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Frequency of Iron Deficiency Anemia in Children Presenting with Pallor to Hayatabad Medical Complex Peshawar

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Abstract: *To determine the frequency of iron deficiency anaemia (IDA) in children who present with clinical pallor. The study was conducted at a tertiary care hospital, Hayatabad Medical Complex, between August 2018 and July 2022. We utilized laboratory information and took blood samples of 5ml to check for haemoglobin and ferritin levels. The criteria for IDA diagnosis were the presence of low haemoglobin levels (<11gm/dl) and low ferritin levels (<30ng/ml). The data were analyzed using SPSS version 26. The study contained 492 children (1 to 15 years). The total number of anaemic was 467 (94.9%) and Iron Deficiency Anemia was found to be present in 28.8% of the patients. Our study concludes that the frequency of iron deficiency is high in children presenting with pallor. Initiatives like National programs incorporating short-term measures like iron supplements and long-term ones like fortifying wheat flour could decrease the burden of IDA.*

Key Words: Iron Deficiency Anemia; Pallor; Children; Prevalence

Introduction

Iron deficiency anaemia (IDA) is a significant public health concern among young children and is the most common type of micronutrient deficiency globally (Habib et al., 2016). It is estimated that over 1.2 billion people worldwide suffer from anaemia, with children under 5 years the most affected. Pallor, characterized by the paleness of the skin, is a usual presenting symptom in children with different underlying health conditions, including IDA. It is the most common cause of nutritional anaemia.

IDA is defined as having a haemoglobin level below 11 g/dL and a ferritin level below 30/ g/L (Li et al., 2020). It has an important effect on the mortality and morbidity of children. It is also linked to compromised cognitive and brain development (Lee, Chao, Huang, Chen, & Yang, 2020; McClorry et al., 2018). IDA is the 13th most important risk factor for global disability-adjusted life years and the third most prevalent cause of impairment globally (Wang et al., 2022). Most of the workload for IDA is concentrated in regions of Africa and Asia that lack sufficient resources (Organization). Understanding the frequency of IDA in children presenting with pallor is essential for early detection, appropriate management, and prevention of potential long-term consequences(Turawa et al., 2021).

In Pakistan, it has been reported that 40-70% of children suffer from IDA. Many clinical and socioeconomic factors, including widespread micronutrient deficiencies, are thought to be the primary causes of IDA in Pakistan (Khan, 2021; Mahmood & Nasir, 2001). There is a lack of prevalence data on this topic, and many studies are outdated or based on small sample sizes from non-representative groups. In simpler terms, IDA is a condition where a person has both low haemoglobin and low ferritin levels. However, most studies in Pakistan have only focused on low haemoglobin levels, but this study emphasizes ferritin levels. Pakistani children with iron deficiency anaemia (IDA) need more data for effective local IDA prevention and treatment initiatives need this information.

This study was conducted in a tertiary care

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hospital between August 2018 and July 2021 to find out IDA frequency in local children with the aim of analyzing the frequency of low ferritin-based anaemia and summarising the findings from selected studies that investigate the frequency of iron deficiency anaemia in children presenting with pallor. Furthermore, it discusses screening methods, diagnostic criteria, and available treatment options to guide clinical practice and public health interventions.

Materials and Methods

The study included children of both genders, aged 1 to 15 years. The inclusion criterion in this study was children with pallor. All the children with pallor and associated hepatosplenomegaly, lymphadenopathy, bleeding tendencies and children with chronic medical and surgical conditions were excluded from the study.

After informed consent, 5 ml of venous blood was collected and sent to a laboratory for estimation of haemoglobin and ferritin levels. The reference range of our laboratory was 11.5 to 17.5g/dl, with any haemoglobin level less than 11.5 g/dl considered low. Similarly, the serum ferritin level ranges of our laboratory were 13-150ng/ml. The concentration of Serum Ferritin was measured to detect iron deficiency in individuals because it has the highest sensitivity and specificity (Baker, Greer, & Nutrition, 2010; JM, 2007; Lozoff, 2007).

Statistical Analysis

To adapt the sampling strategy, all data analyses were done in SPSS version 26 utilizing a convenience sample technique. The study provided the mean outcomes along with their 95% confidence intervals. Univariate analysis preceded multivariate logistic regression. The analysis of two variables provided odds ratios without any adjustments, along with 95% confidence intervals. The used model included variables with a p-value of less than 0.25. Statistical and theoretical factors determined the model. 0.05 type 1 errors. Model estimates give adjusted odds ratios and 95% CI.

Result

This study examined 490 children between the ages of 1 to 15 years. The analysis of blood samples from children showed that 95.3% of them were anaemic with hemoglobulin of less than 11.5 g/dl and 29.5% were iron depleted (ferritin of less than 30 ng/ml). Out of these children, 141 (28.8%) were found to have IDA due to low levels of haemoglobin and ferritin according to the definition. The individuals with IDA had an average haemoglobin concentration of 8g/dL.

