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The Effect of Red Beets Juice Supplementation on Health Status for Patients with Iron Deficiency Anemia

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Abstract

The iron deficiency anemia often occurs due to inadequate iron supplementation to meet requirements or to compensate physiological or pathological losses. Reed beets is an alternative plant rich with iron that may improve iron deficiency. This study aimed to evaluate the effect of red beets juice supplementation on health status for patients with iron deficiency anemia. quasi-experimental research design was utilized. The study was conducted at outpatient clinics at Ain shames hospital**.** A purposive sample of (60) patients from both gender was included in the study. data were collected through using three tools; Patients structured interviewing questionnaire that included two parts, part patients personal characteristics, part II: Patient's dietary habits history. Laboratory study measuring. The Lawton-body instrument activity of daily living scale. the study results revealed that 61.7% of the studied patients had abnormal total Hb pre intervention while 81.7% of them had normal Hb post intervention. 58.3% of them had low functional of total activity of daily living scale pre intervention, 40% of them had moderate functional of total activity of daily living scale pre intervention while 71.7% of them had high functional total activity of daily living scale post intervention. The present study concluded that the regular consumption of red beets juice can improve health status of iron deficiency anemic patients. majority of them had no iron deficiency anemia post taking reed beets juice since 4 weeks. provide educational programs for all age groups about the necessity of including red beets in daily meals.

Keywords: Health Status, Iron Deficiency Anemia, Red Beets Juice.

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1. Introduction

Anemia is not a specific disease state but a sign of an underlying disorder. It is by far the most common hematologic condition. Anemia is a condition that happens when the body doesn't have enough healthy red blood cells or hemoglobin. The main component of blood is hemoglobin which carries oxygen to the cells. Its reduction causes decrease in the availability of oxygen in the body thereby causing anemia ***(Bhadra & Deb, 2020).*** There are many different kinds of anemia, but all can be classified into three broad etiologic categories:1) Loss of RBCs-caused by bleeding, potentially from any major cause, such as the gastrointestinal tract bleeding, the uterus bleeding, the nose bleeding. 2) Decreased production of RBCS can be caused by a deficiency in folic acid, vitamin B12 and iron all these factors required for erythropoiesis; RBC production may also be reduced if the bone marrow is suppressed (eg, tumor, some medications, toxins) or is inadequately stimulated because of a lack of erythropoietin (as occurs in chronic renal disease).3) Increased destruction of RBCs -may occur because of an overactive. Reticuloendothelial System (RES) (including hypersplenism) or because the bone marrow produces abnormal RBCs that are then destroyed by the RES (eg, sickle cell anemia**) *(Stromberg & Dallred, 2022).*** Iron deficiency anemia (IDA) typically results when iron intake is inadequate to meet requirements or to compensate for physiological or pathological losses, body iron stores become depleted. Absolute ID occurs when iron stores are insufficient to meet the needs of the individual. In patients with inflammation, with holding of iron from the plasma promotes iron deficient erythropoiesis and anemia despite adequate body iron stores (functional iron deficiency). This

process is common in patients with complex medical or surgical disorders, in people living in areas where infection prevalence is high, and in patients receiving erythropoiesis stimulating agents ***(Schrage et al., 2020).*** Beet root, scientifically known as Beta vulgaris, it is one of the well-known plants belonging to the family Chenopodiaceae. Members of this family are dicotyledonous. It is rich in essential nutrients as fiber, folate (vitamin B9), manganese, potassium, iron and vitaminC. It is widely used as additives in the food industry because of its natural and harmless pigments and colorant properties and absence of toxicity. It is important from the medicinal point of view, also due to its antiviral, antimicrobial and antioxidant properties. Beetroot is associated with numerous health benefits, including healthy blood pressure, improved athletic performance, digestive health, brain health, fights inflammation and also contains anti-cancer properties (***Masih et al., 2019); (Oh et al., 2022).***

