## **Original Research Article**

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# A study on prevalence of anemia among late adolescent girls in JSS Schools and Colleges of rural and urban Mysuru district, Karnataka, India

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#### **ABSTRACT**

**Background:** Anemia is the commonest micronutrient deficiency across the world. The burden of disease is high in underdeveloped and developing countries. Anemia itself is not a disease but a symptom of underlying deficiency. A large portion of iron deficiency is preventable with appropriate and timely intervention. Adolescence is a crucial phase for growth and development. Increased physiological demands, poor attitude of young children towards nutrition, lack of awareness amongst parents about healthy diet etc., are some of the reasons that makes anemia common among adolescents.

**Methods:** A cross-sectional study was conducted in JSS schools and pre-university during February 2021. Sample size is 292 and a total of 300 girls in late adolescent age group were included in the study. Haemoglobin estimation was done by finger prick method using a digital haemoglobinometer. A structured proforma was used to collect data regarding socio-demographic characteristics and factors associated with anemia.

**Results:** In our study 49% of the girls were anemic. Mean haemoglobin levels of the girls were  $14\pm4$  mg/dl. In this study there was significant association between menarche status (p=0.0041) and history of taking iron supplements (p=0.04). Significant association was noted between the mother's education and the study participants' anemia status (p=0.00). Significant association was noticed between BMI category of the study participants and their anemia status (p<2.2e<sup>-16</sup>).

**Conclusions:** Anemia is huge problem among adolescent girls. The awareness is poor regarding the disease and its effects. The community is ignorant about the detrimental effects of anemia. Hence appropriate health interventions targeting women and children are needed to see any positive changes in their status.

Keywords: Anemia, Prevalence, Adolescent, Factors associated

## INTRODUCTION

Anemia is the common micronutrient among micronutrient deficiency disorder. Anemia itself is not a disease but a manifestation. The most common cause of anemia is iron deficiency. Iron deficiency anemia can be prevented with appropriate and timely intervention. Iron deficiency affects 2 billion people that is roughly over 30% of the world's population and in developing countries the numbers are exacerbated by malaria and worm infestation.<sup>1</sup>

Most often policy makers do not recognize the economic burden, service providers fail in recognizing health consequences and the community is ignorant of its capability to cause cognitive impairment which may be permanent in young children, denying a child its right to full mental and emotional growth/development.<sup>2</sup>

Prevention of anemia can be done at a less cost, the cost/benefit ratio of health programs are few of the biggest achievements in public health field. Anemia can be an indicator for iron deficiency screening, before iron

deficiency anemia occurs, there could be varying degrees of iron deficiency causing impairment in the cellular functioning. Proper differentiation is required for appropriate diagnosis and treatment.<sup>2</sup>

Anemia is very much common in adolescents due to physiological changes and demands of the body. The adolescent age group defined by WHO "the period of life spanning between 10-19 years.<sup>3</sup> Adolescence can be differentiated into early adolescence 10-14 years and late adolescence 15-19 years.<sup>4</sup>

Adolescence is a vulnerable phase for developing nutritional deficiencies including anemia. Anemia in the past did not receive much attention in public health programs. Adolescent girls are at higher risk of developing anemia due to various reasons like neglect from the family, limited resources. Girls are mostly deprived of nutrition, education and seen as an additional support to handle the household activities. Menstrual blood flow and growing iron demands worsens situation.

## **Objectives**

Objectives of the study were to estimate the prevalence of anemia among the late adolescent girls of JSS schools and pre-university in rural and urban Mysuru district and to assess the factors associated with anemia in late adolescent girls

#### **METHODS**

This is a cross-sectional study and it was conducted at 2 JSS schools and 1 pre-university college in Mysore selected conveniently. Sample size is 292 and a total of 300 participants were included in the study. The study was conducted during February 2021. Before data collection consent and assent were taken T as the study population was aged between 15-19 years. Data was collected by interviewing the patient and entered into Google forms.

In this study the haemoglobin levels of all the participants were evaluated by finger-prick method using a digital haemoglobinometer.

Semi-structured questionnaire was used for gathering information about the socio-demographic details like parents' education, religion, occupation, monthly income and weight, height, physical examination and risk factors associated with anemia.

The data obtained was coded and entered into Microsoft excel. Descriptive statistics such as mean, frequencies and percentages were calculated. Bivariate analysis, cross tables were constructed, chi-square test was done and the association with status of anemia were tested. Using R statistical software Fisher's exact test was performed.

Inclusion and exclusion criteria are as follows: Female students in the late adolescent (15-19 years) age group and all female students who are willing to participate in the study were included and girls who are already on treatment for anemia were excluded.

## **RESULTS**

The mean age of the participants was  $16.8\pm1$  years. Majority (39%) were in the age group of 16 years.

