Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/03zrx866

A CROSS- SECTIONAL STUDY ABOUT STATUS OF ANEMIA AND ITS SOCIO-DEMOGRAPHIC CORRELATES AMONG ADOLESCENT GIRLS IN AN URBAN FARIDKOT, PUNJAB, INDIA

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Abstract

Background and Objective: Anemia is a major public health problem among adolescent girls, with significant consequences for health, education, and future maternal outcomes. Objective of this study to estimate the prevalence of anemia and assess its association with socio-demographic factors among adolescent girls.

Materials and Methods: A community-based cross-sectional study was conducted among 290 adolescent girls aged 10–19 years in the urban field practice area of Guru Gobind Singh Medical College & Hospital, Faridkot. Participants were selected through simple random sampling. Data on socio-demographic characteristics were collected using a pretested questionnaire. Hemoglobin estimation was done using Sahli's method. Associations were tested using Chi-square and Fisher's exact tests.

Results: The overall prevalence of anemia was 90.7%. Of these, 31.7% had mild anemia, 57.6% moderate anemia, and 1.4% severe anemia. Anemia prevalence was significantly higher among girls from lower SES categories ($p < 0.001$) and among those whose mothers ($p=0.046$) had lower educational levels.

Conclusion: Anemia remains highly prevalent among adolescent girls in urban Faridkot, with strong associations with low SES and parental education. Targeted interventions focusing on nutrition education, iron-folic acid supplementation, and socioeconomic upliftment are urgently required.

Keywords: Anemia, Adolescent girls, Socio-demographic factors, Punjab

Introduction:

According to World Health Organization, Adolescence is the phase of life between childhood and adulthood, from 10-19 years of the age (1). Adolescence is that phase of life when most significant physical, behavioral, psychological changes occur in the body (2).The health and nutritional status of adolescent girls reflect the cumulative effects of physical growth, the onset of menarche, and increases in fat and muscle mass, all of which impose increased nutritional demands.(3). According to the National Family Health Survey-5(NFHS-5), conducted in 2019-21, the prevalence of anemia in India among different groups is 57.2% in non-pregnant women (15-49 years), 52.2% in pregnant women (15-49 years), 59.1% in adolescent girls (15-19 years). While in Punjab prevalence of anemia among adolescent girls (15-19 years) is 60.3% and 58.7% in all women age 15-49 years (4). Burden of anemia in Faridkot district among women aged 15-49 years are 63% in non-pregnant women and 58% in pregnant women (5). World Health Organization classified anemia into three categories: mild, moderate and severe. HB levels cut off for mild, moderate and severe anemia are 10.0-11.9g/dl, 7.0-9.9g/dl and <7g/dl respectively (6). The risk of anemia increased in India because many girls married and become pregnant in their late adolescence period. Occurrence of pregnancy during adolescence with anemia raises the risk of maternal morbidity and mortality as well as increases the incidence of poor birth outcomes such as preterm birth, low birth weight, stillbirth and also has adverse effect on the iron status of the new-born child (7). Through Anemia mukat bharat wants to reduce the prevalence of maternal and infant anemia in India by three percentage points annually in order to meet the goals set forth by the Prime Minister's Overarching Scheme for Holistic Nutrition Mission, or POSHAN Abhiyaan. Thus, the AMB is essentially thought of as a more intense form of NIPI and proposes a 6×6×6 strategic approach that focuses on six interventions, six beneficiary groups, and six institutional processes (8). Many researches exploring the relationship between dietary habits and the prevalence of anaemia has identified several contributing factors, including deficiencies in iron, folic acid, and vitamin B12, as well as low- meat diets and menstruation, as significant contributors to anaemia in adolescents. Fewer studies related to anemia among adolescent girls in this area has been conducted. So we planned to conduct this study in urban field practice area of GGSMCH, Faridkot, Punjab, India to assess the magnitude of problem related to anemia and its associated factors among adolescent girls.

Material and methods:

Study design and setting: The community based cross-sectional study was conducted in urban field practice area of Department of Community Medicine, Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab, India over a period of 18 months.

