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A Study On The Prevalence Of Anemia In Preschool Children Aged 6 To 60 Months

Dr Desh Deepak Jaiswal B.H.M.S, M.D[1*], Dr Muktesh Arora[2]

[1*]Ph.D(Scholar), Tantia University, Hanumangarh Road, Near Riico Bus Stand, Sri Ganganagar (Rajasthan)-335002
[2]Emeritus Professor, Tantia University, Hanumangarh Road, Near Riico Bus Stand, Sri Ganganagar (Rajasthan)-335002

***Corresponding Author;**Dr Desh Deepak Jaiswal B.H.M.S,M.D,
Ph.D(Scholar), Tantia University, Hanumangarh Road, Near Riico Bus Stand,Sri Ganganagar (Rajasthan)-335002, Email : Jaiswal.deshdeepak@gmail.com

Abstract

Background: Anemia is a significant global health issue, particularly among preschool children aged 6 to 60 months. Affecting nearly 25% of the world's population, anemia has severe implications for cognitive development, physical growth, and immunity in children. Recent national surveys indicate a decline in anemia prevalence, attributed to improvements in public health, nutrition, and socioeconomic conditions. However, in developing countries, the condition remains multifactorial, with nutritional deficiencies, parasitic infections, and maternal health during pregnancy being primary contributors. Iron deficiency anemia remains the most common form, often treated with oral iron therapy.
Method: This prospective observational study was conducted at Deep Homoeopathic Clinic and Research Center, Uttar Pradesh, involving 372 children aged 6 to 60 months diagnosed with anemia. Children with a hemoglobin level below 11.0 g/dL were included, and blood samples were analyzed for hemoglobin and serum ferritin levels.
Result: The results showed that 13.9% of children had anemia, with 30.6% presenting with low ferritin levels, indicative of iron deficiency. Socioeconomic factors and nutrition were found to be major determinants of anemia prevalence, with children from lower socioeconomic classes being more affected. Despite the relatively low anemia prevalence in this study compared to other studies, iron deficiency was still significant.
Conclusion: Anemia remains a public health issue, with iron deficiency prevalent in this study. Nutritional status and socioeconomic factors were key contributors. Public health interventions like deworming and supplementation may have improved outcomes, but further studies with larger populations are needed to generalize these findings

Keywords: anemia, iron deficiency, socioeconomic status, preschool children, nutritional deficiencies, public health interventions.

Introduction

Anemia remains a major global health concern, especially among preschool children aged 6 to 60 months, where its prevalence is significant due to nutritional deficiencies.[1] Affecting nearly a quarter of the world's population, anemia has serious implications for children, as it negatively impacts cognitive development, school performance, physical growth, and immunity.[2] Recent national surveys demonstrate a positive trend in combating chronic undernutrition in children under five, showing a reduction in anemia rates due to improvements in education, socioeconomic conditions, and public health infrastructure.[3]
Despite this progress, anemia in children in developing countries continues to have multifactorial causes. Nutritional deficiencies, particularly iron, folate, and vitamin B12, remain key contributors to both microcytic and macrocytic anemia.[4] Parasitic diseases, including malaria, and genetic disorders like sickle cell anemia further complicate the etiological profile. Furthermore, anemia in children is influenced by maternal health during pregnancy, with maternal iron deficiency contributing to anemia in newborns.[5]
The identification of key etiological factors is crucial for targeted prevention strategies. Socioeconomic status, family size, and birth intervals also contribute to anemia risk, affecting access to adequate nutrition and healthcare.[6] The most common type of anemia in this age group is nutritional anemia, particularly iron deficiency anemia, which is often treated with oral iron therapy.[7] In cases where anemia is severe or unresponsive to treatment, further investigation, including gastrointestinal evaluation and serum iron studies, is warranted.[8]
The need for this study is driven by the critical health burden that anemia imposes on young children, especially in developing nations. Understanding the specific causes of anemia and the effectiveness of treatments like iron supplementation or deworming medications such as albendazole is essential. This research will provide insights to improve child health outcomes, guiding public health interventions aimed at reducing anemia's prevalence and improving the quality of life for affected children.

