

Correlation between Prevalence of Anemia and Body Mass Index among Adolescent Girls

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Abstract: *This study was conducted to find the correlation between the prevalence of Anemia and Body Mass Index. The research design of the study was co-relational research design. The subjects selected for the study were 160 adolescent girls aged 12-16 years studying in 7th to 11th standard. The study participants were selected by convenient sampling technique. Body Mass Index was assessed by measuring the weight with the help of digital weighing machine and height with stadiometer and Body Mass Index was assessed by using WHO calculator with help of z scores tables. Hb% level was assessed by cyanohemoglobin method and prevalence of anemia was detected by General Blood Picture. The study findings revealed that the mean of body mass index of adolescent girls was 19.15 and standard deviation (SD) was 2.6. The average mean of hemoglobin level was 11.8 g/l and the standard deviation (SD) was 1.3. There was a mild positive correlation between anemia and BMI. ($r= 0.127$). There was significant association between the age, menarche and dietary habits with the BMI.*

Keywords: Correlation, Body mass index, anemia, adolescent girls, hemoglobin

1. Introduction

Adolescence is a period in life spanning the ages between 10 to 19 years. This is the formative period of life when the maximum amount of physical, psychological and behavioral changes takes place. This is a vulnerable period in the human life cycle for the development of nutritional anemia, which has been constantly neglected by public health programs. Girls are more likely to be a victim due to various reasons. In a family with limited resources, the female child is more likely to be neglected. She is deprived of good food and education, and is utilized as an extra working hand to carry out the household chores. The added burden of menstrual blood loss, normal or abnormal, precipitates the crisis too often.

The health outcome of adolescents largely depends upon their social environment and the influence of their peer behaviors. Anemia and underweight are the two major problems, both of which, nutritionally related are a global public health problem. Adolescent girls are the future mothers and the future generation's health directly rests in their health condition. Studies have shown that anemic girls show a reduction in physical and mental capacity and diminished concentration in studies and also pose a major threat to future safe motherhood.¹

The health consequences of anemia can include poor pregnancy outcome, impaired physical and cognitive development, and increased risk of morbidity in children and reduced work productivity as adults. In adolescence, studies have shown reduction in physical and mental capacity and diminished concentration in work and educational performance, also poses a major threat to future safe motherhood in girls.^{2,3}

Age of highest prevalence of anemia in girls, i.e., 12 to 13 years old, coincides with menarche (first menstruation). Two inter-related problems reveal themselves here. In one,

substantial numbers of girls had menstrual abnormalities but didn't seek medical help⁴. In the second menstrual blood loss increases daily total iron requirement, consumption of which is sub-optimal for many girls, for reasons we've already covered, namely; inadequate daily intake and inefficient absorption due to peculiarities associated with Indian diets. Thus menstruation in girls exacerbates their pre-existing tendencies to anemia.

BMI in children are closely associated to anemia. Both BMI and BMI for Age are screening and growth monitoring tools (respectively), to determine children's Nutritional status. A positive correlation between underweight and presence of anemia has been established; especially, in IDA. According to WHO, nutritional related problems are the leading causes of anemia in developing countries. Further research should be conducted in both school and community based settings to cover non-school going children.⁵

The burden of anemia and underweight are causing a lot of problem for safe motherhood, which can hinder in the achievement of SDG, so it is very important that we address this issue at the adolescent period itself since the adolescent girls are the future mothers. This study tries to correlate the prevalence of anemia and BMI so that both the issues can be addressed.

2. Statement of Problem

A study to assess the correlation between the prevalence of anemia and body mass index among the adolescent girls studying in selected rural schools of Greater Noida, Uttar Pradesh."

3. Objectives of the Study

- 1) To assess the body mass index by measuring height and weight among the adolescent girls.

- 2) To measure the Hb% level to assess the prevalence of anemia among adolescent girls.
- 3) To find the correlation between the prevalence of anemia with body mass index.
- 4) To find out the association of body mass index and Hb% with their selected demographic variables.

3.1 Hypothesis

H₀1: There will be no significant correlation between Body Mass Index and Anemia among adolescent girls.

