



Original Research Article

A Study of Prevalence and Determinants of Anaemia among Adolescent Girls of Urban Slums in Bellary City

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ABSTRACT

Iron deficiency anaemia is the commonest medical disorder and is a problem of serious public health condition with epidemic proportions especially among poor adolescent girls (65-90%).

Objectives: Our study objectives were to determine the prevalence and determinants of anaemia among adolescent girls living in urban slums of Bellary city, Karnataka state, India.

Methodology: A cross sectional study was conducted in a setting of urban slums of Bellary city, Karnataka state, India, during the period of July 2010 to February 2011. A total of four urban slums were included in the study. Within each selected urban slum 100 adolescent girls were studied. The relevant information was collected with anthropometric measurements and haemoglobin estimation.

Results: The overall prevalence of any anaemia was 82.5%, the prevalence of mild, moderate and severe anaemia was 37.7%, 36.2% and 8.5% respectively. Socio-demographic factors like religion, education of the girl, occupation of the father, menstrual factors like regular periods and excessive bleeding and nutritional factors like low intake of meat, vegetables and body mass index showed significant association with anaemia.

Keywords: Adolescents, Anaemia, urban slums, Bellary

INTRODUCTION

Adolescence, the second decade of life, is a period in which an individual undergoes major physical and psychological changes. Adolescents in India represent over 1/5th (22.3%) of total population. ^[1]

Since adolescence is a significant period of human growth and maturation, unique changes occur and many adult patterns are established. Following early childhood (<2yrs), during the adolescent growth spurt the risk of iron deficiency

anaemia reappears for both boys and girls. After which it subsides in boys but remains for girls because of menstrual blood loss. [2] So it is now viewed anaemia as “Female Disease” which is causing Red Alert for Indian women.

Iron deficiency anaemia is the commonest medical disorder and is a problem of serious public health condition with epidemic proportions. It has significant impact on physical, psychological development, immunity, behaviour and work performance. [3] It is most prevalent nutritional problem in the world today affecting more than 700 million people. [4]

According to NFHS-3 (2005-06) the prevalence of anaemia in adolescents is 55.8%. the prevalence of anaemia is highest in poor adolescent girls (65-90%) and coincides with onset of menstruation and growth. [5] In this regard there is no literature about the prevalence of anaemia among adolescent girls dwelling in urban slums of Bellary city, Karnataka, India. With this back ground the present study was undertaken to know the prevalence of anaemia and to examine the role of socio demographic factors, nutritional and dietary factors and menstruation factors influencing the occurrence of anaemia among the adolescents living in the urban slums of Bellary city, Karnataka, India.

Objectives:

1. To determine the prevalence of anaemia among adolescent girls living in urban slums of Bellary city, Karnataka.
2. To study the determinants of anaemia among adolescent girls living in urban slums of Bellary city, Karnataka.

MATERIALS AND METHODS

Study Design and Study Setting:

A descriptive community based cross sectional study was conducted in a setting of urban slums of Bellary city, Karnataka state,

India, during the period of July 2010 to February 2011.

Sample size and sampling:

The estimated prevalence of anaemia among adolescent girls as per National Family Health Survey-3 [5] data is 56%. Considering this, by using formula $n=4pq/d^2$ sample size for our study was estimated, and allowable error 10%, the estimated sample size was 314 and it was rounded off to 400. The study was done in the setting of urban slums of Bellary city where in first we divided the Bellary city geographically into four quadrants. Within each geographically divided quadrant one slum was selected randomly. A total of four urban slums were included in the study. Within each selected urban slum 100 adolescent girls (between 10 – 19 years) were studied by conducting house to house survey. If the required sample of 100 adolescent girls was not met in the selected slum in a given quadrant another slum was selected randomly in the given quadrant and the study was conducted till a sample of 100 adolescent girls was met.