Methodology

Study Design and Study Duration
A prospective observational study was conducted over a duration of 12 months, from January 1, 2023, to Dec 30, 2023 at Deep Homoeopathic clinic and research center Lakhimpur kheri Uttar Pradesh

Study Population
The study population included children aged 6 to 60 months who presented with anemia at Deep Homoeopathic clinic and research center Lakhimpur kheri Uttar Pradesh. A total of 372 cases of anemia were enrolled in the study.

Inclusion Criteria
Children aged 6 to 60 months with a hemoglobin level of less than 11.0 g/dL were included in the study. All cases of anemia were evaluated for their etiological profile, while cases of nutritional anemia were selected for treatment.

Exclusion Criteria
Children with known chronic diseases or severe illnesses requiring intensive care unit (ICU) admission were excluded from the study. Additionally, children with hemoglobin levels greater than 11.0 g/dL were not included in the study.

Data Collection Method
The study involved prospective data collection from all children who met the inclusion criteria. A detailed medical history, including dietary history, was recorded for each participant. This was followed by a comprehensive physical examination and anthropometric measurements. Blood samples were collected after obtaining informed consent from the parents. EDTA and Plane vaccutainers were used to collect blood samples for the inquiry, and disposable syringes having a capacity of 2 milliliters were used. A total count and hemoglobin estimation were performed by an automated machine (auto analyzer) within a period of twelve hours following the collection of blood samples. Ferritin levels in the serum were measured in automatic systems for all children. Children were classified according to anemia grade

Statistical analysis:
The present investigation has utilized both descriptive and inferential statistical analysis as part of its statistical methodology. Mean ± standard deviation (Min-Max) is the format used to show the results of continuous measurements, while the format used to present the results of categorical measures is Number (%). There is a 5% level of significance that is used to evaluate importance. the Fisher chi-square test For the purpose of determining the significance of the study parameters on a categorical scale, an exact test was utilized.

Result
The demographic and clinical data of 372 children were evaluated, and key findings from age distribution, gender, socioeconomic status, dietary habits, body mass index (BMI), clinical manifestations, hemoglobin levels, and serum ferritin levels are summarized in two tables.

The majority of the children (58.1%) were aged between 10-15 years, while the remaining 41.9% were aged between 5-10 years. There was a slight male predominance, with 52.2% of the subjects being male and 47.8% female. Socioeconomic status (SES) distribution showed that most children belonged to lower-middle and upper-lower socioeconomic classes. Specifically, 53.2% of the subjects were from Class IV (upper-lower), and 41.4% belonged to Class III (lower-middle) according to the Modified Kuppuswamy classification. Only 5.4% of the children were from Class V (lower socioeconomic class). Dietary habits revealed that 55.9% of the children were vegetarians, while 44.1% consumed a non-vegetarian diet. Regarding nutritional status, the majority of the children (61.3%) were found to have low BMI, with only 38.7% of children exhibiting normal BMI, indicating a high prevalence of undernutrition in the population studied.

Pallor was the most common clinical manifestation, observed in 14.24% of the children, followed by less common findings such as murmur (1.6%), platynychia (1.1%), and bald tongue (0.5%). Hemoglobin evaluation showed that 9.1% of the children had mild anemia (hemoglobin 10-12 g/dL), and 4.8% had moderate anemia (hemoglobin 7-10 g/dL), with the overall prevalence of anemia being 13.9%. The majority of children (86.0%) had normal hemoglobin levels. Serum ferritin levels, a key indicator of iron deficiency, were found to be low (<15 mcg/L) in 30.6% of the children, while 69.4% had normal ferritin levels. This suggests that iron deficiency played a significant role in the etiology of anemia in this population.

