Research Article

Prevalence and risk factors of anaemia among adolescent girls in rural area

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Abstract

Background: In India the proportion of population with anaemia is 74.3 percent. India is home to nearly 113 million adolescent girls between the ages of 11 and 18 years, and 90 per cent of them (i.e. 104 million girls) live in the 15 largest states of the country. The National Family Health Survey-3 (NFHS-3) data suggests that anaemia among adolescent girls (15–19 years) is 56 percent. This phase of life is also important due to the ever-increasing evidence that the control of anaemia in adolescent girls can be more easily achieved if a satisfactory iron status can be ensured. **Aims and Objectives:** 1. To study prevalence of anaemia among adolescents. 2. To study associated factors with anaemia. **Material and Methods:** Community based cross-sectional study was carried out among 378 adolescent girls during June 2012 to May 2013 by house to house survey. All the relevant information was collected in predesigned proforma to assess the demographic characteristics, socioeconomic variables. The clinical examination, anthropometric examination and estimation of haemoglobin were done. Haemoglobin was estimated by Sahli's haemoglobin meter. **Results:** Prevalence of anaemia in the adolescent girls was found to be 68.5%. Prevalence of anaemia was higher in late adolescent girls than in early adolescent girls. Age, lower socioeconomic status, BMI, parent's education were significantly associated with the anaemia in adolescent girls. **Conclusion:** Prevalence of anaemia among adolescent females was high in our rural study area.

Keywords: Adolescent girls, anaemia, BMI, education.

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INTRODUCTION

Globally, anaemia affects 1.62 billion people, which corresponds to 24.8% of the population. The prevalence of anaemia among non-pregnant is 30.2% of whom more than 90% live in the developing countries with highest prevalence in South Asia[1]. The National Family Health Survey-3 (NFHS-3) data suggests that anaemia among adolescent girls (15–19 years) is 56 percent[1].A multi-centric study by the ICMR showed that over 90% of adolescent girls throughout the country had some kind of anaemia[2]. Anaemia is a major health problem in Maharashtra. About half (48%) of women in Maharashtra are anaemic. Among adolescents, girls constitute a vulnerable group, particularly in developing countries because if such anaemic adolescent girls get traditionally married at an early age, they are exposed to a greater risk of reproductive morbidity and mortality. The nutritional anaemia in adolescent girls attributes to the high maternal mortality rate, the high incidence of low birth weight babies, high perinatal mortality in their further life[2]. The data on the prevalence of anaemia among the rural adolescents is scarce, particularly in a rural community setup. Meaningful programmes cannot be implemented without sufficient data. Therefore, the present study was undertaken to assess the prevalence of anaemia among adolescent girls who belonged to the rural communities.

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AIMS AND OBJECTIVES

1. To study prevalence of anaemia among adolescent girls.
2. To study associated factors with anaemia.

MATERIAL AND METHODS

The community based cross-sectional study was carried out at field practice area of Rural Health and Training Centre attached to Govt. Medical College and Hospital, Aurangabad during June 2012 to May 2013.

Sample size: The National Family Health Survey-3 (NFHS-3) data suggests that anaemia among adolescent girls (15–19 years) is 56 percent.[1] Sample size (n) was calculated with the help of formula[3] as below $n = P \times (100 - P) \times Z^2/ \varepsilon^2$ Where, P is anticipated population proportion = 56%, Relative precision (ε) = 5.6%, Confidence level = 95% and Z is confidence coefficient = 1.96.Thus the sample size derived was 378.

Ethical consideration: The ethical approval was obtained from the institutional ethical committee of Government Medical College of our city. Cooperation and informed consent was taken from authorities and respondents of the concerned area.

Inclusion criteria

1. Girls willing to participate in the study.
2. Girls residing in the study area

Exclusion criteria

1. Any active disease (acute or chronic) that could affect iron metabolism or cause anaemia through mechanisms other than nutritional deficiencies.
2. Recent hospitalization in past 6 weeks.
3. Girls with history of regular Iron and folic acid supplementation for more than 1 month.
4. Any patient with a documented history of gastrointestinal bleeding or perforation of ulcer in last 6 months.
5. Previous history of hypersensitivity to Iron supplementations.
6. History of blood loss due to accidents

The pilot study was conducted during June 2012 to test the predesigned proforma and to find out the feasibility of the study. The study was conducted during June 2012 to May 2013 by house to house survey, After explaining the purpose and nature of study to the head of family and adolescents and thereafter seeking the permission from head of the family, girls were interviewed, clinical examination done and anthropometric measurement were recorded. The proforma was designed to assess the demographic characteristics, socioeconomic variables. Girls were also questioned about diet, history of menstrual problems and symptoms of anaemia like fatigue and dyspnoea. All girls were clinically examined for signs of anaemia, general and systemic examination was done in presence of female member of house. The clinical examination, anthropometric examination and estimation of haemoglobin were done by investigator himself. Haemoglobin was estimated by Sahli'shaemoglobin meter.