Method of data collection:

Information was collected by standard trained interviewers using face to face interviews based on a structured, pre-tested questionnaire. Pre testing was done on adolescent falling in the same age group (10-19 years), in a similar setting, to screen for potential problems in the questionnaire. The interviewers discussed the questionnaire thoroughly among themselves before data collection to decrease interviewer bias. With the exception of a few open ended questions, the interview was based on prompted questions.

Inclusion and exclusion criteria:

All the adolescent girls in the age group of 10-19 years who were residing in the study area for a minimum period of 6 months and willing for their blood testing were included in the study.

Adolescent girls who were terminally ill and pregnant were excluded from the study.

A total of 441 students were approached for participation in our survey, 41 (9.2%) declined to participate in the study.

Questionnaire and study variables:

The questionnaire had three parts, where in the first part was structured to elicit the socio-demographic profile of the adolescents. The second part of the questionnaire consisted of questions structured to elicit factors influencing the occurrence of anaemia like dietary patterns, menstrual history and awareness of anaemia. The third part of the questionnaire consisted of format for clinical examination and for recording anthropometric measurements like height, weight and body mass index (BMI).

Socioeconomic status (SES) was estimated according to modified B.G. Prasad classification. For haemoglobin estimation, after taking written consent from participants 10 micro litre of capillary blood was taken in a haemoglobin micropipette and transferred to pre numbered test tubes containing 2.5 ml of Drabkin's reagent. Hemoglobin (Hb) estimation was done by Cynomethaemoglobin method using a photoelectric calorimeter with green filter (520nm wavelength). Anaemia was classified based on WHO classification where Hb% less than 12 gm/dl was considered as anaemic. [6]

Statistical analysis:

Data were entered into an electronic database and analysis was done to ascertain the prevalence of anaemia and determinants of anaemia among the adolescent girls using SPSS version 16.0.1 (SPSS, 2007).

Ethical considerations:

The study was given ethical approval by Ethical Review Committee of Vijayanagara Institute of Medical Sciences. All ethical requirements including

confidentiality of responses and informed consent were stringently ensured throughout the project.

RESULTS AND OBSERVATION

Table No. 01

Socio-demographic profile of adolescent girls		
Variables	Frequency	Percentage
Age in years		
10 - 12 yrs	43	10.75
12 - 14 yrs	132	33
14 - 16 yrs	117	29.25
16 - 18 yrs	91	22.75
18 - 19 yrs	17	4.25
Mean ± SD	14.82 ± 2.1	
Religion		
Hindu	309	77.25
Muslim	39	9.75
Christian	49	12.25
Others	3	0.75
Occupation of father		
Unemployed	4	1
Unskilled worker	123	30.75
Semiskilled worker	18	4.5
Skilled worker	79	19.75
Business	39	9.75
Employee/Professional	137	34.25
Education of father		
Illiterate	96	24
Primary	61	15.25
Secondary	124	31
Intermediate	47	11.75
Degree & above	72	18
Education of mother		
Illiterate	163	40.75
Primary	92	23
Secondary	104	26
Intermediate	28	7
Degree & above	13	3.25
Socio-economic status		
Upper class	32	8
Upper middle class	106	26.5
Lower middle class	115	28.75
Upper lower class	110	27.5
Lower class	37	9.25
Marital status of the girl		
Married	18	4.5
Unmarried	382	95.5

About 50% of the adolescent girls in the study were in the age group of 14 to 18 years and 77% of them were Hindus. Majority of them were unmarried, however about 4.5% were married.

About one third of the fathers of girls had completed secondary schooling, 24% of the fathers were illiterate and 18% of them

had completed their degree and above. About one third them were unskilled workers (30.7%) and another one third were employees/professional and nearly 20% of them were skilled workers.

Nearly 41% of the mothers of adolescent girls were illiterate and 59 % of them were literate. Majority of them were home makers (47.5%) and unskilled worker (34.5%) and only 4.2% of them were employees/professionals.

