

# Prevalence of anemia among adolescent girls in an urban slum of Kanpur, Uttar Pradesh

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## ABSTRACT

**Background:** Anemia is a major public health problem in India, particularly among adolescent girls contributing not only to high maternal mortality but also to increased perinatal mortality and morbidity in the future life. **Objectives:** The aim of the study was to assess the prevalence of anemia and the demographic, socioeconomic, and nutritional correlates for anemia in adolescent girls in an urban slum of Kanpur, Uttar Pradesh. **Materials and Methods:** This community-based cross-sectional study was carried out among 400 adolescent girls (10-19 years) in a slum area of Kanpur, Uttar Pradesh from June 2015 to May 2016. A pre-designed and pre-tested pro forma was used to collect the information regarding sociodemographic, menstrual, and dietary factors. Hemoglobin estimation was done using automatic blood analyzer. Statistical analysis was done by mean, standard deviation, and Chi-square test. **Results:** The prevalence of anemia among adolescent girls was found to be 78.5%, of which 40% had mild, 33% had moderate, and 5.5% had severe anemia. Anemia was significantly higher among the adolescent girls whose mothers were either illiterate or having only primary education and those belonging to lower socioeconomic status. **Conclusion:** The prevalence of anemia is alarmingly high among adolescent girls of urban slums. A special attention is needed to improve their hemoglobin status through proper implementation of intervention programs such as iron and folic acid supplementation and dietary modifications along with special emphasis on health education.


**KEY WORDS:** Anemia; Adolescent Girls; Prevalence; Slums

## INTRODUCTION

The WHO has defined adolescence as the age period between 10 and 19 years of age for both sexes (married and unmarried).<sup>[1]</sup> In India, as per Census 2011, adolescent population is 253.2 million constituting 20.9% of the total population of the country, thereby meaning that every fifth person in India is an adolescent. Of this, girls constitute

47.3% of the adolescent population.<sup>[2]</sup> Adolescence is broadly a period of transition from childhood to adulthood. It is the formative period of life when maximal amount of physical, psychosocial, and behavioral changes take place.<sup>[3]</sup>

Anemia is the most common nutritional problem worldwide with high prevalence among adolescent girls and women of childbearing age, particularly pregnant women.<sup>[4]</sup> According to a recent report from UNICEF, an estimated 56% of adolescent girls in India are anemic, and this amounts to an average of 64 million girls at any point in time. Iron requirement in girls increases dramatically during adolescence as a result of expansion of the lean body mass, increase in total blood volume, and the onset of menstruation; these changes make adolescent girls more vulnerable to anemia.<sup>[5]</sup> Anemia not only affects the cognitive and scholastic performance of

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adolescents but also contributes to high maternal morbidity and mortality. Anemia in adolescent girls in the future attributes to high incidence of low birth weight babies with increased perinatal mortality and fetal wastage.

Kanpur is one of the biggest industrial cities of North India and with rapidly increasing urbanization; many people from different parts of the country come to seek employment in this industrial town. This have led to formation of slums in many parts of the city with poor environmental sanitation, unhygienic housing conditions, unsafe water supply, improper excreta disposal, and without proper access to medical and health facilities.

There are limited studies on the prevalence of anemia among adolescent girls of urban slums in North India, who are living in complex ecologic context of poverty and malnutrition. No health programs can either be planned or implemented successfully without having sufficient information regarding the targeted population. Therefore, this study aimed to know the prevalence of anemia in adolescent girls in an urban slum of Kanpur, Uttar Pradesh and to study the sociodemographic and nutritional correlates of anemia.

## MATERIALS AND METHODS

After getting clearance from the Institutional Ethical Committee, a community-based cross-sectional study was conducted among adolescent girls (10-19 years) of slum area named Loharan Bhatta, which is the urban field practice area of Department of Community Medicine, GSVM Medical College, Kanpur from June 2015 to May 2016. The prevalence of anemia according to National Family Health survey in India among adolescent girls is 56%. Considering this the sample size was calculated using Epi Info statistical package of the WHO. Taking a prevalence of 56% with confidence limit of 5% at 95% confidence level, sample size was determined to be 379. However, for a better coverage, we included all eligible adolescent girls in the study ( $n = 400$ ). The adolescent girls who were either pregnant or having any chronic illness or not giving consent were excluded from the study.

After obtaining written and informed consent, information regarding sociodemographic, menstrual, and dietary factors were recorded in pre-designed, pre-tested proforma. Sociodemographic status was estimated by modified Kuppusswamy's classification. Under aseptic conditions, 2 ml of venous blood was collected into a sample bottle containing ethylene diamine tetra acetate and gently mixed to prevent clotting. The sample was transported to pathology laboratory of medical college using vaccine carrier and analyzed using an automated blood analyzer model/medonic. For interpretation of anemia, cutoff point for hemoglobin % was taken as <12 g/dl. The severity of anemia was graded as

mild (10 to <12 g/dl), moderate (7 to <10 g/dl), and severe (<7 g/dl) according to the WHO classification.<sup>[6]</sup> Statistical analysis was done by mean, standard deviation, and Chi-square test.

