



Evaluating the impact of iron deficiency anemia on quality of life using the FACT-Anemia scale in a tertiary care hospital

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Abbreviations:

FACT-An: Functional Assessment of Cancer Therapy-Anemia;

Hb: Hemoglobin;

IDA: Iron deficiency anemia;

MCH: Mean Corpuscular Haemoglobin;

MCV: Mean corpuscular volume;

NSAID: Non-steroidal anti-inflammatory drug;

QoL: Quality-of-life;

RBC: Red Blood Cells;

SF: Serum ferritin;

TIBC: Total binding capacity.

ABSTRACT

Background: Iron deficiency anemia (IDA) reduces oxygen delivery, causing fatigue and a reduced quality of life. Despite its impact on daily functioning is often underestimated. The assessment of QoL in IDA is effective using the FACT-Anemia scale.

Objectives: The research focused on assessing health-related QoL in IDA patients using the FACT-Anemia questionnaire at a tertiary care hospital.

Methodology: A cross-sectional study (January through April 2025) with a convenience sample of 140 cases with IDA sought out patients enrolled with major comorbidities or pregnant patients. All patients completed the FACT-An (FACT-G severe fatigue subscale & anemia subscale). Clinical and Hemoglobin data were recorded. To analyze all predictors of FACT-An scores, Spearman's correlation, Kruskal-Wallis tests, and standard multivariable regression were used.

Results: Among 140 participants (mean age group 19-28 years, 50.7% male), the severity of anemia significantly impacted QoL scores derived through the FACT-Anemia scale. A statistically significant week was observed, but negative correlations were found between hemoglobin and QoL scores ($r_s = -0.217$, $p = 0.010$). The analysis using the Kruskal-Wallis test found a clear link between disease severity and overall QoL ($p < 0.001$). Multiple regression analyses demonstrate that the strongest predictors of impaired QoL in IDA were fatigue-related symptoms of tiredness, weakness, and daytime sleepiness ($R^2 = 0.945$), demonstrating that the main contributor to impaired QoL in IDA is the burden of symptoms.

Conclusion: IDA is strongly associated with reduced QoL, mainly because of fatigue. Therefore, management must be holistic: once the hemoglobin is corrected, management must then specifically focus on fatigue and daily functioning for each person receiving care. These data are important because they underscore the fact that correcting iron deficiency improves QoL and patient outcomes. Specifically, they speak to the need for anemia care that is patient-centered.

Introduction

Iron deficiency anemia (IDA) is still a widespread health issue around the world, particularly in low and middle-income regions, where it affects close to two billion people [1]. Among all age groups, IDA is the most prevalent anemia and nutritional deficiency. This is mainly because our bodies need iron to make hemoglobin, which is responsible for carrying oxygen to our organs and tissues. In the absence of iron, the body is unable to produce enough haemoglobin, which reduces the capacity for red blood cells to carry oxygen. As a result, the symptoms of anemia begin to appear [2]. The pathophysiology of IDA begins with a loss of iron balance, where iron loss exceeds the amount of iron that can be absorbed. During the initial stages of iron deficiency, iron is mobilized from storage sites such as the liver, spleen, and bone marrow [3]. However, low intake and poor absorption persist; these stores become depleted, resulting in decreased serum ferritin (SF) levels and increasingly iron-restricted erythropoiesis. Suggested, varying degrees of iron deficiency can be seen at the hematologic level in IDA, with the bone marrow producing smaller (microcytic), paler (hypochromic) RBC with a limited amount of Hb in each cell [4]. As a consequence, there's a noticeable drop in haemoglobin, and red blood cells are not only smaller but also carry less haemoglobin, which is seen in lower MCV and MCH readings [5]. When HB levels drop, the blood carries less oxygen throughout the body, often leading to symptoms like fatigue, shortness of breath, pale skin during physical activity, and reduced thinking or physical ability [6]. IDA doesn't have a single cause; it's influenced by things like age, gender, and socioeconomic status in adults. The most common cause is chronic blood loss [7]. In women, menorrhagia is a frequent contributor, while in males and females, gastrointestinal bleeding is often due to peptic ulcer disease, malignancies, and nonsteroidal anti-inflammatory drug (NSAID) causes that occur when iron is poorly provided in the diet [8]. This often happens to people who don't have access to nutritious or iron-rich foods or who follow very limited diets. Iron deficiency can also result from inadequate dietary intake. It often affects people who don't have regular access to iron-rich foods or who eat very limited diets, whether to financial hardship, lifestyle, or other challenges [9]. The diagnosis is typically confirmed through blood tests, showing low levels of ferritin, reduced transferrin saturation, and an increased TIBC and reduced HB. A blood smear usually shows red blood cells that are smaller than normal and paler in color [10]. Although rarely required, bone marrow examination can be performed and often shows absent iron

