was found that 56 % of the subjects were normal, 42% underweight, 2% subjects were overweight. 41.07 % respondents with normal BMI had mild anaemia, 8.93% had moderate anaemia. 4.76% respondents who were underweight had severe anaemia, 29% had moderate and 8% had mild anaemia. There was a mild positive correlation between BMI and anaemia. In the study by Patibandla Pavana Roy and Vijaya Vishnu Gunturu (2017), 38.9% of underweight students were normal haemoglobin levels, 5.6 % of underweight students were severely anaemic and 24.6 % of healthy students were mild anaemic but no association between BMI and anaemia was reported.

Conclusion

Adolescent girls are the resources for the future of any nation and hence their health and wellbeing is of paramount importance. Anaemia remains a very common health problem among the adolescent girls and leads to high morbidity and mortality rates among females. Most of the girls have poor knowledge regarding anaemia, its cause, prevention and management. The knowledge regarding anaemia and iron-rich food is low. Thus, nutrition education to improve their knowledge on anaemia, importance of nutrition, dietary sources, and requirement of

nutritious during this period of life, in community can contribute toward reducing the prevalence of anemia.

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