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Research Article

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Nutritional anaemia in adolescent girls: an epidemiological study

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ABSTRACT

Background: Adolescents are the future generation of any country and their nutritional needs are critical for the well-being of the society. The present study was undertaken to find out the magnitude of anaemia in adolescent girls in rural areas of district Amroha, Uttar Pradesh, India and to study the socio-demographic and nutritional factors related to anaemia.

Methods: This community based, cross-sectional study was conducted in among 604 unmarried adolescent girls in the age group 13-19 years using simple random sampling. A pre-tested and pre-designed schedule was used to collect the information. Chi-square test was applied to analyse data using SPSS software.

Results: Out of 604 subjects, 418 (69.2%) subjects were anemic. Majority (39.7%) had mild anaemia while 28.3% had moderate anaemia and 1.2% had severe anaemia. A higher proportion (42.1%) of the anemias were aged between 13-15 years Significant associations of Anaemia was found among those belonging to the low socioeconomic status, increased family size and less parents education

Conclusions: It is important to strengthen health education on the consumption of iron rich foods and proper implementation of intervention programs that would increase the hemoglobin levels among the adolescents age group through prophylaxis treatment, dietary modification and helminthes control.

Keywords: Anaemia, Adolescents, Girls, Rural, Hemoglobin

INTRODUCTION

World health organization has defined 'adolescence' as a period between 10 and 19 years. Adolescence is a vulnerable period in the human life cycle for the development of various nutritional disorders particularly nutritional anaemia. In girls it has been recognized a special period of transition from girlhood to womanhood. Adolescent girls constitute one fifth of the female population in the world. The prevalence of anaemia in adolescents is disproportionately high in developing countries. During this stage the requirement of nutrition and micronutrients is relatively high. Therefore, adolescents, especially girls, particularly those between the ages of 12-15 years, are vulnerable to iron deficiency

mainly because requirements are at a peak.² The other major responsible factors behind this scenario of high risk of iron deficiency and anaemia are poor dietary intake of iron, high rate of infection, poverty, certain diseases, worm infestations as well as the social norm of early marriage, adolescent pregnancy and poor access to health services.

The nutritional anaemia in this group attributes to high MMR, high incidence of low-birth weight babies, high perinatal mortality and fetal wastage and consequent high fertility rates. Anaemia also has a negative effect on the cognitive performance in adolescents. Thus anaemia has major consequences on human health as well as social and economic development. Adolescence is also

important due to the ever-increasing evidence that control of anaemia in pregnant women may be more easily achieved if satisfactory iron status can be ensured during this phase of life.² Adolescents are the future generation of any country and their nutritional needs are critical for the well-being of the society. Several factors affect the nutritional status of adolescents. Among these, socioeconomic and demographic factors are associated with worldwide patterns of nutritional anaemia. Although various health problems of the adolescents have been addressed, there is paucity of data regarding nutritional anaemia particularly in rural areas of district Amroha, Uttar Pradesh, India therefore the present study was undertaken to find out the magnitude of anaemia in adolescent girls in rural areas of district Amroha, Uttar Pradesh, India and to study the socio-demographic and nutritional factors related to anaemia.

METHODS

This community based, cross-sectional study was carried out after obtaining permission from institutional ethical committee, in four most populous villages; namely, Bhajanpuri, Pachokara, Mau & Sirsa of district Amroha, Uttar Pradesh, India under rural field practice area of department of community medicine from August 2014 to December 2014. All unmarried, non-pregnant and nonlactating adolescent girls in the age group 13-19 years in the study area were covered. Considering the prior prevalence rate of anaemia in adolescent girls as 56%, with 4% error, the estimated sample size was 592.³ The total number of adolescent girls selected from each village was 151. Simple random sampling was used to select the individuals from each village. The first household was selected randomly by using lottery method. Thereafter, the other subjects were interviewed in sequence till the desired sample size was achieved. A total of 604 adolescent girls were interviewed after taking their informed consent.