stores. The FACT-Anemia scale is commonly used by researchers to measure how anemia impacts patients' daily well-being and QoL. This validated measure describes fatigue, physical well-being, functional status, and symptoms attributed to anemia, taking into account both general factors and those specifically related to anemia [11]. The tool was developed for use in patients with cancer-related anemia but can also be applied to other anemic populations, including patients with IDA, where fatigue and functional status are the most prominent symptoms [12]. The checklist allows for measurement of symptom burden and the degree to which QoL has been negatively impacted to allow for a patient-centred assessment to consider when determining a treatment plan [13]. The current study aims to investigate the relationship between iron deficiency anemia and fatigue-related quality of life (as measured by the FACT-An scale), and to assess the personally experienced effects of anemia symptoms on patients' daily functioning and quality of life. This research attempts to add a layer of understanding to the burden of IDA and treatment effectiveness from a clinical and patient level through the combination of objective hematological measures with subjective measures of quality of life [14].

Methodology

Study design

An observational study was carried out to assess and evaluate of QoL of iron deficiency anemia patients using the FACT-Anemia scale at a tertiary care hospital, conducted for six months at the department of general medicine. The study period was from January 2025 to April 2025.

Study population and sample size

Sample size estimation was performed using Epi Info™ version 7.2.5, a software program created by the Centers for Disease Control and Prevention (CDC). The preceding study of the Guru Gobind Singh Medical College and Hospital (GGSMCH), Faridkot, Punjab, population yielded a prevalence of 89.9%, which was used for this study to calculate the sample size. The total population for the study was 31,670,000, with a 95% confidence interval and $\pm 5\%$ error variance, which yielded a sample size of 140 subjects. Therefore, a total of 140 patients were recruited from medical and local sources as the final study sample population.

Sampling technique

Patients were selected through a convenience sampling method. The only patients included in the study were those who met the eligibility criteria and provided consent to be participants.

Inclusion and exclusion criteria

The study enrolled male and female participants who were 18 years or older, including pregnant women, who were present at the study site during the data collection period and voluntarily agreed to participate. Inclusion required written and signed informed consent, which was unavailable during the data collection period, or they were unable to communicate effectively due to severe illness or cognitive impairment.

Data collection tool

Demographic information was gathered using a patient profile form, including factors like age, body weight, gender, marital status and occupation, and disease duration. The FACT-Anaemia questionnaire was used to assess the QoL of IDA patients. The scale yields a total score of 160.

Scoring and interpretation

0 = Not at all

1 = A little bit

2 = Somewhat

3 = Quite a bit

4 = Very much

Ethical consideration

The study was reviewed and approved by the Ethics Committee at ISF College of Pharmacy to ensure it met ethical standards and protected participants' rights, Moga (Approval No: IEC/ISFCP/2025/01/30). All participants were informed about the purpose and procedure of the study, and each one gave their written consent before taking part. Participant anonymity and data confidentiality were strictly upheld in alignment with institutional and ethical guidelines.

Results

The study analyzed data from 140 participants aged 19 to 88 years, with the majority (57.9%) in the 19–28 age group, indicating that the sample skewed toward a younger population as depicted in gender distribution was nearly balanced, with 50.7% male and 49.3% female while the weight and marital status distributions respectively, the latter revealing most participants were unmarried. In terms of educational background, 55.7% had attained higher education, and 46.4% of the participants were students. These socio-demographic details are systematically shown in Table 1. Individuals' hemoglobin levels correlated negatively and weakly but significantly with quality-of-life scores measured by the FACT-Anemia Scale, according to the Spearman rank-order correlation test.

Table 1. Socio-demographic characteristics of study participants.