Table 1: Distribution of study participants in relation to anemia and severity of anemia.

Anemia	Number	Percentage (%)					
Distribution of study participants in relation to							
anemia status							
Anemic	147	49					
Non-anemic	153	51					
Total	300	100					
Distribution of study participants in relation to							
severity of anemia							
Degree of anemia							
Mild anemia	62	42.1					
Moderate anemia	79	53.7					
Severe anemia	6	4.08					
Total	147	99.8					

The overall prevalence of anemia was 49%. Out of 300 adolescent girls had 147 (49%) varying severity of anemia, 153 (51%) of girls were non-anemic. Haemoglobin level of girls was ranging from 6.4 mg/dl to 16.4 mg/dl. Mean haemoglobin levels of the girls were 14 mg/dl, 62 (42.1%) were mildly anemic, 79 (53.1%) were moderately anemic and 6 (4.08%) were severely anemic.

In the study out of 300 adolescent girls, majority (94.3%) belonged to class I.

Table 2: Distribution of study participants in relation to age and socio-economic status.

Age (years)	Number	Percentage (%)					
Distribution of study participants in relation to age							
15	19	6.3					
16	117	39					
17	75	25					
18	79	26.3					
19	10	3.3					
Total	300	100					
Distribution of study participants in relation to							
socio-economic status							
Income class							
Class I	283	94.3					
Class II	16	5.4					
Class III	1	0.33					
Total	300	100					

During physical examination, 21 (7%) had pale skin, 27 (9%) had pale nail bed, 81 (27%) had pale conjunctiva.

In this study there is a significant association between the age group and the anemia status for DF-4 and p=0.01467.

In this study there was no significant association between the father's education status and the study participants' anemia status. Significant association was noted between the mother's education and the study participants' anemia status for DF-3 and p=0.00. No significant association was noted between social class and anemia status of the study participants. In this study there was no significant association between dietary type (vegetarian or mixed) of the study participants and their anemia status.

Significant association was noticed between BMI category of the study participants and their anemia status

for DF-3 and p<2.2e<sup>-16</sup>. In this study there was no significant association between family history of anemia and anemia status of the study participants. In this study there was no significant association between history of taking iron supplements and anemia status of the study participants. In this study there was significant association between family type and anemia status of the study participants for DF-2 and p<2.2e<sup>-16</sup>.

Factors like family type, dietary habits, menarche status, and family history of anemia, habit of skipping meals, history of taking iron supplements and history of taking vitamin supplements are some the factors associated with the degree of anemia. Fisher's exact test for association between the above factors and the degree of anemia in this study suggested significant association between menarche status (p=0.0041) and history of taking iron supplements (p=0.04).

Table 3: Distribution of study participants according to their menstruation cycle, dietary habit, skipping meals, BMI and anemia signs.

	Number	Percentage (%)
Distribution of study particip	ants in relation to menstruation cycle	Torcentage (70)
Menstrual cycle		
Regular	211	70.4
Irregular	89	29.6
Total	300	100
Distribution of study particip	ants in relation to dietary habit	
Dietary habit		
Vegetarian	37	12.3
Mixed	263	87.7
Total	300	100
Distribution of study particip	ants in relation to skipping meals	
Skipping meals		
Yes	179	59.7
No	121	40.3
Total	300	100
Distribution of study particip	ants in relation to BMI	
BMI category		
Underweight	102	34
Normal	186	62
Overweight	12	4
Total	300	100
Distribution of study particip	ants in relation to anemia signs	
Anemia signs		
Pale skin	21	7
Pale nail bed	27	9
Pale conjunctiva	81	27

Table 4: Association between age, parents' education status and anemia status.

Variables	Anem	ic	Non-A	nemic	Total		■ X² value	DF	P value
Age (years)	N	%	N	%	N	%	A- value		r value
15	15	10.2	4	2.6	19	6.3		4	0.01467
16	52	35.4	65	42.5	117	39			
17	33	22.4	42	27.5	75	25	12.20		
18	39	26.5	40	26.1	79	26.3	12.39		
19	8	5.4	2	1.3	10	3.3			
Total	147	100	153	100	300	100			

Continued.

Variables	Anem	ic	Non-A	nemic	Total		X <sup>2</sup> value	DF	P value
	N	%	N	%	N	%			
Association between	ı father'	s education	and and	emia status					
Father's education									
Degree and above	15	10.20	14	9.15	29	9.67		3	0.4267
Illiterate	46	31.29	49	32.03	95	31.67	2.7083		
Primary	18	12.24	13	8.50	31	10.33	2.7063		
Secondary	68	46.26	77	50.33	145	48.33			
Grand total	147	100	153	100	300	100			
Association between	n mother	·'s educatio	n and ar	nemia status					
Mother's education									
Degree and above	2	0.0136	5	0.0327	7	0.0233		3	0.0000
Illiterate	38	0.2585	48	0.3137	86	0.2867	31.37		
Primary	42	0.2857	39	0.2549	81	0.27			
Secondary	65	0.4422	61	0.3922	126	0.4167			
Grand total	147	100	153	100	300	100			

Table 5: Association between factors associated with anemia and severity of anemia.

