



# The Silent Burden of Anemia among the Rural Adolescent Girls: A Community Based Study in Maharashtra

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## ABSTRACT

**Introduction:** Adolescent girls constitute a more vulnerable group particularly in developing countries where they are traditionally married at an early age and exposed to the risk of reproductive morbidity and mortality. So, the present study was planned to find out prevalence of anemia and associated epidemiological factors in relation to anemia among rural adolescent girls.

**Material and method:** It is a community- based cross- sectional, descriptive observational study was conducted in the rural field practice areas of tertiary rural hospital. All the villages coming under field practice area of tertiary rural hospital were included in the study. A pre- designed and pre- tested questionnaire was used for data collection.

**Results:** Mean age of adolescent girls was  $13.77 \pm 2.42$ . Among the 480 adolescent girls covered in the study 72.5% were found to be anemic. Prevalence of mild and moderate anemia among adolescent girls was 34.19% and 65.81% respectively. Study found significant association of anemia with socioeconomic status, type of family, father's occupation, father's education, mothers education and mothers occupation.

**Conclusion:** The prevalence of anemia among adolescent girls was high and associated with socioeconomic status, type of family, father's occupation, mothers education.

**Keywords:** Adolescent, Anemia, Rural

## INTRODUCTION

The term 'adolescence' comes from the Latin word meaning 'Adolescere', this means 'to emerge' or 'achieve identity'<sup>1</sup>. According to World Health Organization an adolescent is defined as any person between the ages of 10 and 19 years. Early adolescence is between the ages of 10-13 years, Mid adolescence ages between 14-15 years and Late adolescence is the age between 16-19 years. Adolescence is a developmental period during which a person is no longer a child, but not yet an adult<sup>2</sup>.

Anemia is a worldwide problem most commonly due to widespread nutritional deficiencies and cannot be considered as an isolated apart from the general nutrition, infections, infestations and socioeconomic conditions of the population affected.

Anemia is widely prevalent in India, affects both sexes and all age groups. In India, inadequate intake, faulty dietary habits and hookworm infestations are some of the main causes of anemia in rural areas. Iron deficiency is by far the commonest nutritional cause of anemia, it may be associated with a folate deficiency. Other nutrient deficiencies such as vit. B12, pyridoxine and copper are of little public health significance because of their infrequencies.

Among adolescent girls constitute a more vulnerable group particularly in developing countries where they are traditionally married at an early age and exposed to the risk of reproductive morbidity and mortality. Developmentally it is crucial period particularly with reference to reproductive

health. Adolescence is period of peak growth for boys and girls. Food and nutrient needs are proportionately higher during growth spurt. It has been reported that iron is required for growth in adolescents and that on adolescents girls on marginal diet iron deficiency may be consequence of growth and skeletal development. Low iron stores throughout childhood may contribute to delayed age of menarche and anemia in the adolescents may impair immune response. The present study was planned to highlight the problem of anemia in adolescent girls in the light of scarcely available literature for this high risk group.

About 30% of India's population is in adolescent age group of 10-19 years. It is estimated that there are 331 million adolescents in India<sup>3</sup>. According to NFHS-III, 56% of adolescent girls were anemic and 30% of adolescent boys suffer from anemia. India's National Institute of Nutrition (NIN) found the prevalence rate of anemia in rural areas as high as 91% by 2005 among adult non-pregnant non-lactating women, report shows that across all the age groups, anemia prevalence is roughly 10% higher in rural areas as compared to urban. So study was planned to find out prevalence of anemia and its associated epidemiological factors in relation to anemia among rural adolescent girls.

## MATERIAL AND METHOD

A community- based, cross- sectional, descriptive observational study was conducted from Nov.2010 to May 2012 in the field practice areas of tertiary rural hospital. Study undertaken among all the villages included in the field practice area of tertiary care hospital. Sample size was calculated using the formula  $4 pq/12$ .

After getting necessary approval from the institutional ethics committee, health camps were arranged on Sundays at convenient places in all the villages. The organizers informed people and motivated them to attend the camp. After obtaining the informed consent, adolescent girls were included in the study till the desired sample size 480 was achieved.

Pre-designed and pre-tested standard questionnaire was used for data collection<sup>18</sup>. Age was recorded in completed years based on birth certificates.

