The Role Of Nutrition In Preventing Pediatric Iron Deficiency Anemia At Department Of Pediatric MTI,LRH Peshawar

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Abstract

Background: IDA stands as a common nutritional defect which affects children across the world. The condition damages mental abilities and reduces both immunity strength and body growth. Preventing iron deficiency anemia depends heavily on interventions regarding nutritional aspects which combine iron-enriched food sources with dietary supplementation. Public health activities combined with early nutritional changes in diets serve to lower the occurrence of childhood anemia.

Objectives: to understand how dietary methods can stop iron deficiency anemia from developing in children. This evaluation assesses dietary habits alongside measuring both iron content and the performance of iron-endowed food consumption together with medical supplementation for sustaining proper hemoglobin upkeeps.

Study Desgin : A cross-sectional observational study.

Place and duration of study. Department of pediatric MTI,LRH Peshawar from Janurary 2019 to june 2019

Methods: Department of Pediatrics within MTI LRH Peshawar between January 2019 through June 2019. The study adopted a group of participants through a cross-sectional research design. The study accepted patients between the ages of 6 months to 12 years. Different tests such as dietary recall and blood examinations and ferritin assay measured nutrition intake and hemoglobin levels and iron storage amounts. The statistical evaluation was carried out by SPSS 22.0 software and we established statistical significance at $p < 0.05$.

Results: The participants in the study had a mean age of 5.8 ± 2.4 years. The research investigation established that iron content in food creates a major connection to healthy hemoglobin

measurements ($p < 0.001$). The combination of fortified cereal consumption with leafy greens plus iron medication intake decreased the incidence of anemia in children. Anemic children demonstrated insufficient dietary iron consumption in 68% of cases together with ferritin deficiencies present in 47%.

Conclusion: Children demonstrate lower rates of iron deficiency anemia when they receive dietary treatments comprising iron supplements along with adequate iron supplementation. Health organizations should implement educational programs about appropriate diets and food enrichment standards to prevent anemia occurrence. Enhancing pediatric health outcomes through the year requires preventative nutritional interventions to be established as a top priority.

Keywords: Iron deficiency, pediatric anemia, nutrition, prevention

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Introduction

Iron Deficiency Anemia remains a significant global health matter because it adversely affects more than 40% of children under age five across developing settings [1]. IDA produces negative impacts on mental capacity and protects the immune system while disrupting body development which causes permanent development limitations [2]. Children develop pediatric anemia less frequently when they consume adequate amounts of iron because this element builds hemoglobin while facilitating oxygen delivery [3]. The main dietary iron providers are heme iron from meat fish and poultry and non-heme iron found in leafy vegetables and fortified cereals. Non-heme iron shows reduced absorption in the body therefore vitamin C intake becomes necessary to ensure sufficient absorption of the mineral [4]. Deficiencies occur primarily from problems with dietary intake together with inadequate iron absorption along with physiological demands required during growth spurt stages [5].Various studies have established that supplementary iron treatment with food fortification is an effective way to decrease anemia levels in children. A scientific review demonstrated that the introduction of iron-enriched food products could increase anemic children's hemoglobin quantity by 0.8 g/dL [6]. The results of a separate research demonstrated that school-based iron supplementation initiatives reduced anemia cases by 35% throughout a six-month period [7].IDA continues to affect wide populations because people lack proper nutrition education and have insufficient food intake coupled with social challenges. Maternal educational initiatives together with nutrition programs for children help decrease the extent of anemia in the population [8]. According to the World Health Organization (WHO) patients should receive only breast milk during their initial six months and then start receiving iron-dense complementary foods as a strategy to eradicate early childhood anemia [9]. The author examines dietary behavior and iron condition and anemia prevalence to create useful public health measures which fight pediatric IDA.

Methods

The research took place within the pediatric department at MTI LRH Peshawar throughout the period from January 2019 to June 2019. Researchers involved children from 6 months to 12 years old to evaluate their dietary patterns together with blood iron indicators and storage results. The

24-hour dietary recall questionnaire served for parental survey while blood tests measured patients' hemoglobin levels and ferritin and serum iron content. SPSS version 22.0 ran the statistical analysis where all p values less than 0.05 became statistically significant.

Inclusion Criteria

- Children aged 6 months to 12 years

The participants displayed iron deficiency anemia which fell into the mild to moderate category.

The research participants did not suffer from any diseases which interfere with iron management processes.

Exclusion Criteria

Children under severe anemia needed medical hospitalization services.

- Chronic illnesses (e.g., kidney disease, thalassemia)
- Those on iron therapy for more than three months

Data Collection

The research data originated from three sources which included both interviews with parents and examination of medical records along with laboratory assessments. A standardized food frequency questionnaire measured dietary consumption of participants. The analysis of blood samples through three tests identified anemia status by revealing patient hemoglobin levels and measuring serum ferritin together with iron concentration.

