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To assess the effectiveness of iron supplementation and an iron-rich diet in improving the iron status of children aged 06 to 10 years who have mild anaemia

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Abstract

Background & Methods: The aim of the study is to assess the effectiveness of iron supplementation & an iron-rich diet in improving the iron status of children aged 6 to 10 years who have mild anaemia. It was ensured that the children received iron-rich foods on a daily basis for three months, as part of a diet plan created by a nutritionist. Critical to the formulation's development was the meticulous consideration of palatability indices, specifically optimized to align along the gustatory preferences intrinsic to the paediatric demographic, specifically children aged 6 to 10 years.

Results: Generally demonstrated higher values across various haematological parameters, suggesting potential differences in the effectiveness of iron supplementation via syrup compared to an iron-rich food kit in addressing mild anaemia in children aged 6 to 10 years. While supplementation along iron rich food has also shown positive results. $p<0.05$ parameters are significantly associated.

Conclusion: The results provide valuable insights for healthcare practitioners & policy makers in choosing appropriate iron supplementation strategies for addressing mild anemia in children aged 6 to 10 years. The differential impact observed between iron syrup & iron-rich food supplementation emphasizes the need for tailored interventions based on individual & population-specific factors. Further research along larger sample sizes & longer duration is recommended to validate & generalize these findings.

Keywords: iron, supplementation, children & anaemia.
Study Design: Observational Study.

1. INTRODUCTION

Iron has several biological functions, & the metal is known for its ability in the transport of oxygen in blood. Being a component of Hb, iron plays a vital role in helping a molecule pick up oxygen to lungs & transfer & release it right through the entire body [1]. About 73% of the iron in the body is found in Hb & is recycled as more red cells are created. The rest of the iron which amounts to 12% to 17% is stored in two molecules namely ferritin & hemosiderin both of which binds enormous number of iron atoms.

The global significance of iron deficiency cannot be neglected. Across demographic & their impact on health, especially on infants & pregnant women emphasizes the need

comprehensive strategies to mitigate the consequences effectively. In developing nations where the resource & access to diverse nutritious food is often limited, the occurrence of iron deficiency is aggravated [2]. The primary factor in such cases is inadequate intake of bioavailable iron which calls for enhanced dietary diversity. Iron deficiency occurs when the iron intake is insufficient to meet pathological & physiological losses. Organic physiological iron depletion may manifest through urinary, biliary, & shedding of skin & intestinal cells. In addition to these factors, the presence of intestinal parasites could also potentially contribute to iron loss. Notably, the final trimester of pregnancy witnesses significant weight gain & iron accumulation in the fetus[3]. Although breast milk typically contains low levels of iron, its mineral content boasts high absorption rates, approximately 50%. Despite the introduction of bioavailable iron sources into the diet, meeting the increased physiological demands from 6 to 12 months post-birth is often challenging for infants. Consequently, supplementation along iron is deemed essential for children within this age bracket [4].

This approach includes interventions such as targeting low birth weight infants, implementing delayed cord clamping, promoting improved infant feeding practices, & providing targeted supplementation for school children & adolescents. The study suggested various strategies to enhance iron intake, such as intermittent supervised supplementation, delayed cord clamping, & fortification of foods, while also advocating for non-iron interventions like deworming & addressing other infections [5-7]. Additionally, the authors underscored the importance of effective governance, implementation, & further research to inform comprehensive strategies for preventing childhood anaemia in India.

2. MATERIAL & METHODS

- Present study was conducted at Atal Bihari Vajpayee medical college OPD for 06 months on 500 children.
- To ensure methodological robustness, participant safety, & scientific rigor, the study adopted a prospective observational study.
- 500 children between 6 years to 10 years of age, both males and females who had mild anaemia in CBC report and met the inclusion criteria were included in the study.
- They were advised an iron rich diet and oral iron supplementation as iron syrup for 3 months. Oral iron supplementation was given with dose of 6mg/kg/day.
- After 3 months those children were followed up in OPD and their repeat CBC investigations was done to assess the effectiveness of the therapeutic diet and oral iron supplementation.
- This design type fostered transparency throughout the research continuum, thereby enhancing participant trust, minimizing biases, & enabling objective evaluations of the comparative effectiveness between iron syrup & an iron- rich dietary intervention. This methodological approach, predicated upon sensory optimization, aimed to mitigate potential compliance challenges inherent to paediatric populations, thereby ensuring therapeutic adherence & bio efficacy.