## RESULTS

In our study, of 400 participants, 314 (78.5%) were found to be anemic. 40% girls had mild anemia, 33 % had moderate anemia, and 5.5% had severe anemia (Table 1).

Age-wise distribution showed that the prevalence of anemia was more in middle (79.4%) and late adolescent girls (82.6%) compared to early adolescent girls (75.6%) but the association was not statistically significant (Table 2).

Statistically significant association of anemia was found with some socioeconomic factors such as maternal education and socioeconomic class. Among the socioeconomic classes, high percentage of anemia was found in lower class (85.3%) and upper lower class (83.3%). No participant belonged to upper class in our study. The prevalence of anemia was found to be more in the girls whose mother were either illiterate (83.2) or had only primary education (78%). Other factors such as father's education, type of family, and attainment of menarche were not found to be significantly associated with anemia (Table 3).

Among nutritional correlates, statistically significant association of anemia was found with vegetarian diet, worm infestation, and no history of iron supplementation. Anemia was more commonly found in the girls who were vegetarian, who had positive history of worm infestation, and who had no iron supplementation (Table 4).

## DISCUSSION

In present study, the overall prevalence of anemia in adolescent girls was found to be 78.5%, which was very close to the observations of Premalatha et al., Pattnaik et al. and Rati and Jawadagi, where they found the prevalence at 78.75%, 78.8%, and 80%, respectively.<sup>[7-9]</sup> Whereas Kaur et al. reported the lower prevalence of 59.8% and Toteja et al. reported a higher prevalence of 90.1% in their study.<sup>[10,11]</sup> Thus, a variable prevalence of anemia in adolescent girls has been reported in different studies which might be

**Table 1:** Prevalence of anemia among adolescent girls ( $n=400$ )

Severity of anemia	Number of girls (%)
Mild	160 (40)
Moderate	132 (33)
Severe	22 (5.5)
Total	314 (78.5)

**Table 2:** Age-wise distribution of anemic adolescents

Age group (years)	No anemia (%)	Mild anemia (%)	Moderate anemia (%)	Severe anemia (%)	Total	Chi-square, <i>P</i> value
10-13	42 (24.4)	72 (41.9)	52 (30.2)	6 (3.5)	172	4.85, 0.088
14-16	28 (20.6)	50 (36.8)	50 (36.8)	8 (5.9)	136	
17-19	16 (17.4)	78 (50.0)	30 (39.5)	8 (10.5)	92	
Total	86 (21.5)	160 (40.0)	132 (33)	22 (5.5)	400	

**Table 3:** Sociodemographic factors in relation to anemia in adolescent girls

Sociodemographic correlates	Number of girls	Anemic girls	Percentage	Chi-square	<i>P</i> value
Mothers education					
Illiterate	232	193	83.2	13.69	0.017
Primary	100	78	78		
Junior high school	34	23	67.6		
High school	26	16	61.5		
Intermediate	6	3	50		
Graduation and above	2	1	50		
Father's education					
Illiterate	218	173	79.3	0.334	0.997
Primary	66	52	78.8		
Middle	44	34	77.3		
High school	38	29	76.3		
Intermediate	30	23	76.6		
Graduation and above	4	3	75		
Socioeconomic status (modified Kuppaswamy's classification)					
Upper	0	0	0	28.01	0.000
Upper middle	21	10	47.6		
Lower middle	67	42	62.7		
Upper lower	107	87	81.3		
Lower	205	175	85.3		
Type of family					
Nuclear	252	205	81.3	3.27	0.070
Joint	148	109	80.4		
Status of menarche					
Attained	274	222	81	3.27	0.070
Not attained	126	92	73		
Religion					
Hindu	275	215	80	1.17	0.278
Muslim	125	99	75.2		

**Table 4:** Nutritional correlates of anemia among adolescents

Variables	Number of girls	Anemic girls	Percentage	Chi-square	<i>P</i> value
Dietary habits					
Vegetarian	158	111	70.2	10.52	0.0012
Non-vegetarian	242	203	83.9		
History of worm infestation					
Present	143	126	88.1	12.18	0.0005
Absent	257	188	73.1		
History of iron supplementation					
Absent	284	242	85	26.1	0.000
Present	116	72	62		

attributed geographical diversity. In our study, 44% girls had mild anemia, 33% had moderate anemia, and 5.5% had severe anemia. These findings were consistent with previous studies.<sup>[12,13]</sup>

An inverse relationship was observed between prevalence of anemia and socioeconomic status in this study. The similar finding was reported by other studies.<sup>[14-16]</sup> This may be due to availability of better quality of food in higher socioeconomic classes. A significantly higher prevalence of anemia was noted in girls whose mother were either illiterate or having only primary education, which was also reported by Pattnaik et al.<sup>[8]</sup> It may be attributed to the better awareness among literate mothers about healthcare and nutrition.