Statistical Analysis

The researchers executed all statistical tests through SPSS 22.0 software. The authors utilized descriptive statistics to present the results of demographic information. The data analysis relied on applying chi-square to categorical variables and independent t-tests to evaluate mean Hemoglobin results. Statistics considered the p-value less than 0.05 as a defining indicator for statistical significance.

Results

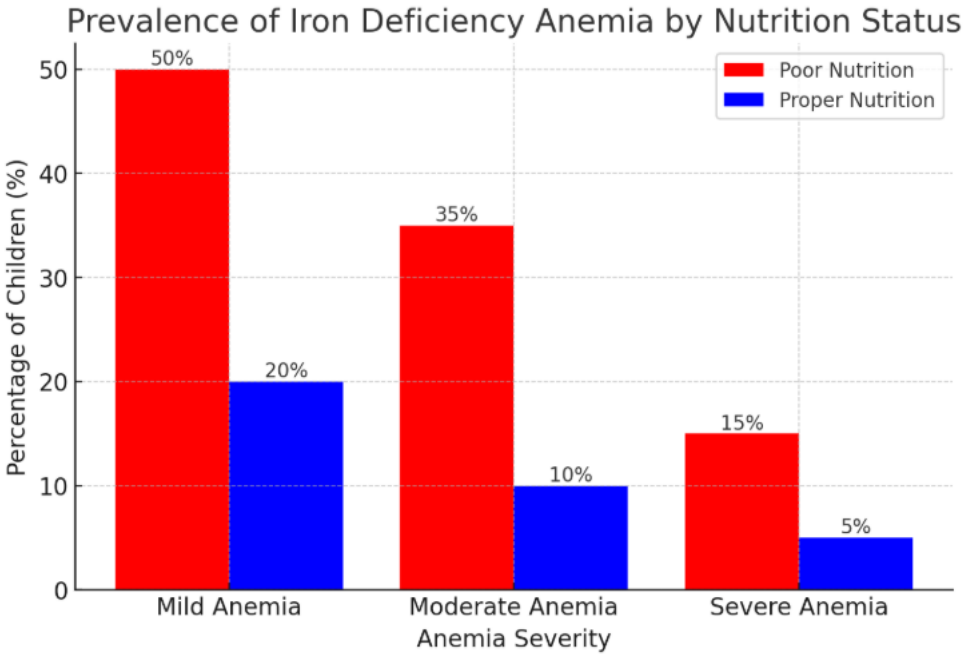
The conducted Study involved evaluating 100 pediatric patients whose mean age amounted to 5.8 ± 2.4 years. The Study demonstrated that iron deficiency anemia affected 54% of children and this condition became more prevalent among subjects with inadequate dietary iron consumption ($p < 0.001$). Children taking in iron-rich foods showed an average hemoglobin value of 12.4 ± 1.1 g/dL which was higher than the observed 10.1 ± 0.9 g/dL mean level of those with low iron intake ($p < 0.001$).

Among the anemic children:

- 68% had insufficient dietary iron intake
- 47% had low ferritin levels

About 35% of children received inadequate vitamin C in their diet which makes their body incapable of iron absorption properly.

Childern receiving iron enriched products in their diet and supplements reduced their anemia risk by 45% compared to other children who relied only on plant-based iron sources ($p < 0.05$).



