

## Original Research Article

# Prevalence of anemia and its correlates among adolescent girls in rural area of Dakshina Kannada District, Karnataka

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## ABSTRACT

**Background:** In India, the population in the age of 10-19 years is currently estimated at 253.2 million, the largest ever cohort of young people to make a transition to adulthood. Nutritional anemia is one of most common micronutrient deficiencies in the world. It is most common in pregnant and lactating women, infants, preschool children and adolescent females. Iron deficiency anemia is a problem of serious public health significance. Present study was undertaken to assess the baseline data of prevalence of anemia and its associated factors among adolescent females belonging to rural community in Dakshina Kannada.

**Methods:** A cross sectional study was done among the adolescent female population in rural field practice area of Dakshina Kannada district from July 2012 to June 2013. A pretested semi-structured questionnaire was used to collect data regarding socio demographic profile, health status and nutrition. Haemoglobin estimation was done by Sahli's method. Statistical analysis was performed using SPSS software trial version 16.

**Results:** The study comprised of 436 study participants, out of which majority (25.5%) were aged 14 years. The mean age was 14.02±2.57 years. The prevalence of anemia among adolescent girls was 72%. Moderate anemia, mild anemia and severe anemia was 68.5%, 28.3% and 3.2% respectively. Pallor was present among 69.72% of adolescent girls.

**Conclusions:** This study showed high prevalence of anemia among adolescent girls and the major associated factors age, diet, menarche attained and presence of pallor. Hence, there is a need to address the anemia problem of the adolescent population.

**Keywords:** Adolescent girls, Anemia, Pallor, Prevalence, Menarche

## INTRODUCTION

Adolescence arises from the Latin word, 'adolescere', which means 'to grow, to mature'.<sup>1</sup> Adolescence refers more broadly to the phase of human development encompassing the transition from childhood to adulthood, which is formative years when maximum amount of physical, psychological and behavioral changes take place. WHO defines adolescents as individuals in the age group of 10-19 years.<sup>2</sup> Adolescents are tomorrow's future and their health is an important issue to deal with at

present. Healthy development of adolescents depends on several complex factors namely socio-economic circumstances, the environment in which they live and grow, the quality of relationship with their families, communities, peer groups and the opportunities for education and employment.<sup>3</sup>

Anemia is one the commonest and most prevalent nutritional problem in India and is mainly due to deficiency of iron. It occurs in all age group, but most prevalent among pregnant women and women in child

bearing age.<sup>4</sup> As per National Family Health Survey 4 (NFHS-4), the prevalence of anaemia (Hb<12 g/dl) among adolescent girls is 54% which is quite high.<sup>5</sup>

The nutritional anemia in adolescent girls not only attributes to high maternal morbidity and mortality rate, but also high incidence of low birth-weight baby and high peri-natal mortality.<sup>6</sup> Many studies were done on anemia among pregnant women and children, but relatively few studies are available on the prevalence of anemia among adolescent girls.

The aim of the study was to assess the prevalence of anemia in adolescent females and factors associated with anemia.

## METHODS

### *Study design and the participants*

The present community-based cross-sectional study was conducted among adolescent girls (10-19 years) residing in Panemangalore, Dakshina Kannada District (Karnataka), which is the rural field practice area of A.J. Institute of Medical Sciences Research Centre.

It is situated approximately 27 km from the Institute and has adopted 15 villages/localities. Out of 15 different villages (total population of 40063), randomly 6 were selected by lottery method. Randomly selected areas were Melkar, Bolangadi, Nehru Nagar, Dasaragudde, Nandavara, and Marnabail. Stratified random sampling was done and probability proportionate size technique was used to select study subject as per required sample size.

All visitors and any adolescent female admitted to hospital or having chronic illness anytime during the study period were excluded from the study

### *Sample size calculation*

By using the formula,

$$N = \frac{4pq}{d^2}$$

The sample size was calculated as 400, after taking the prevalence of anemia as 50% with an allowable error of 10% and level of significance as 5%.<sup>7</sup>

Ethical approval for the study was obtained from the institutional ethics committee.

### *Data collection*

The study was conducted for a period of one year from July 2012 to 2013.

After getting informed consent from the study participants, information regarding sociodemographic profile, dietary habits, menstrual history and history of any medication including deworming was collected through personal interviews using pretested semi-structured questionnaire during house-to-house visits.

### *Hemoglobin estimation*

Estimation was done by using Sahli's method. Using aseptic precautions tip of the ring finger was pricked by using lancets needle and 20 cu mm (i.e.; 0.02 ml) of blood was drawn into the haemoglobinometer pipette and was transferred into the N/10 HCL graduated haemoglobinometer tube. The contents were mixed thoroughly and allowed to stand for 10 minutes for the maximum conversion of haemoglobin in blood to acid haematin.

