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# **Original Research Article**

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# Anaemia prevalence among school children of southern districts of Karnataka

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# **ABSTRACT**

**Background:** Anaemia is a major health problem creating an extreme burden on public health, especially in developing countries. Globally, anaemia affects 1.62 billion people, which corresponds to 24.8% of the population. The government of India is implementing various programs to bring down the prevalence of anaemia including iron and folic acid supplementation to school going children. This study attempts to assess the prevalence of anaemia among school going children of first to the tenth standard, in rural and urban areas of Mysore and Chamarajanagara districts of southern part of Karnataka state, India.

**Methods:** A cross sectional study was conducted in 50 selected schools of Mysore and Chamarajanagara districts for a period of one academic year, and 8719 students were evaluated for anaemia. The data was analyzed using appropriate software and statistical methods.

**Results:** The prevalence of anaemia among school going children in Mysore and Chamarajanagar districts was 27.6%. While 22.7% of the girls showed the signs of anaemia, only 19.2% of boys showed anaemia. The prevalence of anaemia was high in rural areas than urban areas and maximum prevalence was seen among high school students followed by upper primary school students and lower primary school students.

**Conclusions:** The total prevalence of anaemia among school children in Mysore and Chamarajanagara districts was 27.6%. The prevalence of anaemia was below the currently available national standards. This low prevalence could be attributed to the continuing care with yearly screening and iron and folic acid tablets provided to the study population under National Health Mission.

Keywords: Anaemia, School children, Iron and folic acid

## INTRODUCTION

Anaemia is a major health problem creating an extreme burden on public health, especially in developing countries. Nutritional deficiencies contribute to the occurrence of most of the cases of anaemia. 50% of anaemias are attributed to iron deficiency. Nutritional anaemias are defined as a condition in which the haemoglobin content of blood is lower than normal as a

result of a deficiency of one or more essential nutrients, regardless of the cause of such deficiency. The disease is found especially in women of child-bearing age, children, and adolescents.<sup>1</sup>

Globally, anaemia affects 1.62 billion people, which corresponds to 24.8% of the population. The highest prevalence is in preschool-age children (47.4%) and 25.4% of children of school going age suffer from

anaemia in India. The prevalence of anaemia exceeds 70% among young children.<sup>2</sup> World Health Organization report in 2011 classifies the level of public health significance of anaemia in India as 'severe'.3 Lower socioeconomic status and rural areas of residence increase the risk substantially. Despite the advances made in the public health system, the prevalence showed a rise from 1998-99 to 2005-2006. Iron and folic acid supplementation, food fortification with iron, and other strategies like changing dietary habits, control of parasites, and nutrition education are considered as effective interventions to control the anaemia from a public health angle. However, the cost and time involved in and the late expression of positive results call for a high-level commitment from the health system.<sup>1</sup> The government of India is implementing various programs to bring down the prevalence of anaemia. The National Health Mission provides tablets of 45 mg elemental iron and 400 mcg of folic acid weekly for children in 5-10 years of age and biannual de-worming is done in schools through. For children in the age group of 10-19 years, 100 mg elemental iron and 500 mcg of folic acid is given weekly and biannual de-worming is done in schools through teachers. For out-of-school children, these services are provided through Anganwadi centres.

This study attempts to assess the prevalence of anaemia among school going children of first to the tenth standard, in rural and urban areas of Mysore and Chamarajanagara districts of Karnataka, India.

#### **METHODS**

The study design was cross sectional and it was conducted for a period of one year in the academic year

High school

July 2018-March 2019. Schools running under the administration of JSS Mahavidyapeetha were selected for the study. A total of 44 schools were selected by convenience and visited as part of the study. The schools were located in both rural and urban localities of Mysore and Chamarajanagara districts. Consent for the study was obtained from respective school authorities. Children studying from the first standard to 10th standard and who were present on the day of the survey were included in the study. A total of 8719 students were assessed for presence of anaemia. A clinical examination for symptoms and signs of anaemia was conducted by qualified doctors and medical interns and those who were provisionally diagnosed with the evidence of positive signs of anaemia were categorized as anaemic children. The current level of education, rural or urban locality of the school, age and gender of the students were also collected. The information obtained was entered to the Microsoft Excel 2013 spreadsheet and analysis was performed using a licensed SPSS version 23. The descriptive data were reported in percentages and Chisquare tests were done to evaluate the association between the presence of anaemia and various factors.