A pre-tested and pre-designed performa was used to collect the information on socio-demographic

characteristics like age, educational status, family size, family type, monthly family income, parental educational status, history of worm infestation, history of intake of iron supplements and dietary history. Height, weight and hemoglobin were recorded. Hemoglobin estimation was done using cyanmethaemoglobin method. For interpretation of anaemia, cut-off point for hemoglobin level taken was 12 g/dl. The severity of anaemia was graded as mild (11-11.9 gm/ dl), moderate (8-10.9 gm/dl) and severe (<8 gm/dl). Data was entered and analyzed in SPSS version 20.0. Chi-square test was applied. The differences were considered as significant at a p value of <0.05.

RESULTS

Out of 604 subjects, 418 subjects (69.2%) study subjects were anemic. Majority of anemic subjects showed mild grade of anaemia. 240 subjects (39.7%) had mild anaemia while 171 subjects (28.3%) had moderate anaemia. Only 1.2% of the study subjects had severe anaemia (Table 1).

Table 1: Distribution of adolescents according to grade of anaemia.

Anaemia (grade)	Number	Percentage (%)
Severe anaemia	7	1.2
Moderate anaemia	171	28.3
Mild anaemia	240	39.7
No anaemia	186	30.8
Total	604	100.0

Age wise distribution of anemic revealed that overall maximally affected age group was 15-17 years followed by 17-19 years age group. In age group 13-15 most of the cases belong to mild anaemia (34.3) whereas in 15-19 years most of the cases fall in moderate category of anaemia. Age wise variation in anaemia occurrence was found statistically insignificant (p value 0.053) (Table 2).

Table 2: Age wise distribution of anemic adolescents.

Age group (years)	No anaemia	Grading of	f anaemia (n=418)	Chi Ca (df) n value	
		Severe	Moderate	Mild	Chi-Sq (df), p-value
13-15 (n= 274)	98 (35.8)	2 (0.7)	80 (29.2)	94 (34.3)	
15-17 (n= 184)	48 (26.1)	2 (1.1)	82 (44.5)	52 (28.3)	5.88 (2)
17-19 (n= 146)	40 (27.4)	3 (2.1)	62 (42.4)	41 (28.1)	0.053
Total	186	7	171	240	

Most favourable factors for anaemia occurrence were found to be low socioeconomic status, joint family, family size >4, parents education less than or equal to primary school and working status of mothers. Effect of

socioeconomic class on anaemia was clearly seen in the study. Maximum occurrence was in class IV and V (71.7% and 71.1% respectively). Anaemia was more prevalent in lower socioeconomic class than in higher

classes. This inverse relation was also found statistically significant. Statistically significant association was found also with mother's educational status (p value 0.007),

father's educational status (p value 0.041) and family size (p value 0.002) (Table 3).

Table 3: Socio demographic correlates of anaemia.

Socio demographic	Total (n=604)			Chi-square (df)	P-value	
characteristics	No. studied	No. of anemics (n=418)	%	Cili-square (ui)) P-value	
Socio-economic class (Applying modified Prasad's classification)						
I	7	2	28.6		0.002	
II	29	12	41.4			
III	232	164	70.7	17 (4)		
IV	184	132	71.7			
V	152	108	71.1			
Type of family						
Nuclear	176	120	68.2	0.122 (1)	0.727	
Joint	428	298	69.6	0.122 (1)		
Family size						
≤4	146	86	58.9	9.59 (1)	0.002	
>4	458	332	72.5	9.39 (1)		
Mothers' education						
Up to primary school	398	290	72.9	7 22 (1)	0.007	
Above primary school	206	128	62.1	7.33 (1)		
Fathers' education						
Up to primary school	228	169	74.1	4.16 (1)	0.041	
Above primary school	376	249	66.2	4.10 (1)		
Mother's occupation						
Working	286	202	70.6	0.517 (1)	0.472	
Non working	318	216	67.9	0.517 (1)		

Nutrition correlates plays an important role in anaemia prevalence. The study shows that occurrence of Anaemia was significantly associated with positive history of

worm infestation, negative history of taking iron supplement and vegetarian diet (p value 0.000) (Table 4).

Table 4: Nutritional correlates of anaemia among adolescents.