Variables	Category	No of patients	percentage of patients
Age	19-28 years	81	57.9%
	29-38 years	26	18.6%
	39-48 years	18	12.9%
	49-58 years	5	3.6%
	59-68 years	4	2.9%
	69-78 years	5	3.6%
	79-88 years	1	0.7%
Gender	Female	69	49.3%
	Male	71	50.7%
Weight	45-55	51	36.4%
	56-65	51	36.4%
	66-75	22	15.7%
	76-85	11	7.9%
	86-95	5	3.6%
Marital Status	Single	85	60.7%
	Married	55	39.3%
Educational level	No formal education	31	22.1%
	Primary	5	3.6%
	Secondary	26	18.6%

	Higher education	78	55.7%
Occupation	Students	65	46.4%
	Housewife	25	17.9%
	Business	4	2.9%
	Government teacher	5	3.6%
	Farmer	7	5.0%
	Teacher	11	7.9%
	Manager	9	6.4%
	labour	6	4.3%
	Carpenter	8	5.7%

Parametric techniques could not be used because normality tests showed the data to be non-normal, as shown in Figure 1 ($r_s = -0.217$, $p = 0.010$), indicating that as hemoglobin levels decreased, QoL deteriorated—this relationship is visually summarized in the scatterplot in Figure 1.

