

A cross-sectional study of anemia among urban and rural adolescent girls in district Ambala, Haryana

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Received: April 01, 2019; Accepted: April 20, 2019

ABSTRACT

Background: Anemia is a continuously rising threat to not only present but also future generations as well and Indians are under high risk, especially adolescent girls. The anemic adolescent girls grow into adult women with compromised growth, both physical and mental. These women have low pre-pregnancy weight and are more likely to die during childbirth and deliver low birth weight babies. **Objectives:** The objectives of this study were to find the prevalence of anemia in urban and rural adolescent school-going girls 10–16 years of age, among adolescent girls of district Ambala, Haryana. **Materials and Methods:** A community-based cross-sectional study was conducted in government and private schools of district Ambala. This study was conducted among 300 adolescent girls, 10–16 years of age studying in government and private schools of Ambala. The blood samples were taken from the students and hemoglobin was measured. Data were collected by interviewing the study subjects using a self-designed, pre-tested semi-structured questionnaire. **Results:** Overall prevalence of anemia was found to be 69.7%, **Conclusion:** The prevalence of anemia was very high among adolescent girls. This indicates a need to educate them about anemia and its risk factors. Regular screening of school students to rule out anemia is the need of the hour.


KEY WORDS: Adolescent Girls; Anemia; Rural; Urban

INTRODUCTION

Anemia is a major health problem. Anemia is a continuously rising threat to not only present but also future generations as well and Indians are under high risk, especially adolescent girls. The physical and mental development of adolescent girls having anemia is compromised and on reaching adulthood, they have low pre-pregnancy weight, and their chances of death during childbirth are higher. Furthermore, the delivered babies are likely to be low birth weight.^[1]

Teen is known as the period of the second decade of life which nearly makes up over one-fifth of India's population.^[2] Adolescence (which is a Latin word *adolescere*, meaning "to grow up")^[3] is an important transitional stage of physical and psychological, human development that generally occurs during the period from puberty to the age of maturity.^[3,4] Although the physical, psychological, and cultural presentation of adolescence can vary, it is typically associated with the teenage years.^[3-6] It is an important stage in the life cycle for the woman's health due to the occurrence of growth spurt, menarche, bad dietary habits, and the presence of gender bias.

It is reported that more than one-third of the population of the world is suffering from anemia mainly due to iron deficiency and India is one of the high prevalence countries. The prevalence of anemia among children is reported to be 70%–80% National Family Health Survey (NFHS). The

Access this article online	
Website: http://www.ijmsph.com	Quick Response code
DOI: 10.5455/ijmsph.2019.0410321042019	

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presence of anemia indicates gross undernutrition. Anemia can impair the physical growth, the cognitive performance, as well as the behavior of children.^[7]

Anemia is a significant public health problem, which impairs both mental and physical growth, and decreases work performance. Iron deficiency is the most common cause of anemia worldwide. Approximately 2 billion people are suffering from anemia in developing countries. Iron deficiency occurs when the iron absorbed is not sufficient to meet the body's needs. This may be due to inadequate iron intake, poor absorption of iron, enhanced need of iron, and from chronic blood loss. Long-term iron deficiency leads to iron-deficiency anemia or nutritional anemia.^[8]

The prevalence of anemia in India in adolescent is high due to poor dietary intake, low availability of iron, and chronic blood loss due to hookworm infestation and malaria and inadequate adolescent care services. There have been very few studies in this part of India; therefore, the present study has been undertaken to find the prevalence of anemia in urban and rural adolescent school-going girls 10–16 years of the age of district Ambala, Haryana.

MATERIALS AND METHODS

Study Area

The study was conducted in the government and private schools of district Ambala, Haryana.

Study Population

Adolescent girls aged 10–16 years and studying in Class 6th–10th in the study area formed the study population.

Study Period

The time period of the study was from January 2016 to December 2016.

Study Design

A school-based, cross-sectional design was used for studying the prevalence among school-going adolescents.