H₁1: There will be a significant correlation between Body Mass Index and Anemia among adolescent girls.

H₀2: There will be no significant association between the Body Mass Index and Anemia of adolescent girls with their selected demographic variables.

H₁ 2: There will be a significant association between the Body Mass Index and Anemia of adolescent girls with their selected demographic variables.

3.2 Research Methodology

- **Research Approach:-**A quantitative research approach was adopted for this study.
- **Research Design:-**A Co-relational Research Design was used in the present study.

3.3 Variables in the Study

- **Research variables:** Body Mass index and Prevalence of anemia.
- **Demographic variables:** Age, class, age when menarche was achieved, education status of the mother and father, monthly family income, diet (vegetarian/non-vegetarian).

3.4 Research Setting

The study was conducted in following schools - Janta Public School, Shree Bhoj Singh Smarak Public Junior High School (Ghanghola, Greater Noida), Choudhary Ratan Lal Smarak Vidhyalya, (Ghanghola, Greater Noida), Choudhary Harish Chandra Public School, (Selampur, Greater Noida), St. Theresa Public School (Panchayatan, Greater Noida).

3.5 Study Population

- **Target Population**
Adolescent girls from the rural schools of Greater Noida.
- **Accessible Population**
Adolescent girls of (12-16) years who were studying (7th-11th standard) who were present in the school at the time of data collection.

3.6 Sample

- **Sample Size:** A sample size of 160 adolescent girls who were studying in 7-11 Standard.
- **Sampling Technique:** Non-probability convenient sampling technique was adopted to select the samples.

3.7 Description of Tool

Section-I

A Socio-demographic tool which included variables such as; age, class, age when menarche was achieved, education status of the mother and father, monthly family income and type of diet (veg/non-veg).

Section-II

Body Mass Index was assessed by measuring the weight with the help of digital weighing machine and height with stadiometer and Body Mass Index was calculated by using WHO calculator with help of z scores tables. Hb% level was assessed by drawing a blood sample of 2ml from the veins and checked using the cyan-hemoglobin method and prevalence of anemia was detected by General Blood Picture. Demographic data was collected by using questionnaire.

4. Results

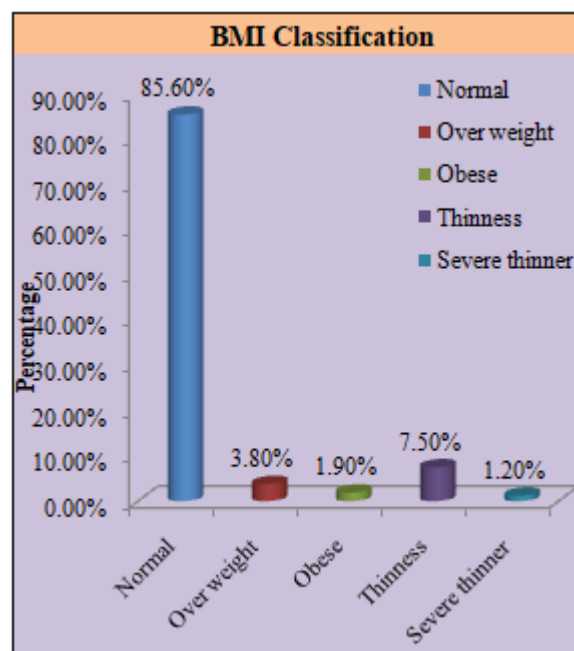
Objective No 1

To assess the Body Mass Index by measuring height and weight among adolescent girls

Classification	Number	Percentage
Normal	137	85.6%
Overweight	6	3.8%
Obese	3	1.9%
Thinness	12	7.5%
Severe Thinness	2	1.2%
Total	160	100%

N=160

Most of the children numbering 137 (85.6%) had normal weight. 12 girls i.e. (7.5%) were thin & only 6 (3.8%) were overweight and 2 (1.2%) children had severe thinness.