Height and weight of all the adolescent girls were recorded by standard protocol and procedure given below<sup>20</sup>.

**a) Height:** Height in centimeter was marked on the wall in school with the help of measuring tape. The children were asked to stand straight, without footwear with heels together, buttocks, shoulders

and back of head touching the wall. The head was held comfortable erect with lower border of the orbit in the same horizontal plane as that of external auditory meatus. Hands were hanging sides. A wooden scale was placed on the topmost point of the head of child, standing against the wall, where the calibration was done. The height was recorded to the nearest 0.5 cm.

**b) Weight:** Weight was recorded with a portable type weighing machine, and standardized every week with standard weight. Children were asked to stand in center of machine without footwear, and with the body weight evenly distributed on both feet. Clothes were not removed, as adequate privacy was not available. The weight was recorded in kilograms to nearest 0.5 kg.

BMI was calculated as ratio of weight in kg / height (in meter).

Physical examination was done which includes **a) General Examination:** Each patient was evaluated for health assessment. The height, weight, temperature, pulse rate, respiratory rate, blood pressure etc. were recorded. Several other signs of nutritional deficiency diseases was noted if any. **b) Systemic examination:** Each patient was examined system wise such as cardiovascular system, respiratory system, gastrointestinal system, genitourinary system and central nervous system according to the standard guidelines in the clinical book. Each patient was examined thoroughly and significant findings were recorded.

Blood was collected from each subject to estimate hemoglobin (in g %) by Sahlis method. Anemia was defined as per WHO criteria. Anemia is defined as Hb concentration < 12 g/dl for the adolescent girls. a) Mild anemia : Hb concentration above 10 g/dl but below cut off value. b) Moderate anemia : Hb concentration 7 to < 10 g/dl. c) Severe anemia : Hb concentration < 7 g/dl<sup>4</sup>.

Finally, the data collected from 480 adolescent girls were analyzed using Microsoft Excel 2007 software, EPI info version 3.4.3, and SPSS 19 version. Adolescent girls found anemic were dewormed and given iron and folic acid tablets with an advice to attend health center for follow-up examination after 1 month. Necessary health and nutrition education regarding locally available iron-rich food items and right cooking procedures applicable at household level to increase the consumption of iron was given to the participants and their care givers.

## RESULTS

Above table shows distribution of adolescent girls according to age. The age of adolescent girls in present study ranged between 10-19 years. In pre-

sent study out of 480 adolescent girls, maximum girls were 12 years of the age i.e. 82 (17.08 %). Mean age of adolescent girls was 13.77± 2.42.

Out of total 480 adolescent girls, 254(52.92%) belonged to early adolescence group, 118(24.58%) belonged to middle adolescence group and 108 (22.50%) belonged to late adolescence group. Out of 480 adolescent girls, 16(3.33%) were illiterate and 464(96.67%) were literate. Among the literate maximum i.e. 386 (80.42%) adolescent girls were educated up to secondary school and 78(16.25%) girls were educated up to higher secondary school.

**Table 1: Distribution of Adolescent girls according to Age**

Age	Number of adolescent girls (n=480) (%)
10	20 (4.17)
11	74 (15.42)
12	82 (17.08)
13	78 (16.25)
14	55 (11.46)
15	63 (13.12)
16	22 (4.58)
17	38 (7.92)
18	28 (5.83)
19	20 (4.17)

