# **Original Research Article**

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# Prevalence of anaemia and its associated factors among adolescent girls: a community based study

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#### **ABSTRACT**

**Background:** Anemia is a major nutritional problem in adolescent girls in many developing countries. Anaemia prior to pregnancy is likely to affect fetal health and survival and therefore it is necessary to evaluate the nutritional needs in this vulnerable group. To know the prevalence of anaemia and its associated factors among adolescent girls residing in the urban field practice area of S. Nijalingappa Medical College, Bagalkot.

**Methods:** A community based cross sectional study. A field practice areas of the urban health training centers, Department of Community Medicine, S. Nijalingappa Medical College in Bagalkot. 400 unmarried adolescent girls were participants. Systematic random sampling. Data was tabulated in Microsoft Excel 2010 and analyzed by using Open Epi software. Data was collected through predesigned, semi-structured questionnaire through house to house visits. Haemoglobin estimation was done by Sahli's method and anaemia was classified based on WHO criteria.

**Results:** The prevalence of anaemia was 63.3%. Factors associated with anemia were age, mother's literacy, SES, type of family, environmental sanitation and tea consumption.

**Conclusions:** Prevalence of anaemia is high and is a major public health problem in this area. Health education and periodical haemoglobin estimation followed by supplementation of iron would help in reduction and prevention of anaemia.

Keywords: Adolescent girls, Anemia, Urban area, WHO criteria, Sahli's method

## **INTRODUCTION**

Anemia is a major nutritional problem in adolescent girls in many developing countries. Anaemia due to lack of iron in girls is the third cause of years lost to death and disability. In all member States of the South-East Asia Region, except Thailand, more than 25% of adolescent girls are reported to be anaemic; in some countries the prevalence is as high as 50%. But, in India, 56% are anemic. Anaemia prior to pregnancy is likely to affect fatal health and survival. Hence, it is necessary to evaluate the nutritional anaemia in this vulnerable group.

On an average adolescent girls mature by  $10\frac{1}{2}$ -11 years taking about 3-4½ years of duration from first sign of

puberty to final maturation of secondary sexual characteristics. During this period, adolescents gain up to 50% of their adult weight, more than 20% of their adult height and 50% of their adult skeletal mass. Increase in height and weight will lead to increased nutritional requirement.<sup>4</sup>

Adding to this, there are problems of urbanization, modernization and changing food habits.<sup>5</sup> Among adolescents, girls are a doubly vulnerable group due to deep-rooted gender discrimination and other sociocultural factors that are prevailing in our Indian society.<sup>6</sup>

Hence this study was carried out with the following objectives to study the prevalence of anaemia among

adolescent girls residing in the urban field practice area of S. N. Medical College, Bagalkot. And to study the factors causing anaemia among adolescent girls.

#### **METHODS**

The present community based cross sectional study was conducted in the field practice areas of the urban health training centers, Department of Community Medicine, S. Nijalingappa Medical College in Bagalkot. The study period was from January 1<sup>st</sup> 2015 to June 31<sup>st</sup> 2016.

#### Inclusion criteria

Unmarried adolescent girls residing in the urban field practice area for more than a year and willing to participate in the study.

#### Exclusion criteria

Those who could not be contacted even after 3 consecutive visits.

#### Sample size

Based on the study done in rural area of Kolar district, Karnataka, sample size was calculated in Open Epi version 2 software taking, allowable error (d)=10%, p=34.8% which was 344 and a total of 400 subjects were recruited.<sup>7</sup>

#### Sampling procedure

Systematic random sampling technique was used to enroll the study subjects.

#### Study tools

Predesigned, pre-tested, semi-structured questionnaire regarding socio-demographic variables, environmental sanitation status, personal hygiene status, menstrual history. Haemoglobin estimation was done by using Sahli's hemoglobinometer and anaemia grading was done based on WHO criteria.

### Data analysis

Data was tabulated in Microsoft Excel 2010 and analyzed by using Open Epi software.