Beetroot juice is used as a paleness solution for youngsters and adolescents. Red beets contain antioxidants known as betalains, which are pigments that give the root its dark hue and this pigment is believed to help cleanse the body and remove toxins from the blood stream. Red beets also contain iron, vitamins C and B6, magnesium, manganese, potassium, folate and fiber to spur digestion and cleansing**.** Beet root juice has positive effects on human blood and blood forming characteristics because of its higher iron substance. It recovers and reactivates the red cells. It supplies new oxygen to the body and helps the typical capacity of vesicular relaxing ***(Butu & Rodino, 2019).*** Beets are one of the foods rich in iron, an essential component of red blood cells. Without iron, red blood cells would not be able to carry oxygen around the body. Accordingly, people with low iron levels can sometimes develop iron deficiency anemia. Some symptoms of iron deficiency anemia, including: Dizziness, fatigue, shortness of breath, headache, heart arrhythmia, As recommended by health care professionals, people with anemia should increase the consumption of beets in their daily meals so that the body can absorb more iron. This will help regenerate blood cells and provide an adequate amount of oxygen to the whole body. Moreover, beets also contain a large amount of copper, which promotes the body to produce more iron, thereby effectively improving iron deficiency anemia ***(Mudgal et al., 2022).*** Nurses play a major role in protecting patients from anemia. Nurses play an axial role in educating patients with IDA. Education for people with IDA and their families plays an important role in developing self-confidence, and becoming competent in self-management, which entails being aware of one‘s own needs and being able to access resources to meet those needs. Obtaining requisite knowledge and skills related to IDA and its management can also promote optimal well-being and quality of life for people with IDA and their families ***(*Abu-*Baker et al, 2021).*** The primary nursing goal of nutritional education and dietary modification is improving and maintaining the iron status, which involves changing in behavior that lead to an increase in the selection of iron rich food (such as: meat, fish, poultry and nonanimal food as legumes and green leafy vegetables). In addition, food that optimize iron absorption (such as: vitamin C which presents in fruits, juices, potatoes and some other vegetables such as green leaves(beets), cauliflower and cabbage) should be increased. On the other hand, food that hinder iron absorption (such as calcium, very fatty foods, phytates and also tannins that presents in tea and coffee) should be also decreased ***(El- Kholy et al., 2021).***

1.1 Significance of the study

Iron deficiency is the most prevalent nutritional deficiency worldwide. According to an estimate by the World Health Organization, up to 27% of the world's population experience iron deficiency anemia. In 2019, global anemia prevalence was 29.9% in women of reproductive age, equivalent to over half a billion women aged 15-49 years ***(WHO, 2021).*** In Egypt, The prevalence of anemia among women of reproductive age from 15-49 years was 28.30% in 2019. The highest prevalence of iron deficiency anemia was 45.05% reported in Al- Gharbia Governorate, followed by Al- Menoufia Governorate was 21.67% and the lowest prevalence was 4.91% in Al- Sharkia Governorate ***(El-Shanshory et al., 2021).***

1.2 Aim of the study

The current study aimed to evaluate the effect of red beets juice supplementation on health status for patients with iron deficiency anemia through:

1) Assess health status of patients with iron deficiency anemia.
2) Administer red beets juice for patients with iron deficiency anemia.
3) Evaluate the effect of red beets juice supplementation on health status for patients with iron deficiency anemia.

1.3 Research Hypothesis

At the end of this study the supplement of red beets juice will have a positive effect on health status for patients with iron deficiency anemia.

1.4 Operational definition of health status

Health status in the current study is referred to a predictor of important health outcomes related to iron deficiency anemia which including laboratory studies, and performance of activity of daily living.

2. Subject and methods

A quasi-experimental research design was used to conduct the study at outpatient clinics at Ain shames hospital.

2.1 Type of Sample

A Purposive sample of 60 adult patients diagnosed with iron deficiency anemia from both genders.

2.2 Tools for data collection

Data were collected using the following tools:

2.2.1 Tool I: Patients structured interviewing questionnaire

This tool was developed by the investigator after reviewing the current national and international related literatures **(Alswailem et al., 2018); (Lotfi et al., 2019)** includes the following parts.

2.2.1.1 Part I: Patients personal characteristics

It included demographic data of the patients as patients ' age, gender, level of education, residence, marital status, occupation and monthly income.

2.2.1.2 Part II: Patient's dietary habits.

It included data regarding:

Dietary habits as type of food, meals contain protein, vegetables and fruits on a continuous basis, drink a lot of tea and coffee, drink tea or coffee immediately after eating, eating fast food and eating fruit after the main meal.