Study population: The study was conducted among adolescent girls 10- 19 years of age residing in urban field practice area of Department of Community Medicine, Guru Gobind Singh Medical College & Hospital, Faridkot, Punjab, India.

Inclusion criteria:

• Adolescent girls 10-19 years of age.

Exclusion criteria:

• Adolescent girls who were not willing to participate in the study.
• Adolescent girls whose mothers refused to give consent.
• Adolescent girls who were suffering from any chronic illness like cancer, leukemia, chronic kidney disease, chronic liver disease etc.
• Adolescent girls who were suffering from permanent disability.

Sampling:

Sample size: Calculated based on this formula (9)

$n=Z^{\alpha/2}\ 2p(1-p)/d^2$
$Z^{\alpha/2} = 1.96$(95% of Confidence level)
p = 22% = 0.22, of anemia from study conducted by Engidaw et al.(2018) in adolescent girls aged 10-19 years (10).
d = 5% (absolute error)
$n = (1.96)^2 \times 0.22 \times 0.78 / (0.05)^2$
$=3.84 \times 0.22 \times 0.78 / 0.0025$
n = 263
The sample size (n) using this formula came out to be 263. Considering non-response rate of 10%, total study subjects included in the study was not < 290.

Sampling technique: Simple random sampling technique was used for sampling. A list of adolescent girls 10-19 years of age was procured from ANMs of urban field practice area of GGSMCH, Faridkot. The individual were selected using computer generated random number till the desired sample size was achieved.

Data collection tools: Pre-tested and validated semi structured questionnaire was used for collection of relevant information from the adolescent girls. Semi- structured tool designed has following sections: -
1. Socio-demographic profile
2. Hemoglobin estimation
3. Menstrual status

Methodology: This study was conducted in the urban field practice area of UHTC of GGS Medical College Faridkot to commencement of the study, a house-to-house survey was conducted in the urban field practice area of Department of Community Medicine GGSMCH, Faridkot during which a line list of adolescent girls 10-19 years of age was done. Unique numbers was given to each household in the line list with adolescent girls 10-19 years and allocated sample size was extracted using computer generated random numbers. Informed & written consent regarding the socio-demographic profile and the data collecting technique was obtained before conducting a one-to-one interview with the respondent at each chosen household. If the selected household fails to satisfy the inclusion and exclusion criteria, immediately next household in the line list was visited. Same procedure was followed if house is locked or concerned person is not available in the house. After completion of the interview, hemoglobin estimation by Sahli's method done.
Data analysis: The collected data was compiled & entered in the form of a data matrix into Microsoft ® excel 2007 and subsequently analyzed using IBM ® SPSS software version 26. Descriptive statistics such as mean, standard deviation, frequencies and percentages were used to summarize the data. The Chi square/Fisher exact test was used to find association between categorical variables. p value <0.05 was considered statistical significant.

Results :
Most participants were aged ≥16–19 years (38.9%), Hindu (56.6%), and from nuclear families (77.2%). More than one-third of mothers were illiterate (36.9%), and the majority of girls belonged to lower socio-economic classes (MKS 2022)(Table 1) The mean HB level of study participants was 9.6g/dl. Hemoglobin levels were significantly associated with age, maternal education, and socio-economic status ($p<0.05$). Severe and moderate anemia were more common in older girls, those with less educated mothers, and those from lower socio-economic classes. Religion was not significantly associated with Hb levels ($p=0.223$)(Table 2). Hemoglobin levels were significantly associated with menstrual characteristics, including cycle length, regularity, flow duration, and number of pads used ($p\leq0.001$). Normal cycles and moderate flow were linked to higher Hb, while

irregular cycles and heavy bleeding were associated with anemia. Age at menarche showed borderline significance (p=0.05), and clot passage was not significant (p=0.107)(Table 3)

Table no. : 1 Distribution of study participants according to their socio-demographic characteristics (n=290)

