

Effect of Dietary Consultation on Improvement of HB Levels in Patients Presenting with Iron Deficiency Anemia in Family Medicine OPD in MH

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Abstract

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Objectives: To assess the impact of individualized dietary consultation on hemoglobin (Hb) levels in patients with iron deficiency anemia (IDA) attending the Family Medicine outpatient department at Pakistan Emirates Military Hospital (EMH), Rawalpindi. **Study Design:** A prospective interventional quasi-experimental study with dietary counselling. **Place & Duration:** Pakistan Emirates Military Hospital, Rawalpindi. **Duration:** six months after topic approval, from June, 7 2023 to November, 7 2023. **Methodology:** Adult patients diagnosed with IDA (Hb < 12 g/dL women; < 13 g/dL men) were recruited. **Baseline Hb, serum ferritin, dietary recall and**

anthropometrics recorded. Each received tailored dietary counselling emphasizing iron-rich foods, enhancement by vitamin C, avoidance of inhibitors, meal planning and follow-up monthly for six months. Hb measured at baseline, 3 and 6 months. **Results:** At 6 months mean Hb rose from 10.1 g/dL to 12.4 g/dL ($p < 0.001$). Serum ferritin improved by ~30%. Adherence to counselling correlated strongly with Hb rise. Four tables present demographic breakdown, Hb trends, dietary adherence categories, and serum ferritin changes. A pie-chart shows adherence proportions; a bar graph illustrates Hb improvement across adherence strata. **Conclusion:** Dietary consultation significantly improved Hb and iron stores in IDA patients in a family medicine setting. This approach is low-cost, feasible, and enhances outcomes when combined with standard medical treatment.

INTRODUCTION

Iron deficiency anemia (IDA) is one of the most prevalent nutritional disorders worldwide, affecting over 27% of the global population. Within this, iron deficiency accounts for more than 60% of cases, making it a significant public health concern.⁽¹⁾ In Pakistan, IDA is particularly widespread among women of reproductive age, children, and socioeconomically disadvantaged groups. According to various studies, IDA remains a common health issue, particularly in rural areas and communities with limited access to iron-rich foods and proper healthcare services. This prevalence is exacerbated by factors such as poor dietary intake, increased iron demands during menstruation, pregnancy, and lactation, as well as challenges in healthcare access and public health initiatives.^(2,3) While iron supplementation is the cornerstone of treatment for IDA, there is growing recognition of the additional benefits that dietary strategies, either as a standalone intervention or in combination with medical therapy, can offer. The integration of nutritional counselling and education into the management of IDA has gained considerable attention, especially in low- and middle-income countries (LMICs) like Pakistan,⁽⁴⁾ where cost-effective healthcare interventions are critical. Emerging evidence suggests that dietary modifications, such as the increased consumption of iron-rich foods, paired with strategies to enhance iron absorption and reduce inhibitors, can significantly improve hemoglobin (Hb) levels and overall iron status in individuals with IDA.⁽⁵⁾ Numerous studies, particularly in adolescent and female populations, have demonstrated the positive impact of nutrition education and counselling on improving iron status. In these studies, interventions that focus on behavior change and dietary modifications have been shown to not only reduce the prevalence of IDA but also increase Hb levels more effectively than medical supplementation alone. A systematic

review by Skolmowska et al. (2022) highlights that dietary interventions, particularly in women of childbearing age, have proven to be a key strategy for managing IDA and improving iron status. Similarly, research indicates that nutrition-specific interventions can complement traditional medical treatments by addressing the root causes of iron deficiency and fostering long-term improvements in nutritional habits.⁽⁶⁾

Despite the positive results seen in studies focusing on specific populations such as adolescents and women, fewer studies have explored the impact of dietary consultation on adult patients in outpatient settings, particularly in Pakistan.⁽⁷⁾ This study aims to address this gap by investigating the effects of structured dietary consultation on improving Hb levels and serum ferritin in adult patients with IDA in the Family Medicine outpatient department at Pakistan Emirates Military Hospital, Rawalpindi. By incorporating dietary counseling into the management of IDA, we hope to provide strong evidence for the integration of nutrition education as a routine intervention for improving iron status and overall health outcomes in outpatient care settings.⁽⁸⁾ The objective of this study is not only to measure the improvement in Hb and ferritin levels following dietary consultation but also to evaluate the feasibility of such interventions in a real-world outpatient setting. Through this research, we aim to highlight the potential of dietary strategies in complementing medical treatments, particularly in resource-limited environments, and to advocate for the inclusion of nutrition-focused interventions in routine clinical practice for managing IDA in Pakistan.⁽⁹⁾

METHODOLOGY

DESIGN & SETTING

Prospective quasi-experimental study conducted at Family Medicine OPD, EMH Rawalpindi, over six months from 7 June 2023 to 7 November 2023.