2.2.2 Tool II: Laboratory study measuring tool:

This part concerned with assessing laboratory study for patients with iron deficiency anemia.

It consisted of 4 items as following (Hemoglobin in blood, mean corpuscular volume (MCV), Hematocrit, Red blood cells).

2.2.2. 1 Scoring system

The score for each item , categorized as following: score for Hemoglobin according to the National Cancer Institute classification **(Bohlius et al., 2006)**,

Grade	0	1	2	3	4
Symptom severity	Within normal limits	Mild	Moderate	Serious/severe	Life threatening
Hemoglobin Values	12.0–16.0 g/dl for women and 14.0–18.0g/dl for men	10g/dl to levels within normal limits	8.0–10.0g/dl	6.5–7.9g/dl	<6.5g/dl

Score for MCV is between 80 to 100 fl (Maner& Moosavi, 2022). Score for hematocrit for men is 40 to 54%; for women it is 36 to 48% (Billett, 1990). Score for RBCS for men is 4.7 to 6.1 million cells per microliter (cells/ mcL) for women 4.2 to 5.4 million cells/ mcL.

2.2.3 Tool III: The Lawton-body instrument activity of daily living scale (LDAL)

It was adapted from (Coyne & Agcnp-bc, 2019). it was used to assess the functional status and was included 8 domains each domain includes ability to use telephone (4 items), shopping (4 items), food preparation (4 items), housekeeping (5 items), laundry (3 items), mode of transportation (5 items), responsibility for own medications (3 items), ability to handle finances (3 items). total questions were 31 items scored as: The investigator modified the Lawton- body instrument activity of daily living scale by change Scoring system from score range from 0 (low function, dependent) to 8 (high function, independent) for woman and 0 through 5 for men to 0-4 (low function, low dependent), 5-7 (moderate function, moderate independent), 8 (high function, high independent). Because the original tool was excluded (food preparation, laundry, housekeeping) from the scoring system for the male and the Females were scored for all the 8 domains. But the investigator found that most of the males included in the sample was manual and official workers and self-reliant in washing their clothes, preparing food, and arranging their living space, making them eligible for evaluation in all the 8 domains for both males and females. During data collecting, it was found that some men and woman included in the sample scored 4, 6 or 7 on the pre-intervention and 5 or 6 post-intervention, despite suffering from anemia, but it did not affect their daily activities, as they had to work to improve their income and commitment to their families.

2.2.4 Scoring system

0-4 (low function, low dependent).
5-7 (moderate function,moderate independent).
8 (high function, high independent).

2.2.5 Validity

Face validity aimed to inspecting the items to determine whether the tools measure what supposed to measure. Content validity was conducted to determine whether the tools covered the aim, test its appropriateness, comprehensiveness, accuracy, correction, clearance, and relevance through a jury of 5 experts (assistant professors and lecturers of medical surgical nursing) from the Faculty of Nursing- Helwan University. Their opinions were elicited regarding tools consistency, rephrasing for some statements and scoring system. Ethics, values, culture, and beliefs were respected.

2.2.6 Reliability

Reliability refers to the stability of the measuring instrument used and its consistency over time. In other words, reliability is the ability to measure instruments to give similar results when applied at different times. However, a strong positive correlation between the results of the measuring instrument is an indication of reliability (Sürücü & Maslakçi, 2020). Cronbach's Alpha was used to determine the internal reliability of the tools. Reliability of the questionnaire normally ranges between 0 and 1. Higher values of Cronbach‘s alpha (more than 0.7) denote acceptable reliability. The tool showed high reliability, 0.81 for laboratory study measuring and it was 0.79 for activity of daily living.

2.2.7 Ethical considerations

An official permission to conduct the proposed study was obtained from the scientific research ethics committee of the faculty of Helwan University. Participation in the study was voluntary and subjects were given complete full information about the study and their role before signing the informed consent. The ethical considerations were included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it wasn‘t be accessed by any other party without taking permission of the participants. Ethics, values, culture, and beliefs were respected.

2.2.8 Operational item

It included preparatory phase, content validity and reliability, pilot study and field work.

2.2.8.1 Preparatory Phase

It included reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals, and magazines to develop tools for data collection. During this phase, the investigator also visited the selected place to get acquainted with the personnel and the setting. The development of the tools was done under the supervisors‘ guidance and experts opinions were considered.

