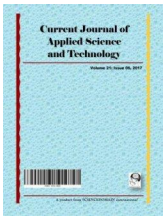

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Socio-demographic Correlates of Anaemia among Adolescent Girls in Rural Area of District Ludhiana (Punjab)

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Authors' contributions

This work was carried out in collaboration between all authors. Authors NS, RA and PS designed the study, wrote the protocol and collected the data. Authors PS and RJ performed the statistical analysis, managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The present study was conducted to study the correlation of various socio-demographic factors with anaemia among the adolescent girls in rural area of Ludhiana district, Punjab.
Subject and Methods: A total of 450 adolescent girls (13-16 years) were randomly selected from the three government schools one each from the three villages i.e. Hambran, Bharowal Kalan and Bhundri of Ludhiana district. An interview schedule was developed to collect the general information along with the estimation of haemoglobin.
Results: The mean age of the selected subjects was found to be 14.3 ±1.1 years and mean Hb. level was 10.0±1.8 g/dl. About 76.5 per cent of the total subjects were found to be anaemic (having Hb. level <12 g/dl). There was a positive correlation between the incidence of anaemia and income of the families as 91.9 per cent of the anaemic subjects belonged to the families having monthly income below Rs. 5000/-. Also, the education level of the parents had a strong correlation with the

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prevalence of anaemia among the subjects.
Conclusion: So, it can be concluded that the dietary habits of rural masses need to be improved through nutrition education programmes about various food based strategies such as inclusion of seasonal fruits and vegetables and avoidance of tea/coffee along with the meals in their diet on daily basis, so as the incidence of anaemia may be reduced.

Keywords: Anaemia; adolescent girls; food habits; family income; haemoglobin; rural Punjab.

1. INTRODUCTION

Nutritional anaemia is one of the global major health problem and affects majority of population. Anaemia is defined as a stage in which there is a decrease in concentration of haemoglobin or circulating red blood cells and ability for the transportation of oxygen to the body also reduced [1]. It is surprising to know that about 30 per cent of population in the world suffers from iron deficiency anaemia, out of which among developing countries, the percentage of anaemic population ranged from 80 to 90 per cent [2]. In India, the prevalence of anaemia among women aged 15-49 years is 53 percent [3]. Adolescence refers as the influential period of life span (10- 19 years) where physical and psychological development as well as behavioural changes occurs. It accounts for one-fifth of the world's population and in India, it constitutes 22 per cent of the total population [4]. Social environment strongly affect eating behaviours of adolescents like friends, family, schools, peer networks and media etc. Unhealthy dieting, over eating and meal skipping are not exceptional eating behaviours. During this period, consumption of inadequate diet can retard physical growth and delay sexual maturation [5].

In developing countries, girls are most vulnerable group among adolescents. At an early age, they get married and possibility of higher risk of morbidity and mortality gets established at the reproductive age. Health status is the image of increase in physical growth, beginning of the menstruation and rise in fat and muscle mass which meet additional requirement of nutrition among adolescent girls. Physical growth is mainly dependent upon adequate intake of diet which is measured by the food availability in terms of quality, quantity and their ability to ingest, digest and absorb the food [6]. It is most crucial period for the development of dietary behaviours and later affects the risks of chronic diseases in life. The nutritional status of adolescents mainly depends upon food intake which delivers sufficient energy and other micronutrients for optimal physical, social and cognitive development [7]. Poor nutritional status during adolescence is an important determinant of health outcomes. Short stature in adolescents resulting from chronic undernutrition is associated with reduced lean body mass and deficiencies in muscular strength and working capacity [8]. So, the present study was carried out to study the prevalence of anaemia and its association with socio-demographic factors among the adolescent girls of rural Punjab.

2. METHODOLOGY

The present study was a school based study for which three government schools one each from the three villages i.e. Hambran, Bharowal Kalan and Bhundri of Ludhiana district were selected. These villages are in Sidhwan Bet Tehsil of Ludhiana District, Punjab State, India. Hambran, Bharowal Kalan and Bhundri are located 22, 32 and 33 km, respectively towards west from District head quarters Ludhiana. A total of 450 adolescent girls in the age group of 13-16 years were selected for the study purpose. An interview schedule was developed to collect the general information about the subjects with respect to their age, education, occupation, type of family, family income, meal pattern etc. Before collecting the data, written consent from the parents of the subjects as well as the permission from the District Education Officer was taken. Haemoglobin was estimated by the cyanmethaemoglobin method [9]. It is measured in terms of g/dl. Capillary blood was drawn by finger prick method. Cuvette tube was pre-filled manually with Cyanmethhemoglobin reagent. It was incubated for 5 minutes and finally readings were noted. For every sample a blank tube was placed in the machine to avoid the error or check the accuracy. Blood specimens of the subjects were collected by the technician hired from a public laboratory. The subjects were classified on the basis of their haemoglobin levels according to classification of anaemia given by WHO [10]. Anaemia was classified as a haemoglobin concentration less than 12 g/dl for non-pregnant

