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FREQUENCY AND ASSOCIATED FACTORS OF ANEMIA AMONG CHILDREN AGED 6 MONTHS TO 5 YEARS

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Abstract

Background

Anemia is a common health issue in children under five years age, especially in low-resource settings. It can impair growth and development, with iron deficiency and malnutrition being major causes. In Pakistan, data on childhood anemia remains limited. This study aims to fill that gap by assessing its frequency and related factors.

Study design: A cross-sectional descriptive study

Duration and place of study: This study was conducted in Khairpur Medical College and Hospital Khairpur Mir's from January 2024 to January 2025

Objective

This study aimed to assess how common anemia is among children aged 6 months to 5 years and to identify the key factors associated with its occurrence.

Methods

A total of 200 children presenting with palmar pallor and hemoglobin levels below 11 g/dL were enrolled using consecutive non-probability sampling. Data were collected using a structured questionnaire and analyzed using SPSS version 26.0. Means and standard deviations were calculated for quantitative variables, while frequencies and percentages were used for qualitative variables. Stratification and post-stratification chi-square tests were applied to identify significant associations, with a p-value ≤0.05 considered statistically significant.

Results

Of the 200 children included, 46% were male and 54% female, with a mean age of 27.8 ± 14.3 months. The overall prevalence of anemia was 64%. Anemia was more common among children

from rural areas (68%), those with visibly pale skin (67%), and those belonging to lower socioeconomic backgrounds (48%). Iron deficiency anemia was diagnosed in 54% of the anemic children. Malnutrition was widespread, with 32% showing mild malnutrition and 43% falling into the moderate to severe category. No significant association was observed between anemia and parasitic infections, including malaria or worm infestations.

Conclusion

Anemia affects a significant proportion of children under five years of age, with contributing factors including iron deficiency, malnutrition, poverty, and rural living conditions. Focused nutritional support, education, and poverty alleviation strategies are essential to address this ongoing public health concern.

Keywords: Anemia, Iron Deficiency, Nutrition, Parasitic infections, Malnutrition, Pediatrics

Introduction

Anemia in early childhood is a significant global health concern that continues to affect millions of children, particularly in low- and middle-income countries. It is characterized by a reduction in the concentration of hemoglobin in the blood, which can lead to impaired oxygen delivery to tissues, ultimately affecting a child's growth, cognitive development, and immunity [1]. The World Health Organization (WHO) estimates that nearly 42% of children under the age of five worldwide are anemic, with South Asia carrying a disproportionately high burden [2].

In Pakistan, anemia remains alarmingly prevalent among children under five, with national surveys indicating rates ranging between 50–60% depending on region and age group [3, 4]. While iron deficiency is the most common cause, anemia in this age group is often multifactorial, influenced by poor dietary intake, recurrent infections, intestinal parasitic infestations, and underlying chronic illnesses [5-7]. Additionally, factors such as low maternal education, poor access to healthcare, poverty, and food insecurity all compound the risk, making the condition particularly difficult to manage in underserved populations [8, 9].

The consequences of untreated anemia in early childhood are profound. Numerous studies have shown that anemic children are more likely to experience developmental delays, reduced academic performance later in life, and increased susceptibility to infections [10, 11]. These effects are not just short-term but can lead to long-lasting socioeconomic implications for individuals and communities [12].

Despite the magnitude of this issue, localized data remain limited. Most national reports aggregate data across broad demographics, failing to account for regional variations in risk factors and access to care [13]. The local population faces unique challenges, including high poverty rates, undernutrition, limited health infrastructure, and cultural barriers to healthcare access [14, 15].

This study aims to address an important gap by examining the prevalence and contributing factors of anemia among young children. Gaining insight into the burden of anemia and its associated determinants is vital for informing effective public health strategies, particularly in low-resource environments.

Methodology

This study was designed as a descriptive, cross-sectional survey to explore the prevalence of anemia and its associated factors among children aged 6 months to 5 years. The study included a total of 200 children who met the inclusion criteria. These children were brought to the pediatric outpatient department or admitted to the ward for various complaints, and were found to have clinical signs of anemia, especially, palmar pallor. To confirm the diagnosis, hemoglobin levels were tested, and only those with values below 11 g/dL, as per WHO criteria for anemia in this age group, were included in the final analysis. We used a consecutive non-probability sampling technique, which meant that every eligible child seen during the study period was enrolled until the sample size was complete.

Parents or caregivers were approached, and after obtaining informed verbal consent, data were collected using a structured, pre-tested questionnaire. This form included sections on the child's demographic profile (age, gender, place of residence), dietary habits, clinical features (such as pallor, appetite, and history of infections), socioeconomic background, and maternal education. Weight and height were recorded, and nutritional status was assessed using WHO growth charts.

To maintain consistency and minimize bias, all hemoglobin estimations were done using the same automated hematology analyzer in the hospital laboratory. Any child with a known chronic illness, recent blood transfusion, or ongoing iron supplementation was excluded from the study to avoid confounding.

All collected data were entered and analyzed using SPSS version 26.0. Continuous variables like age and hemoglobin levels were summarized using mean and standard deviation. Categorical variables, including gender, socioeconomic status, and nutritional status, were presented as frequencies and percentages. To explore associations between anemia and different variables, we applied the chi-square test after stratifying by factors such as age group, sex, and rural versus urban residence. A p-value of ≤ 0.05 was considered statistically significant.