2.2.8.2 Pilot study

The pilot study was done on 10% (6 patients) of the sample to examine the clarity of questions and time needed to complete the study tools. Subjects included in the pilot study weren't excluded from the study sample because no modification in the tools were done.

2.2.9 Field work

- An approval was obtained from the scientific ethical committee of Faculty of Nursing- Helwan University and the study subjects.
- An approval from director of Ain shames hospital to obtain permission for the collection of data.
- An oral informed consent was gotten from every patient. They were guaranteed that the data gathered would be dealt with privacy and would be utilized for the research purpose.
- Purpose of study was simply explained to the patients who agreed to participate in the study prior to any data collection.
- Data collection was started and completed within six months, from beginning of February 2023 to the end of July 2023.
- Data collection was done two days per week (Saturday and Wednesday) in the morning by face-to-face meeting then using mobile phones and WhatsApp, to ensure that the required amount of red beet juice is taking and post-test are taking after one month.

2.2.9.1 Assessment phase

- In this phase the researcher collected data from both gender (female and male). Data collection was started with structured interview questionnaire which included (personal characteristics and patients dietary habits history), laboratory study measuring tool and activities of daily living scale, which took ranged from 45-60 minutes to answer all questions.
- checking the CBC of the patients (pre- test) to determine the complete blood count especially Hb level, MCV, Hct, RBC, for each patient before giving red beets juice.

2.2.9.2 Implementation phase

- Red beetroots were washed with tap water, chopped into small pieces.
- Freshly prepared beetroot juice was previously diluted with tap water in a ratio 1:3.
- In a face to face meeting, the investigator clarified to patients the benefits of taking red beets juice.
- The investigator obtained patients telephone number from each patients and the investigator‘s telephone number was provided to the patients for contact purpose.
- The investigator call patients in telephone or sent massages every day reminders to patients for taking red beet juice.
- After obtaining the results of the complete blood cells of all patients (pre test) the investigator immediately giving reed beet juice to patients. The intake was as much as 250ml per day for four weeks.
- The patients takes two cups, one in the morning and one in the afternoon. And follow these instructions such as (stop fasting food, decrease drinking tea and coffee immediately after eating and during the day, don’t drink red beets juice on empty stomach).

2.2.9.3 Evaluation phase

- Evaluation was conducted through interviewing patients at the outpatient clinics by using the same tools to evaluate the effect of red beets juice supplementation on health statues for patients with iron deficiency anemia.
- After four weeks, the investigator checked again the patients CBC (post-test).
- Then, the investigator compared the results of the pre-test and the post-test of the patients Hb level, MCV, HCt, RBC, activities of daily living scale in each patient.

2.2.10 Administrative item

Approval to carry out this study was obtained from the dean of the faculty of nursing Helwan University and the director of Ain shames hospital to obtain permission for the collection of data.

2.2.11 Statistical Item

Upon completion of data collection, data were computed and analyzed using Statistical Package for the Social Science (SPSS), version 24 for analysis. For quantitative data, numbers, percentage, mean and standard deviation (SD) were used to describe the results. For qualitative data, frequency and percentage distribution of each category were calculated. Appropriate inferential statistics such as chi-square, Paired t-test was used as well.
The observed differences were considered as follow: Highly significant (HS) if P value < 0.001 Significant (S) if P value < 0.05 Non-significant (NS) if P value > 0.05.

3. Results

Table (1) reveals that, 35%of the studied patients were in age group 20 years to less than 30 years old with a mean age 36.24±9.15and 80% of them were females, 50% of the studied patients were married and 40% of them had high education, 40% of them were manual working, 66.7% of them hadn‘t enough monthly income, also 51.7% of them were live in rural area. Table (2) demonstrates that, 50% & 88.3% of the studied patients ate vegetarian and animal food and their meals contain protein, vegetables and fruits on a continuous basis respectively.95% of them drinking a lot of tea and coffee immediately after meals, also 85% & 90% of them eating fast food and hadn‘t fruit after the meal respectively. Table (3) explains that, there were no statistically significant difference in the MCV , HCT , RBC pre- and post- intervention at p-value≤ 0.05. Figure (1) shows that, 61.7% of the studied patients had abnormal total Hb pre intervention while 81.7% of them had normal Hb post intervention. Figure (2) shows that, 58.3% of the studied patients had low functional total ADLS pre

intervention, 40% of them had moderate functional total ADLS pre intervention while 71.7% of them had high functional total ADLS post intervention. Table (4) clarifies that, there were high statistically significant relations between total Hb of the studied patients and their total activities of daily living at P-value= 0.001 pre-post intervention.