**Table 2. Socio-demographic correlates and prevalence of anemia among the adolescent girls**

Socio-demographic correlates	Adolescent girls	Anaemic cases (%)	P value	Odd's ratio (95% CI)
<b>Type of family</b>				
Nuclear	323	211 (65.32)	<0.05	0.275 (0.1631-0.4636)
Joint	120	105 (87.5)		
Three generation	37	32 (86.49)		
<b>Religion</b>				
Hindu	412	306 (74.27)	< 0.05	1.787 (1.045-3.057)
Buddhist	46	26 (56.52)		
Muslim	22	16 (72.73)		
<b>Socio-economic class</b>				
I	Nil		<0.05	0.1013 (0.06089-0.1685)
II	Nil			
III	227	117 (51.54)		
IV	127	116 (91.34)		
V	126	115 (91.27)		
<b>Literacy status of their father</b>				
Illiterate	61	55 (90.16)	<0.05	7.071 (2.990 -16.72)
Primary	60	51 (85)		
Secondary	243	183 (75.31)		
Higher secondary	69	47 (68.12)		
Graduate	36	11 (30.56)		
Post graduate	11	1 (9.09)		
<b>Literacy status of their mother</b>				
Illiterate	135	120 (88.89)	<0.05	4.105 (2.295-7.342)
Primary	84	74 (88.1)		
Secondary	235	147 (62.55)		
Higher secondary	14	3 (21.43)		
Graduate	9	3 (33.33)		
Post graduate	3	1 (33.33)		
<b>Occupation of their father</b>				
Farmer	196	139 (70.92)	<0.05	5.862 (3.514-9.780)
Non-agricultural labourer	118	111 (94.06)		
Agricultural labourer	86	72 (83.72)		
Service	56	14 (25)		
Business	12	3 (25)		
others	12	9 (75)		
<b>Occupation of mother</b>				
Housewife	233	159 (68.24)	<0.05	4.130 (2.133-7.999)
Farmer	118	85 (72.03)		
Non-agriculture labourer	44	42 (95.45)		
Agricultural Labourer	62	53 (85.48)		
Service	11	2 (18.18)		
Business	12	7 (58.33)		

Socio-economic classification used was Modified B.G.Prasads classification <sup>19</sup>.

**Table 3: Distribution of anemia in adolescent girls according to severity of anemia**

Severity of anemia	Hemoglobin (gm%)	Adolescent girls	Prevalence (%)
Mild	10 to < 12	119	34.19%
Moderate	7 to < 10	229	65.81%
Severe	<7	Nil	Nil
No anemia	>12	132	27.50%

It shows that there is significantly higher ( $\chi^2= 6.54$ ,  $p < 0.05$ ) prevalence of anemia (74.27%) among the adolescent girls who belonged to Hindu religion as compared to Muslim (72.73%) and Buddhist religion (56.52%).

Prevalence of anemia was significantly higher ( $\chi^2= 25.51$ ,  $p < 0.05$ ) among adolescent girls belonging to joint family (87.5%) than those belonging to the nuclear (65.32%) and three generation family (86.49%). Prevalence of anemia also found to be significantly higher ( $\chi^2= 94.88$ ,  $p < 0.05$ ) in socio-economic class IV (91.34%) and significantly reduced with rise in socioeconomic status being minimum (51.54%) in socio-economic class III.

Prevalence of anemia was found significantly higher ( $\chi^2= 94.74$ ,  $p < 0.05$ ) in those adolescent girls whose father were working as non-agricultural laborer (94.06%) than those of doing service and business (25%).

Prevalence of anemia was found significantly higher ( $\chi^2= 30.57$ ,  $p < 0.05$ ) in those adolescent girls whose mother were working as non-agricultural laborer (95.45%) than those of doing service (18%).

Prevalence of anemia was also found significantly higher ( $\chi^2 = 10.94$ ,  $p < 0.05$ ) in those adolescent girls having illiterate (90.16%) father as compared to better educated fathers (9.09%).

Prevalence of anemia was also found significantly higher ( $\chi^2 = 27.02$ ,  $p < 0.05$ ) in those adolescent girls having illiterate (88.89%) mother as compared to better literate mothers (33.33%).

Among the 480 adolescent girls covered in the study 72.5% were found to be anemic. Most of the adolescent girls were suffering from mild to moderate anemia. None of these girls was suffering from severe anemia as shown in the table 2.

## DISCUSSION

In the present study, age of adolescent girls ranged between 10 -19 years. Maximum number of girls were from the age of 12 years i.e. 82(17.08 %) and minimum number of girls i.e. 20(4.17%) were from the age of 10 year and 19 year. Mean age of these girls was  $13.77 \pm 2.42$ . This age group of adolescent girls '10-19 years' was also reported by Kulkarni M

V et al<sup>4</sup> (2012), Siddharam S M et al<sup>5</sup> (2011), Patil S N et al<sup>6</sup> (2009), Chaudhary S M et al<sup>7</sup> (2008), Goel S et al<sup>8</sup> (2007).