# **RESULTS**

Among the 8719 children, 4352 (49.9%) were girls and 4367 (50.1%) were boys. Of the total students examined, 2783 (31.9%) were from rural areas and 5936 (68.1%) were from urban areas. 1283 students (14.7%) were belonging to lower primary school, 1122 students (12.9%) were in upper primary schools and 6314 students (74.4%) were in high school (Table 1).

72.4

Demographics		Number	%
Gender	Male	4352	49.9
	Female	4367	50.1
Area of residence	Urban	2783	31.9
	Rural	5936	68.1
	Lower primary	1283	14.7
<b>Current education</b>	Upper primary	1122	12.9

Table 1: Demographic characters of the children examined.

Table 2: Factors affecting anaemia among school children.

		Anemia			
Factors		Present		P value	
		N (%)	N (%)		
Gender	Male	836 (19.2)	3516 (80.8)	<0.001	
	Female	1572 (36)	2795 (64)		
Area of residence	Urban	632 (22.7)	2151 (77.3)	<0.001	
	Rural	1776 (29.9)	4160 (70.1)		
Current education	Lower primary	230 (17.9)	1053 (82.1)		
	Upper primary	244 (21.7)	878 (78.3)	<0.001	
	High school	1934 (30.6)	4380 (69.4)		

6314

The prevalence of anaemia among school going children in Mysore and Chamarajanagara districts was 27.6%. A total of 2408 students were diagnosed with the anaemia. The prevalence of anaemia was higher among girls compared to boys. While 36% of the girls showed the signs of anaemia, only 19.2% of boys showed anaemia. This difference was statistically significant with a chisquare test, p value, less than 0.001. An increasing trend was noted in the prevalence of anaemia when compared across different levels of schooling. Maximum prevalence was seen among high school students followed by upper primary school students and lower primary school students. A prevalence of 30.6% was seen among high school students, 21.7% among upper primary school students, and 17.9% among lower primary school

students. A Chi-square test was performed and a statistical significance with a p value less than 0.001 was noted (Table 2).

The prevalence of anaemia was high in rural areas than in urban areas according to this study. 22.7% of urban children and 29.9% of rural children were diagnosed with anaemia by clinical examination. This difference was proven to be statistically significant by a p value of less than 0.001 on the Chi-square test. The prevalence was higher among girls in both urban and rural locality. 22.7% of urban and 38.6% of rural girl students showed anaemia. The prevalence was lower, 16.2% and 20.7% among boys in urban and rural schools respectively (Tables 2, 3).

Factors		Anemia	Anemia		
		Present	Absent	P value	
		N (%)	N (%)		
Urban	Male	238 (16.2)	1229 (83.8)	-0.001	
	Female	394 (29.9)	922 (70.1)	<0.001	
Rural	Male	598 (20.7)	2287 (79.3)	.0.001	
	Г 1	1170 (20.6)	1072 (61.4)	<0.001	

1873 (61.4)

1178 (38.6)

Table 3: Anaemia in rural and urban localities.

#### DISCUSSION

In the current study the prevalence of anaemia among school going children in Mysore and Chamarajanagara districts was found to be 27.6%. The prevalence obtained through our study is lesser than the national averages and observations made in many similar studies. A study conducted by Jain et al in a northern part of the country showed contradicting finding of a high prevalence of 56.5% among school going children of 5 to 16 years of age.5 Another study conducted by Shivaprakash et al in Mandya districts which is bordering with Mysore and Chamarajanagara districts, the study included school children of 6-12 years of age showed a prevalence of 25.4% anaemia. All three districts share the same sociodemographic, geographical and cultural characters.6 However, a lesser prevalence compared to the findings of this study was found in study by Muthayya et al in Bangalore, where the prevalence of anaemia among school children was 13.6%.

