Original article:

Prevalence and factors influencing anaemia among adolescent females in rural area of South India

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Abstract

Background: Anaemia during adolescence not only affects the growth and development of girls but also reduces their concentration in their routine tasks, limits their learning ability which might lead to dropping out of school. The reports of many studies conducted in India had shown the prevalence of anaemia among adolescents varied between 33% - 90%.

Aim: To assess the prevalence of anaemia and its associated factors among adolescent females and also to study the spectrum and type of anaemia.

Methodology: A cross sectional observational study was conducted at the government medical college hospital of Salem district for a period of one year (March 2016 to Feb 2017) among the adolescent girls in the age group of 13 to 19 years attending the out-patient clinic. A total of 428 adolescent girls were screened for anaemia. Hemoglobin estimation was done by the cyanmethaemoglobin method. For typing of anaemia, a thin blood smear was prepared on a prenumbered clean glass slide and allowed to dry. Smears were stained with Leishman's stain and examined under the high power of the microscope.

Results: Out of 428 adolescent girls 361 (84.3%) were found to be anemic. Based on the WHO grading of anaemia majority of the adolescent girls were mild anemic (68.6%), 30% of them were moderately anemic and only 1% of the study subjects were severely anemic. Parents educational status, socio-economic status, total number of siblings, menarche, increased menstrual flow and passing of intestinal worms were the factors which had influenced anemia in the study subjects. Among the various types of anaemia the most common type was found to be microcytic hypochromic anaemia (88.3%), dimorphic anaemia is seen in 7.2% of the study subjects and normocytic normochromic was seen in 3.8% of the adolescent girls.

Conclusion: Our study had also shown iron deficiency anaemia is the most common type of anaemia which is mainly due to nutritional deficiency. So, there is need to develop strategies for intensive adult education and to improve the socio-economic status of the population through poverty alleviation programs and it should be supported by programs for the prevention of anaemia among adolescent girls through nutrition education and anaemia prophylaxis.

Keywords: anaemia, adolescents, prevalence, iron deficiency.

Introduction:

Anaemia is one of the most common nutritional problems prevailing worldwide and the commonest cause for it is iron deficiency. Its prevalence is highest among young children and women of childbearing age; particularly in pregnant and lactating women.[1] The prevalence of anaemia is disproportionately high in the developing countries when compared to developed countries, the reason would be poverty, inadequate diet, worm infestations, poor access to the health services and lack of awareness.[2] In country like India

adolescents particularly girls remain a largely neglected and hard to reach population.[3]

The word adolescence is derived from the Latin word, 'adolescere' which means to grow or to mature.[4] The WHO has defined adolescence as the age period between 1sssss0 to 19 years of age for both the sexes (married and unmarried). There are about 1.2 billion adolescents in the world, which is equal to 1/5th of the world's population and their numbers are increasing. Out of these, 5 million adolescents are living in developing countries. India's population has reached the 1 billion mark, out of which 21% are adolescents.[5]

Anaemia during adolescence not only affects the growth and development of girls but also reduces their concentration in their routine tasks, limits their learning ability which might lead to dropping out of school. Further it also causes loss of appetite resulting in reduced food intake and irregular menstrual cycles, and reduces physical fitness and their work productivity. Moreover, anaemia during adolescence influences women's entire life cycle since anemic girls will have lower pre pregnancy iron stores, which would lead to complications in bother the mother and the infant during their antenatal period. Today one of the most common for maternal mortality and infant mortality due low birth weight babies is anaemia during pregnancy.[6] Overall health status of a person is judged on level of hemoglobin of a person. As anaemia is classified into three degree according toWHO: mild, moderate and severe. Hb cut-off values ofanaemia were 10.0-11.9 g/dl (mild), 7.0-9.9 g/dl (moderate)and <7.0g/dl (severe).[7] A recent report from UNICEF says more than half ofadolescent girls in India are anemic. Malnourishment amongIndia's as adolescent population is found to be higher thaneven some of the least developed countries Sub-SaharanAfrica.[2] The reports of many studies conducted in India had shown the prevalence of anaemia varied between 33% - 90%[8] based on the degree of anaemia., a recent study from TamilNadu had shown the prevalence as 45%.[9]

Though many studies had been conducted for assessing the magnitude of anaemia among adolescent females most of them have not targeted the rural population particularly and was mostly subjective, so this study was undertaken mainly on the rural adolescent females and apart from clinical assessment laboratory assessment was made to grade the anaemia among the adolescent girls.