About two thirds of the families were belonging to lower middle class (28.7%), upper lower class (27.5%) and lower class (9.3%) and remaining one third of the

families belonged to upper class and upper middle class.

Table No. 02

Prevalence of Anaemia among adolescent girls		
Grades of anaemia	N	Percentage (95% CI)
Mild (10 - 11.9 g/dl)	151	37.75 (33.14 - 42.6)
Moderate (7 - 10 g/dl)	145	36.25 (31.65 - 41.05)
Severe (< 7 g/dl)	34	8.5 (6.054 - 11.54)
Any anaemia (< 11.9 g/dl)	330	82.5 (78.54 - 85.99)

The prevalence of any anaemia was 82.5% among the adolescent girls dwelling in the urban slums of Bellary city. It was observed that the prevalence of mild and moderate anaemia was 37.7% and 36.2% respectively, however the prevalence of severe anaemia was found to be 8.5%.

Table No. 03

Socio-demographic factors influencing anaemia among adolescent girls				
Variables	n(%)	95% CI	OR (95% CI)	P value
Age in years				
10 - 12 yrs (n=43)	32 (74.4)	59.76 - 85.07	1	
12 - 14 yrs (n=132)	107 (81.1)	73.54 - 86.3	1.468 (0.6317 - 3.291)	0.3586
14 - 16 yrs (n=117)	99 (84.6)	76.99 - 90.04	1.882 (0.7832 - 4.414)	0.1531
16 - 18 yrs (n=91)	76 (83.5)	74.57 - 89.75	1.734 (0.7011 - 4.219)	0.2282
18 - 19 yrs (n=17)	16 (94.1)	73.02 - 98.95	5.383 (0.8072 - 126.4)	0.0918
Marital status				
Unmarried (n=382)	314 (82.2)	78.05 - 85.71	1	
Married (n=18)	16 (88.9)	67.2 - 96.9	1.73 (0.4434 - 11.36)	0.5064
Religion				
Hindu (n=309)	262 (84.8)	80.36 - 88.36	2.47 (1.135 - 5.181)	0.02383
Muslim (n=39)	27 (69.2)	53.58 - 81.43	1	
Christian (n=49)	40 (81.6)	68.64 - 90.02	1.96 (0.7196 - 5.475)	0.1891
Others (n=3)	1 (33.3)	6.15 - 79.23	0.2312 (0.007291 - 3.285)	0.2854
Socio-economic status				
Upper class (n=32)	26 (81.3)	64.69 - 91.11	1.199 (0.451 - 3.536)	0.7445
Upper middle class (n=106)	83 (78.3)	69.54 - 85.08	1	
Lower middle class (n=115)	97 (84.3)	76.61 - 89.86	1.491 (0.7508 - 2.99)	0.2551
Upper lower class (n=110)	91 (82.7)	74.59 - 88.65	1.325 (0.6712 - 2.638)	0.4183
Lower class (n=37)	33 (89.2)	75.29 - 95.71	2.275 (0.7697 - 8.213)	0.1484
Education of mother				
Illiterate (n=163)	136 (83.4)	76.97 - 88.36	2.226 (0.56 - 7.681)	0.2315
Primary (n=92)	79 (85.9)	77.31 - 91.55	2.669 (0.6328 - 9.961)	0.1673
Secondary (n=104)	83 (79.3)	71.1 - 86.4	1.747 (0.4305 - 6.186)	0.4004
Intermediate (n=28)	23 (82.1)	64.41 - 92.12	2.006 (0.3972 - 9.795)	0.387
Degree & above (n=13)	9 (69.2)	42.37 - 87.32	1	
Education of the girl				
Primary (n=30)	29 (96.0)	88.65 - 100	9.081 (1.659 - 191.5)	0.0047
Secondary (n=234)	178 (76.1)	70.21 - 81.09	1	
Intermediate (n=136)	122 (89.7)	83.46 - 93.77	2.735 (1.48 - 5.291)	0.00095
Occupation of father				
Unemployed (n=4)	4 (100.0)	51.01 - 100	-	0.3796
Unskilled worker (n=123)	108 (87.8)	80.85 - 92.47	2.013 (1.031 - 4.045)	0.04018
Semiskilled worker (n=18)	16 (88.9)	67.2 - 96.9	2.233 (0.5485 - 15.07)	0.3086
Skilled worker (n=79)	64 (81.0)	71.01 - 88.14	1.195 (0.6005 - 2.442)	0.6223
Business (n=39)	31 (79.5)	64.47 - 89.22	1.086 (0.4598 - 2.756)	0.8735
Employee (n=137)	107 (78.1)	70.46 - 84.21	1	