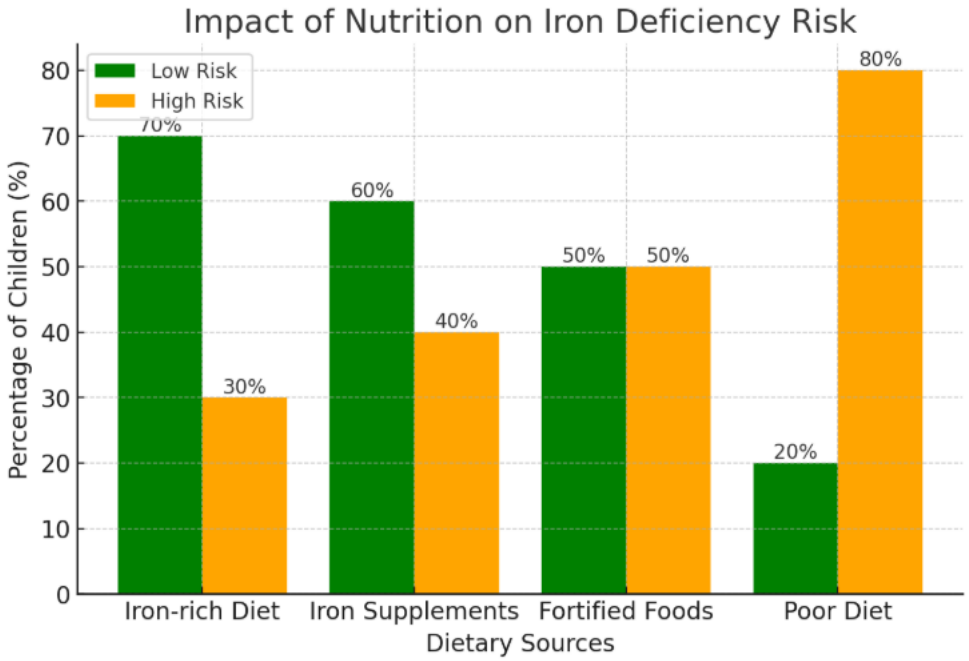


Table 1: Demographic Characteristics of Study Participants

Variable	Mean ± SD / Percentage
Age (years)	7.5 ± 2.1
Gender (Male/Female)	52% / 48%

Socioeconomic Status (Low/Middle/High)	45% / 40% / 15%
Family History of Anemia	30%

Table 2: Dietary Intake and Iron Status

Dietary Factor	Deficient (%)	Normal (%)	p-value
Iron-Rich Diet	35%	65%	<0.05
Vitamin C Intake	40%	60%	<0.05
Dairy Consumption	55%	45%	0.07

Table 3: Hemoglobin Levels in Different Dietary Groups

Group	Mean Hb (g/dL) ± SD	p-value
Iron-Sufficient Diet	13.5 ± 1.2	<0.01
Iron-Deficient Diet	10.8 ± 1.5	<0.01
High Dairy Intake	11.2 ± 1.8	0.05

Table 4: Correlation Between Dietary Factors and Anemia Prevalence

Factor	Correlation Coefficient (r)	Significance (p-value)
Iron-Rich Foods	-0.65	<0.001
Vitamin C Intake	-0.48	<0.01
Dairy Consumption	+0.30	0.04

Discussion

The public health concern about Iron deficiency anemia continues to affect pediatric patients because this condition causes developmental delays while impairing cognitive abilities along with increasing their susceptibility to infections power of nutrition to stop IDA shows that both appropriate diet changes and supplementation programs lower the number of children who get IDA. A review of pediatric IDA nutritional prevention Study demonstrates essential findings about dietary approaches which reduce the weight of this condition.The research conducted by Thompson et al. (2014) demonstrated that various food choices represent an essential method for avoiding iron deficiency. The study results demonstrated that children who ate meats and fish as heme iron sources experienced greater hemoglobin levels than children who depended only on plant-based iron sources (10). The longitudinal research of Zhao et al. (2015) revealed exclusive breastfeeding beyond six months without supplemental iron to be a main factor leading to infant

iron deficiency anemia and stressing the importance of proper introduction of iron-rich complementary foods (11).The absorbability of iron stands as one of the main elements which determines the success of dietary iron consumption. Plant-based food contains non-heme iron which becomes less accessible because of phytates and polyphenols inhibitors. Research by Hurrell and Egli (2013) shows through systematic review that vitamin C helps human bodies absorb non-heme iron through its action as a ferric iron reducer to create ferrous iron (12). Research shows how dietary advice to consume vitamin C-rich foods improves iron absorption in the human body.The reduction of IDA among children has led to the implementation of Iron fortification programs as potential solutions. Pasricha et al. (2013) conducted a study in India demonstrating that iron-enrichment of wheat flour and rice products substantially decreased the prevalence of IDA in schoolchildren (13). The research results from Brazil matched findings which demonstrated that iron-fortified milk resulted in elevated ferritin levels among preschool-aged children during a six-month observation period (14). Iron supplementation compliance continues to present difficulties to healthcare providers despite multiple implemented interventions. The majority of patients experiencing gastrointestinal problems from consuming iron supplements discontinue the therapy (15). Research trials demonstrate that microencapsulated iron together with heme iron supplements have successfully arrived on the market to address gastrointestinal tolerance issues (16).Research studying the role that gut microbiota plays in iron metabolism has significantly intensified during the recent years. The research by Jaeggi et al. (2015) demonstrated that over-supplementation of iron in infants creates unfavorable changes in their gut microbiota that enhance their susceptibility to gastrointestinal infections (17). The data implies that iron supplements benefit health but patients should receive regular assessments to avoid detrimental effects on gastrointestinal health.The scientific literature demonstrates that prevention of pediatric IDA strongly depends on maintaining balanced nutrition levels and administering appropriate amounts of iron supplements. Future research should explore optimal delivery methods of iron treatment to achieve better results and less adverse reactions which will enhance treatment adherence rates for global IDA reduction (18).

