Original research article

Prevalence of anaemia among adolescent girls in urban areas of Warangal

[1]Dr. Sujatha Pambi, [2]Dr. M. Kalyani, [3]Dr. Sravanthi Gilla, [4]Dr. Bhavani K

[1, 3]Assistant Professor, Department of Community Medicine, Kakatiya Medical College, Telangana, India
[2]Assistant Professor, Department of Community Medicine, Andhra Medical College. Visakhapatnam, Andhra Pradesh, India
[4]Professor, Department of Community Medicine, Osmania Medical College, Hyderabad, Telangana, India

Corresponding Author:
Dr. Sravanthi Gilla

 Abstract
Background and Objectives: It is important to get the right amount of nutrition during adolescence because there are significant growth changes during this time. Undernutrition and iron deficiency anemia are the two main nutritional issues affecting the adolescent population, among other things. To find out how common anemia is in adolescent girls in the Kakatiya Medical College Warangal, AP urban field practice area. to identify various socio-demographic elements that affect adolescent girls' anemia.
Methods: A cross-sectional study was conducted in three areas that were part of the Warangal, Kakatiya Medical College's urban health center, which serves as a field practice area. Between November 2021 and October 2022, the study was carried out. 350 teenage girls (aged 10 to 19) in total were enrolled in the study. To gather information about the socio-demographic variables, a pre-designed and pre-tested proforma was used. Each participant underwent a pertinent clinical examination. With the help of cyanomethemoglobin, hemoglobin was estimated. When the hemoglobin level fell below 12 gm/dl, anaemia was determined to be the cause.
Results: Anaemia was prevalent in 81.1% of the population, with mild anemia accounting for 36.9%, moderate anemia for 40.9%, and severe anemia for 3.4%. When compared to late adolescents (15–19 years old), it was found that early adolescents (10–14 years old) had a higher prevalence of anemia. Most of the girls were moderately anemic. Girls living in hostels with working mothers and illiterate fathers were significantly more likely to have anemia than non-hostel residents.
Conclusion: It was discovered that adolescent girls had a high prevalence of anemia, which was particularly high in the early adolescents. Anemia and father's educational background and employment status were significantly correlated. Giddiness and anemia were strongly correlated.
Keywords: Haemoglobin, anaemia, adolescent girls, socio-demographic variables.

Introduction
The latin root of the word "adolescence" means "to grow into maturity" [1]. According to the WHO, adolescence is the time between 10 and 19 years old [2]. These formative years, which mark the passage from childhood to adulthood, are when the greatest number of physical, psychological, and behavioral changes occur. Teenage years are a critical time in a person's development, especially in relation to reproductive health. In terms of the caliber of our next generation, the group of young women on the cusp of becoming women is the most important segment of our population. Adolescent growth is at its highest during this time. During the growth spurt, a person's needs for food and nutrients are proportionately higher. Most of the adolescent girls who had anemia had widespread nutritional deficiencies linked to socioeconomic status, family type, father's occupation, mother's education, family size, etc. [3].

There are 1.2 billion people in the world who are 10 to 19 years old. The United States (44 million), China (207 million), and India (243 million) are the countries with the largest populations of adolescents (2). The prevalence of anaemia, a problem that affects people all over the world, especially adolescents, is reported to be 65.75 percent in underprivileged communities in India. This obvious deficiency in young adolescent girls is likely caused by a low intake of haemopoietic nutrients because childhood increases nutrient demand along with menstrual losses of iron [4]. Due to poverty, a poor diet, parasitic infestations, pregnancy and lactation, and limited access to healthcare, the prevalence of anemia is disproportionately high in developing nations. The start of the menstrual cycle or reproductive process in females occurs during adolescence.

Adolescents experience a "growth spurt" between the ages of 10 and 19 when they gain 30% of their adult weight and more than 20% of their adult height [5]. Malnutrition and anemia are major concerns for

adolescent girls. The reproductive years of life and beyond can be severely impacted by inadequate nutrition during adolescence [5]. The risk of anemia is doubled in India because girls frequently get married and start having children before the end of the growth phase [6].