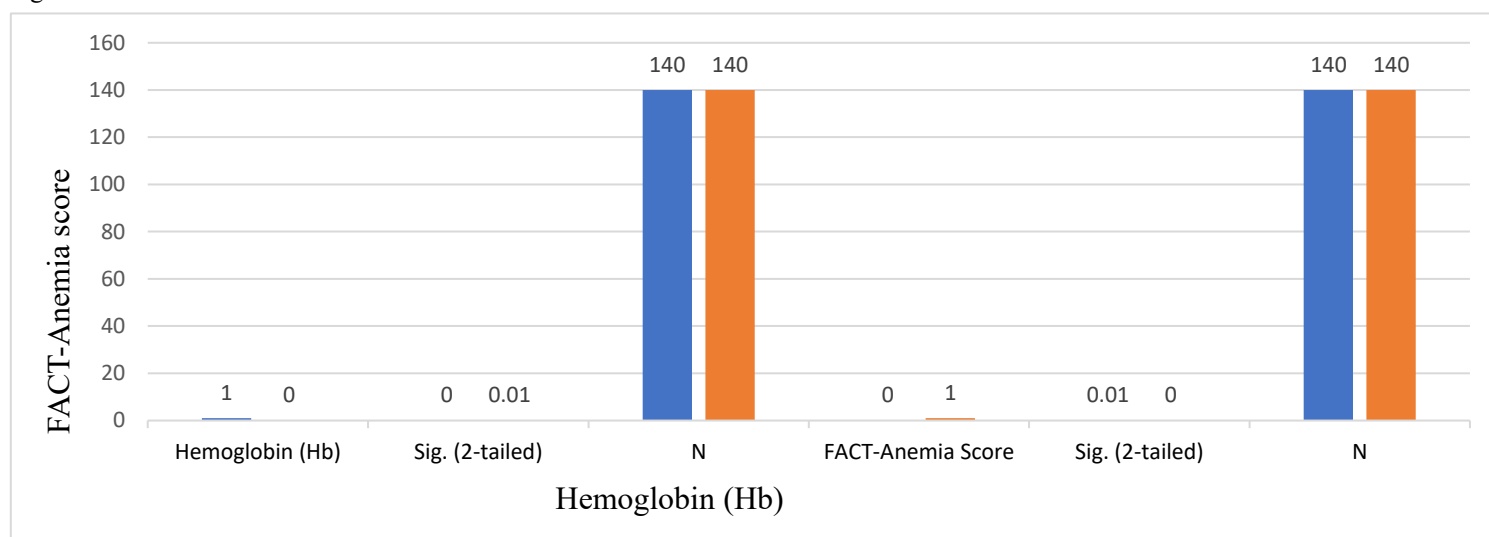


Figure 1. Spearman's correlation between haemoglobin and FACT-Anemia scores

To evaluate the impact of anemia severity on QoL, participants were categorized based on their FACT-Anemia scores into three groups: severe (0-60), moderate (61-110), and mild (111-188). The Kruskal-Wallis H test found statistically significant differences across all nine QoL dimensions ($p < 0.001$), establishing that more severe anemia was associated with worse physical, emotional, functional, and social well-being. These findings are presented in Table 2, and to the symptoms most strongly associated with poor QoL, a multiple linear regression analysis was performed. As shown in Table 3. The model demonstrated strong explanatory power ($R^2 = 0.945$), with fatigue-related symptoms emerging as the most influential predictors of QoL. The highest impact was observed for the items: "I feel tired" ($\beta = 0.85$, $p < 0.001$), "I have trouble finishing things because I am tired" ($\beta = 0.83$, $p < 0.001$), and "I feel weak all over" ($\beta = 0.79$, $p < 0.001$). Additional significant

symptoms included dizziness, daytime sleepiness, and headaches. These predictors are detailed in Table 4, underscoring the central role of fatigue in QoL deterioration among individuals with anemia. An optional visualization of the regression model's explanatory strength is provided in Figure 3. Overall, the results indicate that both the severity of anemia and the associated symptom burden—especially fatigue—are key determinants of impaired QoL, emphasizing the impact of early intervention and targeted symptom control.

Discussion:

The goal of the current study was to assess QoL in IDA patients in a tertiary care setting using the FACT-Anemia scale. The current authors considered demographic information of patients, the importance of symptoms, rates of functional status, and the

Table 2. Kruskal-Walli’s test results for 9 QoL items by severity group

Hypothesis Test Summary				
S. No	Null Hypothesis	Test	Sig.	Decision
1	The distribution of I have trouble walking is the same across categories of severity level.	Independent-Samples Kruskal-Wallis Test	0.00	Reject the null hypothesis.
2	The distribution of I have trouble finishing things because I am tired is the same across categories of severity level.			
3	The distribution of I have trouble starting things because I am tired is the same across categories of severity level.			
4	The distribution of I have been short of breath is the same across categories of severity level.			
5	The distribution of I feel weak all over is the same across categories of severity level.			
6	The distribution of I feel fatigued is the same across categories of severity level.			
7	The distribution of I feel tired is the same across categories of severity level.			
8	The distribution of I have a lack of energy is the same across categories of severity level.			
9	The distribution of I feel lightheaded (dizzy) is the same across categories of severity level.			

Table 3. Regression model summary

Model	R	R square	Adjusted R-squared	Std. error of the estimate
1	.972 ^a	.945	.938	12.81