4. Discussion

Iron deficiency anemia (IDA) is a state in which there is insufficient iron to maintain the normal physiological function of tissues, IDA is the most frequent cause of anemia world-wide and is a very common disorder in daily medical practice, WHO has recognized IDA as the most common nutritional deficiency in the world, with 30% of the population being affected with this condition While IDA is more prevalent in women, adult men are also susceptible depending on their socioeconomic status and health conditions, Although the most common causes of IDA are gastrointestinal (GI) bleeding and menstruation in women, decreased dietary iron intake (Kumar et al., 2022). Beetroot have high content of folic acid and iron. These substances are needed to form red blood cells and new hemoglobin in the body. Beetroot juice is useful in anemia as it forms blood owing to substantial iron. It triggers and activates the R.B.C., supplier fresh oxygen into the body and enhances lung function for normal breathing. The juice of the red beet enhances body's power of resistance, the usually deep-red roots of beetroot are eaten boiled either as a cooked vegetable, or as salad after cooking and adding oil and vinegar, or raw and shredded, either alone or combined with any salad vegetable. A large proportion of the commercial production is processed into boiled and sterilized beets or into pickles (Risnawati et al., 2021);(Royhanaty & Suciati, 2023). Regarding to patient's age, the present study clarified that about more than one third of the studied patients were in age group 20 less than 30 years old with mean age 36.24 ± 9.15. This result is in disagree with Beyable et al., (2022) in a study entitled "Prevalence and factors associated with preoperative anemia among adult patients scheduled for major elective surgery at University hospital in Northwest Ethiopia; a cross- sectional study", who study found that majority of their studied participant age in between 15 – 49 years. This study result is contradiction with Ali et al., (2022), in a study entitled " Life style of female student's nurses with iron deficiency anemia", who studied noticed that highest percentage of the studied female students' nurses their age less than 18 years old. As regard to gender, the present study simplified that the majority of the studied patients were females. from investigator's point of view, This can be explained by female with excessive menstruation more risk for having anemia which cause loss of red blood cells . This result is in accordance with Hamali et al., (2020), in a study entitled " Prevalence of anemia among Jazan university students ", who documented that majority of his anemic patients sample were females. Also, This result is in agreement with Owaidah et al., (2020), in a study entitled " Iron deficiency and iron deficiency anemia are common epidemiological conditions in Saudi Arabia", who study found that majority of their studied participant were females.

Also this result disagreement with Masood et al., (2019), in a study entitled " Symptomatic complications and quality of life in Pakistani patients with iron deficiency anemia: quality of life in iron deficiency anemia patients", who documented that majority of his anemic patients sample were males. As regard to marital status, the present study clarified that half of the studied patients were married. This may be due to that most of the study patients were within 20 years – 30 years and usually by this age they are married, according to the Egyptian society culture. This result is disagreement with Ali et al., (2021), in a study entitled " Overweight and obesity among urban women with iron deficiency anemia in Bangladesh", who documented that the majority of his study participants were married. Also, this result is discrepancy with Mohammad et al., (2020), in a study entitled " Awareness of iron deficiency anemia among the adult population in Riyadh, Saudi Arabia", who revealed that about more than half of his study participants were married. Concerning to educational level, this study result revealed that about more than half of the studied patients had high education and post graduate studies. from investigator point of view, This can be explained by spending most of the day at manual and official working due to insufficient income and depend on eating fasting food or unhealthy food during working. these results are in contradiction with Rahat & Kamani, (2021) in a study entitled " Frequency of iron deficiency anemia (IDA) among patients with Helicobacter pylori infection", who study results evaluated that about more than half of the studied patients had matriculation, also our results are inconsistent with Abu-Baker et al., (2021) in a study entitled " The impact of nutrition education on knowledge, attitude, and practice regarding iron deficiency anemia among female adolescent students in Jordan", who evaluated that about more than half of the studied patients had lower level of educational. According to the occupation , about less than half of the studied patients were manual working, These study results agree with Solomon et al., (2022), in a study entitled " Prevalence of anemia and associated factors among adult diabetic patients attending Bale zone hospitals", who revealed that about less than half of his study participants were manual working such as Farmer and Merchant, Also, This result is in contradiction with Almalki et al., (2022), in a study entitled " Assessment knowledge about general anemia signs and symptoms among adult patient attending at primary health care, Makkah Al-Mokarrama, Saudi Arabia 2022", who documented that about less than half of the studied patients were official working. As regard to monthly income, the present study clarified that more than half of the studied patients reported that they had not enough monthly income, This may be due to that about more than half of the study patients were manual and not working, which resulted in agreement with Naeemullah et al., (2022), in a study entitled "Frequency and risk factors of anemia among adult female population of district Swat Khyber Pakhtunkhwa Pakistan", who documented that about more than half of the sample hadn't enough family income. Also this result is in disagreement with Jamnok et al., (2020), in a study entitled " Factors associated with anemia and iron deficiency among women of reproductive age in Northeast Thailand: a cross-sectional study", who documented that about more than half of woman's had enough family income. Regarding to patients' residence, the current study result showed that; half of the studied patients were from rural area.