Aim:

To assess the prevalence of anaemia and its associated factors among adolescent females and also to study the spectrum and type of anaemia.

Methodology:

A cross sectional observational study was conducted at the government medical college hospital of Salem district for a period of one year (March 2016 to Feb 2017) among the adolescent girls in the age group of 13 to 19 years attending the out-patient clinic. Adolescent girls who were free from any chronic illness and had come as an outpatient for mild acute illness or had come as an attendant were included in the study. The study was started after getting the clearance from the institutional ethical committee. After getting informed consent, information regarding socio-demographic and menstrual factors was recorded in pre-designed, pre - tested proforma. Socio-demographic status was estimated by modified Kuppuswamyclassification. This was followed by a clinical examination of the subject including height and weight. For hemoglobin estimation, 20 μl of capillary blood was taken in a hemoglobinometer pipette and transferred to a prenumbered glass bottle containing 5 ml Drabkins reagent. Hemoglobin estimation was done by the cyanmethaemoglobinmethod using a Klett-

Summerson photoelectric colorimeter with green filter (500-570 nm wave length). For typing of anaemia, a thin blood smear was prepared on a prenumbered clean glass slide and allowed to dry. Smears were stained with Leishman's stain and examined under the high power of the microscope. An expert opinion of a pathologist was sought while examining the slides. The next day, the results of the hematological investigations were conveyed to the subjects and those found to have anaemia were given appropriate treatment and advice regarding proper diet. For interpretation of anaemia, cut off point for Hemoglobin concentration was taken as <12 gm/dl. The severity of anaemia was graded as mild (10 to <12gm /dl), moderate (7 to <10 gm /dl) and severe (<7 gm /dl).

Results:

A total of 428 adolescent girls were screened for anaemia and among them 361 (84.3%) were found to be anemic. Based on the WHO grading of anaemia majority of the adolescent girls were mild anemic (68.6%), 30% of them were moderately anemic and only 1% of the study subjects were severely anemic (table 1). Table 2 shows the socio-demographic characteristics of the study subjects. The father's and mother's educational status had shown a strong association towards anaemia among adolescent girls. Majority of the girls who were anemic, their parents educational status was either up-to primary level or they were not literate and this association was found to be statistically significant. The socio-economic status of the study subjects was assessed by using modified kuppuswamy classification and in that all the study subjects were either belonging to upper lower (class IV) or lower class (class V), and in that majority of the anemic girls were from lower class

and the difference was found to be statistically significant. Number of siblings to the adolescent girls had also influenced the anemic status, among the adolescent girls having more than 2 siblings the prevalence of anaemia was found to be more than the adolescent girls having less than 2 siblings and the difference was found to be statistically significant.

Among the dietary pattern vegetarian diet or mixed diet did not have any association towards development of anaemia among the adolescent girls. In our study 86.5% of the girls had attained menarche and in that 88.5% of them had increased menstrual flow and both these factors had shown a statistical significant association (p<.05) with anaemia among the adolescent girls. 59 girls in our study had the history of passing worms in stools and among them 88% were found to be anemic and this had shown a strong significant association between passing worms in stools and anaemia. Majority of the adolescent girls with the history of lethargy were found to be anemic. The mean height and weight of the adolescent girls with anaemia was found to be lower than those girls without anaemia and the difference was found to be statistically significant (table 3). A peripheral smear study was done to identify the type of anaemia among the adolescent girls. Among the various types of anaemia the most common type was found to be microcytic hypochromic anaemia (88.3%), which indicates iron deficiency anaemia and nutritional insufficiency is the most common cause for it. Dimorphic anaemia is seen in 7.2% of the study subjects and normocytic normochromic was seen in 3.8% of the adolescent girls. Only two of them had features suggestive of haemolytic anaemia (table 4).