Female

The prevalence of anaemia was higher among girls compared to boys. While 36% of the girls showed the signs of anaemia, only 19.2% of boys showed anaemia. Such a significant difference is supported by many similar observations from India. A study conducted by Basu et al in Chandigarh showed a prevalence of 23.9% among females and 7.7% among males. A wider gap in the prevalence of anaemia among girls and boys was observed by Jain et al among school going children in north India where the prevalence among girls and boys were 66.6% and 33.4% respectively. The study from Bangalore also showed that anaemia prevalence was lower in boys than girls (12.0% and 15.3% respectively).

A contradictory finding was observed in a study done by Anand et al in Delhi where the prevalence among boys exceeded the prevalence among girls in the age group of 12-14 years. <sup>9</sup> This difference might be attributed to the difference in the eating habit between boys and girls.

The prevalence of anaemia was higher in rural areas than in urban areas according to this study. 22.7% of urban children and 29.9% of rural children were diagnosed with anaemia the prevalence was higher among girls in both urban and rural locality. This observation made by us is comparable to most of the observations made in similar studies. A high prevalence of 41.8% was observed in urban slums in India by Gambar et al. 10 Anemia was observed more in rural (25.4%) as compared to urban (14.2%) adolescents by Basu et al in Chandigarh. However, Muthayya et al observed no significant difference in anaemia prevalence between children in urban and rural locations (14.6 and 12.3%, respectively).

Our study observes a comparatively lesser prevalence of anaemia. The continuous care availed by the study population through National Health Mission and School management like yearly health check-ups, iron and folic acid supplementation, deworming and referral services must have led to the improved status of anaemia.

Even though a sample size of 8719 was covered, the sample distribution was not even in the districts. No blood investigation was done to assess the haemoglobin levels for laboratory diagnosis of anaemia among school children.

### **CONCLUSION**

The total prevalence of anaemia among school children in Mysore and Chamarajanagara districts was 27.6%. The prevalence of anaemia was higher among girls compared to boys. The prevalence of anaemia was higher in rural areas than in urban areas. Maximum prevalence was seen among high school students followed by upper primary school students and lower primary school students.

The prevalence of anaemia was below the currently available national standards in both sex, all educational levels and both urban and rural localities. This low prevalence could be attributed to the continues care with yearly screening and iron and folic acid tablets distribution provided to the study population by either National Health Mission or school management (JSS Mahavidyapeetha).

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Institutional Ethics Committee

#### **REFERENCES**

- 1. Park K. Park's Textbook of Preventive and Social Medicine. Chapter 11, Nutrition and Health. 24th ed. Jabalpur, India: M/s Banarsidas Bhanot; 2017: 679-680.
- WHO. The global prevalence of anaemia in 2011, WHO. Available at http://www.who.int/entity/ nutrition/publications/micronutrients/global\_prevale nce\_anaemia\_2011/en/index.html. Accessed 25 June 2019.
- 3. WHO. Global anaemia prevalence and number of individuals affected. WHO. Available at

- https://www.who.int/vmnis/anaemia/prevalence/sum mary/ anaemia\_data\_status\_t2/en/. Accessed 25 June 2019.
- 4. Umesh K, Bhadoria AS. National Iron-plus Initiative guidelines for control of iron deficiencyanaemia in India, 2013. Natl Med J India. 2014;27(1): 27-9.
- 5. Jain N, Jain VM. Prevalence of anaemia in school children. Med Practice Reviews. 2012;3(1):1-4.
- Shivaprakash NC, Joseph RB. Nutritional status of rural school-going children (6-12 years) of Mandya District, Karnataka. Int J Scientific Study. 2014;2(2):39-43.
- Muthayya S, Thankachan P, Zimmermann MB, Andersson M, Eilander A, Misquith D, et al. Low anemia prevalence in school-aged children in Bangalore, South India: possible effect of school health initiatives. Europ J Clin Nutr. 2007;61(7):865.
- 8. Basu S, Basu S, Hazarika R, Parmar V. Prevalence of anemia among school going adolescents of Chandigarh. Indian Pediatr. 2005;42(6):593.
- Anand K, Kant S, Kapoor SK. Nutritional status of adolescent school children in rural north India. Indian Pediatr. 1999;36:810-6.
- 10. Gomber S, Madan N, Lal A, Kela K. Prevalence and etiology of nutritional anaemia among school children of urban slums. Indian J Med Res. 2003;118:167-71.

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