The high rate of maternal mortality, the high prevalence of low birth weight babies, the high rate of perinatal mortality, and the ensuing high fertility rates are the causes of nutritional anemia in adolescent girls. This stage of life is also significant because there is mounting evidence that if a satisfactory iron status can be maintained during adolescence, anemia in pregnant women can be controlled more easily (7). A national nutritional anaemia prevention program has been in place for a while. The beneficiaries of this program, who are expected to receive IFA prophylaxis and treatment, include pregnant women, young children, and adolescent girls. Inspite of several decades in operation, this programme has been visible only for the pregnant women to some extent. For the under-fives and adolescents the programme has not made any significant dent on the problem of anaemia.

Materials and Methods

A proforma was designed and approval was taken from the faculty and head of the department of Community Medicine, Kakatiya Medical College, Warangal, form November 2021 and October 2022. It was a cross sectional study carried out in 3 areas *namely Peddammagadda* (5000 population) *Rangam pet* (3000 pop) *Thummalakunta* (3000pop) which are under urban health centre a field practise area of dept community medicine Kakatiya Medical College, Warangal. Selection of three areas were done by simple random sampling.

Method of collection of data

- After prior intimation, one medical camp was conducted in each area, information regarding camps were circulated in the study area with the help of Anganwadi workers.
- A pretested proforma was used to record information on socio demographic characters like age, educational status, monthly income, diet history, height, weight, was taken.
- After taking consent from the participants, haemoglobin estimation was done by using cyanomethaemoglobin method.

Inclusion criteria

- Adolescent girls between the ages of 10 and 19
- Adolescents who had lived in the study area for at least six months.
- Adolescents who were willing to have their blood tested.

Exclusion criteria

- Adolescent girls who are pregnant
- Adolescent girls who didn't give consent to give their blood

Results
I. Tables on demography

Table 1: Age wise distribution of adolescent girls.

Age group		
Age (yrs)	Number	Percent
10-14	130	37.1
15-19	220	62.9
total	350	100

Majority 220(38.4%) out of 350 belongs to 15-19 age group, 37.1% were belongs to 15- 19 yrs age group.

Table 2: Distribution of adolescent girls according to religion

Religion	Number	Percent
Hindu	230	65.7
Muslim	47	13.4
Christian	73	20.9
Total	350	100

Majority 230(65.7%) of the study participants were Hindus. Followed by Christians (20.9%).

Table 3: Distribution of study population according to marital status

Marital status	Number	Percent
Married	7	2

Unmarried	343	98

In the present study majority of the participants were unmarried 343 (98%), 2% were married.

Table 4: Distribution according to Education of Father

Education of father	Number	Percent
Illiterate	71	20.29
Up to high school	185	52.9
Above high school	94	26.9
Total	350	100

In present study majority (52.9%) of the respondent's fathers were studied up to high school, 26.9% were studied beyond the high school education, 20.29% were illiterates.

Table 5: Distribution of study population according to Education of

Education of mother	Number	Percent
Illiterate	147	42
Up to high school	171	48.9
Above high school	7	9.1
Total	350	100

The present study shows that among the total study population the majority of the respondent's [171 (48.9%)] mothers were studied up to high school level, 147(42%) were illiterate, 9.1% were studied above high school.

Table 6: Distribution of study population according to father's Occupation

Occupation	Number	Percent
Professional	7	2
Semi professional	32	9.1
Clerical/shop owner/farmer	133	38
Skilled worker	86	24.6
Semi-skilled	30	8.6
Unskilled	59	16.9
Unemployed	3	0.8
Total	350	100

In present study majority of the (38%) respondent's fathers were clerical/shop owner/farmer, followed by skilled workers (24.6%).

Table 7: Distribution of study population according to Occupation of mother

Occupation	Number	Percent
Home maker	200	57.1
working	150	42.9
Total	350	100

The present study shows that among the total study population the majority of the respondent's mothers were homemakers [200 (57.10%)], 42.9% were working mothers.

Table 8: Distribution of adolescent girls according to Type of Family

Type of family	Frequency	Percent
Nuclear	287	82
Joint	58	16.6
Joint extended	5	1.4
Total	350	100

In present study Majority of the study participants (287 (82%) belongs to nuclear family, 16.6% from joint family, 1.4% were from joint extended family.

Table 9: Distribution of Study Participants according to their staying

Staying with	Number	Percent
Parents	207	59.1
In hostel	143	40.9
Total	350	100

In the present study majority of the study participants [207(59.1%)] living with parents in home, 40.9% were staying in hostel for education purpose.

