

Prevalence of anemia among toddlers (12–36 months) in urban area of district Rohtak, Haryana

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ABSTRACT

Background: Children are considered as an important asset for any country and their health as one of the important indicators of a healthy country. There are several factors affecting children's health and anemia is one of them. Globally around 1.62 billion people are affected by it, which corresponds to 24.8% of the population, with the highest prevalence of anemia (47.4%) among preschool-aged children. **Aim:** The present study was conducted to estimate the prevalence of anemia among toddlers (12–36 months) and to determine the associated factors. **Materials and Methods:** A cross-sectional study was carried out among toddlers (12–36 months) in the urban field practice area of Pt. B.D. Sharma PGIMS, Rohtak. A total of 170 toddlers were enrolled in the study and their mothers were interviewed using a semi-structured pretested questionnaire. Hb was estimated by Sahli's acid hematin method. The data were analyzed using SPSS software version 20. **Results:** In the present study, more than half (55.9%) participants were girls and 44.1% were boys. The overall prevalence of anemia was found to be 62.4%, with mild, moderate, and severe anemia being 41.8%, 17.7%, and 2.9%, respectively. The children with regular intake of iron supplementation were found to be 6.625 times likely to be nonanemic as compared to those with no supplementation. **Conclusion:** Every endeavor should be made to combat the anemia in children through multisectoral and multipronged approach such as nutritional education of mothers, growth monitoring, nutritional supplementation, etc.

Keywords: Anemia, Anganwadi center, supplementary nutrition, toddler

Introduction

Children are considered as an important asset for any country and their health as one of the important indicators of a healthy country. There are several factors affecting children's health and anemia is one of them. Anemia is considered a public health problem of concern engulfing both developed and developing nations. Globally around 1.62 billion people are affected by it, which corresponds to 24.8% of the population, with the highest prevalence of anemia (47.4%) among preschool-aged children.^[1] The prevalence

of anemia in India was estimated at 58.4% as per data available from NFHS-4, whereas in Haryana, 69.6% of children between the age of 6 and 59 months are anemic in urban areas of Haryana and the prevalence is 72% in urban area of district Rohtak.^[2] Nutritional anemia is the most prevalent form worldwide. Almost half of anemia cases are due to iron deficiency. Other deficiencies like vitamin B12 and folate are also important etiological factors for anemia.^[3] Despite the existence of effective control programs: Nutritional Anaemia Prophylaxis Program as early as since 1970, National nutritional anaemia control program (NNACP) since 1991, and a RCH program, the benefits have not been appreciated in the target population.^[1]

In 2013, the ministry of health and family welfare (MOHFW) expanded the NNACP and renamed it as National iron plus

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initiative (NIPI) program. Later on “POSHAN Abhiyaan” was launched in March 2018 with the objective of reduction of anemia among target population. Complying with the targets of POSHAN Abhiyaan and National Nutrition Strategy set by NITI Aayog, the Anemia Mukht Bharat strategy has been designed to reduce the prevalence of anemia by 3 percentage points per year among children, adolescents, and women in the reproductive age group (15–49 years), between the year 2018 and 2022.

To the best of our knowledge, very few studies are available in literature on anemia among children (<3 years) in Haryana. Hence, the present study was planned with the objective of assessing the prevalence of anemia in this age group. This study has helped in early screening of anemia in these children so that appropriate interventions can be planned. This will in turn have a beneficial effect on the overall growth and development of these children in the long run.

Objectives of study

1. To study the prevalence of anemia among toddlers (12–36 months).
2. To study the factors associated with anemia

Material and Method

Study Design: A cross-sectional study of descriptive type.

Study Area: Urban field practice area attached to the Department of Community Medicine, Pt. B.D Sharma PGIMS, Rohtak.

Study Population: Children 12–36 months of age and their mothers (informants).

Study tool: A predesigned and pretested semi-structured schedule.

Study technique:

1. Interview based for administering proforma to the mothers of the study participants.
2. Assessment of blood hemoglobin (Hb) level of the study participants using Sahli's acid hematin method.