This was diluted by adding distilled water in drops till the colour matched with that of the standard. The reading of the meniscus from the scale on the haemoglobinometer was read and haemoglobin was expressed as grams per 100 ml of blood.

### *Statistical analysis*

Data was entered in Microsoft excel sheet and was analyzed by using SPSS software trial version. Data was presented in the form of frequencies and percentages. Tests of significance such as Chi square test were used for significant association and the statistical significance level was fixed at p<0.05.

The following operational definitions were used in this study

### *Diagnosis of anemia among adolescent as per WHO guideline<sup>8</sup>*

The diagnosis of anaemia among adolescent as per WHO guidelines were- normal:  $\geq 12$  g%; and anemia:  $< 12$  g%.

### *Severity of anemia<sup>9</sup>*

The severity of anemia was- mild anemia: 11-11.9 g%; moderate anemia: 8-10.9 g%; and severe anemia:  $< 8$  g%.

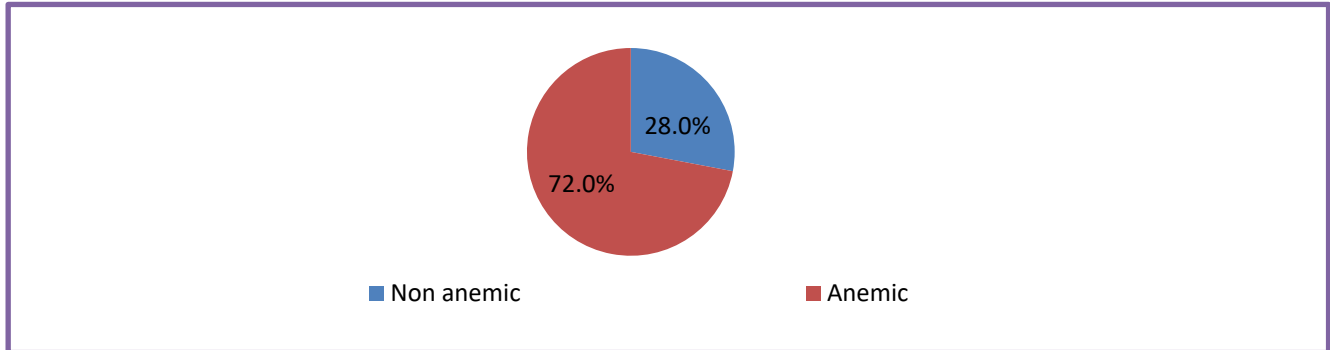
## RESULTS

The study comprised of 436 study participants. The mean age was  $14.02 \pm 2.57$  years. Majority (48.9%) were Muslims, followed by 45.4% Hindus, and 5.7% were Christians.

Maximum adolescent females were having mixed diet (96.3%) and 61.7% adolescent females had attained menarche. The mean age at which the females attained menarche was  $12.68 \pm 1.19$  years (Table 1).

The overall prevalence of anemia was 72% (314) (Figure 1). Out of 314 adolescent females, 215 (68.5%) were moderately anemic, 89 (28.3%) were mild anemic and 10 (3.2%) were severely anemic (Table 2). The prevalence of anemia was higher (73.8%) among the adolescent age group 15-19 years as compared to 10-14 years age group

adolescent. Even the anemia was more prevalent among upper class of socio-economic status adolescent, which was significant. The prevalence of anemia was higher (87.5%) among adolescent who were vegetarian and those who attained menarche (75.1%) (Table 3).



**Figure 1: Distribution of adolescent females in relation to anemia (n=436).**

**Table 1: Distribution of study participants according to socio-demographic characteristics (n=436).**

Variables	N	%	
<b>Age (years)</b>	Early adolescence (10-14)	295	67.3
	Late adolescence (15-19)	141	32.7
<b>Religion</b>	Hindu	198	45.4
	Muslim	213	48.9
	Christian	25	5.7
<b>Family composition</b>	Nuclear	273	62.6
	Joint	163	37.4
<b>Diet</b>	Veg	16	3.7
	Mixed	420	96.3
<b>Socio-economic status</b>	Lower middle class	5	1.1
	Middle class	84	19.3
	Upper middle class	203	46.6
	Upper class	144	33
<b>Menarche</b>	Attained	269	61.7
	Not attained	167	38.3

**Table 2: Distribution of study participants in relation to the severity of the anemia (n=314).**

Severity of anemia	N	%
<b>Mild anemia</b>	89	28.3
<b>Moderate anemia</b>	215	68.5
<b>Severe anemia</b>	10	3.2
<b>Total</b>	314	100.0

