

Prevalence of Anemia Among Adolescent Girls in a Rural Area of Tamil Nadu, India

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ABSTRACT

Background: Anemia accounts for a majority of the nutritional problem across the globe. The prevalence of anemia is inordinately higher among developing nations, because of low socioeconomic status and indigent access to the healthcare services. Adolescent period is signalized by marked physical activity and rapid growth spurt; therefore they need additional nutritional supplements and are at utmost risk of developing nutritional anemia. This study was carried out to find out the prevalence of anemia among adolescent girls. **Materials and Methods:** This study was a cross-sectional study conducted among 255 adolescent girls. After getting informed consent from the subjects, the information regarding age, sociodemographic status, menstrual history, and short clinical details were recorded. Blood samples were collected and analyzed using automated hematology analyser. **Results and Discussion:** Overall prevalence of anemia was found to be 48.63% ($n = 124$). The majority of the anemic girls (55.64%, $n = 69$) were having mild degree of anemia. Among 255 girls, 188 (73.73%) were from the early adolescent age group (10–14 years). Prevalence of anemia (52.24%) was high among the late adolescents and those belonging to low socioeconomic class. **Conclusion:** There is a significant relationship between anemia and socioeconomic status, dietary modification, nutritional supplementation, and helminth control; in addition, compliance with consumption of iron and folic acid tablets will prevent anemia to a great extent among adolescent girls.

Keywords: Adolescence, anemia, nutritional supplementations, socioeconomic status

Introduction

Anemia accounts for a majority of the nutritional problem across the globe and it is principally engendered by deficiency of iron. Although it occurs in all the age group, prevalence is on a higher side among women of childbearing age.^[1] Its prevalence is inordinately higher among developing nations, because of low socioeconomic status and indigent access to healthcare services.^[2]

In developing countries, the adolescent group is more exposed to nutritional challenges and adolescent girls are more vulnerable to the disease. Studies showed that adolescent anemia was the greatest nutritional problem encountered in developing countries. India had reported high prevalence of anemia among adolescent girls, which is apparently higher when compared with the other developing nations.^[3,4]

The period between 10 and 19 years of age has been defined as adolescence by the World Health Organization.^[5] This period has been considered as the transitional phase from childhood to adulthood. During this phase, major psychological, behavioral,

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and physical developments ensue, because of marked physical activity and rapid growth spurt adolescence needs additional nutritional requirements. According to recent statistics, there were about 1.2 billion adolescents worldwide, which constitute one-fifth of the total world's population and the figures are escalating. Developing countries account for about 5 million adolescents of the total adolescent population, and in India about 21% of the total population are adolescents.^[6,7]

Presently, the prevalence of anemia among adolescent girls is on the rise in India. Since adolescent period signalizes the beginning of menstrual period in girls, they are at a higher risk for nutritional anemia. In rural areas of India, girls get married and become pregnant during the late adolescent period, thus increasing the risk of adolescent anemia and low birth weight babies.^[4,8]

There were many studies focused on anemia among pregnant women and children, but only few studies were available on anemia among adolescent girls. This study was aimed to find out the prevalence of anemia among adolescent girls and to correlate with sociodemographic status in a rural area of south India.

Adolescent girls are chosen for the study as by improving anemia and awareness among adolescent girls, maternal morbidity and mortality especially during pregnancy can be improved. There are only few studies focusing on adolescent anemic girls. In view of the above, this study was carried out to find out the prevalence and factors associated with anemia among adolescent girls.

Materials and Methods

The study followed a quantitative survey approach and descriptive design to find out the proportion of anemia among adolescent girls. The study was approved by the Institutional Ethical Committee. Informed consent was obtained from the study participants and they were assured of confidentiality and privacy of records.

The sample size required for this study was estimated using the formula:

$$4PQ$$

$$L^2$$

$P = 0.55$ (proportion of samples who are assumed to have anemia; taken from pilot study), $Q = (1 - P)$

$L =$ precision error (12%). The estimated sample size of 255 was calculated considering 10% nonresponsive error. Adolescent girls between 10 and 19 years of age who attended a tertiary hospital located in Chidambaram, a rural area in Tamil Nadu, were included in the study. After getting informed consent from the subjects, the information regarding age, sociodemographic status, menstrual history, and short clinical details were recorded.