Variables	Total (n=604)			Chi-square (df)	P-value	
	No. Studied	No. of anemic (418)	Percentage	om square (ur)	1 varac	
History of worm infestation						
Absent	418	270	64.6	12 5 (1)	0.000	
Present	186	148	79.6	13.5 (1)		
History of taking iron supplement						
Absent	426	357	83.8	145 (1)	0.000	
Present	178	61	34.3	145 (1)		
Dietary habits						
Vegetarian	398	302	75.9	24.4.(1)	0.000	
Non-vegetarian	206	116	56.3	24.4 (1)	0.000	

DISCUSSION

The overall prevalence of anaemia was found to be 69.2% in this study. Similar prevalence was reported by

Rajaratnam et al in Tamil Nadu.⁶ National family health survey (NFHS) 3 estimates reveal the prevalence of anaemia to be 65-75% in adolescent girls.³ WHO/UNICEF has suggested that the problem of

anaemia is of very high magnitude in a community when prevalence rate exceeds 40%. This indicates that the high prevalence (69.2%) of anaemia in our study should be considered a serious public health problem. In a multicountry study on the nutritional status of adolescents, which was carried out by the international centre for research on women (ICRW), anaemia was found to be the most widespread nutritional problem and its prevalence ranged from 32-55%. §

Verma et al conducted a study in college going youths in rural northern India and found that the overall prevalence of anaemia was 43.76%, severe anaemia was 3.58%. moderate anaemia was 11.16% and mild anaemia was 29%. In the study conducted in rural Tamil Nadu the overall prevalence of anaemia was 44.8%, anaemia was 2%, moderate anaemia was 6.3% and mild anaemia was 36.5%.6 Studies conducted in rural Wardha and Lucknow estimated the prevalence of anaemia among adolescents to be 59.8% and 56% respectively. 10,11 In the rural Wardha study, prevalence of severe, moderate and mild anaemia was found to be 0.6%, 20.8% and 38.4% respectively. In another study which was conducted among school going adolescents Ahmedabad revealed that 55.2% adolescents were mildly anaemic, 44.9% were moderately anaemic and that 0.6% were severely anaemic.12 Thus, various studies have demonstrated that the prevalence of anaemia was high in other parts of the country as found in this study.

Toteja et al, reported 90% prevalence of anaemia among adolescent girls from 16 districts of India, with 7.1% having severe anaemia. Kaur et al, Rana et al and Seshadri et al reported similar prevalence of 59.8%, 60% and 63% respectively. 10,14,15

Thus a variable prevalence (23.9%-81.8%) of anaemia in adolescent girls has been reported in different studies. ¹⁶ Majority (71.1%) of adolescent girls with anaemia belonged to low socioeconomic status in this study. Similar finding was reported by Gawarika et al, where 96.5% of anemic adolescent girls belonged to the weaker economic group. ¹⁷

In the present study, age, type of family and mother's occupation was not significantly related with anaemia. Mehta et al and Kotecha et al also reported that age is not a significant correlate of anaemia. ^{18,19} Verma et al reported no association between mother's education, type of family and anaemia that is similar to the present study. ¹² Various authors found association between socioeconomic status and anaemia, which is contradictory to the present study. ^{8,10} As maximum number of girls in the present study were from lower socioeconomic class. This may be one of the reasons for such finding of this study.

Anaemia was significantly higher among adolescents having a positive history of worm infestation in this study. Kaur et al have also shown that presence of worms in adolescent population may contribute significantly to blood loss in intestine with resultant anaemia and call for deworming campaign along with iron folic acid supplementation in anaemia control programme. Our study revealed that as compared to non-vegetarians, a high proportion of vegetarians was anemic which is also reported by Kaur et al. In India poor bioavailability of dietary iron along with low intake of haem iron from animal food is the major cause for anaemia. Dietary modification such as promoting of iron absorption enhancers like haem iron and vitamin C rich food or on reducing ingestion of inhibitors (phytates, tannins and oxalates) are beneficial.

Hashizume et al too found that high iron intake was significantly associated with decrease prevalence of anaemia.²⁰

CONCLUSION

This study indicates that adolescent is a vulnerable group for nutritional anaemia. The high prevalence of mild and moderate anaemia demands appropriate emphasis on covering high risk adolescents group to improve their iron status. It is quite important to strengthen health education on the consumption of iron rich foods and proper implementation of intervention programs that would increase the hemoglobin levels among the adolescents age group through prophylaxis treatment, dietary modification and helminthes control.

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