women and less than 11 g/dl for pregnant women. Mean and standard deviation for various parameters studied were computed. Correlation between various socio-demographic factors and prevalence of anaemia was also calculated.

3. RESULTS AND DISCUSSION

The results of the present study revealed that 31, 23, 28 and 18 per cent fell in the age group of 13, 14, 15 and 16 years respectively. Mean age of the selected subjects was found to be 14.3 ±1.1 years and mean Hb level was 10.3 ±1.7 g/dl (Table 1) which was lower than the normal level of 12 g/dl for a non- pregnant woman as per WHO classification [10].

Table 1. Baseline data of selected subjects (N=450)

Parameters	Mean ± SD
Age (years)	14.3 ±1.1
Hb (gm/dl)	10.3±1.7

Prevalence of anaemia among the selected subjects has been presented in Fig. 1. Among all the subjects, 39 per cent of the girls were found to be mildly anaemic, whereas 33.3 and 4.2 per cent found to be moderately and severely anaemic, respectively. However, 23.5 per cent were found to be non-anaemic. When compared to NFHS-4 (2015-16) data, 53.5 per cent of women (15-49 years) were anaemic. Contrary to the present study, another study reported that 96.5 per cent of the adolescent girls were found to be anaemic in Ujjain city [11]. The results reported by other study showed the prevalence of anaemia was found to be 32 per cent among the adolescent girls aged 10-19 years [6]. A study conducted in Karnataka also reported that prevalence of anaemia was 80 per cent among among adolescent girls out of which 48.7, 42.5 and 8.75 per cent were mildly, moderately and severely anaemic, respectively [4].

3.1 Prevalence of Anaemia among the Rural Adolescent Girls in Relation to Their Demographic Profile

Total number of girls who were having Hb. level <12 g/dl was found to be 344 which comprised 76.5 per cent of the total subjects. The reason for such a high prevalence of anaemia among these girls might be less consumption of green leafy vegetables in their daily diet and also due to post meal consumption of tea in rural areas [12]. Analysis of the data related to the demographic profile of the subjects (Table 2) revealed that majority of the anaemic subjects i.e. 71.8 per cent belonged to nuclear families and 28.2 per cent were from joint families, which indicates that smaller family size might also be one of contributing factor to the causes of anaemia. In joint families, more number of food items can be cooked and also the processing and cooking of green leafy vegetables can be more because of more number of women in the family. Further, it was reported that 91.9 per cent of the anaemic subjects were from the families whose monthly income was below Rs. 5000/-. Family income and prevalence of anaemia was found to be closely associated (*P*=0.05). Because of the lower family income, the availability and access to food is reduced which can lead to deficiency of various nutrients in the diet. Another study observed a close association between socio economic class and anaemia among adolescent

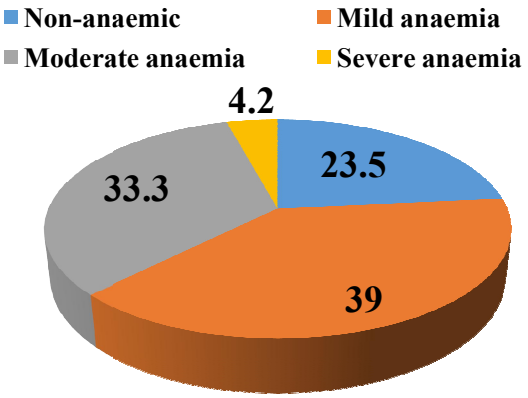

Fig. 1. Distribution of subjects according to WHO (2011) classification

Table 2. Relationship between socio-economic status and anaemia among adolescent girls