Method of Sampling

This was a stratified random sampling technique.

Sample Size

The formula used for sample size estimation was $n = 4pq L^2$ with a confidence limit of 95% and absolute margin of sampling error 5%. A literature review revealed that the prevalence of anemia among school-going adolescents in

India is 70%^[8] (NFHS-4). Using this formula, the sample size for the study deduced to be 322.

Sampling Technique

The total number of higher secondary and senior secondary schools (District Education Officer's office, Ambala) is 224. The schools were selected by lottery method and four schools were selected from four educational zones. In each school, 75 girl students were selected.

Strategy

The study was started after approval from the Institutional Ethics Committee. Permission from District Education Officer, Ambala, was obtained. The principal was contacted and apprised of the study objectives and consent of the parents was taken at the parent-teacher meeting. This was taken during parent-teacher meet in the school. The students were apprised of the objectives of the study those willing were administered the pretested self-designed questionnaire. Those not willing were excluded and eventually, a total of 300 students participated in the study.

The blood samples were collected by trained laboratory technicians and the results were interpreted by Sahli's method. The following method was used. Fill the hemoglobin meter tube with N/10 HCL up to its lowest mark (10% or 2 g) with the help of a dropper. Clean the finger with spirit and cotton let it dry. The finger was pricked under aseptic precautions and the first drop of blood was discarded. The prick was made deep enough to have a spontaneous flow of blood. The finger was not squeezed to get the drop of blood. A large drop of blood was allowed to form on the fingertip, and then, the tip of the hemoglobin meter pipette was dipped into the blood drop and the blood is sucked up to 20 mm³ mark of the pipette. The solution was left untouched for 10 min in the tube. After 10 min, the acid hematin was diluted by adding distilled water drop by drop. Mix it well with a stirrer. Match the color of the solution in the tube with the help of standards of the comparator. Note the reading when the color of the solution exactly matches the standard and express the hemoglobin content as g%.

Anemia was defined as having hemoglobin concentration <12 g/dl.

Anemia was classified as mild when in the range of 10–12 g/dl, moderate when in the range of 7–10 g/dl, and severe when it was <7 g/dl.

Participants were informed about their hemoglobin levels. Those who were found to be anemic were counseled regarding the management of anemia. Dietary advice for the management of anemia was given to all the participants having anemia. Those requiring treatment for anemia were provided treatment.

Data Analysis

The completed questionnaires were compiled and data analysis was done using SPSS Version 21 software. The prevalence of anemia was calculated. The anemic adolescents were categorized into mild, moderate, and severely anemic.

RESULTS

Table 1 shows the sociodemographic profile of the study subjects. It was seen that maximum (42%) girls belonged to the age group of 15–16 years. About half (54%) belonged to private schools. Maximum (35.4%) study subjects were from Grade 4 families according to BG Prasad scale.

Table 2 shows the prevalence of anemia in the study population. It was observed that of 300 adolescent girls, 69.7% were anemic while 30.7% did not have anemia. Maximum 38.7% had moderate anemia, while 26.3% had mild anemia. Severely anemic was only 4.7%.

Table 1: Sociodemographic profile of the study subjects

Variables	Number of girls (%)
Age group	
10-12	81 (27)
13-14	93 (31)
15-16	126 (42)
Type of school	
Private	163 (54.3)
Government	137 (45.7)
Type of family	
Joint	174 (58)
Nuclear	126 (42)
Socioeconomic status	
Grade 1 (Rs. 5156 and above)	43 (14.3)
Grade 2 (Rs. 2578-5155)	44 (14.7)
Grade 3 (Rs. 1547-2577)	52 (17.3)
Grade 4 (Rs. 773-1546)	107 (35.7)
Grade 5 (below Rs. 773)	54 (18)

Table 2: Prevalence of anemia in the study subjects

Anemia	Frequency (%)
No anemia	92 (30.7)
Mild anemia	79 (26.3)
Moderate anemia	115 (38.3)
Severe anemia	14 (4.7)
Total	300 (100)