Sample size: using formula $4PQ/L^2$, where P = prevalence of childhood anemia (72%), $Q = 100 - P$, and L = the allowable error (10%), the minimum sample size calculated was 155 study subjects. Taking 10% of nonresponse rate 170 study subjects were enrolled in the study.

Inclusion criteria: Children aged 12–36 months:

- (i) Who were residing in the study area for at least 6 months.
- (ii) Whose mothers were willing to participate in the study.
- (iii) Who were registered at the local Anganwadi centers.

Exclusion criteria: Study subjects

- (i) Who were seriously ill/hospitalized.
- (ii) Had history of any bleeding disorder.

- (iii) Separation from mother (death, divorce, and adoption).

Data Collection: The study area was being served by 14 Anganwadi centers (AWC) out of which 8 AWC were selected randomly. A list of eligible participants was prepared from each of the selected AWC. A total of 22 study participants of age group 12–36 months were selected from each AWC by simple random sampling. A written consent was obtained from the mothers of the eligible study participants. Information was obtained from mothers on the predesigned, pretested semi-structured proforma by the candidate himself. The proforma included information about the sociodemographic variables, iron and folic acid supplementation, and supplementary nutrition from Anganwadi center during last one year. After a thorough physical examination, Hb was estimated by Sahli's acid hematin method after taking all aseptic precautions.

The permission from the institutional ethics committee was obtained before the commencement of this study.

Results

The present study included 170 participants, more than half (55.9%) participants were girls and 44.1% were boys. Out of all the children, 60% belonged to general category, while 27.1%, 11.2%, and 1.8% belonged to OBC, SC, and ST category, respectively. More than half of the study subjects belonged to nuclear family (54.1%), 35.3% belonged to 3-generation family, and only 10.6% belonged to joint family as described in [Table 1].

Regarding socioeconomic status, almost half (49.4%) of participants belonged to lower middle class and 27.6% to upper-middle class followed by upper lower class 20.0%. Only 2.9% belonged to upper class.

Table 1: Sociodemographic profile of the study subjects

Sociodemographic variables	Frequency (%) (n=170)
Gender	
Male	76 (44.1)
Female	94 (55.9)
Category	
General	102 (60)
OBC	46 (27.1)
SC	19 (11.2)
ST	03 (1.8)
Type of Family	
Nuclear	92 (54.1)
Joint	18 (10.6)
Three-generation	60 (35.3)
Socioeconomic status*	
Upper	05 (2.9)
Upper-middle	47 (27.6)
Lower-middle	84 (49.4)
Upper-lower	34 (20)

*Modified Kuppuswamy sociodemographic scale

Regarding the prevalence of anemia, about two-third (62.4%) were anemic with mild, moderate, and severe anemia being 41.8%, 17.7%, and 2.9%, respectively as described in [Table 2].

As shown by [Table 3], the mean hemoglobin for all the study participants was 10.60 g/dL. Mean hemoglobin for age groups 12–18 months, 19–24 months, 25–30 months, and 31–36 months was found to be 10.29 g/dL, 10.58 g/dL, 10.70 g/dL, and 10.87 g/dL, respectively. There is a significant difference in the mean Hb (g/dL) among various age groups ($P = 0.004$) using one-way ANOVA test.

Table 2: Prevalence and severity of anemia among study subjects

Variable	Frequency (%) (n=170)
Anemia	
Yes	106 (62.4)
No	64 (37.6)
Degree of Anemia	
No anemia (≥ 11 g%)	64 (37.6)
Mild anemia (10-10.9 g%)	71 (41.8)
Moderate anemia (7-9.9 g%)	30 (17.7)
Severe anemia (< 7 g%)	5 (2.9)

Table 3: Mean hemoglobin (g/dL) levels distributed according to age of study participants

Age group (months)	Hb (mean \pm SD)	P
12-18	10.29 \pm 1.03	0.004*
19-24	10.58 \pm 0.85	
25-30	10.70 \pm 0.87	
31-36	10.87 \pm 1.10	
All age groups (12-36 months)	10.60 \pm 0.96	