Table 1: Frequency & percentage distribution of personal characteristics of the studied patients (n=60).

Demographic characteristics		N	%
Age (in years)	20 years to less than 30 years	21	**35**
	30 years to less than less than 40 years	18	30
	40 years to less than less than 50 years	15	25
	50 years or more	6	10
	Mean±SD	**36.24±9.15**	
Gender	Male	12	20
	Female	48	**80**
Marital status	Single	21	35
	Married	30	**50**
	Widow	3	5
	Divorced	6	10
Education level	No read and write	6	10
	Read and write	6	10
	Primary education	6	10
	Intermediate education	6	10
	High education	24	**40**
	Postgraduate studies	12	20
Occupation	Official work	21	35
	Manual work	24	**40**
	Not working	15	25
	Retirement	0	0
Monthly income	Enough	20	33.3
	Not enough	40	**66.7**
Residence	Urban area	29	48.3
	Rural area	31	**51.7**

Table 2: Frequency and percentage distribution of the studied patients according to their dietary habits (n=60).

dietary habits		N	%
Type of food	Vegetarian	15	25
	Animal	15	25
	vegetarian and animal	30	**50**
Meals contain protein, vegetables and fruits on a continuous basis	Yes	7	11.7
	No	53	**88.3**
Drinking a lot of tea and coffee	Yes	57	**95**
	No	3	5
Drinking tea or coffee immediately after meals	Yes	57	**95**
	No	3	5
Eating fast food	Yes	51	**85**
	No	9	15
Eating fruit after the main meal	Yes	6	10
	No	54	**90**

Table 3: Mean scores of laboratory measuring of the studied patient‘s pre and post intervention (n=60).

Laboratory measuring	Pre	Post	Paired t-test	
	Mean±SD	Mean±SD	T	P-value
Mean corpuscular volume **(MCV)**	75.65±9.28	77.37±8.06	1.086	0.280
Hematocrit **(HCT)**	34.92±6.61	36.15±6.20	1.051	0.295
Red blood cells **(RBC)**	4.66±0.73	4.73±0.72	0570	0.570