Table 10: Distribution of study population according to Socio Economic Status. (B. G. Prasad's classification)

Class	Frequency	Percent
Upper class	20	5.7
Upper middle	57	16.3
Middle	90	25.7
Upper lower	161	46
Lower	22	6.3
Total	350	100

In the present study most of the respondents 161[46%] belongs to upper lower class 25.7% belongs to middle class,16.3% were upper middle class.

Table 11: Distribution of Study Participants According to Type of Diet

Type	Frequency	Percent
Mixed	318	90.8
Vegetarian	32	9.2
Total	350	100

Majority of the study participants 318 (90.8%) were taking mixed diet, 9.2% were Vegetarians.

Table 12: Distribution of Study Participants According to BMI

BMI	Frequency	Percent
Underweight	168	48
Normal	168	48
Overweight/obese	14	4
Total	350	100

Among the study participants 168(48%) were under weight and 168(48%) were normal.

Discussion

Preschool children and expectant mothers in developing nations are particularly at risk for anemia. Although these two at-risk groups have been the subject of numerous studies, there is a dearth of information on anemia in adolescents living in developing nations in the complex ecological context of poverty and malnutrition [8]. It is becoming more and more obvious that if a satisfactory iron status can be guaranteed in the adolescent females prior to marriage, anaemia control in pregnant women can be more easily achieved [9].

To determine whether iron deficiency anemia was a significant issue among the general population, the WHO's recommended cut off points were used [10].

Prevalence	Public health problem
<5	Not a problem
5-14.9	Low magnitude
15-33.9	Moderate magnitude
40% and above	High magnitude

Prevalence of anaemia

In present study prevalence was found out of 350 cadolescent girls, 284 (81.1%) were suffering from various degrees of anaemia and that 66 (18.85%) were non anaemic.

This indicated that it was a public health problem of high magnitude as per the WHO guide lines

Similar results were found in Factors influencing Anaemia among girls of school going age (6-18 years) from the slums of Ahmadabad city by Verma *et al*, This study stated that majority (81.8%) of girls were anaemic, out of which 55.2% were mildly anaemic, 0.6% severely anaemic and the rest were moderately anaemic [11].

Similarly Baral *et al*. (2009) conducted a cross sectional community based study in Morang district to

determine prevalence and distribution of anemia in terms of age, sex and locations (urban and rural) among adolescent population. The overall prevalence of iron deficiency anemia among adolescent population was 65.6% with the distribution of rural 62.4%, urban 70.0%, male 52.3% and female 78.3% [12].

Pattnaik S, *et al*., reported that the prevalence of anaemia among adolescent girl was found to be 78.8% [13].

Gupta, V.K., Maria, *et al*., found that the prevalence of anemia in females 5-30 years was 89.5%, which included 49.8% of mild, 38.2% of moderate and 1.5% of severe anemia cases [14].

Prevalence of anaemia according to severity
In present study the prevalence of mild anaemia was 36.9%, that of moderate anaemia was 40.9%, and severe anaemia was 3.4%.The results were consistent with follow studies,
Study done by Siddharam S M, and stated that the overall prevalence of anemia was found to be 45.2%, of which 5% were severe anemia, 55% moderate anemia and 40%mild anemia [15].
Bulliyy G, *et al*., found that 96.5% prevalence among non-school going adolescent girls in three districts of Orissa, of which 45.2%, 46.9% and 4.4% had mild, moderate and severe anemia (16). But this study findings differ from study done by Verma G, *et al*., the study which was conducted among school going girls in Ahmedabad revealed that 55.2% were mildly anaemic, 44.9% were moderately anaemic and that 0.6% were severely anaemic [11].

Anaemia with respect to age
In the present study anaemia was more prevalent in girls of 10-14 years age group (84.6%). Observed difference between two groups were statistically significant.
Similar findings found in study conducted on adolescent girls in Varanasi by Richa *et al*., stated that extent of anaemia was significantly more in the age group 10-13 years (64.06%) than in 14-19 years (40%) [17].
This Study Findings Differ from Gupta N, Kochar G. which was conducted in Haryana on 110 adolescent girls who belonged to low socio-economic groups, and found that anaemia was more prevalent in girls who were more than 14 years of age [18].