#### **RESULTS**

The prevalence of mild, moderate and severe anaemia was found to be 23.3% (93), 38.2% (153) and 1.8% (7) respectively. Rest 36.7% (147) was having normal haemoglobin level. Overall prevalence of anaemia was found to be 63.3%.

Table 1: Association between socio-demographic variables and anaemia in study subjects.

Variables	Normal (n=147) N (%)	Anaemia (n=253) N (%)	Total (n=400) N (%)	Significance values
Age in years	14 ( /0)	14 ( /0)	14 ( /0)	
10-13	85 (41.9)	118 (58.1)	203 (50.8)	γ2=4.652, df=1,
14-16	40 (31.3)	88 (68.8)	128 (32.0)	p = 0.031
17-19	22 (31.9)	47 (68.1)	69 (17.3)	
Father's education				2 1 70 6 16 1
Illiterate	24 (30.8)	54 (69.2)	78 (21.8)	$\chi 2=1.796, df=1,$ p=0.18
Literate	109 (39.1)	170 (60.9)	279 (78.2)	p=0.18
Mother's education				2-15 12 16 1
Illiterate	30 (23.6)	97 (76.4)	127 (32.5)	$\chi 2=15.13, df=1,$ p=0.0001
Literate	116 (44.0)	148 (56.0)	264 (67.5)	p=0.0001
Socio-economic status	S			
Class I	1 (50.0)	1 (50.0)	2 (0.5)	
Class II	13 (50.0)	13 (50.0)	26 (6.5)	$\chi^2=12.518$ , df=4,
Class III	17 (40.5)	25 (59.5)	42 (10.5)	p=0.014
Class IV	87 (41.4)	123 (58.6)	210 (52.5)	
Class V	29 (24.2)	91 (75.8)	120 (30.0)	
Type of family				
Nuclear	79 (33.6)	156 (66.4)	235 (58.8)	$\chi^2=11.521$ , df=3,
Joint	27 (37.5)	45 (62.5)	72 (18.0)	$\chi = 11.321, \text{ di} = 3,$ p=0.009
3-generation	27 (58.7)	19 (41.3)	46 (11.4)	— p=0.009
Broken	14 (29.8)	33 (70.2)	47 (11.8)	

The prevalence of anaemia was higher in 14-16 years (68.8%) and 17-19 years (68.1%) age group as compared to in 10-13 year age group i.e., early adolescent girls (58.1%). Adolescent girls in 14-19 year age group have

1.567 times more chances of suffering from anaemia as compared to 10-13 year age group [OR: 1.567; 95% CI: 1.04, 2.368]. This difference was statistically significant (p=0.031).

Table 2: Association between environmental sanitation and anaemia in study subjects.

Environmental status	Normal (n=147)	Anaemia (n=253)	Total (n=400)	Significance values
	N (%)	N (%)	N (%)	
Good	37 (52.1)	34 (47.9)	71 (17.7)	
Satisfactory	66 (37.3)	111 (62.7)	177 (44.3)	$\chi^2$ =11.212, df=2, p=0.004
Poor	44 (28.9)	108 (71.1)	152 (38.0)	

Table 3: Association between personal hygiene and anaemia in study subjects.

Personal hygiene status	Normal (n=147) N (%)	Anaemia (n=253) N (%)	Total (n=400)	Significance values
Good	88 (38.3)	142 (61.7)	N (%) 230 (57.5)	
Fair	50 (36.2)	88 (63.8)	138 (34.5)	$\chi^2$ =1.266, df=2, p=0.531
Poor	9 (28.1)	23 (71.9)	32 (8.0)	

Table 4: Association between menarche status and anaemia in study subjects.

Menarche	Normal (n=147) N (%)	Anaemia (n=253) N (%)	Total (n=400) N (%)	Significance values
Not attained	78 (41.8)	109 (58.4)	187 (46.8)	$\chi^2$ =3.719, df=1, p=0.054
Attained	69 (32.4)	144 (67.6)	213 (53.2)	OR:1.492; CI: 0.9913, 2.249

Table 5: Association between type of diet and anemia in study subjects.