*No significance P value > 0.05

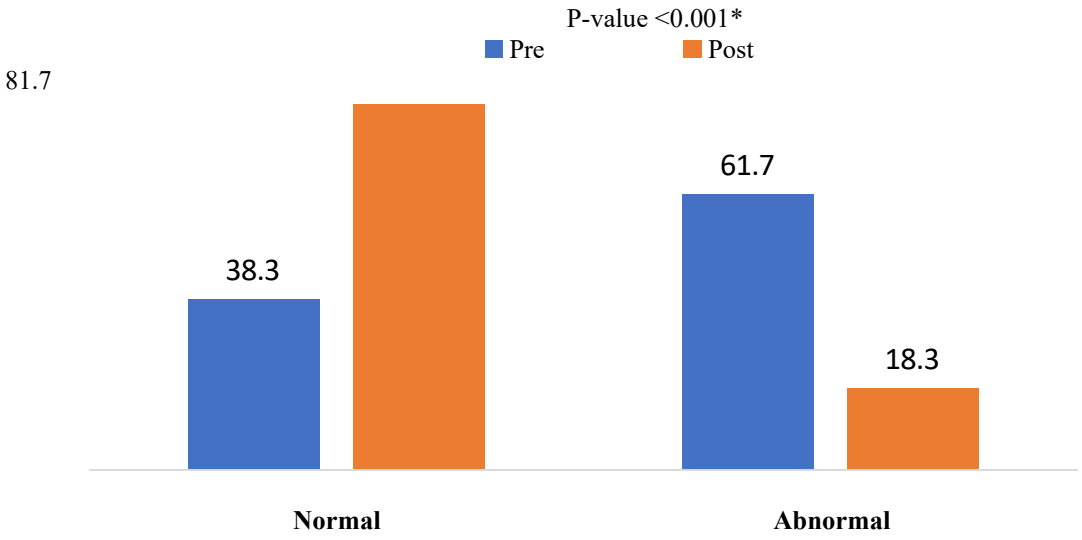

Figure 1: percentage distribution of studied patients regarding total Hb level pre and post intervention.

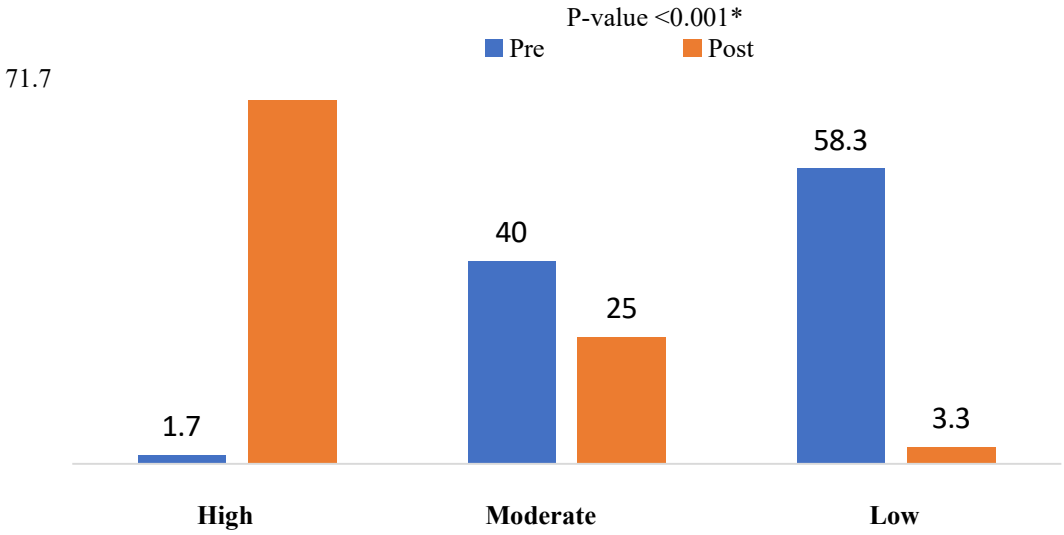

Figure 2: Percentage distribution of total activities of daily living pre and post intervention.

Table 4: Relations between total activities of daily living of the studied patients and their total Hb pre and post intervention (n=60).

Total activities of daily living	Total HB					
	Normal		Abnormal		Chi-square	
	N	%		%	X2	P-value
Pre						
High	1	1.7		0.0	25.976	<0.001*
Moderate	18	30.0		10.0		
Low	4	6.7	1	51.7		
Post						
High	40	66.7		5.0	13.086	<0.001*
Moderate	8	13.3		11.7		
Low	1	1.7		1.7		