*Significant

Table 4: Association of different study variables with prevalence of anemia among study participants

Variable	Anemia (n=170)		Chi-square, P	ODDS Ratio (OR) P
	Yes (106) n (%)	No (64) n (%)		
Iron supplementation from age of 6 months				
Bi-weekly	40 (43.0)	53 (57)	$\chi^2=27.01$, $P=0.000^*$	6.625, $P<0.01^*$
Irregular	50 (83.3)	10 (16.7)		0.313, $P=0.285$
No supplementation	16 (94.1)	1 (5.9)		Reference category
Supplementary nutrition from Anganwadi Centers				
Regular	38 (41.7)	53 (58.3)	$\chi^2=34.515$, $P=0.000^*$	3.983, $P<0.01^*$
Irregular	65 (85.5)	11 (14.5)		1.376, $P=0.317$
Never	3 (100)	-		Reference category
Socioeconomic Status				
Upper	1 (20)	4 (80)	$\chi^2=13.539$, $P=0.000^*$	15.429, $P=0.022^*$
Upper middle	22 (46.8)	25 (53.2)		4.383, $P=0.004^*$
Lower middle	56 (66.7)	28 (33.3)		1.929, $P=0.174$
Upper Lower	27 (79.4)	7 (20.6)		Reference category
Birth order				
1	20 (35.7)	36 (64.3)	$\chi^2=26.01$, $P=0.000^*$	13.800, $P=0.000^*$
2	63 (71.6)	25 (28.4)		3.042, $P=0.091$
≥ 3	23 (88.5)	3 (11.5)		Reference category

As shown in [Table 4], a significant association between iron supplementation and the prevalence of anemia was observed. The children with regular intake of iron supplementation were found to be 6.625 times likely to be nonanemic as compared to those with no supplementation. A similar trend was also observed between supplementary nutrition and the prevalence of anemia. Children availing supplementary nutrition from AWC regularly were found to be 3.983 times likely to be nonanemic as compared to those who never availed supplementary nutrition. The prevalence of anemia was inversely related with socioeconomic status. The children belonged to the upper class of socioeconomic status were found to be 15.429 times likely to be nonanemic as compared to those belonged to the upper lower class. The children who were first in birth order were found to be 13.800 times likely to be nonanemic as compared to ≥ 3 birth order children.

Discussion

This study was an attempt to describe the situation of anemia among children (12–36 months) prevalent in the urban area of Haryana. In the present study, the majority (55.9%) of participants were female, while male contributed around 44.1% of study population. The prevalence of anemia was found to be 62.4%, whereas mild, moderate, and severe anemia were 41.8%, 17.7%, and 2.9%, respectively. These findings are comparable with the studies of DLHS-4 (2012-13, Haryana)^[4] in which the prevalence of anemia in children (6–59 months) was 62.3%.

Studies conducted by Arlappa *et al.*^[5] in Maharashtra and Arlappa *et al.*^[6] in West Bengal reported 76.5% and 91% prevalence of anemia, respectively, among rural preschool children (1–3 years), which was found to be higher compared to the present study. This could be due to different sociocultural background and different geographical areas of these studies. The studies conducted by Bano *et al.*^[7] in Meerut (Uttar Pradesh) and Mishra *et al.*^[8] in

Uttar Pradesh found the prevalence of anemia as 77.5% and 73%, respectively, among children 1–3 years old. The reason for higher prevalence of anemia may be due to low socioeconomic status of study subjects. In these studies, lack of cleanliness and worm infestation are common among low socioeconomic group. Singh and Patra^[9] showed the prevalence of anemia among preschool children (6–59 months) to be about 71% in the EAG states. This may be due to poor maternal iron stores during pregnancy and lactation, poverty, and delayed initiation of complementary foods among the study population in EAG states, whereas Haryana is better in terms of socioeconomic conditions and maternal nutritional status and level of awareness is better because of better education status.