Anaemia with religion
In present study shows that prevalence of anaemia among Muslim community was found to be 87.2%, where as in Christian community it was 82.2%, in Hindu community it was found to be 79.6%. Observed difference is not statistically significant.
Similar findings seen in study which was conducted by Vankudre *et al*., it was revealed prevalence of anaemia in Muslim girls was 58% as compared to Hindu girls 42.1% and 28.6% in Christian girls [19].
According to NFHS-3 (2005-2006) anaemia is more in Hindu community than in any other community (20). Verma *et al*., in his study on anaemia in adolescent girls reported 90% Hindus adolescent girls were anaemic [11].
Beena Sachan *et al*., reported that a significant association of anemia was with religion and caste (p<0.03). The overall prevalence of anemia was greater among Hindu girls 57.1% than Muslim girls (49%) [21].

Anaemia in relation with Socio economic status
In present study higher prevalence of anaemia was seen among girls those belonged to upper middle (82.2%), upper lower (82%) and lower class (76.3%) than those belonged to upper class (60%). Higher prevalence of severe anaemia was seen among upper lower social class, severe anaemia was not seen in upper class. But observed difference was not statistically significant.
Similar research by Al-Sharbatti, S.S.*et al*. discovered that adolescents in high socioeconomic areas (HSEA) had a 12.9% anemia prevalence rate while those in low socioeconomic areas (LSEA) had a 17.6% anemia prevalence rate [22].
According to research by R. Gawarika *et al*., the prevalence of anemia among teenage girls in lower socioeconomic groups was 96.5%, compared to 65.18% among those in middle- or higher-income groups. 11.0% of adolescent girls from lower socioeconomic groups had severe anemia. And the figure for girls in the middle- or upper-income group was 2.63% [23].
According to Shilpa S. *et al*., girls from lower socioeconomic groups were more likely to have anemia than girls from higher socioeconomic groups (4.1% in class III), with rates of anemia reaching 100% in class V and 43.1% in class IV. This had statistical importance [24].

Anaemia in relation with marital status
In present study there is no significant relation of anaemia with marital status.

Anaemia and type of diet
Present study showed that 90.7% of anaemia seen in those who took vegetarian diet, 80% prevalence seen in those who took mixed diet. Observed difference is not significant.
Study done by Kaur S, Desmukh *et al.*, revealed that one of the important correlates of anemia was found to be vegetarian diet [25].
Verma *et al.*, also quoted that compared to non-vegetarians (38%), more vegetarians (65.9%) were anemic [11].

Anaemia and Education of Mother
Present study showed that Majority (95.4%) of study participants whose mothers were illiterate are anaemic, followed by whose mothers studied up to high school (81.9%), high prevalence of moderate anaemia was (45.5%) seen in illiterates, 66.7% severe anaemia was seen among Illiterates.
Similar results were seen in Rekha sharma study, which showed a significant correlation between haemoglobin and mother's education [26].
Another study by Pattnaik S *et al.* found that teenage girls with mothers who only have a primary education are significantly more likely to have anemia than girls with mothers who have a college degree or higher (P=0.000). The father's educational background and employment status, however, were not linked in any meaningful way [13]. Gowarikar *et al.*, did not find any association with prevalence of anaemia with mother's education [27].

Anaemia and education of father
In present study high prevalence of anaemia (85.9%) was seen among study participants whose fathers were illiterate. 50% severe anaemia was observed among girls of illiterate fathers. Observed difference was statistically significant.
Similar findings observed in Pattnaik S, *et al.*, study which showed a significant reciprocal association between prevalence of anaemia in adolescent girls and maximum educational qualification of their fathers and prevalence of anaemia was 72.5% in whose fathers were illiterate and 20.5% in whose fathers studied beyond high school [13].
Another study, conducted by Sanjeev M. *et al.*, found a significant correlation between anemia prevalence and parental education level, which they concluded reflected better socioeconomic status and greater awareness among literate mothers [28].

Anaemia and mother occupation
Present study showed that high prevalence of anaemia ((86.7%) was seen in whose mothers were working, 77% anaemia was seen in whose mothers were home makers.

Anaemia and father's occupation
In present study higher percentage of normal participants (43%) present among whose fathers were professionals, higher prevalence of anaemia (86.7%) was seen in whose fathers were semi-skilled workers. difference was not significant.
Similar findings from Verma *et al.*'s (2004) study revealed that high prevalence was observed in those whose fathers were employed as semi-skilled or skilled workers (77%) [11].
According to Singh's (1998) research, fathers of adolescent girls who were professionals had the lowest prevalence of anemia [29].