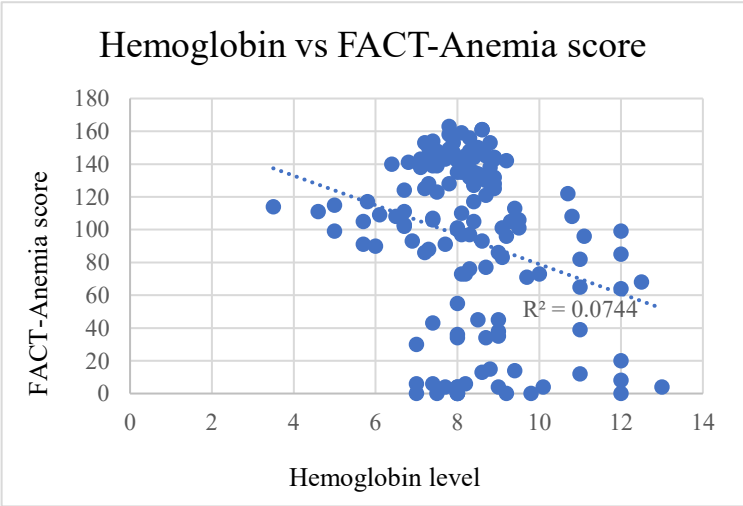


Figure 2. Scatterplot of haemoglobin level vs. FACT-Anemia score

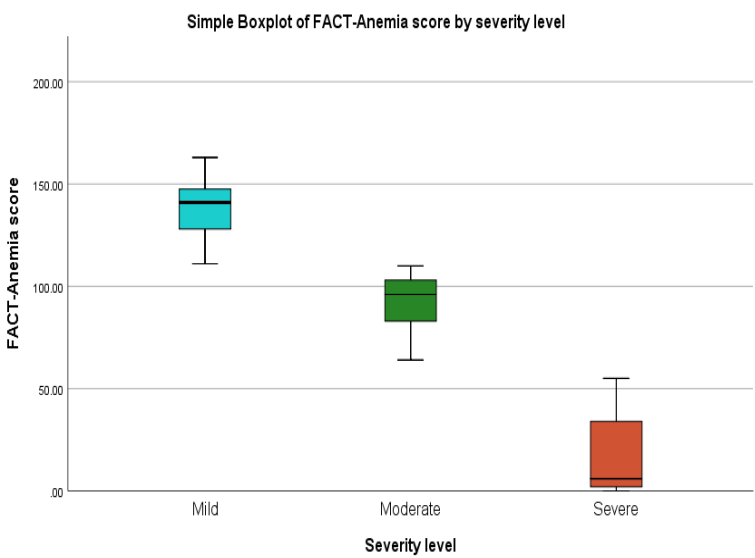


Figure 3. Boxplots of FACT-Anemia scores by severity group

Table 4. Most influential symptom predictors of FACT-Anemia scores

z	30.87 (1.89), 0.81	<0.001	0.81	0.65	0.65	265.75
I feel dizzy	30.60 (2.00), 0.79	<0.001	0.792	0.62	0.62	232.06
I got a headache	31.40 (1.83), 0.82	<0.001	0.82	0.68	0.67	293.95
I have been short of breath	27.31 (1.91), 0.77	<0.001	0.77	0.59	0.59	203.52
I have pain in my chest	26.60 (2.16), 0.72	<0.001	0.72	0.52	0.52	151.35
I am too tired to eat	27.57 (2.09), 0.74	<0.001	0.74	0.55	0.55	173.07
I am interested in sex	24.10 (2.29), 0.66	<0.001	0.66	0.44	0.44	109.99

influence of anemia on daily living. The findings add useful information to the functioning of research into (IDA), especially in the north India based hospitalized population [15]. In this study tended to be skewed the Age distribution toward younger participants (57.9% of participants were ages 19-28). This research study is clinically significant because it is an important contradiction to the common assumption that anemia occurs in older individuals [16]. Although this age trend perhaps reflects the social makeup of the area, there is a sizable number of young adults, in particular students, who form a large part of the healthcare-seeking population. Moreover, it is important to acknowledge the increasing burden of IDA even in this age group, with contributions likely related to poor dietary consumption, menstrual blood loss in females, greater nutritional needs, and lifestyle-related stress. The comparative study, such as [17], A comprehensive global study on disease burden, noted high prevalence of anemia in the 15–19-year age group globally, especially in females, which aligns with our findings. Furthermore, [18] aimed to show that QoL was severely impacted by anemia, even in younger cancer patients, reflecting the burden of symptoms that occur at an earlier onset. It is worth noting that younger participants comprised a significant portion of the sample for this study; however, older adults (those 49 years and above) made up a statistically significant portion of the remaining sample. However, anemia in older adults is a documented issue, and is often, in conjunction with chronic illness, marked with decreased nutrient absorption, and reduction of functional capacity [19]; described that mild anemia in old persons, was related to decreases in energy, thinking, mobility, and hence the case for routine testing and management of anemia for all ages. The weight exploration manifests that the majority of participants (72.8%) fell into the 45-65 kg range. Normal body weight might reflect long-term undernutrition, one of which major risk factors for developing

IDA. Prior research has shown that inadequate nutritional status and low body mass index are actively connected to IDA and decreased QoL. Reduced transferrin saturation and high levels of inflammation (like CRP) were described as contributing to poorer QoL [20] suggested that chronic inflammation, alongside low nutrition reserves may lead to ongoing fatigue and functional impairment these outcomes of [21, 22] also reinforced the nutritional aspect of the management of chronic anemia, they describe patients who were low weight and nutritionally deficient who were treated with intravenous iron therapy and were able to experience a significant improvement in their quality of life. Notably, there was almost an equal distribution of genders in the study population (50.7% male and 49.3% female). While IDA is a known risk in females, it does not mean it is restricted exclusively to females. We often think of anemia as a female issue, especially if it is a problem related to blood loss from menstruation. In contrast, the findings indicate that men are equally susceptible to IDA, either associated with their dietary behaviour or due to parasitic infections endemic to the region within which this study occurred. Moreover, half of the participants (55.7%) were educated, yet still affected by anemia. This finding raises the question of whether or not education might provide sufficient protection against IDA, indicating that knowledge alone requires appropriate access to healthcare, economic resilience, and access to a sustainable diet. This conclusion supports what [22] stated, that even with improved socio-economic development, some locations may continue to see evidence of anemia caused by cultural and lifestyle demands. Factors such as mean FACT-Anemia scores revealed a high range of variability (mean score = 93.80, SD = 51.24) in the variable quality of life. The numerous regression investigations suggest that fatigue-related symptoms were the strongest predictors of poor