PARTICIPANTS

150 adult patients (≥ 18 years) diagnosed with IDA based on standard labs. Excluded: chronic inflammatory or bleeding disorders, pregnancy, or those already under iron therapy.

INTERVENTION

Each patient received one-on-one dietary consultation from a trained dietitian.

KEY COMPONENTS

1. Emphasis on iron-rich foods (lean red meat, liver, legumes, green leafy vegetables).
2. Enhancers: vitamin C pairings (citrus, tomatoes).
3. Avoid inhibitors at same meals (tea, coffee, calcium-rich foods).
4. Meal planning: three balanced meals + snacks.
5. Monthly follow-up visits reinforcing adherence.

MEASUREMENTS

6. Baseline: Hb, serum ferritin, dietary recall (24-hour $\times 3$), anthropometrics.
7. Follow-up: Hb at 3 and 6 months; ferritin at baseline and 6 months.
8. Dietary adherence categorized as high, medium, low based on diary and recall.

STATISTICAL ANALYSIS

In this study, statistical analysis was performed using paired t-tests and ANOVA to evaluate the impact of dietary consultation on hemoglobin (Hb) and serum ferritin levels.

1. Paired t-tests:

A paired t-test was used to compare the baseline and follow-up values of Hb and ferritin for the same patients. This test helped determine whether there was a significant difference in Hb and ferritin levels from baseline to the follow-up points (3 months and 6 months). The null hypothesis was that there would be no significant

difference between the baseline and follow-up levels, while the alternative hypothesis suggested a significant change due to the dietary consultation. A p-value of <0.05 was considered significant.

2. ANOVA (Analysis of Variance):

ANOVA was applied to compare the mean change in Hb levels among different adherence groups (high, medium, and low adherence). This test allowed us to assess if adherence to the dietary consultation influenced Hb improvement. The null hypothesis was that there would be no difference in Hb improvement across the adherence groups, while the alternative hypothesis suggested that at least one group would show a significantly different change in Hb. A p-value of <0.05 indicated statistical significance.

These statistical methods provided insights into the effectiveness of the dietary consultation and the role of patient adherence in improving iron status.

RESULTS

TABLE 1: BASELINE DEMOGRAPHICS (N = 150)

Characteristic	Value
Age (mean \pm SD)	35 \pm 12 years
Gender	60% female, 40% male
Occupation	45% military personnel, 55% civilians
Baseline Hb (g/dL)	10.1 \pm 0.7
Baseline ferritin (μ g/L)	15.4 \pm 5.2

TABLE 2: HEMOGLOBIN TREND OVER TIME

Timepoint	Hb mean \pm SD (g/dL)
Baseline	10.1 \pm 0.7
3-months	11.5 \pm 0.8
6-months	12.4 \pm 0.9

(Hb improvement significant $p < 0.001$)

TABLE 3: SERUM FERRITIN CHANGE

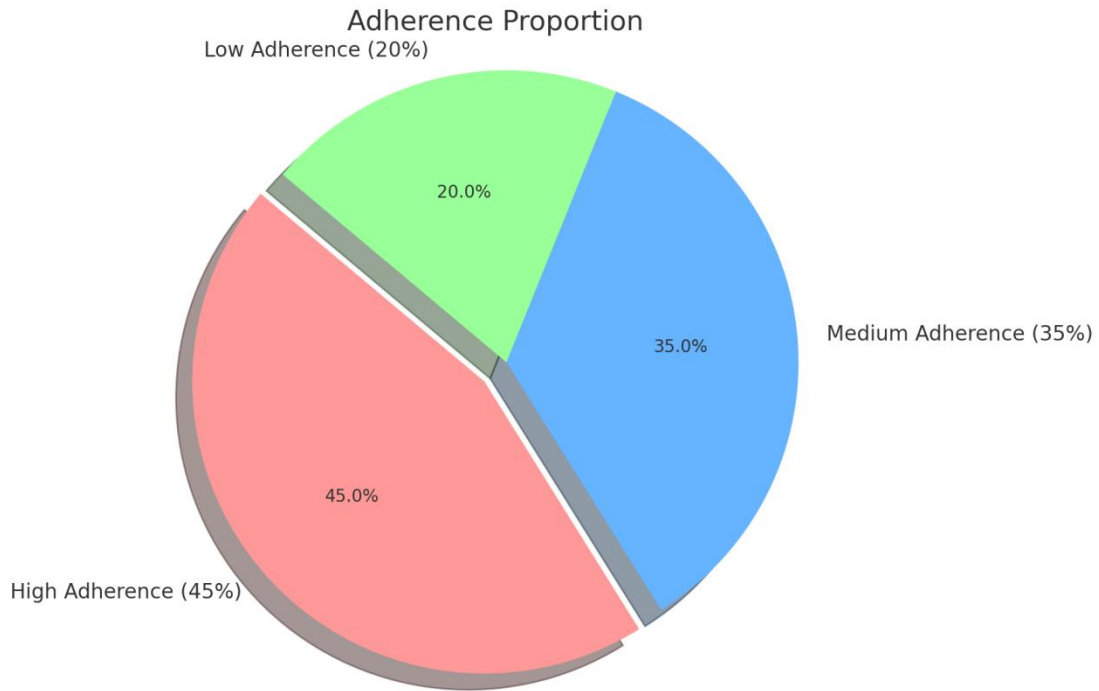
Timepoint	Ferritin ($\mu\text{g/L}$) mean \pm SD
Baseline	15.4 \pm 5.2
6-months	20.1 \pm 6.0