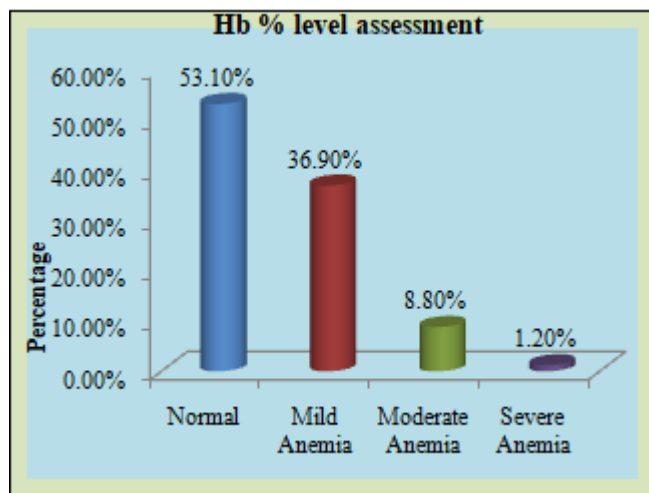
Objective No 2:

To measure the Hb % level and to determine the prevalence of anemia among adolescent girls.

Hb% level according to WHO Classification	Number	Percentage
Normal	85	53.1%
Mild Anemia	59	36.9%
Moderate Anemia	14	8.8%
Severe Anemia	2	1.2%
Total	160	100%

N=160

Majority of girls 85 i.e. 53.1% had normal Hb% and hence no anemia. 59 (36.9%) adolescent girls had mild anemia, 14 (8.8%) girls had moderate anemia while 2 (1.2%) girls had severe anemia.



Objective No 3:

To find out the correlation between the prevalence of anemia with Body Mass Index

Variable	Mean	SD	Correlation values
BMI	18.8	2.34	R=0.127
Hb (for those with anemia)	10.7	1.34	

The above table shows that there is a mild positive correlation at $p = 0.127$ between body mass index and anemia. The null hypothesis was rejected and H_1 - true hypothesis was accepted.

Objective No 4:

To find out the association of Body Mass Index and anemia with their selected demographic variables.

There is significant association between age and menarche achieved and dietary habits with the BMI so the null hypothesis was rejected and true hypothesis was accepted for these variables. There was no significant association with age, class, mother's educational level, father's educational level and monthly income and dietary habits with the severity of anaemia. Hence null hypothesis accepted.

5. Conclusion

The findings revealed that among 160 adolescent girls 137 (85.6%) were having normal BMI, 6 (3.8%) girls were underweight, 3 (1.9%) adolescent girls were obese, 12 (7.5%) girls were in the category of thinness and 2 (1.2%)

were under severe thinness. In the classification of Anemia it was observed that among 160 girls, 85 (53.1%) were having normal Hb% level, 59 (36.9%) adolescent girls were coming under mild anemia, 14 (8.8%) adolescent girls were moderately anemic and 2 girls (1.2%) were found with severe anemia. Mild positive correlation was found between anemia and Body Mass Index significant at $r=0.127$ and $p<0.001$, hence the research ($H_{1.1}$) hypothesis was accepted.

There is significant association between age and menarche achieved and dietary habits with the BMI, hence null hypothesis was rejected and true hypothesis was accepted for these variables. There was no significant association with age, class, mother's educational level, father's educational level and monthly income.

There was no significant association between age, class, age at menarche, mother's educational level, father's educational level, monthly income and dietary habits with the severity of anaemia, hence null hypothesis was accepted.

6. Limitations

- 1) The study was limited to adolescent girls aged 12-16 years who were studying in 7th to 11th standard.
- 2) The sample size was limited to 160 adolescent girls.
- 3) This study was limited to the adolescent girls studying in the schools located in the rural areas.
- 4) The study was confined to a sample selected by non-probability sampling technique.

7. Recommendations for Further Studies

On the basis of the findings of the study the following recommendations have been made:

- 1) Similar study can be undertaken with a large sample to generalize the findings.
- 2) A same study can be done as a comparative study between adolescent girls in rural and urban schools.
- 3) Structured teaching programme can be conducted to find out the effectiveness to enhance the knowledge.
- 4) An interventional research study can be conducted to improve the nutritional status among school going children.

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