Inclusion Criteria

1. Age & Hemoglobin Levels: The study targeted children aged 6 to 10 years exhibiting Hb levels ranging between 11 to 11.4 g/dl (Mild anemia cut off reference as per WHO) ensuring a focused & clinically relevant cohort for the investigation.

Exclusion Criteria

1. Children aged less than 6 years & more than 10 years.
2. Parents or legal guardians who were not willing for their children to participate.
3. Children along renal, liver disease and cardiac diseases.
4. Hypersensitivity & Adverse Reactions: Participants along documented hypersensitivity or adverse reactions to the components present in either the iron syrup or the provided iron rich

food was excluded, prioritizing participant safety & minimizing potential risks.
5. All pathological anemia other than iron deficiency anemia like hemolytic anemia, aplastic anemia, megaloblastic anemia, leukemia.
6. children with severe acute malnutrition

3. RESULT

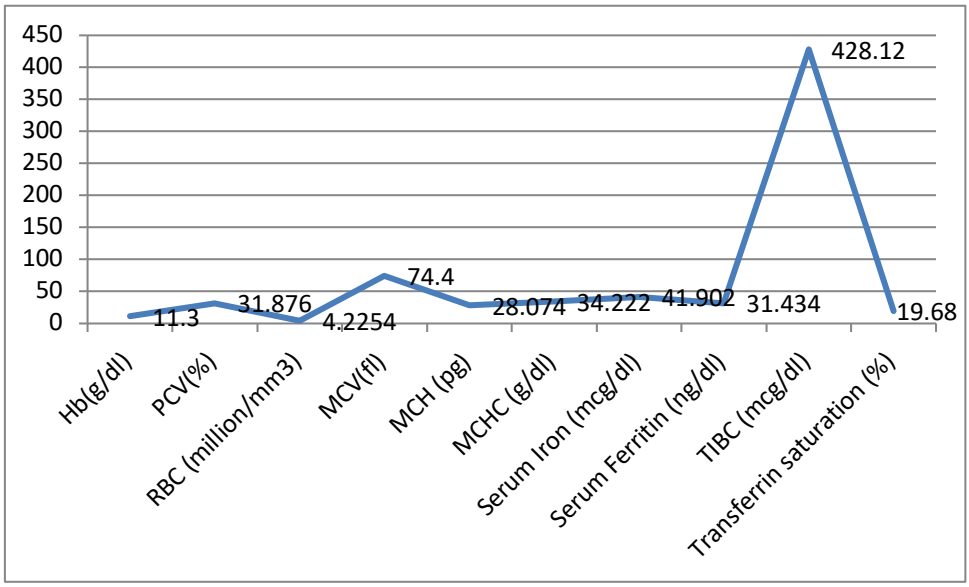
Table No. 1: Age-related statistics, including mean

Parameter	Value
Mean	**7.5**
Median	**7.4000**
Mode	**7.40**
Std. Deviation	**1.09305**

The mean age for individuals is reported as 7.5years, serving as the average age representation. The median, denoted as 7.4years represents the middle point of the age values, indicating the central tendency of the age distribution. The mode is specified as 7.4 years, signifying that this age value occurs most frequently. The standard deviation, reported as 1.09305, quantifies the dispersion of individual age values from the mean.