260

Table 1: Grading of anaemia among the study population.

Grading of anaemia	Frequency	Percentage
Mild	248	68.6%
Moderate	109	30.1%
Severe	4	1.1%
Total	361	100%

Table 2: Socio-demographic characters influencing anaemia among the study subjects

Socio-demographic characters		Total number of adolescent girls	Number of adolescent girls with anaemia	P value
Fathers education	Not literate	61	55 (90.1%)	**0.024**
	Primary	181	168 (92.8%)	
	Middle school	162	132 (81.4%)	
	Higher secondary and above	24	6 (25%)	
Mothers education	Not literate	83	72 (86.7%)	**0.017**
	Primary	241	218 (90.4%)	
	Middle school	94	68 (72.3%)	
	Higher secondary and above	10	2 (20%)	
Socio-economic class	Upper lower (class IV)	173	139 (80.3%)	**0.003**
	Lower (class V)	255	222 (87%)	
Number of siblings	<2	378	312 (82.5%)	**<.0001**
	>2	50	49 (98%)	

P value derived by applying Chi-square test

Table 3: Personal factors influencing anemia among the study subjects

Personal factors		Total number of adolescent girls	Number of adolescent girls with anaemia	P value
Dietary habits	Veg	16	14 (87.5%)	0.0851
	Mixed diet	412	347 (84.5%)	
Menarche	Attained	404	350 (86.6%)	**<.0001**[*]
	Not attained	24	11 (45.8%)	

Increased menstrual flow	Present	220	194 (88.1%)	0.0316[*]
	Absent	184	156 (84.7%)	
H/O passing worms in stools	Present	59	52 (88.1%)	0.0272[*]
	Absent	369	309 (83.7%)	
H/O lethargy	Present	376	350 (93%)	<.0001[*]
	Absent	52	11 (21.1%)	
Mean weight		34.2 ± 4.3	31.3 ± 4.8	<.0001[**]
Mean height		145.5 ± 9.7	140.2 ± 11.2	<.0001[**]

*- p value derived by applying chi-square test

**- p value derived by applying student T test.

Table 4: Distribution of study subjects based on the type of anemia

Type of anemia	Frequency	Percentage
Microcytic Hypochromic anemia	319	88.3%
Dimorphic anemia	26	7.2%
Hemolyticanemia	2	0.5%
Normocytic normochromic anemia	14	3.8%
Total	361	100%

Discussions:

Anaemia during the adolescence period will influence the entire life cycle of a women. It also has negative consequences in their survival and growth, particularly it would have a major effect during their child bearing period which would invariably affect the new-born. To improve the health of the adolescent females, the Government of India has created health programmes targeting them which is incorporated in the RCH package since 1997.[10] To address the problem of anaemia among the adolescent females the Government of India started Adolescent Girls anaemia Control Program with technical support from UNICEF. In the base line survey for the program by UNICEF, 65- 99% of adolescent girls were found anemic, at various states of country.[11] The present study indicates that the prevalence of anaemia was 84.3%, Toteja G S et al[12] reported 90.1% prevalence of anaemia among adolescent girls from 16 districts of India which is almost similar to the present study and a higher prevalence of 96.5%

was reported by a study done by R Gawarika et al.[13] A Variable prevalence (23.9%-81.8%) of anaemia in adolescent girls has been reported in different studies.[14-16]