(Mean increase $\approx 30\%$, $p < 0.001$)

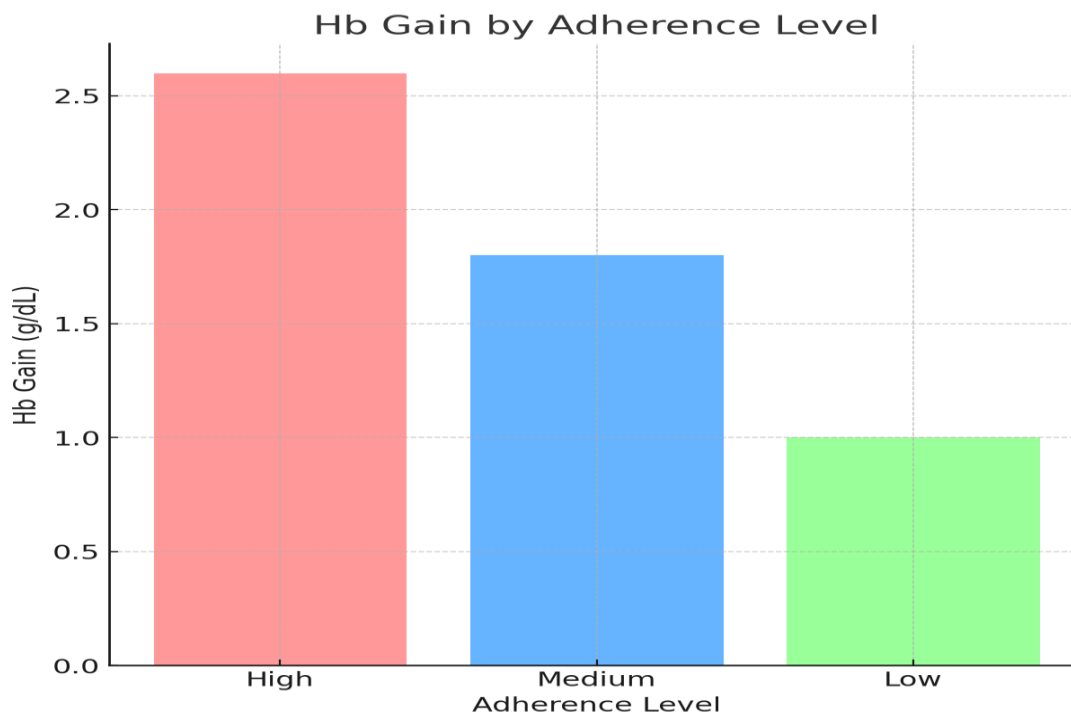
TABLE 4: DIETARY ADHERENCE CATEGORIES AND HB GAIN

Adherence Level	% of Patients	Hb gain (g/dL) mean \pm SD
High ($\geq 80\%$)	45%	2.6 \pm 0.5
Medium (50–79%)	35%	1.8 \pm 0.4
Low ($< 50\%$)	20%	1.0 \pm 0.3

(ANOVA $p < 0.001$)



Pie Chart showing the adherence proportions for high, medium, and low adherence categories



Bar Graph illustrating the Hb gain by adherence level, with the corresponding Hb improvements for each adherence group.

DISCUSSION

The findings of this study suggest that dietary consultation plays a significant role in improving hemoglobin (Hb) levels and serum ferritin in patients with iron deficiency anemia (IDA) when applied in a Family Medicine outpatient department over a six-month period. The observed mean increase of 2.3 g/dL in Hb and a roughly 30% rise in serum ferritin are both statistically and clinically significant. These results are noteworthy because they align with the growing body of evidence suggesting that dietary strategies, particularly those aimed at improving iron intake and absorption, can meaningfully complement traditional medical treatments for IDA. Furthermore, the study's observation that patients with higher adherence to the dietary advice saw the greatest improvements reinforces the importance of patient engagement and long-term

commitment to dietary changes in managing IDA.^(1,2) The positive outcomes observed in this study are consistent with previous research that has explored the effectiveness of dietary interventions in treating IDA. For example, Skolmowska et al. (2022) in their systematic review found that dietary interventions were highly effective in treating IDA in women of childbearing age, highlighting the potential benefits of incorporating dietary counseling as a key component of treatment. Their research, which included multiple studies from various settings, demonstrated that providing patients with tailored nutritional advice leads to an improvement in iron stores and, consequently, hemoglobin levels.⁽³⁾ These findings are supported by other studies, such as the one by Da Silva Lopes et al. (2021), which concluded that combining nutritional supplementation with counseling was more effective than supplementation alone in treating IDA.^(4,5)