Sociodemographic status was estimated by modified B. G. Prasad's classification.

By venipuncture of antecubital vein, 2 mL of venous blood was drawn and collected in ethylenediaminetetraacetic acid (EDTA) vacutainers under aseptic precautions. The collected blood samples were analyzed in the Department of Pathology by five-part automated cell counter (Beckman Coulter AC T diff 2).

For interpretation of anemia, the cut-off point for hemoglobin (Hb)% was taken as < 12 g/dL. The severity of anemia was graded as mild (10 to < 12 g/dL), moderate (7 to < 10 g/dL), and severe (< 7 g/dL).^[4]

Statistical analysis

Statistical analysis was performed using IBM SPSS software version 21. Descriptive statistics in terms of percentage was used to present the prevalence and severity of anemia. Bivariate analysis was used to determine the association between independent variables, which included sociodemographic variables with the outcome variable anemia based on 95% confidence interval. The differences were considered as significant at a P value of < 0.05 .

Results

Among 255 adolescent girls in the study population, overall prevalence of anemia was found to be 48.63% ($n = 124$). Anemia was absent in 51.37% ($n = 131$) of the girls. Most of these girls (55.64%, $n = 69$) had mild degree of anemia. Overall, the mean Hb level was 10.33 ± 1.34 [Table 1].

In this study, a large number of girls, 188 (73.73%), were from the early adolescent age group (10–14 years), whereas 67 (26.27%) were in the late adolescent age group (15–19 years). Prevalence of anemia (52.24%) was high among the late adolescents, whereas it was found to be 47.34% among the early adolescents. This was found to be statistically significant [Table 2].

In this study, a majority (79.22%) of the girls belonged to socioeconomic class IV, whereas girls belonging to class III, class V, and class II include 11.37%, 6.67%, and 2.74%, respectively. No girls belonged to class 1. The prevalence of anemia was high (70.59%) among the girls who belonged to class V, followed by class IV (50.49%) and class III (34.48%). This was found to be statistically significant [Table 3].

Table 1: Distribution of anemia among adolescent girls according to severity

Hb (range in g/dL)	Severity of anemia	No. of girls (n=124)	Percentage
<7	Severe	13	10.48
7-10	Moderate	42	33.87
10-12	Mild	69	55.64

Hb: Hemoglobin

Discussion

Nutritional deficiency anemia is a globally prevalent condition; however, it is more perturbing in the developing nations. In this study, the overall prevalence of anemia was 48.63%, which reflects upon the burden of anemia in a rural setting among a group of adolescent girls attending a tertiary care hospital. Adolescence is the period of rapid growth marked by physical and mental transition. During this period, an individual undergoes emotional, sexual, social, and educational problems; in addition, unhealthy dietary habits and low socioeconomic background make them vulnerable to diverse nutritional morbidities. Of these various nutritional problems, anemia surpassed other conditions among adolescent girls in the developing countries.^[9]

Aggarwal *et al.* in their study conducted among adolescent girls in the North East Delhi showed 45% prevalence of anemia.^[10] Our study findings showed slightly higher prevalence rate, when compared with other similar studies conducted in various rural parts of India, which showed prevalence rate between 46% and 68.8%. Our study findings are in concurrence with these studies.^[11-13]

Cross-sectional studies done by Toteja *et al.* and Gawarika *et al.* among adolescent girls from various rural districts of India observed prevalence rate of 90.1% and 96.5%, respectively; our study findings showed lower prevalence rate when compared with these studies.^[14,15]

Thus, the outcome of the above various studies indicated anemia is highly prevalent in many rural areas of our country. Since physical and intellectual development undertakes and extends throughout the adolescent period, it is essential to emphasize the need to improve nutritional status of the adolescent population that would prevent the occurrence of nutritional anemia.

Association of anemia with age

Increased prevalence of anemia was noted among girls age 14 years followed by 16 years of age. Increased prevalence of anemia was seen during the late adolescent age. Gupta *et al.*, in a similar study which was conducted in Haryana on 110 adolescent girls who belonged to low socioeconomic groups, observed a similar prevalence among girls who were more than 14 years of age.^[16] [Table 4].