Table 3 shows the association of the place of school and anemia. It was seen that students studying in schools in urban areas were more likely (74.4%) to have anemia as compared to their rural counterparts (65.9%). Mild and severe anemia were more in urban areas, whereas moderate anemia was more in rural area. This association was found to be statistically significant ($P = 0.043$)

DISCUSSION

The present study was conducted among 300 school-going adolescent girls aged 10–16 years in district Ambala. In this study, the prevalence of anemia was found to be 69.7%. 38.7% of girls had moderate anemia, while 26.3% of girls had mild anemia. Severely anemic was only 4.7%. In this study, it was seen that students studying in schools in urban areas were more likely (74.4%) to have anemia as compared to their rural counterparts (65.9%).

Mild, moderate, and severe anemia were found to be 26.3%, 38.3%, and 4.7%, respectively, in the present study. A similar study was conducted by Leela and Priya on the morbidity pattern and iron status in school-going children in Coimbatore. In this study, the occurrence of mild anemia was 63.2%, while moderate and severe anemia were reported in 12.5% and 5.3%, respectively. Normal hemoglobin levels of 12 g/dl and above were reported by 19%.^[9] Ahmed *et al.* conducted a study and found that the prevalence of anemia (Hb <12 g/l) among the sample was 27%, while from all the anemic girls, 32% had iron deficiency anemia. Geographic variations may account for the different results obtained in this study.^[10] Rajaratnam *et al.* did a study on the prevalence of anemia and found that the prevalence of anemia was 44.8% and severe, moderate, and mild anemia being 2.1%, 6.3%, and 36.5%.^[11] Gowarikar and Tripathi conducted a study and found out that mean hemoglobin was 9.80 g/dl and overall prevalence of anemia was 96.5% in 459 girls of 10–18 years of age in Ujjain.^[12] Similarly, in a study in urban slums of Kanpur, Arya *et al.* reported that the prevalence of anemia among adolescent girls was 78.5%, of which 40% had mild, 33% had moderate, and 5.5% had severe anemia.^[13] In this study, it was seen that students studying in schools in urban areas were more likely (74.4%) to have anemia as compared to their rural counterparts (65.9%). This was corroborated in a study by Baral and Onta who did a cross-sectional study in urban and rural locations among adolescent population. His findings were that the overall prevalence of anemia in urban-based population was 70% and in rural-based population was 62.4%, respectively.^[14] Similarly, Ayoya *et al.* reported

Table 3: Distribution of anemia according to the place of school

Place	No anemia (%)	Mild anemia (%)	Moderate anemia (%)	Severe anemia (%)	Total (%)
Rural	31 (25.60)	28 (23.10)	58 (47.90)	4 (3.30)	121 (100)
Urban	61 (34.10)	51 (28.50)	57 (31.80)	10 (5.60)	179 (100)

a study to determine the prevalence of anemia in pregnant and non-pregnant females based in rural and urban areas. The prevalence was 50% and 40%, respectively.^[15]

The strength of the study is that both rural and urban population were considered. However, the limitation was that the factors other than location were not taken into account.

CONCLUSION

The prevalence of anemia was very high among adolescent girls. This indicates a need to educate them about anemia and its risk factors. Regular screening of school students to rule out anemia is the need of the hour. Parents should encourage their children's to eat iron-rich food and foods that enhance iron absorption. It is imperative that teachers teach students about the harmful consequences of anemia and motivate them to eat a healthy and iron-rich diet. Supplements of iron and folic acid will go a long way to reduce anemia. Deworming done twice a year will also reduce anemia.

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How to cite this article: Chauhan AK, Bhardwaj A, Mittal A, Singh S. A cross-sectional study of anemia among urban and rural adolescent girls in district Ambala, Haryana. *Int J Med Sci Public Health* 2019;8(7):494-497.

Source of Support: Nil, **Conflict of Interest:** None declared.