**Table 3: Distribution of adolescent females in relation to anemia and diet (n=436).**

Variables	Anemic		Non anemic		Total		P value	
	N	%	N	%	N	%		
<b>Age (years)</b>	Early adolescence (10-14)	210	71.2	85	28.8	295	100	0.576
	Late adolescence (15-19)	104	73.8	37	26.2	141	100	
<b>Socio-economic status</b>	Lower middle class	3	60.0	2	40.0	5	100	0.001
	Middle class	46	54.8	38	45.2	84	100	
	Upper middle class	155	76.4	48	23.6	203	100	
	Upper class	111	77.1	33	22.9	144	100	
<b>Diet</b>	Vegeterian	14	87.5	2	12.5	16	100	0.128

Continued.

Variables		Anemic		Non anemic		Total		P value
<b>Religion</b>	Mixed	300	71.4	120	28.6	420	100	0.001
	Hindu	176	82.6	37	17.4	213	100	
	Muslim	122	61.6	76	38.4	198	100	
	Christian	16	64.0	9	36.0	25	100	
<b>Family composition</b>	Nuclear	200	73.3	73	26.7	273	100	0.455
	Joint	114	69.9	49	30.1	163	100	
<b>Menarche</b>	Attained	202	75.1	67	24.9	269	100	0.070
	Not attained	112	67.1	55	32.9	167	100	
<b>De-worming taken</b>	Yes	144	67.6	69	32.4	213	100	0.045
	No	170	76.2	53	23.8	223	100	
<b>Pallor</b>	Present	269	88.5	35	11.5	304	100	0.001
	Absent	45	34.1	87	65.9	132	100	

## DISCUSSION

Nutritional anemia is one of the most common micronutrient deficiencies in the world and is higher in adolescent females. Adolescence is a phase of rapid growth, which is marked by physical and mental transition. This study was done among adolescent girls in rural area of Dakshina Kannada district (Karnataka), which showed the prevalence of anemia as 72%. This study findings can be comparable with the study done by Premalatha et al in Chennai with the prevalence of anemia among adolescent girls as 78.75%.<sup>10</sup> Similarly, in a study done by Toteja et al in 16 districts of India, the overall prevalence was found to 90.1%.<sup>11</sup> The difference in prevalence rate of anemia in various studies may be due to different study setting and different method of haemoglobin estimation.

In the present study, maximum adolescent girls had moderate anemia as per WHO guidelines. Similarly, in the study by Siddharam et al had prevalence of moderate, mild and severe anemia was 54.92%, 45.2% and 4.92% respectively which was comparable to our study findings.<sup>12</sup>

The prevalence of anemia was slightly higher among late adolescent girls (73.8%) as compared to early adolescent girls (71.2%). Similar finding was observed in a study done by Chandrakumari et al in rural area of Tamil Nadu, which showed that prevalence of anemia was 52.4% in late adolescent girls as compared to 47.34% in early adolescent girls.<sup>13</sup> Even in the studies conducted by Kaur et al and Kishore et al, the prevalence of anaemia was reported higher among late adolescent girls than early adolescent girls.<sup>14,15</sup>

In this study the prevalence of anemia was high (75.1%) among females who had attained menarche as compared to females who had not attained menarche (67.1%). Similarly, in study done by Kaur et al, the prevalence of anemia was higher in those who had attained menarche when compared to those who had not attained.<sup>14</sup> In a Dutt et al study, the prevalence of anemia was higher in those who had attained menarche when compared to those who had not attained.<sup>16</sup>

Pallor was significantly associated with anemia among adolescent girls in this study. Similarly, in a study done by Kamble et al in Delhi among adolescent girls, showed that the pallor was present among 53.4% anemic girls which was significant.<sup>17</sup>

The strength of this study was haemoglobin estimation by Sahli's method. The limitation of this study was recall bias by the adolescent girls regarding menstrual history and history of any disease.

## Recommendations

Regular screening program for detecting anemia at the earliest should be carried out along with periodic free full medical check-up. Changes in life style, health promoting behaviour and consumption of a balanced diet among adolescent females should be encouraged.

## CONCLUSION

Anemia is a major public health issues among adolescent girls in rural areas of India. The present study showed higher prevalence of anemia among adolescent girls in rural area of Dakshina Kannada, and the prevalence of moderate anaemia was higher than mild and severe anemia. The factors like age, diet, menarche attained and presence of pallor was found to be associated with anaemia among adolescent girls. There is urgent need of corrective or therapeutic measures against nutritional anemia among adolescent girls. Health education should be given to adolescent girls regarding nutritional improvement and importance of Iron folic acid (IFA) supplementation.

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