Whereas the age group of present study is partially comparable with following authors. S. Kaur et. al.<sup>9</sup>(2006) reported that, the age of adolescent girls in their study ranged between 13-19 years. R. Gawarikar et. al.<sup>10</sup> (2006) studied the adolescent girls between the age of 10.5-18 years. S Siddhu et. al.<sup>11</sup> (2005) found that, the age of adolescent girls ranged between 11-15 years in their study. R Singh et. al.<sup>12</sup> (2008) conducted a study among the adolescent girls of 10-18 years of age.

The present study reported 72.5% anemic adolescent girls of which 34.19% of girls having mild and 65.81% had moderate anemia. None of them having severe anemia. Similarly higher prevalence of anemia reported by S. Kaur et. al.<sup>9</sup> (2006), B. Sudhagandhi et. al.<sup>14</sup> (2011), Bulliyy G et. al.<sup>15</sup> (2007), M V Kulkarni et. al.<sup>4</sup> (2012) found 59.8%, 67.77%, 96.5% and 90.1% prevalence of anemia respectively. S M Chaudhary et. al.<sup>7</sup> (2008) reported very low anemia prevalence 35.1% with 69.20% girls had mild while 30.80% girls had moderate anemia. None of the girl had severe anemia.

In the present study the prevalence of anemia was significantly higher (87.5%) among the adolescent girls belonging to joint families as compared to those from nuclear families (65.32%) and three generation families (86.49%) which would be due to availability of quantitatively and qualitatively adequate food in nuclear families. Similar findings reported by C.S.M. Rawat et. al.<sup>16</sup> (2001) but M V Kulkarni et. al.<sup>4</sup> (2012), S M Chaudhary et. al.<sup>7</sup> (2008) does not show significant relationship between anemia and type of family.

Present study found significantly higher 74.27% prevalence of anemia among the adolescent girls who belonged to Hindu religion ( $\chi^2 = 6.54$ ,  $p < 0.05$ ) as compared to muslim religion which was 72.73% and Buddhist religion was 56.52% reason could be that, most of them practice vegetarianism on accounts of religion and bioavailability of iron from vegetarian diet is low and further presence of inhibitors of iron absorption in vegetarian diet increased the risk of iron deficiency among these girls. R Singh et. al.<sup>12</sup> (2008) C.S.M. Rawat et. al.<sup>16</sup> (2001), S Siddhu et. al.<sup>11</sup> (2005)) does not give significant association between religion and anemia.

Study found inverse association between socioeconomic status and prevalence of anemia, as the higher socioeconomic class adolescent girls shows lower prevalence of anemia (51.54%) and highest prevalence (91.27%) was observed among lowest socioeconomic class this would be because of better availability of quality of food in better socio-

economic status. Similar findings also reported by R. Gawarika et. al.<sup>10</sup> (2006), S M Chaudhary et. al.<sup>7</sup>(2008), R Singh et. al.<sup>12</sup> (2008)

Study reported significantly higher prevalence of anemia among adolescent girls having illiterate mothers (88.89%) as compared to better literate mothers (33.33%) similar findings reported by R Singh et.al.<sup>12</sup>(2008), S M Chaudhary et. al.<sup>7</sup> (2008) M V Kulkarni et al<sup>4</sup> (2012) which is due to better awareness among literate mothers about nutritional needs of the adolescent girls. Study showed significantly higher prevalence of anemia among adolescent girls having illiterate father (90.16%) as compared to better literate fathers (9.09%) similar findings reported by S M Chaudhary et. al.<sup>7</sup> (2008) .

Study reported higher prevalence of anemia 94.06% among the adolescent girls whose father were working as labourer than those of businessman( 25%) and serviceman (25%) .Similar findings were also reported by R Singh et. al.<sup>12</sup> (2008), R.Gawarika et. al.<sup>10</sup>(2006), A Verma et. al.<sup>17</sup> (2004)

Study reported higher prevalence of anemia (95.45%) among the adolescent girls whose mother were working as labourer than those of doing service (18.18%) similar finding reported by M V Kulkarni et. al.<sup>4</sup> (2012)

## CONCLUSION AND RECOMMENDATIONS

The prevalence of anemia among adolescent girls was found to be . Significant association of anemia with socioeconomic status , type of family, father's occupation, mothers education stressed the need to develop the strategies for intensive adult education, nutrition education and dietary supplementation including anemia prophylaxis.

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