QoL. Key items such as "I feel tired," "I feel weak all over," "I need to sleep during the day," and "I had trouble finishing things because I am tired" were associated with lower FACT-An scores. These findings were consistent with several major studies [23]. Confirmed fatigue is the highest disabling symptom in IDA, with the FACIT-fatigue scale being particularly sensitive to such problems. Comparably, Stute et al. discovered that even if hemoglobin levels are not greatly improved, the resolution of fatigue after intravenous iron therapy leads to improved well-being in patients [24]. We note that the R² value of 0.945 in our regression model expresses a dominant linear relationship, as the burden of symptoms accounts for nearly 95% of the variance in QoL scores. In addition, this concurs with findings from Strauss et al. (2018) and Gluazak et al., who described that reductions in fatigue and improvements in energy were the major contributors to greater health-related QoL in patients with anemia [25]. This research shows how the challenge of IDA is not solely in the hematological parameters but extends deeply to the patients' physical, emotional, and functional domains. A comprehensive treatment approach should therefore not be limited to re-establishing hemoglobin levels but may include treating other symptoms such as fatigue, weakness, and cognitive difficulty [26]. Treatment procedures such as iron therapy, whether oral or intravenous, along with dietary counselling and lifestyle modification, are important in improving outcomes. In summary, it is imperative to establish public health policy, with a focus on nutrition education approaches, regular screening of anemia in children and elderly adults, and access to required treatment in university hospitals and inpatient settings [27]. The recent study showed the association between hemoglobin levels and QoL measured using the FACT-Anemia scale, as well as compared across all different levels of anemia severity. There was a significant but weak ($r_s = -0.217$, $p = 0.010$) negative correlation between hemoglobin levels and FACT-Anemia scores, which indicated that lower levels of hemoglobin were associated with lower quality of life. These findings are compatible with past investigations [28, 29], which indicate that anemia (more specific, untreated anemia) negatively affects physical and functional well-being. Furthermore, the Kruskal-Wallis H test shows statistically significant differences in the FACT-Anemia scores between the severity level groups ($p < 0.001$), with mild anemia indicating the greatest level of QoL and severe anemia indicating the lowest. This trend is demonstrated, which illustrates that for each degree of severity in anemia, physical functioning (walking), emotional functioning (depression, sadness), and social functioning (social activities) are

steadily worsened. The literature also supports this trend, clearly noting that severe anemia is associated with fatigue, decreased physical activity, and decreased psychosocial functioning [30, 31]. The findings indicate that assessing for and treating anemia, no matter the cause, can improve hemoglobin concentration and also improve and add to overall quality of life. It should be noted that treating anemia, especially moderate to severe anemia, should be an additional clinical priority, since effective treatment could help reduce the adverse consequences of anemia on functional activities of daily living and QoL.

Conclusion:

Overall, our results show that IDA severely restricts patient quality of life, predominantly by way of extreme fatigue. These findings have immediate implications for practice and policy: anemia care should include regular QoL measurements (using such a proven instrument as FACT-An) in clinical practice. Treatments like formal exercise, energy-conservation training, and fatigue self-management education should be added to conventional iron supplementation to treat patients' functional symptoms. Through their incorporation of such patient-oriented measures, health care systems and clinicians can truly improve effectiveness in treatment and reduce the morbidity associated with IDA beyond the means of haemoglobin targets.

Ethics approval and consent to participate

The study was reviewed and approved by the Ethics Committee at ISF College of Pharmacy to ensure it met ethical standards and protected participants' rights, Moga (Approval No: IEC/ISFCP/2025/01/30).