Throughout the process, efforts were made to ensure ethical standards. Confidentiality of participants was maintained, and all procedures followed the principles outlined in the Declaration of Helsinki.

Results

A total of 200 children between the ages of 6 months to 5 years were enrolled in this study. Of these, 92 (46%) were boys and 108 (54%) were girls. The average age of the participants was 27.8 ± 14.3 months. Most children came from rural areas (63%), while the rest were from urban settings.

The overall prevalence of anemia, as defined by a hemoglobin level below 11 g/dL, was found to be 64% (n = 128). Among these anemic children, a significant number presented with visibly pale skin (67%) and came from families classified as low socioeconomic status (48%).

Iron deficiency anemia was the most common type observed, affecting 54% (n = 69) of the anemic cases. Malnutrition was another notable factor. About 32% of children with anemia were found to be mildly malnourished, while 43% had moderate to severe malnutrition.

Interestingly, no significant relationship was identified between anemia and recent or ongoing parasitic infections such as malaria or intestinal worm infestations. While these conditions were present in a small portion of the population, their distribution was almost equal in both anemic and non-anemic children.

The summarized demographic and clinical findings are presented in the tables below:

Table 1: Demographic Characteristics of the Study Population (n = 200)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	92	46.0
Female	108	54.0
Age Group (months)		
6–12	40	20.0
13–36	92	46.0
37–59	68	34.0
Residence		
Urban	74	37.0
Rural	126	63.0
Socioeconomic Status		
Low	96	48.0
Middle	78	39.0
High	26	13.0

Table 2: Clinical and Nutritional Characteristics Related to Anemia (n = 128 anemic children)

Variable	Frequency (n)	Percentage (%)
Pale Skin (Palmar Pallor)	86	67.2
Type of Anemia		
Iron Deficiency Anemia	69	53.9
Other/Unspecified	59	46.1
Nutritional Status		
Mild Malnutrition	41	32.0
Moderate to Severe Malnutrition	55	43.0
Normal Nutrition	32	25.0
Parasitic Infections		
Malaria	6	4.7
Worm Infestation	8	6.3
None	114	89.0

These findings highlight a worrying burden of anemia in young children, particularly among those living in rural areas and under challenging nutritional and economic conditions. The data also suggest that while parasitic infections are a known risk factor, in this specific population, other determinants, especially diet and poverty, play a more dominant role.

Discussion

The overall anemia prevalence in our cohort was 64%, which is unfortunately high but not entirely surprising. Similar findings were reported in a study conducted in Bhubaneswar, India, where 61% of under-five children were found to be anemic [16]. The situation is also comparable to results from Ethiopia, where Gebreegziabiher et al. reported anemia in 66.8% of children within the same age range [17]. These figures reflect the persistent burden of anemia in low-resource settings, where nutritional insecurity, repeated infections, and limited access to preventive care all play a role.

Our results showed a higher prevalence of anemia among children from rural areas, which is in agreement with a study from southern Tanzania by Simbauranga et al., where rural residence significantly correlated with higher anemia rates among preschool-aged children [18]. This rural-urban divide could be attributed to differences in access to healthcare, maternal education, and dietary diversity, all of which are crucial for healthy child development.

Iron deficiency anemia emerged as the most frequent type in our population, affecting 54% of the anemic children. This is slightly lower than the 68% reported by a study in Iraq, which emphasized the role of poor iron intake and delayed introduction of iron-rich complementary foods [19]. Though the proportions vary, the consistency of iron deficiency as the leading cause across multiple countries underscores the universality of dietary inadequacy in early life.

We also observed that malnutrition, particularly moderate to severe, was present in over 40% of anemic children. This closely aligns with findings from a study in northern Nigeria, where over 45% of anemic children were also found to be moderately or severely malnourished [20]. Malnutrition and anemia often exist in a vicious cycle, poor nutrition reduces hemoglobin production, while anemia exacerbates physical weakness and reduced food intake—thus making integrated nutritional interventions essential.

Unlike some studies that report a strong link between anemia and parasitic infections, especially in endemic areas, we did not find a significant association with malaria or worm infestation. This finding diverges from research in coastal Kenya, where Ngesa and Mwambi noted a substantial proportion of anemia cases attributed to parasitic infections [21]. Our differing results may be explained by geographic variation in parasite prevalence or the fact that many caregivers in our setting had already sought treatment for obvious infections before coming to the hospital.

One encouraging aspect of our study was the level of awareness and participation from parents. While not measured quantitatively, many caregivers expressed concern over their child's pallor and weakness, indicating a growing recognition of early warning signs, which could be pivotal for future intervention programs.
Overall, the findings of our study are consistent with existing literature while also offering localized insight into a public health problem that continues to impact millions of children.

Conclusion

This study highlights a worrisome level of anemia among children aged 6 months to 5 years, with the condition affecting nearly two-thirds of the participants. The most common contributors were iron deficiency, malnutrition, and socioeconomic hardship, particularly among rural families. These findings call for practical, community-based interventions that focus on improving nutrition, raising awareness, and addressing poverty-related challenges. Tackling anemia in early childhood is not just about supplements, it requires a broader, more thoughtful approach that supports both children and their caregivers through education, healthcare access, and sustainable nutritional solutions tailored to local needs.

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Permission
Ethical approval obtained

Conflict of Interest
None

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