* high statistical significance P value <0.01

This finding goes in the same line with Sundar & UK, (2023), in a study entitled " A comparative study of anemia in adult women of Telangana population", who study evaluated that prevalence of anemia is slightly higher among rural adult females compared to urban females. while these results are in contradiction with Ali et al., (2022), who showed that most of the studied sample from urban area. According to Dietary Habits, the current study demonstrated that half of the studied patients ate vegetarian and animal food, and their meals contain protein, vegetables and fruits on a continuous basis, drink a lot of tea or coffee immediately after eat and eating fast food, these result is agreement with Hamodi et al., (2022), who found that half of patients drink Tea or coffee after meals directly and had Vegetarian diet. While this result is disagreement with Chaturvedi et al., (2017), in study entitled " Study of correlation between dietary habits and anemia among adolescent girls in Ranchi and its surrounding area ", who found that more than half of patients had non- vegetarians, and one third of them drink a lot of tea or coffee post meal, Fruits/fruits juice frequently. According to laboratory study measuring pre and post intervention, the present study found that there was a statistically significant difference between studied patients` regarding hemoglobin pre and post intervention. This study results consistent with Al- aboud, (2018) in study entitled " Effect of red beetroot (Beta vulgaris L.) intake on the level of some hematological tests in a group of female volunteers", who found that there is an increase in Hb levels of the subjects after taking beetroot juice. Also, MCV levels showed mild increase in the study subjects after taking red beet juice.

This result is contract with Ginting et al., (2021), in study entitled " The intake of beta vulgaris and amaranthus tricolor L. Juice on increasing the hemoglobin level", who showed that there was a positive effect of increasing Hb level through the intake of Beta Vulgaris juice. While this result is in disagreement with Lotfi et al., (2019), in study entitled "Acute beetroot juice intake: Hematological, antioxidant and lipid parameters in female athletes'', who found that there were no significant differences in blood indices (levels of hemoglobin, hematocrit, red blood cells, iron, and mean corpuscular volume), Also these result is agreement with Pibriyanti & Safira (2021), in study entitled " The effectiveness of giving beetroot juice on increasing hemoglobin (Hb) levels of adolescent women in Islamic boarding school ", who found that there is a statistically significant difference between the hemoglobin level before and after the intervention of beetroot juice in adolescent girls in Islamic boarding school. According to mean corpuscular volume, Hematocrit, Red blood cells, This study indicates that there were mild increase in mean scores in corpuscular volume, Hematocrit, Red blood cells post intervention than pre intervention. Also, there was no statistically significant difference in MCV, HCT, RBC pre and post intervention. Also these result mismatching with Surma et al., (2023) in their study entitled " Relationship between the consumption of fermented red beetroot juice and levels of Perfluoroalkyl substances in the human body's fluids and blood parameters", and showed that the intake of fermented red beetroot juice resulted in a significant decrease in mean corpuscular volume (MCV). According to Relations between total activities of Daily Living of the studied patients and their total Hb pre and post intervention, the present study found that there was a high statistically significant relation between total Hb of the studied patients and their total activities of daily living pre and post intervention, From investigator point of view, it's might be due to the effect of red beets juice, on increasing Hb level and improving performance of total ADLS many of the studied patients with mild to moderate degenerations in Hb level, had significantly poorer outcomes in activities of Daily Living functioning (pre), also majority of the studied patients with moderate to high improvement in Hb level, had significantly development outcomes in activities of Daily Living functioning post intervention. This study results consistent with Fukushima et al. (2019) who found that there was statistically significant relations between activity of daily living and total hemoglobin. These results matching with Lee et al., (2021) in study entitled " Prevalence of anemia and its association with frailty, physical function and cognition in community-dwelling older adults: findings from the HOPE study.", and showed that there was statistically significant relations between activity of daily living and total hemoglobin, While the current study results discrepancy with Payne et al., (2018) in study entitled " Cross- sectional relationship between hemoglobin concentration and measures of physical and cognitive function in an older rural South African population ", and showed that there no statistically significant relations between poor physical or cognitive function and total hemoglobin.

5. Conclusion

Based on the findings of the present study, it can be concluded that: The present study showed that the consumption of red beets juice had positive effect on health status for patients with iron deficiency anemia. About more than half of the studied patients had abnormal Hb and low functional total activity of daily living(ADLS) (pre intervention) and majority of them had normal Hb and high functional total ADLS (post intervention). so there were high statistically significance relations between total activities of daily living of the studied patients and their total Hb pre and post intervention.

Recommendations

Based on the findings of the study results, the following recommendations were suggested:

1. Provide health education for all patients with iron deficiency anemia about the importance of red beets and ways of their eating and their benefits for general health.
2. Increase public awareness about the necessity of including red beets in daily meals for all age groups.

Recommendations for further research:

- Health educational program about prevention of anemia among female in productive age, especially education about nutrition.
- Replicate this study with a large probability sample size in a differant geographic location to confirm the finding for generalization of the results.

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