Variable	Category	Frequency(n)	Percentage (%)
1. Age(in years)	10-<13 years	93	32.1
	≥13-<16 years	84	29.0
	≥16-19 years	113	38.9
2. Religion	Sikh	123	42.4
	Hindu	164	56.6
	Christian	3	1.0
3. Family type	Nuclear	224	77.2
	Joint	66	22.8
4. Educational status of mothers	Professional or Honor	1	0.3
	Graduate/postgraduate	6	2.1
	Intermediate/ post high school diploma	18	6.2
	High school certificate	43	14.8
	Middle school certificate	43	14.8
	Primary school certificate	73	25.2
	Illiterate	106	36.6
5. Socio economic status (MKS 2022) Class	Upper	0	0
	Upper middle	9	3.1
	Lower middle	79	27.2
	Upper lower	96	33.1
	Lower	106	36.6

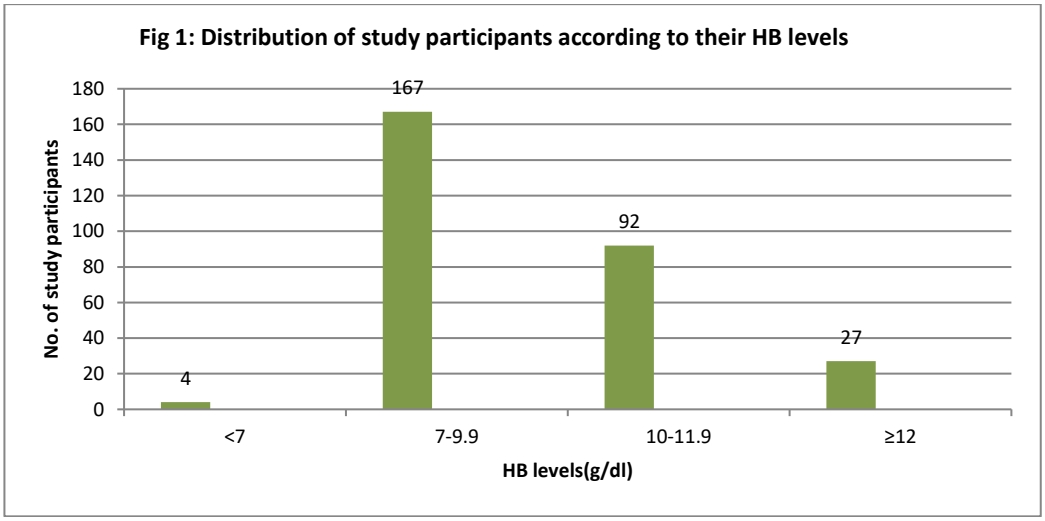

Table no. : 2 Association between hemoglobin levels and socio-demographic profile of study participants (n=290)

Variables	Categories	Haemoglobin levels				p value
		<7g/dl n(%)	7-9.9g/dl n(%)	10-11.9g/dl n(%)	≥12g/dl n(%)	
Age(in years)	10-<13	0(0)	50(29.9)	37(40.2)	6(22.2)	**<0.001**
	≥13-<16	0(0)	52(31.1)	26(28.3)	6(22.2)	
	≥16-19	4(100)	65(39)	29(31.5)	15(55.6)	
Education (Mother)	Professional or Honor	0(0)	0(0)	1(1)	0(0)	
	Graduate/ postgraduate	0(0)	0(0)	4(4.3)	2(7.4)	
	Intermediate/ post high school diploma	0(0)	10(6)	6(6.5)	2(7.4)	
	High school certificate	0(0)	18(10.8)	19(20.7)	6(22.2)	
	Middle school certificate	1(25)	20(12)	17(18.5)	5(18.5)	

	Primary school certificate	0(0)	47(28.1)	19(20.7)	7(26)	
	Illiterate	3(75)	72(43.1)	26(28.3)	5(18.5)	**0.046**
Religion	Sikh	1(25)	67(40.1)	38(41.3)	17(63)	
	Hindu	3(75)	99(59.3)	52(56.5)	10(37)	
	Christian	0(0)	1(0.6)	2(2.2)	0(0)	**0.223**
Socio-economic status	Upper Middle	0(0)	0(0)	0(0)	0(0)	
	Upper Middle	0(0)	1(0.6)	5(5.4)	3(11.1)	
	Lower Middle	0(0)	38(22.8)	30(32.6)	11(40.7)	
	Upper lower	2(50)	57(34.1)	26(28.3)	11(40.7)	**<0.001**
	Lower	2(50)	71(42.5)	31(33.7)	2(7.5)	