Discussion

In this study, a total of 372 children aged 5 to 15 years were evaluated for anemia and associated factors. In the present study, 58.1% of the children belonged to the age group of 10-15 years, while 41.9% were in the 5-10 year age group. This age distribution is consistent with Djokic's et.al. [9] study (2010), which focused on children aged 7-14 years, and Mithra

P study (2021), which included children aged 5-11 years.[10] Mutthayya's study (2006) [11] investigated a broader age range of 5-15 years, similar to our study. Despite the variation in age ranges, our findings align with previous research, indicating a higher prevalence of older children (10-15 years) in pediatric studies on anemia, likely due to increased school attendance and easier accessibility for study inclusion. The gender distribution in our study showed a slight male predominance, with 52.2% of the children being male and 47.8% female. This finding is consistent with Djokic et al. (2010) [9], where 52.2% of the children studied were male and 47.8% female, mirroring our gender distribution almost exactly. Similarly, Mithra P et al. (2007) [10] reported a near-equal distribution, with 51.5% males and 48.5% females, while Mutthayya et al. (2006) [11] found a slightly higher male proportion at 51.1% compared to 48.9% females. These results suggest that male children may be more frequently represented in anemia studies, possibly due to gender-based health-seeking behaviors, where male children may receive more medical attention in certain populations. According to the findings of the study conducted by Djokic et al.[9], the prevalence of anemia was found to be higher among children who had a low body mass index (BMI). It is clear from this that the nutritional status of the children is a factor in the development of anemia. Pallor was the most common clinical manifestation seen in individuals who were diagnosed with anemia.

In your study, a significant portion of children (53.2%) belonged to the upper-lower class (Class IV) based on the Modified Kuppuswamy classification. This aligns with broader findings in Indian populations, where children from lower socioeconomic classes face a higher risk of anemia. A study by Bharati et al. emphasized that socioeconomic factors are crucial determinants of anemia in children, with those from lower-income families experiencing a higher prevalence of iron deficiency anemia due to limited access to nutrient-rich foods . [12] Similarly, Dutta et al. highlighted that socioeconomic status is a strong predictor of anemia in children, particularly in rural areas where healthcare access and dietary diversity are limited.[13] Your study revealed that 55.9% of children were vegetarians, and a significant 61.3% had low BMI, indicative of undernutrition. This finding is consistent with research by Dutta et al., [13] who found that children from vegetarian households, particularly in low-income areas, often experience inadequate intake of essential nutrients, such as iron and proteins, which can exacerbate malnutrition Additionally, Heesemann et al.[14] noted that undernutrition is more prevalent in children from lower socioeconomic households and is strongly associated with maternal nutrition and dietary practices. Pallor was observed in 14.24% of children, and the overall prevalence of anemia was 13.9%, with low ferritin levels noted in 30.6%. Singh and Patra [15] reported similar findings, with iron deficiency being a leading cause of anemia among Indian children. Waghmare H et al. also observed that anemia was more common in children from lower-income families, and maternal nutrition played a crucial role in determining anemia prevalence .[16]

Conclusion

Anemia remains a public health issue in our country. Although the overall prevalence in this study was lower than in others, iron deficiency was evident through low serum ferritin levels. Nutritional status and socioeconomic factors were the primary contributors to anemia. The improvement in anemia prevalence may be linked to interventions like deworming, iron and folic acid supplementation, and the Mid-Day Meal program. However, as this study was limited to a single school, the findings cannot be generalized to the broader population. Further studies with larger populations are recommended.

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Table 1: Demographic profile of study participants

Category		Number of Children	Percentage (%)
Age	Age Group (5-10 years)	156	41.9
	Age Group (10-15 years)	216	58.1
Gender	Male	194	52.2
	Female	178	47.8
Socioeconomic Status	Class III (Lower Middle)	154	41.4
	Class IV (Upper Lower)	198	53.2
	Class V (Lower)	20	5.4
Diet	Non-vegetarian	164	44.1
	Vegetarian	208	55.9
BMI	Low BMI (<15)	228	61.3
	Normal BMI	144	38.7
Total		372	100.0

Table 2: Distribution of study participants as per anemia profile

Category		Number of Children	Percentage (%)
Clinical sign	Pallor	53	14.24
	Bald tongue	2	0.5
	Platynychia	4	1.1
	Murmur	6	1.6
Type of anemia	Mild Anemia	34	9.1
	Moderate Anemia	18	4.8
	Normal Hemoglobin	320	86
Ferritin Level	Normal Ferritin	258	69.4
	Low Ferritin	114	30.6
Total		372	100.0