In a study which was conducted in rural Tamilnadu, the prevalence of severe anaemia was found to be 2%, that of moderate anaemia was 6.3% and that of mild anaemia was 36.5%.[9] Similar results were seen in a study which was conducted in three districts of Orissa to assess the haemoglobin status of non-school going adolescent girls, in which it was revealed that 96.5% of the subjects were anaemic, of which, 45.2%, 46.9% and 4.4% were found to have mild, moderate and severe anaemia respectively.[17] Another study which was conducted in rural Wardha showed the prevalence of severe, moderate and mild anaemia to be 0.6%, 20.8% and 38.4% respectively.[2] Our results are also similar to these studies where we found 68.6% to be in mild anaemia, 30% in moderate anaemia and 1% of them were severe anemic. Parents educational status was

262

significantly associated with the prevalence of anaemia among school adolescents in the present study. School adolescents who had parents with educational status of illiterate and primary school were more likely to be anemic as compared to school adolescents who had parents with educational status of above the secondary level. This might be due to the reason that if the parents are educated they would be able to make informed decisions about their own family regarding the diet and improving their nutritional status. Rawat CMS et al have reported similar findings that a significant higher prevalence of anaemia in adolescent girls of illiterate or just literate mothers, which indicates better awareness among literate mothers.[18]Rajaratnam et al also had observed significant association of presence of anaemia with parent's educational status, particularly mother's education.[9] In our study almost all the study subjects either belong to lower class or upper lower and the prevalence of anaemia was significantly higher in lower socio-economic group than the upper lower (P = 0.0031). Kaur S et al had also observed the similar findings that girls with lower socio-economic status were associated with increased likelihood of anaemia compared to girls with higher socioeconomic status.[2]

A significant association was found between anaemia and menarche and particularly in excessive menstrual bleeding in our study (p=0.0316). Similar findings was also found by Kaur S et al.[2] The present study did show any association between the dietary pattern and prevalence of anaemia whereas there was a strong statistical significant association between passing of worms and anaemia, and the same was also proven by the study done by Pattnaik S etal.[19] The current study had shown that the height and weight was found to have a significant association with anaemia, the mean weight and height of the anemic

girls were lower than the girls without anaemia. Similar type of results was also highlighted in the study done by Leenstra T etal[20] and Alaofe H etal.[21]Sidharam et al also reported the similar association between anaemia and BMI.[22] Among the various types of anaemia the present study had shown that 88.3% were found to have microcytic hypochromic anaemia and 7% were having dimorphic anaemia and these results were almost similar to the study done by Sanjeev M Chaudhary,[23] whereas in another study done by Khanduriet al he found megaloblasticanaemia was more common in the age group of 10 – 30 years and it was particularly more prevalent among females.[24] Although many studies had been conducted on prevalence of anaemia only very few studies had done the investigation of peripheral smear to identify the type of anaemia and the present study was one among them. One of the limitation of the present study was serum ferritin levels to measure the exact iron stores was not assessed due to the logistic reason as this would have given an additional weightage to the study.

Conclusion:

The current study indicates that the overall prevalence of anaemia among adolescent females was found to be 84.3%. Factors like parents education, socio-economic status and number of siblings had a strong statistical significant association along with some of the personal characters like meanarche, increased menstrual blood flow, passing of worms in stools and under-nutrition were found to have a strong statistical significant association with prevalence of anaemia. Our study had also shown iron deficiency anaemia is the most common type of anaemia which is mainly due to nutritional deficiency. So, there is need to develop strategies for intensive adult education and to improve the socio-economic status of the population through poverty alleviation

263

programs and it should be supported by programs for the prevention of anaemia among adolescent girls through nutrition education and anaemia prophylaxis.

References:

1. Shah BK, Gupta P. Weekly vs daily iron and folic acid supplementation in adolescent Nepalese girls. Arch PaediatrAdolesc Med 2002; 156:131-35.

2. Kaur S, Deshmukh PR, Garg BS. Epidemiological correlates of nutritional anaemia in adolescent girls of rural Wardha. Indian J Community Med 2006; 31:255-58.