Table No. 2: Pre haematological parameter measurements of iron supplementation

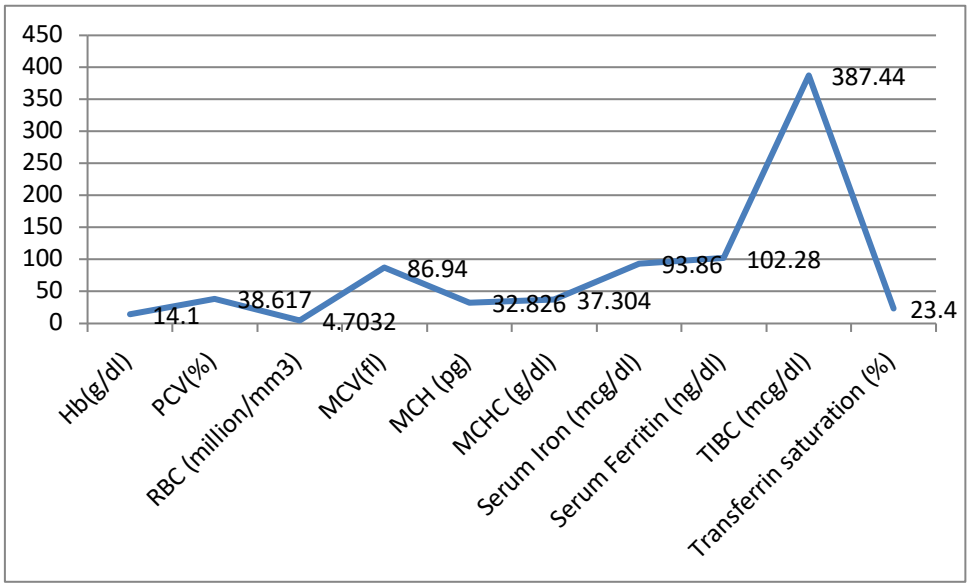
Parameter	Mean	Std. Dev	P Value
Hb(g/dl)	11.3	0.11778	0.69
PCV(%)	31.876	2.25810	
RBC (million/mm3)	4.2254	0.37269	
MCV(fl)	74.400	4.44202	
MCH (pg)	28.074	3.72684	
MCHC (g/dl)	34.222	1.62422	
Serum Iron (mcg/dl)	41.902	6.89816	
Serum Ferritin (ng/dl)	31.434	16.9388	
TIBC (mcg/dl)	428.12	52.5413	
Transferrin saturation (%)	19.68	3.55837	



A thorough analysis of pre & post-haematological parameter measurements, elucidating the effects of an iron supplementation regimen. Prior to the intervention, the mean Hb level stood at 11.3 g/dL, along a median of 11.3 g/dl & a mode of 11.2 g/dl, displaying a standard deviation of 0.11778. Post-supplementation, a substantial increase was observed, along a mean of 14.1g/dl, median of 14.1g/dl, & a mode of 13.8 g/dl, accompanied by a standard deviation of 0.86434, indicating a significant improvement in Hb levels. $p>0.05$ parameters are significantly not associated.

Table No. 3: Post haematological parameter measurements of iron supplementation

Parameter	**Mean**	**Std. Dev**	**P Value**
Hb(g/dl)	14.1	0.86434	
PCV(%)	38.617	2.69700	
RBC (million/mm3)	4.7032	0.41297	
MCV(fl)	86.9400	4.38458	
MCH (pg)	32.8260	3.69352	
MCHC (g/dl)	37.3040	1.64683	
Serum Iron (mcg/dl)	93.8600	18.0569	0.047
Serum Ferritin (ng/dl)	102.280	34.9817	
TIBC (mcg/dl)	387.44	52.6494	
Transferrin saturation (%)	23.40	3.53885	



Generally demonstrated higher values across various haematological parameters, suggesting potential differences in the effectiveness of iron supplementation via syrup compared to an iron-rich food kit in addressing mild anaemia in children aged 6 to 10 years. While supplementation along iron rich food has also shown positive results. $p<0.05$ parameters are significantly associated.

4. DISCUSSION

The overall interpretation of the present investigation shows that iron syrup, as an intervention modality, is more effective than an iron-rich food kit in improving various hematological parameters associated along mild anemia in children aged 6 to 10 years. These findings have implications for healthcare practices, providing evidence-based insights into optimal strategies for managing iron deficiencies in pediatric populations[8].

Studies have shown that measure of haematological parameters like serum levels of iron, TIBC, transferrin saturation & ferritin gives a precise analysis of patients' iron status. These parameters collectively offer valuable insights into the various stages of iron metabolism. & these parameter measurements decrease significantly in cases of ID in children[9]. In the current study both iron syrup & iron rich food kit is effective in improving Hb, PCV, RBC, MCV, MCH, MCHC, serum iron, serum ferritin, TIBC, & transferrin saturation. Earlier studies have also shown that iron supplementation has significant effect on Hb & ferritin.