Variable	Categories	Mild anemia	Moderate anemia	Severe anemia	Non anemic	P value	
	Joint	8	14	1	23		
Family type	Nuclear	53	64	5	123	0.7811	
	3 generation	1	1	0	7		
Distant habit	Mixed	50	68	5	140	0.1151	
Dietary habit	Vegetarian	12	11	1	13	0.1151	
Menarche	No	1	1	0	2	0.0041	
attained	Yes	61	78	6	151	0.0041	
Family history of	No	57	69	6	142	0.07	
anemia	Yes	4	10	0	11	0.07	
CI. I	No	27	27	1	66	0.24	
Skips meals	Yes	35	52	5	87	0.34	
History of taking	No	55	65	5	133	0.04	
iron supplements	Yes	7	14	1	20	0.04	
Taking vitamin	No	57	68	6	141	0.11	
supplements	Yes	5	11	0	12	0.11	

## **DISCUSSION**

In the present study out of 300 adolescent girls 147 (49%) were suffering from varying severity of anemia. 153 (51%) of the girls were non-anemic. Similarly, a study conducted in rural areas of Tamil Nadu showed, anemia prevalence was 48.63% (n=124). 55.64%, were having mild degree of anemia. High prevalence 52.24% was noted among the late adolescents and in those with low socioeconomic status.<sup>5</sup>

A study conducted in Kalaburgi, revealed out of 318 adolescent girls, most adolescent girls 176 (55.35%) were moderately anaemic, 15 (4.72%) were having severe anemia, 13 (4.09%) had mild anemia. A study conducted in central Kerala showed the anaemia was prevalent by 21% among adolescent girls.<sup>6</sup>

In the current study, out of the 147 adolescent girls, sixty-two (42.1%) were mildly anemic, 79 (53.1%) were the moderately anemic and 6 (4.08%) were severely anemic.

In a study conducted in Arunanchal Pradesh, it was found that 40% of women were mildly anaemic, 12% were moderately anaemic, and 1% were severely anaemic. Similarly in a study conducted in Maharashtra, among 1010 adolescent girls 87% had anaemia. The prevalence of mild anemia was 17%, moderate anemia was 65% and severe anaemia was 5%.

A study conducted in Belagavi, overall prevalence of anemia was 44.4% (n=154). Where in 35.2% (n=122) were mild anemic followed by 8.9% (n=31) moderate anemia.<sup>9</sup>

In this study, factors like family type, dietary habits, menarche status, and family history of anemia, habit of skipping meals, history of taking iron supplements and history of taking vitamin supplements are some the factors associated with the degree of anemia. Fisher's exact test for association between the above factors and the degree of anemia in this study suggested significant association between menarche status (p=0.0041) and history of taking iron supplements (p=0.04). Significant

association was noted between the mother's education and the study participants' anemia status for DF-3 and p=0.0000. Significant association was noticed between BMI category of the study participants and their anemia status for DF-3 and p<2.2e<sup>-16</sup>. In this study there was no significant association between family history of anemia and anemia status of the study participants. In this study there was no significant association between history of taking iron supplements and anemia status of the study participants. In this study there was significant association between family type and anemia status of the study participants for DF-2 and p<2.2e<sup>-16</sup>.

A study conducted in Nagpur revealed out of 296 subjects, 35.1% subjects were anemic. Anemia was found to have significant association with the socio-economic status of study subjects. Significant association was found with the mothers and father's educational status. Other factors like attainment of menarche, age, family size, type of family and type of diet were not associated with anemia. This study showed a significant association between age group (p=0.01467), mother's education (p=0.0000), BMI category (p<2.2e<sup>-16</sup>) and family type (p<2.2e<sup>-16</sup>). Other factors like father's education status, socio economic status, and dietary type/habit of study participants were not significantly associated with anemia.

## Limitation

Only the JSS schools and college going adolescents were studied hence the results aren't generalizable.

The study was conducted to find out the prevalence of anemia. However, type of anemia was not included in the study.

Due to the prevailing COVID-19 scenario randomization in data collection was not done. Hence the schools and colleges open during the data collection time were selected.

## **CONCLUSION**

Anemia is huge problem among adolescent girls. The awareness is poor regarding the disease and its effects. The community is ignorant about the detrimental effects of anemia. Hence appropriate health interventions targeting women and children are needed to see any positive changes in their status.

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