The studies conducted by Sharma *et al.*^[10] in Nepal (42.3%), Shankar and Patel^[11] in Karnataka (47%), and Ritu *et al.*^[12] in Andaman Nicobar (43.9%) reported a lower prevalence of anemia among the children in the same age group. The reason for the low prevalence of anemia could be the difference in the socioeconomic status, the difference in dietary pattern, and the regular intake of iron folic acid (IFA) tablets by study subjects. The study by Huang *et al.*^[13] in China showed a very low prevalence of anemia among children aged 6–23 months (29.73%) in comparison to the present study. The reason for the low prevalence of anemia might be the supplementation of soya bean powder-based micronutrient (nutrient sachets), which significantly reduced the burden of anemia among these children. Consumption of four nutrient sachets weekly by infants is recommended in China. Addition of milk powder or infant formula was associated with a decreased risk of anemia likely because these have higher levels of minerals than breast milk. Moreover, in China, predominant diet is nonvegetarian as compared to our study in which majority were vegetarian.

In the present study, the association between socioeconomic status and prevalence of anemia among study participants was found to be statistically significant ($P < 0.01$). Children belonging to lower socioeconomic class were at high risk for anemia. A similar observation was seen in the studies conducted by Bharati and Bharati^[14] in Kolkata and Singh and Patra^[9] in EAG states of India. It is due to lack of proper nutrition, which is directly related to insufficient income sources of the parents and poor sanitation conditions. Hence, inadequate nutrition and monotonous eating habits of the laborers also affect the blood hemoglobin level of the child.

In the present study, the mean hemoglobin of the study participants was observed to be 10.6 g/dL. The study conducted by Chandyo *et al.*^[15] in Nepal reported a mean hemoglobin 11.2 g/dL, which is found to be higher as compared to the present study. This difference may be attributed to a different study area, as Nepal being hilly area study participants tend to have higher hemoglobin level as compared to our study area. The studies conducted by Quaderi *et al.*^[16] in Bangladesh, Anjali *et al.*^[17] in Gujarat, and Sahu *et al.*^[18] in Orissa reported the mean hemoglobin as 9.2 g/dL, 7.87 g/dL, 8.35 g/dL, and 8.6 g/dL,

respectively. This difference may be attributed to better IFA supplementation and dietary practices in the present study area.

In the present study, the association between birth order and anemia among study participants was found to be statistically significant ($P < 0.01$). A similar observation was seen in the studies conducted by Singh and Patra^[9] in EAG states of India and Ray *et al.*^[1] in New Delhi. The higher birth order children suffer from anemia more because of insufficient iron stores in mothers during pregnancy and inadequate nutrition. The present study revealed that the association of iron supplementation with anemia and severity of anemia was found statistically significant ($P < 0.01$). A similar observation was seen in the studies conducted by Arlappa *et al.*^[5] in Maharashtra, Zhao *et al.*^[19] in Burma, and Ray *et al.*^[1] in New Delhi, which implies that children who were taking IFA tablets regularly were less likely to be anemic.

Conclusion

Anemia is an important cause of morbidity in children. It was observed in this study that the prevalence of anemia was unacceptably high, i.e., 62.4% among the children (12–36 months). Every endeavor should be made to combat the anemia in children through multisectoral and multipronged approach such as nutritional education of mothers, growth monitoring, nutritional supplementation, nutritional rehabilitation, and early diagnosis and treatment of morbidities besides providing environment conducive to health. Therefore, appropriate intervention measures such as supplementary iron and folic acid, periodic deworming, and health and nutrition education should be strengthened. The community needs to be encouraged to diversify their diets by consuming iron-rich foods. Thus, it is important to know the etiological pattern of anemia in our community so that effective measures can be taken to tackle the problem. Further studies are needed in detail to identify the cause of nutritional deficiency among our population.

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Limitations

This study was conducted in urban field practice attached to only one medical college and hence lacks generalization of results.

Declaration of patient consent

The authors certify that they have obtained all appropriate participant consent forms. In the form, the parents have given their consent for their children images and other clinical information to be reported in the journal. The parents understand that their children names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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