Training of the investigator

Investigator himself had undergone formal training for clinical examination in the department of medicine and for haemoglobin estimation in the department of physiology of the government medical college before undertaking the study, so that the accuracy was ensured in the study. Information regarding population of study area was collected form national informatics centre. Estimated population of the studied area was 34,000 during 2012-2013. According to UNICEF 2011, population of adolescent girls was (11.23%)[4]. On the basis of this information, investigator selected every 10th house to cover the entire population for achieving desired sample size of 378. If study subject not found at 10thhouse, immediate next house was considered till the desired subject obtained.

OBSERVATIONS AND RESULTS

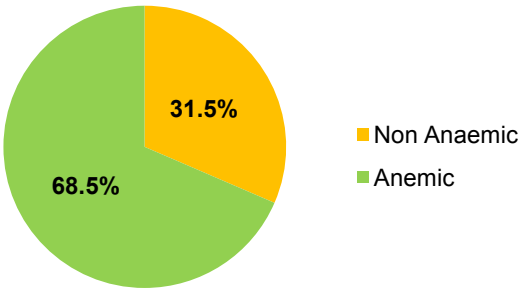

Figure 1: Prevalence of Anaemia among adolescent girls

Graph 1 represents the distribution of anaemia in adolescent girls.259 (68.5%) were anaemic and 119 (31.5%) girls were non-anaemic. Prevalence of anaemia in the adolescent girls was found to be 68.5%.

Table 1: Age wise distribution of anaemia according to severity in adolescents

Age in Years	Non-anaemic	Mildanaemic	Moderate anaemic	Total
10-11	44 (34.4%)	57 (44.5%)	27 (21.1%)	128 (100%)
12-13	34 (40%)	34 (40.0%)	17 (20.0%)	85 (100%)
14-15	22 (30.6%)	24 (33.3%)	26 (36.1%)	72 (100%)
16-17	13 (22.8%)	20 (35.1%)	24 (42.1%)	57 (100%)
18-19	6 (16.7%)	13 (36.1%)	17 (47.2%)	36 (100%)
Total	**119 (31.5%)**	**148 (39.2%)**	**111 (29.4%)**	**378 (100%)**

(Figures in parenthesis denotes row wise percentage, Chi square= 21.79, df=8, p=0.005, Calculated by combining columns of moderate and severe anaemic) High percentages of subjects suffering from moderate anaemia (60.36%) were in the age groups of 14-19 years as compare to (39.64%) age group of 10-13 years. High percentages of subjects suffering from mild anaemia (61.49%) were in the age group 10-13 years as compare (38.57%) to age 14-19 years. This can be attributed to the onset of menstruation after 13 years of age which further deteriorated the already existing low iron status in adolescent girls. In our study we found that only 0.80% of adolescent girls were having severe anaemia which is shown graphically in graph 2.

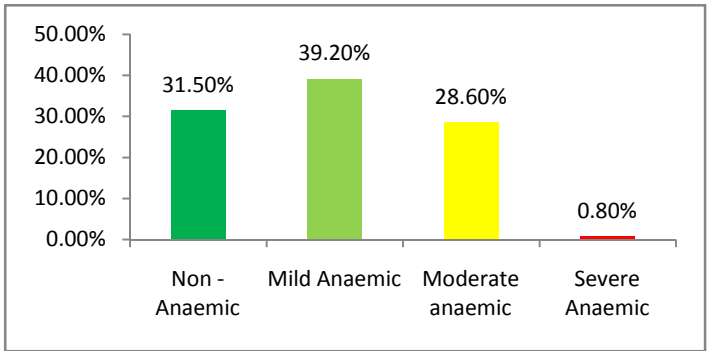

Figure 2: Distribution of anaemia according to severity in girls

Above graph shows severity of anaemia in girls. Out of 378, 148 (39.2%) were in category of mild anaemia, followed by moderate anaemia 108 (28.6%) and severe anaemia 3 (0.8%).In the present study it was observed that most of the girls were suffered from mild anaemia (39.2%).