As the age of the adolescent girls increases the prevalence of anaemia also increases. The odds of having anaemia increases as the age of the adolescent increases and this difference were not found to be statistically significant.

The married adolescents have higher odds [OR 1.73, 95% CI 0.44 - 11.36] of suffering from anaemia when compared to unmarried adolescents and the difference was not found to be statistically significant.

Hindu adolescent girls have higher odds [OR 2.47, 95% CI 1.135 - 5.181] of being anaemic when compared to other religion girls and this difference was found to be statistically significant.

There was no statistically significant difference in the prevalence of anaemia between the different socio-economic strata. However adolescent girls belonging to lower socio-economic status had higher odds [OR 2.27, 95% CI 0.76 - 8.21] of being anaemic when compared to other socio-economic groups.

The prevalence of anaemia was high among adolescent girls whose mothers were illiterate (83.4%) and educated up to primary (85.9%), secondary (79.3) and

intermediate (82%) when compared to girls whose mothers were educated up to degree and above (69%) and this difference was not found to be statistically significant.

Adolescent girls who were doing their primary schooling [OR 9.08, 95% CI 1.659 - 191.5] and intermediate [OR 2.73, 95% CI 1.48 - 5.29] are at higher odds of being anaemic when compared to rest of the group and this difference was found to be statistically significant.

Adolescent girls whose fathers were unemployed, unskilled [OR 2.01, 95% CI 1.03 - 4.04] and semiskilled [OR 2.23, 95% CI 0.54 - 15.07] had higher odds of being anaemic when compared to other groups and this difference was found to be statistically significant.

Adolescent girls with regular menstrual cycles [OR 2.49, 95% CI 1.40 - 4.37], with menstrual period of 3 – 7 days [OR 38.99, 95% CI 17.12 - 93.98] and more than 7 days had higher odds [OR 8.31, 95% CI 3.95 - 18.08] of suffering from anaemia when compared to other groups and this difference was found to be statistically significant.

Table No. 04

Menstruation factors influencing anaemia among adolescent girls				
Variables	n(%)	95% CI	OR (95% CI)	P value
Menstrual cycle				
Irregular (n=85)	60 (70.6)	60.18 - 79.21	1	
Regular (n=315)	270 (85.7)	81.42 - 89.15	2.493 (1.406 - 4.376)	0.002036
Duration of menstrual period				
< 3 days (n=48)	15 (31.3)	19.95 - 45.33	1	
3 - 7 days (n=231)	219 (94.8)	91.14 - 97.0	38.99 (17.12 - 93.98)	<0.0000001
> 7 days (n=121)	96 (79.3)	71.28 - 85.6	8.314 (3.956 - 18.08)	<0.0000001

Adolescent girls with body mass index – thinness [OR 25.07, 95% CI 5.87 - 119.7] and normal [OR 5.48, 95% CI 1.63 - 19.53] have higher odds of being anaemic when compared to other group and this difference was found to be statistically significant.

Adolescent with lesser frequency of meat consumption {Less than thrice per

week [OR 2.0, 95% CI 1.16 - 3.49], Never [OR 5.14, 95% CI 1.88 - 17.63]} and green leafy vegetables {Less than thrice per week [OR 3.47, 95% CI 1.94 - 6.18], Never [OR 15.8, 95% CI 2.72 - 343.9]} had higher odds of having anaemia when compared to other groups and this difference to was found to be statistically significant.