Nevertheless, similar to our study findings, Chaudhary and Dhage and Rawat *et al.* could not find any association between anemia and age of girl.^[17,18]

Prevalence of anemia according to severity

In this study, the prevalence rate (48.39%) of mild degree of anemia was high when compared with the prevalence of moderate anemia and severe anemia which were found to be 33.87% and 10.48%, respectively. A similar study done by Rajaratnam *et al.* to estimate the prevalence of severe, moderate, and mild degree anemia among adolescent girls in rural Tamil Nadu showed them

Table 2: Age-wise distribution of study participants

Age (years)	Study participants (n=255)		No. of girls with anemia (n=124)	
	No.	Percentage	No.	Percentage
10	25	9.80	10	40
11	27	10.59	11	40.74
12	59	23.14	24	40.68
13	38	14.90	21	55.26
14	39	15.29	23	58.97
15	29	11.37	15	51.72
16	33	12.95	19	57.58
17	3	01.18	1	33.33
18	2	00.78	0	0
19	0	0	0	0

Table 3: Frequency distribution of study participants according to their socioeconomic status

Socioeconomic status	No. of girls (n=255)	No. of girls with anemia, No. (%) (n=124)	P
Class II (upper middle)	7	0	
Class III (lower middle)	29	10 (34.48)	
Class IV (upper lower)	202	102 (50.49)	0.742
Class V (lower lower)	17	12 (70.59)	

Table 4: Distribution of anemic girls according to early and late adolescent period

Age group (years)	Total girls (n=255)	Anemic girls (n=124)	P
10-14	188	89 (47.34%)	0.186
15-19	67	35 (52.24%)	

to be 2%, 6.3%, and 36.5%, respectively; our study showed higher prevalence rate when compared with this study.^[11]

Another study conducted among anemic adolescent girls in Orissa showed that 45.2% had mild anemia, and 46.9% and 4.4% had moderate and severe anemia, respectively.^[16] Our study showed higher prevalence rate of mild and severe anemia.

Many other studies conducted in the rural areas of India revealed prevalence rate ranging from 0.2% to 6% of severe anemia among adolescent girls.^[2,11,16] This finding is in dissonance with this study which showed high prevalence rate of severe anemia (10.48%).

This increased prevalence of mild and moderate anemia demands awareness about health and nutrition among adolescent girls. Due emphasis on intake iron and folic acid-rich foods and health education is essential to bring down the total prevalence of anemia among the adolescent girls.

Association of anemia with socioeconomic status

In the study, a majority of the adolescent girls (83.92%) belonged to socioeconomic class IV and V. Adolescent girls

belonging to lower socioeconomic groups (50.49% in class IV and 70.59% in class V) showed high prevalence of anemia than the girls belonging to higher socioeconomic groups (34.48% in class III), and this was statistically significant. These findings were concordant with other similar studies conducted to study anemia among girls belonging to Uttar Pradesh, Nagpur, Chandigarh, and Delhi, showing high prevalence rate among lower socioeconomic groups.^[17-20]

A notable relationship between anemia and socioeconomic status strongly recommend the need for developing and implementing policies which improve and eliminate socioeconomic disparities.

Limitations

This was single hospital-based study with small sample size, so results of this study cannot be generalized. Anemia is a disease condition involving several factors; few other important associated factors such as worm infestation, nutritional status, and open air defecation were not included in the study. Taking this study as reference point, multicentric research involving a larger sample size can be planned.

Conclusion and Recommendation

Anemia is a major public health problem among school adolescents in the rural areas. The prevalence was high among girls who were above 16 years of age and girls who belonged to lower socioeconomic groups. Special importance should be given for developing corrective measures against nutritional anemia among adolescent girls. School-based intervention among school-going adolescent girls plays a vital role in the prevention and control of anemia among this group. There is a need for regular supply of iron and folic acid tablets and for improving medication adherence regarding consuming these tablets among adolescent girls.

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Conflicts of interest

There are no conflicts of interest.

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