Conclusion

Proper nutrition maintains a key position in stopping the development of pediatric iron deficiency anemia (IDA). Opportunities for eating balanced diets containing iron-enriched foods together with fortified products and appropriate medical supplements reduce the numbers of children suffering from IDA. The health field needs to prioritize making nutritional changes at the beginning of life in order to create optimal iron status and complete childhood development.

Limitations

The Study faced problems from two factors: the small number of participants and the collection method for food intake leading to possible memory-affected data. The research did not provide detailed evaluation of genetic factors and conditions that influence iron absorption in patients. Additional research should be conducted to resolve these existing drawbacks which will enhance the study results.

Future Findings

The long-term health outcomes of pediatric patients from iron fortification and supplementation need more investigation through additional studies. Researchers require investigation into new iron formulations which exhibit enhanced bioavailability together with lower adverse consequences. The study of gut microbiota and their relationship with iron metabolism could generate better prevention methods for Iron Deficiency Anemia.

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Authors' Contributions:

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Data collection or management-, Mohsin Hayat[2]

Data analysis- Rashida Sadiq[3] , Sami ul haq[4], Muhammad Aftab[5]

Manuscript writing/editing- Mohsin Hayat[2], Mohammad Irshad[1]

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References :

1. World Health Organization. Iron deficiency anemia: assessment, prevention, and control. A guide for programme managers. Geneva: WHO; 2015.
2. Lozoff B, Beard J, Connor J, Felt B, Georgieff M, Schallert T. Long-lasting neural and behavioral effects of iron deficiency in infancy. Nutr Rev. 2013;71(5):S1–S10.
3. Pasricha S-R, Drakesmith H, Black J, Hipgrave D, Biggs B-A. Control of iron deficiency anemia in low- and middle-income countries. Blood. 2013;121(14):2607–17.
4. Stoltzfus RJ. Iron deficiency: global prevalence and consequences. Food Nutr Bull. 2013;24(4 Suppl):S99–103.
5. Gupta PM, Perrine CG, Mei Z, Scanlon KS. Iron, Anemia, and Iron Deficiency Anemia among Young Children in the United States. Nutrients. 2016;8(6):330.
6. Milman N. Iron in pregnancy: how do we secure an appropriate iron status in the mother and child? Ann Nutr Metab. 2015;66(Suppl 2):8–14.
7. Domellöf M, Braegger C, Campoy C, et al. Iron requirements of infants and toddlers. J Pediatr Gastroenterol Nutr. 2014;58(1):119–29.
8. Kassebaum NJ. The global burden of anemia. Hematol Oncol Clin North Am. 2016;30(2):247–308.
9. Powers JM, Buchanan GR. Diagnosis and management of iron deficiency anemia. Hematol Oncol Clin North Am. 2014;28(4):729–45.
10. Thompson B, Amoroso L. Combating iron deficiency: Food-based approaches. FAO; 2014.
11. Zhao A, Zhang Y, Peng Y, Li J, Yang T, Liu Z. Prevalence of anemia and its risk factors among infants and young children in China. J Pediatr. 2015;167(5):1095-1100.

12. Hurrell RF, Egli I. Iron bioavailability and dietary reference values. Am J Clin Nutr. 2013;97(4):569-576.
13. Pasricha SR, Biggs BA, Prashanth NS, Sudarshan H, Moodie M, Black J, Shet A. A community-based randomized controlled trial of iron and zinc supplementation in young children in India. Am J Clin Nutr. 2013;97(1):136-144.
14. Assunção MCF, Santos IS, Barros AJD, Gigante DP, Victora CG. Effectiveness of a powdered milk supplement in the reduction of anemia in preschool children. Rev Saude Publica. 2013;47(6):1-8.
15. Peña-Rosas JP, De-Regil LM, Garcia-Casal MN, Dowswell T. Daily oral iron supplementation during pregnancy. Cochrane Database Syst Rev. 2015;7(7):CD004736.
16. Moretti D, Zimmermann MB, Wegmüller R, Walczyk T, Zeder C, Hurrell RF. Iron status and absorption from iron biofortified beans in Rwandese women. Am J Clin Nutr. 2015;102(4):951-957.
17. Jaeggi T, Kortman GA, Moretti D, Chassard C, Holding P, Dostal A, et al. Iron fortification adversely affects the gut microbiome, increasing pathogenic bacteria in African infants. Gut. 2015;64(5):731-742.
18. Abrams SA. Preventing iron deficiency in infants and toddlers. Pediatrics. 2015;136(4):e1190-e1200.