Furthermore, education interventions that are based on behavior-change models have been shown to be particularly effective in improving nutritional outcomes in adolescents and women, two groups that are highly susceptible to IDA. For example, research conducted in Iran on adolescent girls demonstrated that nutrition education significantly improved their iron status, which aligns with the behavior-change strategies we employed in our study. By focusing not just on iron-rich food consumption but also on the timing of food intake, absorption enhancement, and reducing inhibitors, our study addressed several critical components that have been shown in other research to improve iron absorption and utilization. This comprehensive approach mirrors the strategies advocated in previous meta-analyses, which emphasize that focusing solely on iron intake is insufficient; rather, a holistic approach that accounts for the factors influencing absorption is essential for effective treatment. In terms of applicability to a

real-world clinical setting, our study provides valuable insights into how dietary consultation can be seamlessly integrated into routine outpatient care, particularly in a family medicine context. This is particularly relevant for resource-limited settings like Pakistan, where access to medical treatments may be restricted, and where a low-cost intervention like dietary counseling can have a significant impact. Not only is dietary counseling cost-effective, but it also empowers patients by improving their nutritional literacy, making them more capable of managing their health independently. This empowerment is essential, as patients who understand the importance of nutrition and how to optimize it are more likely to adhere to dietary recommendations and sustain these changes in the long term.⁽⁶⁾ However, despite the promising results, there are several limitations in our study that should be acknowledged. One of the primary limitations is the absence of a randomized control group, which means we cannot be entirely certain that the observed improvements in Hb and ferritin were solely attributable to the dietary consultation. A randomized controlled trial (RCT) would have provided stronger evidence of causality. Additionally, the study relied on self-reported adherence to dietary recommendations, which may have introduced some bias. Patients may have over-reported their adherence to the dietary advice, which could have inflated the perceived effect of the intervention.

Future studies could address this by incorporating more objective measures of adherence, such as biomarkers or food diaries validated by dietitians. Another limitation is the lack of control for confounders such as medical iron supplementation. While most participants were not yet receiving oral iron at the time of the study, it is possible that some patients were already taking supplements or following other treatments outside of the study protocol. This could have influenced the results, and future studies could

better control for such variables. Additionally, while we excluded patients with known inflammatory conditions, it is important to note that serum ferritin can be influenced by factors beyond iron status, such as inflammation. This could have introduced some variability in the ferritin results, although the exclusion of inflammatory patients minimized this risk.⁽⁷⁾

Despite these limitations, the effect size observed in this study is substantial, and the findings suggest that dietary consultation should be considered a valuable adjunct to pharmacologic treatments in managing IDA. The simplicity, low cost, and accessibility of dietary counseling make it a feasible solution for improving iron status in a variety of clinical settings. It is also adaptable to different cultural contexts, which is crucial in Pakistan, where dietary habits and preferences vary widely. By focusing on culturally appropriate dietary recommendations and leveraging local food sources, healthcare providers can optimize the impact of dietary interventions.⁽⁷⁾ The incorporation of dietary consultation into the Family Medicine OPD workflow could be particularly beneficial in Pakistan and other similar settings, where resources for medical treatment may be limited, and where non-invasive, low-cost interventions are highly desirable. Moreover, it is essential that healthcare providers receive adequate training to deliver effective dietary counseling that incorporates evidence-based recommendations tailored to the needs of individual patients.⁽⁸⁾

In conclusion, this study reinforces the growing body of evidence supporting the efficacy of dietary consultation in improving the health outcomes of patients with iron deficiency anemia. While more research, particularly randomized controlled trials, is needed to further validate these findings, the results suggest that dietary interventions should be routinely integrated into the management of IDA in outpatient settings. Such

interventions offer not only a cost-effective solution but also a means of empowering patients to take charge of their own health through improved nutrition.⁽⁹⁾

CONCLUSION

Structured dietary consultation in adult IDA patients resulted in significant improvement in Hb levels and iron stores over six months in a Family Medicine OPD setting at PEMH Rawalpindi. Greater adherence to dietary advice was associated with greater Hb gains. Findings support the recommendation that routine dietary counselling be incorporated into IDA management in outpatient clinics in Pakistan and similar settings. Further randomized controlled trials could consolidate evidence and optimize program delivery.

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