In a comparative study of iron supplementation for children having mild ID along iron & zinc plus iron regimen showed that one month of iron supplementation help significantly improve Hb, hematocrit, MCV, MCH, ferritin & TIBC serum levels. Present research finding indicate an decrease of TIBC along the intake of iron rich food. Studies have shown improvement in various haematological parameters though iron rich food intake[10]. A study conducted by Shah et al. on the impact of iron-rich foods, including figs, currants, & dates, on iron deficiency anemia revealed that these foods enhance hemoglobin levels, iron levels, & serum ferritin levels. The discovery also revealed a decrease in TIBC levels. Low et al.'s study on iron supplementation in children demonstrated advantageous effects on cognitive performance, IQ, increased hemoglobin levels, reduced incidence of anemia & iron insufficiency, & improvements in ferritin levels. A comprehensive review of randomized controlled trials by Gera et al. evaluated the effect of iron supplementation on hemoglobin concentrations in children[11]. The study results reveal that the combined estimate for the change in Hb attributable to iron supplementation was 0.74 g/dL, indicating a moderate but significant

increase in Hb levels. The modifications were significant yet measured. A systematic evaluation conducted by Thompson et al. assessed the effects of consistent iron supplementation in children aged two to five. The review determined that iron supplementation effectively enhances Hb & ferritin levels; nevertheless, further comprehensive research is necessary on its impact on anemia & iron deficiency[12].

5. CONCLUSION

The results provide valuable insights for healthcare practitioners & policy makers in choosing appropriate iron supplementation strategies for addressing mild anemia in children aged 6 to 10 years. The differential impact observed between iron syrup & iron-rich food supplementation emphasizes the need for tailored interventions based on individual & population-specific factors. Further research along larger sample sizes & longer duration is recommended to validate & generalize these findings.

6. REFERENCES

1. Sachdev HP, Gera T. Preventing childhood anemia in India: iron supplementation & beyond. European journal of clinical nutrition. 2013 May;67(5):475-80.
2. Kulkarni B, Peter R, Ghosh S, Pullakhandam R, Thomas T, Reddy GB, Rajkumar H, Kapil U, Deb S, Johnston R, Agrawal PK. Prevalence of iron deficiency & its sociodemographic patterning in Indian children & adolescents: findings from the Comprehensive National Nutrition Survey 2016–18. The Journal of nutrition. 2021 Aug 1;151(8):2422-34.
3. Iannotti LL, Tielsch JM, Black MM, Black RE. Iron supplementation in early childhood: health benefits & risks. The American journal of clinical nutrition. 2006 Dec 1;84(6):1261-76.
4. Thompson J, Biggs BA, Pasricha SR. Effects of daily iron supplementation in 2-to 5-year-old children: systematic review & meta-analysis. Pediatrics. 2013 Apr 1;131(4):739-53.
5. Veena A, Amit D, Sonagra B, Rekha MB, Jayaprakash MD. Study of serum iron, TIBC, transferrin saturation & ferritin in iron deficiency anemia in tertiary care hospital. International Journal of Pharmacy & Biological Sciences. 2013;3(1):14-23.
6. Maulood KA. Study of some haematological & biochemical variables in children along iron-deficiency anaemia in Erbil-citv. Tikrit Journal of Pharmaceutical Sciences. 2009;5(2).
7. Thompson J, Biggs BA, Pasricha SR. Effects of daily iron supplementation in 2-to 5-year-old children: systematic review & meta-analysis. Pediatrics. 2013 Apr 1;131(4):739-53.
8. Moradveisi B, Yazdanifard P, Naleini N, Sohrabi M. Comparison of iron alone & zinc plus iron supplementation effect on the clinical & laboratory features of children along iron deficiency anemia. International Journal of Hematology-Oncology & Stem Cell Research. 2019 Oct 10;13(4):220.
9. Shah R, Deshpande SV, Kulkarni A, Gujarathi RH. Effect of Mixture of Figs, Dates & Currants on Symptomatology & Changes in Haematology & Biochemical Markers of Iron Deficiency Anaemia. Journal of Coastal Life Medicine. 2023 May 29;11:668-75.
10. Low M, Farrell A, Biggs BA, Pasricha SR. Effects of daily iron supplementation in primary-school–aged children: systematic review & meta-analysis of randomized controlled trials. Cmaj. 2013 Nov 19;185(17):E791-802.
11. Gera T, Sachdev HP, Nestel P, Sachdev SS. Effect of iron supplementation on haemoglobin response in children: systematic review of randomised controlled trials. Journal of pediatric gastroenterology & nutrition. 2007 Apr 1;44(4):468-86.

12. Thompson J, Biggs BA, Pasricha SR. Effects of daily iron supplementation in 2-to 5-year-old children: systematic review & meta-analysis. Pediatrics. 2013 Apr 1;131(4):739-53.