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Conflict of interest

No conflicts of interest to declare.

CRediT authorship contribution statement

GV: Writing – review & editing the manuscript. KM and Rohit: Conceptualization, review, editing, visualization.

Declaration of Competing Interest

The authors assert that they do not have any known financial interests or personal relationships that could be perceived as influencing the work reported in this paper.

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Data availability

Not applicable.

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References:

11. Kumar SB, Arnipalli SR, Mehta P, Carrau S, Ziouzenkova O. Iron deficiency anemia: efficacy and limitations of nutritional and comprehensive mitigation strategies. *Nutrients*. 2022 Jul 20;14(14):2976.
12. Bathla S, Arora S. Prevalence and approaches to manage iron deficiency anemia (IDA). *Critical Reviews in Food Science and Nutrition*. 2022 Nov 14;62(32):8815-28.
13. Saboor M, Zehra A, Hamali HA, Mobarki AA. Revisiting Iron Metabolism, Iron Homeostasis, and Iron Deficiency Anemia. *Clinical Laboratory*. 2021 May 1(3).
14. Pasricha SR, Tye-Din J, Muckenthaler MU, Swinkels DW. Iron deficiency. *The Lancet*. 2021 Jan 16;397(10270):233-48.
15. English E, Idris I, Smith G, Dhataria K, Kilpatrick ES, John WG. The effect of anaemia and abnormalities of erythrocyte indices on HbA1c analysis: a systematic review. *Diabetologia*. 2015 Jul;58:1409-21.
16. Wagh D, Kanase S, Balid A, Fulari S, Bhosale A, Wadkar S, Gurud T, Narawade T, Walekar S. A Brief Review on Anemia. *Int. J. Sci. R. Tech*. 2024;1(12).
17. Chaparro CM, Suchdev PS. Anemia epidemiology, pathophysiology, and etiology in low-and middle-income countries. *Annals of the New York Academy of Sciences*. 2019 Aug;1450(1):15-31.
18. Ciebia M, Esfandyari S, Siblini H, Prince L, Elkafas H, Wojtyła C, Al-Hendy A, Ali M. Nutrition in gynecological diseases: current perspectives. *Nutrients*. 2021 Apr 2;13(4):1178.
19. Bhadra P, Deb A. A review of nutritional anemia. *Indian Journal of Natural Sciences*. 2020 Jun;10(59):18466-74.
20. Khajuria A, Raju M, Verma MK. Iron Deficiency Anemia: An Updated Review. *International Journal*. 2022 May;5(3):757.
21. Mo A, Poynton M, Wood E, Shortt J, Brunskill SJ, Doree C, Sandercock J, Saadah N, Luk E, Stanworth SJ, McQuilten Z. Do anemia treatments improve quality of life and physical function in patients with myelodysplastic syndromes (MDS)? A systematic review. *Blood Reviews*. 2023 Sep 1;61:101114.
22. Busti F, Marchi G, Ugolini S, Castagna A, Girelli D. Anemia and iron deficiency in cancer patients: role of iron replacement therapy. *Pharmaceuticals*. 2018 Sep 30;11(4):94.
1. Gilbert A, Sebag-Montefiore D, Davidson S, Velikova G. Use of patient-reported outcomes to measure symptoms and health-related quality of life in the clinic. *Gynecologic oncology*. 2015 Mar 1;136(3):429-39.
2. Natalucci V, Virgili E, Calcagnoli F, Valli G, Agostini D, Zeppa SD, Barbieri E, Emili R. Cancer-related anemia: an integrated multitarget approach and lifestyle interventions. *Nutrients*. 2021 Feb 1;13(2):482.
3. Hempel EV, Bollard ER. The evidence-based evaluation of iron deficiency anemia. *Medical Clinics*. 2016 Sep 1;100(5):1065-75.
4. Safiri S, Kolahi AA, Noori M, Nejadghaderi SA, Karamzad N, Bragazzi NL, Sullman MJ, Abdollahi M, Collins GS, Kaufman JS, Grieger JA. Burden of anemia and its underlying causes in 204 countries and territories, 1990–2019: results from the Global Burden of Disease Study 2019. *Journal of hematology & oncology*. 2021 Dec;14:1-6.
5. Stauder R, Valent P, Theurl I. Anemia at older age: etiologies, clinical implications, and management. *Blood, The Journal of the American Society of Hematology*. 2018 Feb 1;131(5):505-14.
6. Muthanna FM, Hassan BA, Karuppannan M, Mohammed AH. Evaluation of the impact of anaemia on quality of life among breast cancer patients undergoing chemotherapy in Malaysia. *Journal of Pharmaceutical Health Services Research*. 2021 Jun 1;12(2):310-2.
7. Raza S, Wei J, Ashad Abid S, Azhar G. Are Blood Transfusions Useful for Non-Specific Symptoms of Anemia in the Elderly?. *The Open Medicine Journal*. 2014 Jul 11;1(1).
8. Bhandari S, Parfrey P, White C, Anker SD, Farrington K, Ford I, Kalra PA, McMurray JJ, Robertson M, Tomson CR, Wheeler DC. Predictors of quality of life in patients within the first year of commencing haemodialysis based on baseline data from the PIVOTAL trial and associations with the study outcomes. *Journal of Nephrology*. 2023 Jul;36(6):1651-62.
9. Dahl NV, Moore A, Jiang J, Strauss WE. Sustained Improvements in Anemia and Fatigue of AUB after a Single Course of Ferumoxytol: 6-Month Follow-up [20J]. *Obstetrics & Gynecology*. 2019 May 1;133:112S-3S.
10. Safiri S, Carson-Chahhoud K, Noori M, Nejadghaderi SA, Sullman MJ, Heris JA, Ansarin K, Mansournia MA, Collins GS, Kolahi AA, Kaufman JS. Burden of chronic obstructive pulmonary disease and its attributable risk factors in 204 countries and territories, 1990–2019: results from the Global Burden of Disease Study 2019. *Bmj*. 2022 Jul 27;378.