Table 2: Distribution of anaemia in adolescent girls according to socio-demographicvariables

Variable		Non-anaemic	Anaemic	Total	P value
Age Category	Early Adolescents (10-14 yrs)	91 (36.70%)	157 (63.30%)	248 (100%)	0.003
	Late Adolescents (15-19 yrs)	28 (23.54%)	102 (78.46%)	130 (100%)	
Education	Primary School	39 (32.77%)	80 (67.23%)	119 (100%)	0.20
	Middle School	78 (32.23%)	164 (67.77%)	242 (100%)	
	High School	2 (11.76%)	15 (88.23%)	17 (100%)	
Type of Family	Nuclear	90 (31.25%)	198 (68.75%)	288 (100%)	0.862
	Joint	29 (32.33%)	61 (67.77%)	90 (100%)	
SES	Upper Middle (II)	35 (50.72%)	34 (49.28%)	69 (100%)	< 0.001
	Lower Middle (III)	39 (34.82%)	73 (65.18%)	112 (100%)	
	Upper Lower (IV)	45 (22.95%)	151 (77.05%)	196 (100%)	
	Lower (V)	0	1 (100%)	1 (100%)	
Diet Nature	Mixed	69 (37.5%)	115 (62.50%)	184 (100%)	0.014
	Vegetarian	50 (25.80%)	114 (74.20%)	194 (100%)	
Girl's Menarche Status	Pre menarche	86 (30.05%)	140 (61.95%)	226 (100%)	0.001
	Post menarche	33 (21.73%)	119 (78.27%)	152 (100%)	
Menorrhagia	Absent	119 (32.51%)	247 (67.49%)	366 (100%)	
	Present	0	12 (100%)	12 (100%)	
Mean BMI		19.98 ± 1.97	18.30 ± 1.68		< 0.001

Above table shows that there is significant association between anaemia in adolescent girls and late adolescent age (78.46 %), lower socioeconomic status (77.05%),, vegetarian diet (74.20%), and post menarche (78.27%). The mean BMI of anaemic girls were 18.30 ±1.68 and of non- anaemic girls were (19.98 ± 1.97). 48.1% of the girls were under nourished with body mass index less than 18.50% .BMI shows significant association with anaemia (p<0.001).

Table 3: Distribution of anaemia in adolescent girls according to their parent's education status

Variable		Non-anaemic	Anaemic	Total	P value
Father's Education	Illiterate	18 (23.08%)	60 (76.92%)	78 (100%)	P = 0.001
	Primary School	34 (30.09%)	79 (69.91%)	113 (100%)	
	Middle School	26 (33.33%)	52 (66.67%)	78 (100%)	
	High School	11 (36.66%)	19 (63.33%)	30 (100%)	
	Intermediate	11 (25.58%)	37 (74.42%)	43 (100%)	
	Graduate	17 (80.95%)	4 (19.05%)	21 (100%)	
	Total	117 (31.80%)	251 (68.20%)	368 (100%)	
Mother's Education	Illiterate	16 (17.39%)	76(82.61%)	92 (100%)	P = p<0.001)
	Primary School	45(31.69%)	97(68.31%)	142(100%)	
	Middle School	24(28.91%)	59(71.09%)	83 (100%)	
	High School	14(53.85%)	12(46.15%)	26 (100%)	
	Intermediate	10(41.66%)	14(58.34%)	24 (100%)	
	Graduate	10(90.90%)	1(09.10%)	11 (100%)	
	Total	**119(31.50%)**	**259(68.50%)**	**378 (100%)**	

There is a significant association between Father's Education and anaemia in the adolescent females (chi square = 28.445, p= 0.001) Among 78 illiterate fathers 60 (76.92%) adolescent girls had anaemia. Among 21 graduated fathers, 4(19.05%) girls had anaemia. There is a significant association between Mother's Education and anaemia in the adolescent females (chi square = 34.46, p<0.001).Above table observe that among 92 illiterate mothers 76 (82.61%) adolescent girls had anaemia. Among 11 graduated mothers, only 1 (9.10%) girls had anaemia.