Relationship between anaemia and participants staying (home/hostel)
In present study majority of study subjects 128(89.52%) who were staying in hostel were anaemic, majority 68(47.5%) of the hostellers having moderate anaemia, 156 (75.4%) were anaemic who were living with parents in home. Difference was statistically significant. (P=0.009).
Similar studies found in Anjankar S.P (2012) study which showed difference in the hemoglobin percentage of girls staying in hostel, rented rooms and homes was detected. It was found that hemoglobin percentage of hostel girls and those residing in rooms were less than those staying at home [30].

Relationship between intake of Meat, Egg and Anaemia
In present study participants those never consumed meat had high prevalence of anaemia (86.2%) than those consumed meat more than thrice per week (76.2%).
Among the study participants those never consumed egg had 100% prevalence of anaemia, those took egg once in week had higher percentage of moderate anaemia, those consume egg more than once per week had higher percentage of mild anaemia. Difference was statistically significant.
Similar results were found in these studies.
According to a study by Jyothsna Kudaravalli *et al.*, more people who were not anemic (P = 0.05) consumed meat more frequently than three times per week [31].
In their research, Aikawa *et al.* (2006) found, using a multiple regression analysis, that egg consumption

was positively correlated with pregnant women's Hb concentrations [32].

Relationship between intake of green leafy vegetables and anaemia
Who were taking green leafy vegetables more than thrice per week had less percentage of anaemia (79.3%) than who never consumed green leafy vegetables (94.21%), who never consume green leafy vegetables had higher proportion of moderate anaemia (70.58%).
Saratha A *et al*., revealed 89.71% students were anaemic who do not consume green leafy vegetable regularly [33].
In Allahabad, Kumar *et al*. studied the effects of family vegetable farming on the prevalence of anemia in 80 adolescent girls. The study's findings also revealed that intake of all nutrients was relatively lower than the recommended dietary allowance [34].
Nearly all of the nutrients were not consumed to their recommended levels. 500 adolescent girls (13-18 years old) from the Marathawada region were found to consume insufficient amounts of all food groups, particularly green leafy vegetables, roots and tubers, fruits, and milk, according to Zanvar *et al*. [35].

Conclusion
In the present study out of 350 adolescent girls 81.1% were anaemic, 18.9% were non anaemic. Among the study participants 36.9% had mild anaemia, 40.9% moderate anaemia, 3.4% severe anaemia. Among the participants 62.9% were belong to 15-19 yrs of age group, 37.1% belong to 10-14 years age group and high prevalence of anaemia was seen among 10-14 years of age group, among 15-19 years age group majority of participants had moderate anaemia, severe anaemia was not seen in 10-14 years group. Observed difference between the two groups was statistically significant. (p value =0.001). Among the study participants 65.7% were Hindus followed by Christians. High prevalence of anaemia was seen in Muslim community. Majority of the study participants 57.7% were living with parents, 41.7% were staying in hostel, high prevalence of anaemia was seen in those stay in hostel. Observed difference between two groups were statistically significant (P value=0.0019). Majority of the study participants mothers were studied up to high school, high prevalence of anaemia was seen in those mothers were illiterate, majority of study participant mothers were home makers, high prevalence was seen in whose mothers were working. Majority of study participants fathers were studied upto high school level, high prevalence of anaemia was seen in whose fathers were illiterate and studied up to high school, and observed difference was statistically significant (p=0.035).
Majority of study participants belong to upper lower socio economic status, high prevalence was seen in low socio economic status. Majority of study participants who consumed green leafy vegetables more than thrice per week had less prevalence of anaemia In present study 90.7% prevalence of anaemia was seen in those participants who took vegetarian diet. 80.2% anaemia was seen in those took mixed diet. Prevalence of severe anaemia was 100% in vegetarians. Among the study participants no statistical significance was seen in relation with the frequency of citrus fruits intake. In present study, participants those never consume meat had high prevalence (86.2%) of anaemia than those consumed meat more than once per week (76.2%). Among the study participants those never consumed egg had 100% prevalence of anaemia, difference was statistically significant. Among the study participants no statistical significance was in relation with BMI. Among the study participants no statistical significance was seen in relation with clinical symptoms headache and fatigue. Among study participants 22% had history of giddiness, higher proportion (92.2%) of anaemia was seen in who had history of giddiness, statistically significant association was seen. In present study 190(66.9%) anaemic participants presented with pallor, pallor absent in 94(33%) anaemic participants, 100% pallor present in severe anaemic subjects, 82.5% pallor present in moderate anaemic subjects and 46.50% pallor present in mild anaemic subjects.

Conflict Of Interest: None.

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