Table No. 05

Nutritional and dietary factors influencing anaemia among adolescent girls				
Variables	n(%)	95% CI	OR (95% CI)	P value
Body Mass Index				
Thinness (< - 2SD) (n=101)	96 (95.0)	88.93 - 97.87	25.07 (5.873 - 119.7)	0.000013
Normal (-2SD to + 1SD) (n=287)	229 (79.8)	74.77 - 84.03	5.485 (1.638 - 19.53)	0.006187
Overweight/Obese (n=12)	5 (41.0)	16.5 - 71.4	1	
Meat consumptio				
Morethan once a week (n=152)	113 (74.3)	66.86 - 80.62	1	
Lessthan once a week (n=184)	157 (85.3)	79.49 - 89.71	2.003 (1.16 - 3.491)	0.0125
Never (n=64)	60 (93.8)	85 - 97.54	5.146 (1.881 - 17.63)	0.00058
Intake of green leafy vegetables				
Thrice or more per week (n=74)	47 (63.5)	52.13 - 73.56	1	
Lessthan thrice per week (297)	255 (85.9)	81.44 - 89.36	3.473 (1.942 - 6.184)	0.00003
Never (n=29)	28 (96.6)	82.83 - 99.39	15.8 (2.727 - 343.9)	0.00029
Intake of citrus fruits				
Thrice or more per week (n=17)	11 (64.7)	41.3 - 82.69	1	
Once per week (n=72)	54 (75.0)	63.91 - 83.56	1.627 (0.4927 - 5.061)	0.4061
Occasionally (n=260)	221 (85.0)	80.15 - 88.83	3.074 (0.9991 - 8.792)	0.0501
Never (n=51)	44 (86.3)	74.28 - 93.19	3.355 (0.8942 - 12.53)	0.07206

Lesser the frequency of intake of citrous fruits higher are the odds of anaemia among the adolescents and this was not statistically significant.

DISCUSSION

In our study prevalence of any anaemia was 82.5% among the adolescent girls dwelling in the urban slums of Bellary city. It was observed that the prevalence of mild and moderate anaemia was 37.7% and 36.2% respectively, however the prevalence of severe anaemia was found to be 8.5%.

Similar results were observed in a study done in 16 districts of 11 states in India by Toteja GS et al (2006) [7] where the overall prevalence of anaemia was 90% with 7.1% having severe anaemia. According to District Level Household Survey (DLHS) on Reproductive child health, India (2002-04) [8] in India, overall, 98 % of adolescent girls have any anaemia. 22% of them are mildly anaemic, 49 % are moderately anaemic and 27 % are suffering from severe anaemia and in Karnataka, 96 % of adolescent girls have any anaemia, 37% of them are mildly anaemic, 44 % are moderately anaemic and 15% are having severe anaemia.

The NFHS-3 (2005-06) data revealed the prevalence of anaemia in 15-19 years age group is 55.8% and is more prevalent in

rural areas (57.4%) than urban area (50.9%). [5]

The odds of having anaemia increases as the age of the adolescent increases and the married adolescents have higher odds [OR 1.73, 95% CI 0.4434 - 11.36] of suffering from anaemia when compared to unmarried adolescents and the difference was not found to be statistically significant. Similar findings were reported by DLHS (2002-04) [8] and Dallman P.R (1992). [9]

Hindu adolescent girls have higher odds [OR 2.47, 95% CI 1.135 - 5.181] of being anaemic when compared to other religion girls and this difference was found to be statistically significant. Similar findings were reported in NFHS-3 (2005-06) [5] where anaemia was more in Hindu community (55.9%) when compared rest of the religious groups.