Type of diet	Normal (n=147)	Anaemia (n=253)	Total (n=400)	Significance values
	N (%)	N (%)	N (%)	
Vegetarian	24 (30.0)	56 (70.0)	80 (20.0)	
Mixed	91 (37.9)	149 (62.1)	240 (60.0)	$\chi^2$ =2.072, df=2, p=0.355
Ova-vegetarian	32 (40.0)	48 (60.0)	80 (20.0)	

Table 6: Distribution of study subjects by anemia status.

Anemia status	No.	0/0
Non anemic	147	36.7
Mild anemia	93	23.3
Moderate anemia	153	38.2
Severe anemia	7	1.8
Total	400	100

The prevalence of anaemia was maximum (69.2%) in girls whose fathers were illiterates than in (60.9%) girls whose fathers were literate. This difference was not statistically significant (p=0.3395). The prevalence of anaemia was maximum (76.4%) in girls whose mothers were illiterates compared to 56.1% girls whose mothers were literate. This difference was highly statistically

significant (p=0.0001). Girls whose mothers were illiterate have 2.528 times more chances of suffering from anemia than girls whose mothers were literates.

The prevalence of anaemia was maximum (75.8%) in girls who belonged to Class V followed by girls who belonged to Class III (59.5%) and Class IV (58.6%) and least in Class I (50%) and class II (50%) girls. This difference was statistically significant (p=0.014).

The prevalence of anaemia was maximum (70.2%) in girls who belonged to broken families followed by girls who were from nuclear families (66.4%) and joint family (62.5%) and least in girls of 3-generation family (41.3%). This difference was statistically significant (p=0.009) (Table 1).

The prevalence of anaemia was maximum (71.1%) in girls who lived in poor environmental status followed by girls who lived in a satisfactory environment (62.7%) and least in girls who lived in a good environmental status (47.9%). This difference was statistically significant (p=0.004) (Table 2).

The prevalence of anaemia was maximum (71.9%) in girls who had poor personal hygiene as compared to girls in whom personal hygiene was good (61.7%) and fair (63.8%). This difference was not statistically significant (p=0.531) (Table 3).

The prevalence of anaemia was more among girls who have attained menarche (67.6%) as compared to girls who have not attained menarche (58.3%). Menstruating girls were 1.492 times at risk for anaemia than nonmenstruating girls [OR: 1.492; CI: 0.9913, 2.249]. This difference was not statistically significant (p=0.054). (Table 4).

The prevalence of anaemia was more among girls who had vegetarian diet (70%) followed by girls who had mixed diet (62.1%) and ova-vegetarian diet (60%). This difference was not statistically significant (p=0.355) (Table 5).

The prevalence of anaemia was more among girls who had tea or coffee in their dietary pattern (66.4%) as compared to girls who did not have tea/coffee in their diet pattern (50.6%). Girls who had tea/coffee in their diet pattern were 1.92 times at risk for anaemia than those who do not have tea/coffee in their diet pattern [OR: 1.92; CI: 1.163, 3.169]. This difference was statistically significant (p=0.009).

#### DISCUSSION

The prevalence of anaemia was 63.3% in the present study. This finding was almost similar to a study done in an urban slum of Karad, Maharashtra found where prevalence of anaemia was 60.43%.

A study done in an urban community of Gulbarga, Karnataka in 2005 revealed that 94% had anemia. In a study done in a rural area of Kolar, the prevalence of anemia was 34.8%. In a study done in a rural area of Belgaum, Karnataka, prevalence of anaemia was 75%. The findings of these studies were in contrast to the present study which could be due to different study period and different study setting.

The prevalence of anaemia was higher in 14-19 year age group (68.5%) compared to 10-13 year age group (58.1%). This difference was significant statistically (p=0.031).

In a study done in a rural area of Belgaum, Karnataka, it was found that prevalence was more in 15-19 years age group girls (60%) than in 10-14 years age group (38.9)

%).<sup>11</sup> In a study done in Shimla, it was found that there was higher prevalence of anaemia in 14-16 age group girls and was statistically significant.<sup>12</sup> These study findings were consistent with the present study.