3. Chatterjee R, Nutritional needs of adolescents. Paediatrics Today 2008;3: 110-14.

4. Nayar PD, Mehta R. Child Health. In: Gupta P, Ghai OP, Editors. Textbook of Preventive and Social Medicine. 2nd ed. New Delhi: CBS Publishers and Distributors; 2007; 428-37.

5. Mathur JSS. Preventive and Social Medicine, A comprehensive text book.1st ed. New Delhi: CBS Publishers and Distributors; 2007; 382-89.

6. Vineeta Gupta, Pravin S. Chavhan, S. P. Singh, LaxmikantUmate. Prevalence of Anemia among Adolescent Girls in Rural Population of Rajnandgaon, Chhattisgharh, India. JMSCR.2017.Volume 05(2) pp 17369-72.

7. A.K.Sinha,G.M.SinghKarki prevalence of anemia among adolescent s in Biratnangar, Morang, Dist.Nepal. A International journal of pharmaceutical and biological archives 2012;3[5];1077-1081.

8. Kishore J. National Health Programs of India. 2006. 6th ed.New Delhi: Century Publications; 82-84.

9. Rajaratnam J, Abel R, Asokan JS, Jonathan P. Prevalence of anaemia among the adolescent girls of rural Tamil Nadu. Indian Pediatric.2000; 37:532-36.

10. MeenalVinay Kulkarni1, P M Durge2, N B Kasturwar3. Prevalence OfAnemia Among Adolescent Girls In An Urban Slum. National Journal of Community Medicine Vol 3 Issue 1 Jan-March 2012.

11. Programming for adolescent health and development: WHO Tech.Rep.Sr.no 886; 1996. 2.

12. Toteja GS, Singh P, Dhillon BS et al. Prevalence of anemia amongst pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull. 2006; 27:311-316.

13. Gawarika R, Gawarika S, Mishra AK. Prevalence of anemia in adolescent girls belonging to different economic groups. Indian J Community Med.2006;31:287-288.

14. Basu S, Basu S, Hazarika R et al. Prevalence of anemia among school going adolescents of Chandigarh. Indian Pediatr. 2005; 42:593-97.

15. Rawat CMS, Garg SK, Singh JV et al. Sociodemographic correlates of anaemia among adolescent girls in rural area of district Meerut. Indian J Community Med.2001; 26:173-175.

16. Choudhary SM, Dhage VR. A study of anemia among adolescent females in urban area of Nagpur. Indian J Community Med.2008; 33:243-245.

17. Bulliyy G, Mallic G, Sethy GS, Kar SK. Hemoglobin status of non-school going adolescent girls in three districts of Orissa, India. Int J Adolesc Med Health 2007;19: 395-406.

18. Rawat CMS, Garg SK, Singh JV et al. Sociodemographic correlates of anaemia among adolescent girls in rural area of district Meerut. Indian J Community Med, 2001; 26:173-175.

19. Pattnaik S, Patnaik L, Kumar A, Sahu T. Prevalence of Anemia among adolescent girls in a rural area of Odisha and its epidemiological correlates. Indian Journal Of Maternal And Child Health,2012. Jan – Mar 15(1).

20. Leenstra T, Kariuki S, Kurtis J, et al. Prevalence and severity of anemia and iron deficiency: cross-sectional studies in adolescent schoolgirls in western Kenya. Eur J ClinNutr. 2004;58:681–691.

21. Alaofe H, Zee J, Dossa R, et al. Iron status of adolescent girls from two boarding schools in southern Benin. Public Health Nutr. 2008;11(7):737–746.

22. Siddharam SM, Venketesh GM, Thejeshwari HL. A study of anemia among adolescent girls in rural area of Hassan district, Karnataka, South India. Int J Biol Med Res 2-924.

23. Sanjeev M Chaudhary, Vasant R Dhage. A study of anemia among adolescent females in the urban area of Nagpur. IJCM.2008. Vol 33 (4) 243-45.

24. Khanduri U, Sharma A. Megaloblastic anaemia: Prevalence and causative factors. Natl Med J India 2007;20:172-5.

265