23. Acaster S, Dickerhoof R, DeBusk K, Bernard K, Strauss W, Allen LF. Qualitative and quantitative validation of the FACIT-fatigue scale in iron deficiency anemia. Health and quality of life outcomes. 2015 Dec;13:1-0.
24. Stute P, Akpan IJ, Breyman C, Murji A, O'Brien SH, Powers JM, Munro MG. Effect of Ferric Derisomaltose on Fatigue in Iron Deficiency Anemia Associated With Abnormal Uterine Bleeding. American Journal of
25. Gluszk C, de Vries-Brilland M, Seegers V, Baroin C, Kieffer H, Delva R, Cornuault-Foubert D. Impact of iron-deficiency management on quality of life in patients with cancer: a prospective cohort study (CAMARA study). The Oncologist. 2022 Apr 1;27(4):328-33.
26. Portugal-Nunes C, Castanho TC, Amorim L, Moreira PS, Mariz J, Marques F, Sousa N, Santos NC, Palha JA. Iron status is associated with mood, cognition, and functional ability in older adults: a cross-sectional study. Nutrients. 2020 Nov 23;12(11):3594.
27. Kulkarni A, Khade M, Arun S, Badami P, Kumar GR, Dattaroy T, Soni B, Dasgupta S. An overview on mechanism, cause, prevention, and multi-national policy level interventions of dietary iron deficiency. Critical Reviews in Food Science and Nutrition. 2022 Jun 29;62(18):4893-907.
28. Cella D, Lai JS, Chang CH, Peterman A, Slavin M. Fatigue in cancer patients compared with fatigue in the general United States population. Cancer. 2002 Jan 15;94(2):528-38.
29. Jankowska EA, Rozentryt P, Witkowska A, Nowak J, Hartmann O, Ponikowska B, Borodulin-Nadzieja L, Banasiak W, Polonski L, Filippatos G, McMurray JJ. Iron deficiency: an ominous sign in patients with systolic chronic heart failure. European Heart Journal. 2010 Aug 1;31(15):1872-80.
30. Guralnik JM, Eisenstaedt RS, Ferrucci L, Klein HG, Woodman RC. Prevalence of anemia in persons 65 years and older in the United States: evidence for a high rate of unexplained anemia. Blood. 2004 Oct 15;104(8):2263-8.
31. Knight K, Wade S, Balducci L. Prevalence and outcomes of anemia in cancer: a systematic review of the literature. The American journal of medicine. 2004 Apr 5;116(7):11-26.