Table 1

*Hemoglobulin and ferritin level cross-tabulation (Ferritin Value * HB)*

Crosstab				
Count		HB		
		Normal (11.5-16)	Less Than 11.5	Total
Ferritin Value	Normal (30-400)	19	326	345
	Less Than 30	4	141	145
Total		23	467	490

Table 2

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.724[a]	1	.189
Continuity Correction[b]	1.164	1	.281
Likelihood Ratio	1.901	1	.168
Fisher's Exact Test			
Linear-by-Linear Association	1.721	1	.190
N of Valid Cases	490		

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 6.81.

b. Computed only for a 2x2 table

Discussion

This study found that 28.8% of children between 1 year to 15 years old had IDA, considered a "moderate burden" based on WHO criteria (Habib et al., 2016).

The observed prevalence is consistent with previous research conducted in various regions of Pakistan. For example, a study conducted in the district of Swat reported a prevalence of 35.8% among children aged 6 to 24 months (Lisbôa, Oliveira, Lamounier, Silva, & Freitas, 2015). Similarly, a cross-sectional survey conducted in the rural district of Matiari, Sindh, found a prevalence of 29.7% among children aged 6-59 months (Nambiema, Robert, & Yaya, 2019). These findings indicate a high burden of iron deficiency anaemia in children across different regions of Pakistan, regardless of the healthcare setting.

In this study, the prevalence of IDA is less compared to earlier studies conducted in other developing countries like Kenya and Palestine (Camaschella, 2015). It is also significantly lower than the estimation from an earlier study conducted in Pakistan (Khan, 2021; Mahmood & Nasir, 2001).

The results of the study are lower than the reported incidence of IDA in Kazakhstan, which is 32.4% (Brotanek, Halterman, Auinger, Flores, & Weitzman, 2005), Yemen (34.2%) (Al-Alimi, Bashanfer, & Morish, 2018), and in accordance with the 2001 Pakistan National Nutrition Survey, the percentage of malnourished anaemic individuals was 36%. However, this percentage is higher than the results of studies conducted in Morocco, which reported a rate of India (23.1%) (Pasricha et al., 2010) and Iran (29.1%) (Kassebaum et al., 2014).

During the first 5 years of life, babies experience a significant growth spurt and require more iron than usual. As a result, there is a higher risk of developing iron deficiency anaemia (IDA) during this time. In addition, some factors can contribute to young children developing iron deficiency anaemia (IDA), such as not having enough access to foods that are rich in iron, not following proper feeding practices for infants and young children (such as not exclusively breastfeeding, breastfeeding for too long, or introducing inappropriate weaning foods), and experiencing frequent illnesses (Mantadakis, Chatzimichael, & Zikidou, 2020).

Screening programs for early detection of iron deficiency anaemia should be included in routine healthcare practices, especially in primary healthcare settings and schools, where children are more likely to present with symptoms such as pallor. Early identification of iron deficiency anaemia can lead to early treatment and prevent the progression of the condition, thereby reducing its impact on the child's health and development.

Conclusion

Our study concludes that the frequency of iron deficiency is high in children presenting with pallor. The findings underscore the urgent need for targeted interventions, to reduce the impact of IDA including improved nutritional intake, enhanced access to healthcare services, and increased awareness among parents and caregivers. Implementing these measures will not only reduce the burden of iron deficiency anaemia but also contribute to the overall well-being and development of children in Pakistan. It is important to have national initiatives that include both short-term solutions like iron supplements and long-term solutions like fortifying wheat flour.

Study Limitations

There are some limitations to this study. The study relied on clinical diagnosis which is observer biased. Also, while measuring ferritin levels, the infectious state was not considered by doing CRP levels, which can lead to false negative values. In addition, the study was conducted in a specific geographic region of Pakistan, and the findings may not be generalizable to the entire country.

Future Findings

IDA-reducing plans need to be implemented in Pakistan, such as short-term vertical plans like iron supplementation and long-term horizontal plans like wheat flour fortification. Pakistan depends on wheat, thus reviving its national wheat flour fortification schemes is essential. Funding because of poverty and education, especially for mothers regarding the use of iron supplements and deworming are needed. Behavioural change communications may be needed to improve diet. To effectively address the high prevalence of iron deficiency anaemia in children with pallor in Pakistan, it is crucial to implement comprehensive strategies at various levels. Additionally, targeted interventions should be implemented to enhance access to healthcare services and increase awareness among parents and caregivers about the importance of early identification, screening and management of iron deficiency anaemia. Pakistan must move quickly to eliminate IDA to benefit existing Pakistani children.

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