In our study adolescent girls belonging to lower socio-economic status [OR 2.27, 95% CI 0.76 - 8.21] and doing their primary schooling [OR 9.08, 95% CI 1.659 - 191.5] and intermediate [OR 2.73, 95% CI 1.48 - 5.29] are at higher odds of being anaemic when compared to rest of the groups and this difference was found to be statistically significant. Socio economic status is one of the important determinant of

anaemia among adolescent girls which was also evident in studies conducted by R. Gawarika et al (2006) [10] where they observed the overall prevalence of anaemia among adolescent girls of weaker economic group was 96.5% and in middle income group was 65.1%. In another study conducted by Sanjeev M Choudhary et al, [11] a statistically significant association of anaemia was found with the socio-economic status of the study subjects and a similar association was found in studies done by Rawat CMS et al [12] and S Kaur et al. [13]

In a study done by J S Asokan et al (1999) [14] reported a significant association between the mean haemoglobin concentration of girls with no education or those who completed up to 5th standard.

In our study the prevalence of anaemia was high among adolescent girls whose mothers were illiterate (83.4%) and educated up to primary (85.9%), secondary (79.3) and intermediate (82%) when compared to girls whose mothers were educated up to degree and above (69%) and this difference was not found to be statistically significant. However in a study done by Sanjeev M choudhary et al, [11] Rawat CMS et al [12] and J S Asokan et al (1999) [14] revealed a statistically significant association between anaemia among girls and their parental educational status.

In the present study adolescent girls whose fathers were unemployed, unskilled [OR 2.01, 95% CI 1.03 - 4.04] and semiskilled [OR 2.23, 95% CI 0.54 - 15.07] had higher odds of being anaemic when compared to other groups and this difference was found to be statistically significant. This finding was similar to the study conducted by Rawat CMS et al, [12] where they found a statistically significant association of anaemia among girls with their father's occupation.

Nutritional status and the dietary patterns influence the onset of anaemia

among the adolescent girls. In the present study adolescent girls with body mass index – thinness [OR 25.07, 95% CI 5.87 - 119.7] and normal [OR 5.48, 95% CI 1.63 - 19.53] and with lesser frequency of meat consumption {Less than thrice per week [OR 2.0, 95% CI 1.16 - 3.49], Never [OR 5.14, 95% CI 1.88 - 17.63]} and green leafy vegetable {Less than thrice per week [OR 3.47, 95% CI 1.94 - 6.18], Never [OR 15.8, 95% CI 2.72 - 343.9]} had higher odds of having anaemia when compared to other groups and this difference was found to be statistically significant. It was evidently shown that the nutritional status i.e. BMI was important determinant of anaemia among adolescents in studies done by Rajarathnam et al, [15] Bentley et al [16] and Verma A et al. [17]

In a study done by Goel S et al, [18] showed the relation of poor diet (i.e. inadequate green leafy vegetables, pulses) with anaemia was found to be statistically significant, although, the relationship of anaemia with meat intake was found to be insignificant. In another study done by S Kaur et al, [13] on univariate analysis low iron intake and vegetarian diet showed a significant association with anaemia and a similar finding was seen in a study done by Nelson et al. [19]

Adolescent girls with menstrual period of 3 – 7 days [OR 38.99, 95% CI 17.12 - 93.98] and more than 7 days had higher odds [OR 8.31, 95% CI 3.95 - 18.08] of suffering from anaemia when compared to other groups and this difference was found to be statistically significant. Our results are in consonance with the study done by S. Kaur et al [13] who showed that the strongest predictor of anaemia was vegetarian diet followed by history of excessive menstrual bleeding and similar findings were found by Soon-Myung Hong et al. [20]

CONCLUSIONS

The overall prevalence of anaemia among adolescent girls of urban slums of Bellary city was 82.5% and the prevalence of severe anaemia was found to be 8.5%. Lesser frequency of meat and green leafy vegetables consumption, increased duration of menstrual blood flow, body mass index, and religion, educational status of the girl and occupation of girl's father were the determinants of anaemia among the adolescent girls of urban slums of Bellary city.

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