The prevalence of anemia was found to be more in vegetarians as compared to non-vegetarians, which was consistent with the findings of Verma et al. and Kaur et al.<sup>[11,12]</sup> This may be due to poor bioavailability of iron from vegetarian diet. A higher prevalence of anemia was observed in non-vegetarians by Premalatha et al.<sup>[7]</sup> Age of the participants, father's education, type of family, and religion were not found to be significantly correlated with the prevalence of anemia in the present study. Other studies also stated that age was not significantly correlated factor of anemia.<sup>[11,17,18]</sup> Anemia was significantly higher in girls with positive history of worm infestation, which was also reported by Kaur et al. as worm infestations may cause significant blood loss from gastrointestinal tract resulting in anemia.<sup>[11]</sup>

As the sample size in our study was small, representative of only one urban slum of 380 slums in Kanpur, it limits the generalization of our results.

## CONCLUSION

The present study revealed that anemia is a major public health problem among the adolescent girls in the urban slums of Kanpur. Although the prevalence of severe anemia is low, higher prevalence of mild, and moderate anemia demands special emphasis on proper implementation of intervention programs such as iron and folic acid supplementation, health education regarding consumption of iron rich foods, dietary modifications, and deworming to decrease the total prevalence of anemia among the adolescent girls.

## REFERENCES

1. World Health Organization. Programme for Adolescent Health and Development. WHO Technical Report. Serial Number 886. 1996. p. 2.
2. United Nations Population Fund-India. A Profile of Adolescents and Youth in India; 2014. p. 26.
3. Kishore J, editor. National Health Programs of India. 6<sup>th</sup> ed. New Delhi: Century Publications; 2006. p. 82-4.

4. Recommendations to prevent and control iron deficiency in the United States. Centres for Disease Control and Prevention. MMWR Recomm Rep. 1998;47:1-29.
5. Adolescent Girls Anemia Control Programme. Briefing Paper Series: Innovations, Lessons and Good Practices. UNICEF; 2011. p. 1.
6. World Health Organization. Hemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. Geneva: World Health Organization; 2001.
7. Premalatha T, Valarmathi S, Sriyayanth P, Sundar JS, Kalpana S. Prevalence of anemia and its associated factors among adolescent school girls in Chennai, Tamil Nadu, India. *Epidemiology*. 2012;2:118.
8. Pattnaik S, Pattnaik L, Kumar A, Sahu T. Prevalence of anemia among adolescent girls in a rural area of Odisha and its epidemiological correlates. *Indian J Mater Child Health*. 2013;15(1):1-11.
9. Rati SA, Jawadagi S. Prevalence of anemia among adolescent girls studying in selected schools. *Int J Sci Res*. 2014;3(8):1237-42.
10. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP, et al. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. *Food Nutr Bull*. 2006;27(4):311-5.
11. Kaur S, Deshmukh PR, Garg BS. Epidemiological correlates of nutritional anemia in adolescent girls of rural Wardha. *Indian J Community Med*. 2006;31(4):255-8.
12. Bulliy G, Mallick G, Sethy GS, Kar SK. Hemoglobin status of non-school going adolescent girls in three districts of Orissa, India. *Int J Adolesc Med Health*. 2007;19(4):395-406.
13. Verma A, Rawal VS, Kedia G, Kumar D, Chauhan J. Factors which influenced anaemia among girls of the school going age (6-18 years) from the slum of Ahmedabad city. *Indian J Community Med*. 2004;29(1):25-6.
14. Basu S, Basu S, Hazarika R, Parmar V. Prevalence of anemia among school going adolescents of Chandigarh. *Indian Pediatr*. 2005;42(6):593-7.
15. Rawat CM, Garg SK, Singh JV, Bhatnagar M. Socio-demographic correlates of anaemia among adolescent girls in rural areas of the district Meerut, Uttar Pradesh. *Indian J Community Med*. 2001;26(4):173-5.
16. Kapoor G, Aneja S. Nutritional disorders in adolescent girls. *Indian Pediatr*. 1992;29(8):969-73.
17. Singh R. Sociodemographic factors causing anemia in adolescent girls in Meerut. *Health Popul Perspect*. 2008;38:198-203.
18. Kotecha PV, Patel RZ, Nirupam S. Prevalence of Anaemia among Adolescent School Girls Vadodara District. Baseline Report. Vadodara, India: Department of Preventive and Social Medicine; 2000.

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