DISCUSSION

Prevalence of anaemia among adolescent girls was found to be 68.5%.Similar results were documented previously by Kaur*set al*[5]with 59.8%.prevalence of anaemia. Sharda S, Kanta K[6]reported 70.50% girls with anaemia. Baral KP, Onta SR[7] reported 78.3%.prevalence of iron deficiency anaemia among adolescent girls. Our results are also consistent with Dutt R, Patil S *et al* [8](61%), Chandra Sekhar*et al* [9](68.95%),Jayasree P, SushamabaiS *et al*[10]While some authors have reported low prevalence of anaemia among adolescent girls like Basu S, Hazarika R *et al*[11]reported 23.9% prevalence of anaemia among adolescent girls. Goel S, Gupta B[12]found that 13.3% girls were anaemic while Chaudhary SM *et al* [13] found 35.1% subjects were anaemic. In our study we found that high percentages of subjects suffering from moderate anaemia (60.36%) were in the age groups of 14-19 years as compared to 39.64% in age group of 10-13 years. High percentages of subjects suffering from mild anaemia (61.49%) were in the age group 10-13 years as compare (38.57%) to age 14-19 years. This can be attributed to the onset of menstruation after 13 years of age which further deteriorated the already existing low iron status in adolescent girls (table 1). Our findings are consistent with the study done by Goyle A, Prakash S[14]. Sharda S *et al*[6] showed the prevalence of anaemia increases with age and becomes maximum (78.57%) in the age group 15 and above. In our study we found that out of 378 adolescent girls, 148 (39.2%) were in category of mild anaemia, followed by moderate anaemia 108 (28.6%) and severe anaemia 3 (0.8%) (graph 2).Our findings are consistent with the studies done by Rajaratnam J *et al*[15],Sharda S *et al*[6]Chaudhary SM *et al*[13]and Goyle A, Prakash S[14]. Gupta A, Paraskar A *et al* [16]conducted study in 1596 adolescent girls of age (10-19 years). It was seen that among the anaemic adolescent girls, 77.3% had mild anaemia, 21.9% had moderate anaemia, and 0.9% had severe anaemia. Present study differs from the study done by Rawat CMS *et al*[17]who reported 19.0 % mild, 14.1 % moderate and 1.4 % severe anaemia in adolescent girls. In our study, we found that the prevalence of anaemia was higher (78.46%) in late adolescent girls than in early adolescent girls and this difference was statistically significant (p=0.003). Singh R [18]reported the prevalence of anaemia in the age group of 15-18 years was 37.6 per cent as compared to 35.4 per cent in the age group of 10-14 years. Biradar S *et al* [19]also observed that the prevalence of anaemia was high (60%) in late adolescents (15-19 yrs.) as compared to 38.9% in the early adolescents (10-14 yrs.). Gupta A *et al*[16]also found that the age of the adolescent girls shows a significant relation with the prevalence of anaemia. Iron deficiency anaemia

increased with advancing age of the adolescent girls. While results of studies done by Chaudhary SM *et al*[13] and Dutt R *et al*[8] are contrary to our study, Author's reported no significant association of age of adolescent girls and anaemia. Kapoor G, Aneja S[20] reported, anaemia was present in 51% of young girls (n = 68) compared to 38.5% (n = 39) in older girls. In our study we found more prevalence of anaemia in girls of lower socioeconomic status than in middle socioeconomic status and this difference was found to be statistically significant ($p< 0.001$). Our findings are consistent with studies done by Vasanthi J, Pawashe AB *et al*[21], Rawat CMS *et al*[17],Kaur S, Deshmukh PR, Garg BS [22], Chaudhary SM *et al*[13], Bharati P *et al*[23],Chandra Sekhar K [9], and Biradar S*et al*[19]. We did not found any association of anaemia in adolescent girls with their education status and type of family. While we found a significant association between anaemia and late adolescent age, vegetarian diet, menarchae status or menorrhagia. These findings are consistent with the previous studies done by various authors[,8,13,17,23,24.] In adolescent girls BMI shows significant association with anaemia (table 2). Chaudhary SM *et al*[13]also reported significant association between Hb concentration of adolescent girls and the body mass index. Premalatha T *et al*[26] reported that the prevalence was high in underweight girls. Jayasree P *et al*[10] reported that the increased prevalence in adolescent girls with lower BMI was found to be statistically significant. While some authors have found that the body mass index was not significantly associated with anaemia[16, 22.] There is a significant positive association between parent's education and the adolescent girl's anaemia (table 3). These findings are similar to the previous studies done by Chaudhary SM *et al*[13], Rajaratnam J *et al*[15] Rawat CMS *et al*[17] and Singh R.[18] While some studies reported that the educational level of parents did not show significant correlation with anaemia in adolescent girls.[22, 24 25]

CONCLUSION

The overall prevalence of anaemia among adolescent females was high in our rural study area (68.5%). Majority of girls were having mild anaemia in early adolescent age while in late adolescent girls moderate anaemia was more prevalent. This may be attributed to onset of menarche. Loss of blood during menstruation which leads to anaemia further increases the severity of anaemia who were already anaemic in late adolescent girls. Prevalence of anaemia decreases with an increase in educational status of girls. An inverse relation was found between anaemia and socioeconomic status. In this study body mass index have an association with anaemia. Also parent's education status is significantly correlated with anaemia in adolescent girls.

RECOMMENDATIONS

These results warrant a need for a special attention to anaemia among this age group, and eventually encourage the development of directed educational and nutritional programs to safeguard the well-being of these future mothers.

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