Table no. : 3 Association between hemoglobin levels with various menstrual variables (n=196)

		Hemoglobin levels				
		<7g/dl	7-9.9g/dl	10-11.9g/dl	≥12g/dl	**p value**
Variables		n(%)	n(%)	n(%)	n(%)	
Age of menarche (years)	<10	0(0)	4(3.3)	0	0	
	10-16	3(75)	117(96.7)	49(100)	22(100)	**0.05**
	>16	1(25)	0(0)	0(0)	0(0)	
Cycle length (days)	<21	3(75)	12(9.9)	2(4.1)	1(4.5)	
	21-35	0(0)	83(68.6)	44(89.8)	20(91)	**<0.001**
	>35	1(25)	26(21.5)	3(6.1)	1(4.5)	
Regularity of cycle	Regular	0(0)	72(59.5)	46(94)	20(90.9)	
	Irregular	4(100)	49(40.5)	3(6)	2(9.1)	**<0.001**
Days of flow	<3	4(100)	15(12.4)	2(4.1)	1(4.5)	
	3-5	0(0)	81(66.9)	43(87.7)	19(86.4)	**<0.001**
	>5	0(0)	25(20.7)	4(8.2)	2(9.1)	
Number of pad changed/day	<2	3(75)	13(10.7)	0(0)	3(13.6)	
	2-4	1(25)	83(68.6)	43(87.8)	17(77.3)	**0.001**
	>4	0(0)	25(20.7)	6(12.2)	2(9.1)	
Passage of clot	Yes	0(0)	22(18.2)	3(6.1)	1(4.5)	
	No	4(100)	99(81.8)	46(93.9)	21(95.5)	**0.107**
Note : p value <0.05 is statistically significant						

Discussion

In present study, the mean age of study participants was 14.37 years. On the distribution of participants according to socioeconomic status, 33.1% belonged to upper lower SES class. Similar results was observed in study conducted by Upadhye JV and Upadhye JJ showed 33.3% participants from upper lower SES class (3). The mean HB level of study participants was 9.6g/dl indicating a high burden of anemia among adolescent girls. A staggering 90.7% of the participants were anemic, with 57.6% having moderate anemia, 31.7% mild anemia, and 1.4% suffering from severe anemia. These results resonate with findings by Upadhye JV and Upadhye JJ who reported anemia in 90% of adolescent girls (3) Among the 290 girls, 67.6% had attained menarche, with most having a cycle length between 21–35 days and experiencing 3–5 days of flow. However, significant associations were found between anemia and menstrual irregularities. Girls with irregular cycles, prolonged flow, and those using 4 pads/day had disproportionately low hemoglobin levels. This aligns with findings from Kakkar R et al. and Mathad V et al. who also reported significant relationships between menstrual health and anemia in adolescents (11),(12). A significant association was observed between hemoglobin levels and age, mother's education, and socioeconomic status (SES). These findings are consistent with those of Chaudhary SM and Dhage VR , who also highlighted that lower maternal education and poor economic status are closely linked to inadequate nutritional intake and a higher prevalence of anemia (13). In this study, 36.6% of participants belonged to the lower socioeconomic class, and this group had the highest proportion of girls with haemoglobin.

Conclusion

The present study revealed that anemia is a significant public health problem among adolescent girls in the urban field practice area of Faridkot, with a prevalence of 59.0%. The majority of cases were mild in severity. Socioeconomic factors, particularly lower socioeconomic status and lower levels of maternal and paternal education, were significantly associated with anemia. These findings emphasize the need for targeted interventions focusing on nutritional awareness, dietary diversification, and regular iron–folic acid supplementation, especially among socioeconomically disadvantaged groups, to reduce the burden of anemia in this vulnerable population.

Limitation: As the study design was cross-sectional, so the effect – cause relationship can not be established.

Conflict of interest: Nil

Ethical approval: Approved by Institutional Ethical Committee of GGSMCH, Faridkot, Punjab,India.

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