The prevalence of anaemia was more in girls whose fathers (69.2%) and mothers (76.4%) were illiterate. No statistically significant association was found for fathers education (p=0.3395) whereas statistical association was highly significant for mothers education (p=0.0001). Similar findings were seen in studies done in Shimla city and urban area of Pune, Maharashtra. This could be attributed to lack of awareness of parents regarding nutrition. Certain cultural practices and gender discrimination prevails in the families due to lack of education that affect nutrition.

The prevalence of anaemia was more in girls who belonged to Class V (69.2%). This association was statistically significant (p=0.014). Similar findings were found in studies done in rural area of Belgaum (Class V: 100%) and rural area of Hassan (Class V: 32.5%, Class IV: 33%). This could be due to lack of higher education where more than half of the parents education is below high school level and also majority of them are engaged in semiskilled and unskilled occupation. Majority of the mothers are home makers. All these factors might have led to low income generation in the families leading to inability to provide iron rich food to their daughters.

The prevalence of anaemia was more in girls who belonged to broken family (70.2%) followed by girls who belonged to nuclear family (66.4%) and joint family (62.5%) and least in girls of 3-generation family (41.3%). This difference was significant statistically (p=0.009). This finding was in contrast to a study done in Pune, Maharashtra which revealed high prevalence of anaemia in girls of joint family (57.5%) than nuclear family (36.8%). Also, in a study done in Shimla, it was found that there was no association between anaemia and type of family.

The prevalence of anaemia was 71.1% in girls who lived in an environment with poor sanitation followed by girls who lived in an environment with satisfactory sanitation (62.7%) and least in girls who lived in an environmental with good sanitation (47.9%). This difference was statistically significant (p=0.004). In a study done in Pune, Maharashtra, it was found that prevalence of anaemia was more in those who lived in kaccha house (59.3%) than pucca house (37.7%) which was statistically significant (p=0.004). This could be attributed to parasitic infestations and vector borne diseases due to receptive environment.

The prevalence of anaemia was more in girls who had poor personal hygiene (71.1%) as compared to girls in whom personal hygiene was good (61.7%). This finding was not statistically significant (p=0.531). Similar finding

was found in a study done in rural adolescent girls of Tamil Nadu where the prevalence of anaemia was more in girls with poor personal hygiene (82.9%) than in those with good personal hygiene. This study showed statistically significant association (p=<0.05). Also a study done in an urban area of Shimla found that anaemia was more in females who had poor personal hygiene (63.5%). Poor personal hygiene again leads to parasitic infestations leading to anaemia.

The prevalence of anaemia was more among girls who had attained menarche (67.6%). This difference was not statistically significant (p=0.054). This was consistent with findings of studies done in rural area of Kolar rural area of Hassan and Belgaum.<sup>7,8,15</sup> However, findings of a study done in Delhi were similar with present study and also statistically significant.<sup>17</sup> This indicates the need for supplementation with iron to all girls who have attained menarche.

The prevalence of anaemia was more among girls who had a vegetarian diet (70%) than those who had mixed diet (62.1%) and ova-vegetarian diet (60%). This difference was not significant statistically. Similar finding was seen in a study done in Pune (p=0.305). However, studies done in Delhi and Shimla indicated a statistically significant association between vegetarian diet and anemia. 13,17 This could be attributed to the fact that vegetarian diet has low bioavailability of iron.

The prevalence of anaemia was more among girls who had tea or coffee in their dietary pattern (66.4%) as compared to girls who did not have tea/coffee (50.6%). This difference was significant statistically (p=0.009). This could be explained by the fact that tea and coffee contains tannins and phytates which inhibit absorption of iron.

# **CONCLUSION**

The present study revealed high prevalence of anaemia among adolescent girls. Anaemia was found more among late adolescent age group, in those whose mothers were illiterate, belonged to low socioeconomic status and broken families. It was also significantly high in girls who lived in an environment with poor sanitation. Also, consumption of tea and/or coffee regularly was associated with high prevalence of anaemia among these adolescent girls. Factors not statistically significant with anaemia were father's literacy, personal hygiene, attainment of menarche.

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