Parameters	Total girls (N=450)	Anaemic girls (n=344)		P- value
	No.	No.	%	
Family type and income				
Nuclear	321	247	71.8	0.033
Joint	129	97	28.2	
<5000	403	316	91.9	0.047
5000-10,000	35	20	5.8	
10,000-15,000	12	8	2.3	
Mother's education				
Illiterate	195	151	44.0	0.000
Primary	154	134	39.0	
Secondary	95	59	17.0	
Higher	6	-	-	
Mother's occupation				
Working	159	113	32.8	0.001
Housewife	291	231	67.2	
Father's education				
Illiterate	133	110	32.0	0.000
Primary	181	152	44.2	
Secondary	126	80	23.2	
Higher	10	2	0.6	
Father's occupation				
Unemployed	33	22	6.4	0.019
Daily Paid Labourer	244	187	54.4	
Service	62	45	13.1	
Farming	62	54	15.6	
Own business	49	36	10.5	
Food habits				
Vegetarian	289	216	62.8	0.000
Non-vegetarian	109	87	25.3	
Ovo-lacto-vegetarian	52	41	11.9	
Meal pattern/day				
1 time	15	9	2.6	0.005
2 times	188	146	42.4	
3 times	237	181	52.6	
4 times	10	8	2.4	

girls. Anaemia was found to be more prevalent in upper lower and lower class (83.3 %) followed by 81.0 per cent among lower middle class, 48.8 per cent in upper middle and 43.3 per cent in upper class subjects [13]. Mother's education was found to be highly correlated (*P*=0.01) with the prevalence of anaemia, as 44 and 39 per cent of the mothers of anaemic subjects were illiterate and educated upto primary level, respectively. Only 17 per cent of the mothers were educated upto secondary and higher secondary level. The authors had also reported a highly significant (*P*=0.05) association among anaemic girls of illiterate or primary educated mothers and housewives having lower socioeconomic status [14]. Similar results regarding correlation have been reported by authors between education of mothers and anaemic status of adolescent girls [15].

Out of the 344 anaemic subjects, the mothers of 231 subjects were found to be housewives which comprised 67.2 per cent of the total subjects (Table 2). Mother's occupation was found to be highly associated (*P*=0.01) with the prevalence of anaemia. The reason might be that working mothers contribute to the family's income by which food security at the family level is enhanced to some extent. Likewise, father's education was also found to be highly correlated (*P*=0.01) with the prevalence of anaemia. Good educational status of the parents can lead to

better upbringing of their children and hence better dietary habits are developed in the children right from their childhood. According to a study, prevalence of anaemia was higher in rural girls as compared to urban girls; it could be due to difference in educational status of the parents [16]. Data regarding father's occupation of the selected subjects revealed that 54.4 per cent of the fathers of anaemic subjects were daily paid labourers. A highly significant (P=0.01) association was found between the occupation of father and prevalence of anaemia. While collecting data it was also revealed by the subjects that even the daily wages were not assured, because whenever they used to get any work, they were paid; otherwise they were not able to even provide sufficient daily meals to the family. Similar trend was observed in another study which showed a significant (P=0.05) association between occupation of mother and prevalence of anaemia among the girls [17].

Food habits of the selected subjects were also found to be significantly (P=0.01) associated with prevalence of anaemia, as the data revealed that 62.8 per cent of the anaemic subjects were found to be vegetarian. It has been reported that bioavailability of iron from a vegetarian diet is lower as compared to that from a non-vegetarian diet. Earlier study conducted in Ludhiana reported that mean haemoglobin values among vegetarian and non-vegetarian subjects was 9.9 ± 1.0 and 10.7 ± 0.1 g/dl, respectively [18]. Prevalence of anemia was found to be more among vegetarians when compared to non-vegetarians [2]. Furthermore, it was found that majority i.e. 52.6 per cent of the anaemic subjects were following a meal pattern of three meals per day, while 42.4 per cent were having meals twice per day.

4. CONCLUSION

From the present study, it can be concluded that the prevalence of anaemia was higher among the girls belonging to nuclear families with income less than Rs 5000 per month as majority of the fathers of the anaemic subjects were daily paid labourers. The educational level of the parents had a positive correlation with the prevalence of anaemia as mothers of the majority of the anaemic girls were found to be illiterate while the fathers were educated upto primary level only. Vegetarianism was more common among the anaemic girls. Though, especially in Punjab, lots of seasonal green leafy vegetables and fruits are available at very cheap and affordable prices, but due to lack of knowledge (poor educational status), the masses are not aware about the nutritional contribution of these foods towards achieving a better health status.

So, it is recommended that the rural masses should be made aware through the nutrition education programmes about the various food based strategies such as inclusion of seasonal fruits and vegetables and avoidance of tea/coffee along with the meals in their diet on daily basis, so as the incidence of anaemia may be reduced.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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