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Assessment of Blood Parameters & Serum Ferritin in Depression

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Abstract

Psychiatric disorders represent a group of mental health conditions marked by significant changes in thinking, feelings, actions, and challenges in social interactions, occupational performance, or family dynamics. Depression is identified as a mental health disorder and is defined as a condition that negatively affects your feelings, thinking patterns, and actions. Iron is an essential element that greatly supports cognitive abilities, sensory-motor functions, and brain oxygen supply.This research aims to assess the correlation between serum ferritin concentrations and complete blood count metrics in relation to the severity of depression among Sudanese individuals. Fifty male and female participants aged 20 to 50 years. 3 ml of venous blood obtained in an EDTA tube for CBC, and 3 ml in a plain tube for serum ferritin assessment. The averages of Hb, RBC count, MCV, MCH, MCHC were 15 mg/dl, 9.5 pg, 32.06, 88.25, respectively. The average for HTC stands at 40.9%. The typical platelet count in this research is 237.1. The typical serum ferritin concentration is 15_300 micrograms/liter for men and 15_200 micrograms/liter for women.The relationship between depression severity and serum ferritin along with CBC parameters is insignificant, as indicated by P-values of 0.349 and 482, both exceeding the 0.05 limit. This suggests that serum ferritin levels do not connect with CBC parameters concerning depressive disorders.

Keywords: *Depression, Ferritin, CBC parameters, Sudanese patients*

Introduction

Psychiatric disorders include various signs and symptoms marked by a notable disruption in an individual's mental processes, affecting mood, thought, emotion, regulation, or behavior, indicating impairments in the psychological, biological, or developmental systems of mental function, significantly raising the chances of disability, distress, mortality, or loss of autonomy. Depression ranks as one of the most prevalent mental illnesses; certain causes of depression (genetic) are enduring, whereas others may be altered. Nutrition is an essential adjustable factor (Saez E et al. 2022). It is a significant mental health concern that impacts an individual's emotions, thoughts, and behaviors, resulting in sadness and a diminished interest in activities once enjoyed, which can hinder performance in both work and home environments. Ferritin is a protein that holds iron and cannot be detected via photomicroscopy, though it may display a weak and diffuse stain in tissue cells with Prussian blue; in concentrated form, it is water-soluble and heat-resistant up to 75 degrees (Arosio P et al. 2024).

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It acts as a reservoir for iron within the body. Serum ferritin is essential for the storage of intracellular iron and has been extensively reviewed. In the general population, iron deficiency is categorized into three degrees of severity (Mattia Vaca et al. 2016), depletion of iron stores, mild iron deficiency, and iron deficiency anemia. Ferritin levels below 12 micrograms per liter suggest depletion of iron stores, despite normal concentrations of circulating iron and hemoglobin (Al-Naseem A et al. 2021). Marginal iron deficiency is marked by decreased iron levels and lower circulating iron, while maintaining a normal hemoglobin level. Iron deficiency without anemia was noted in up to 11% of women (primarily in the perimenopausal period) and 4% of men (Soppi ET et al. 2018). It seems there was an error, as the text you wanted to be paraphrased is missing. Please provide the specific text you want to be rephrased

Materials & Methods

This study was an analytical cross-sectional investigation conducted among Sudanese individuals aged 18 to 50 years diagnosed with depressive disorder. Three milliliters of venous blood were collected in an ethylene diamine

tetraacetic acid tube for complete blood count analysis, and three milliliters were collected in a plain tube for serum ferritin assessment. Participants were questioned right after they consented to complete the questionnaire. Three milliliters of whole blood were collected in a plain container, and then centrifuged to separate the serum; afterward, the serum was stored at 2-8°C for a duration of 7 days.

The Mindray BC 3000plus analyzer was employed for quantifying RBCs, PLTs, and WBCs, along with assessing Hb concentrations. Serum ferritin concentrations were evaluated using a Roche Cobas 8000 Modular Analyzer Series.

Data were analyzed using IBM SPSS Statistics software, version 22.0. A Chi-square test was performed to examine categorical data among the groups.

Descriptive statistics encompass median, average, standard deviation, frequency, and percentage figures. A p-value below 0.05 was considered statistically significant

Results

This study involved 50 Sudanese participants diagnosed with depression at the psychiatric department of Omdurman Military Hospital. The participant group comprised both males and females, with ages spanning from 20 to 50 years. The objective was to evaluate the relationship among serum ferritin levels, complete blood count parameters, and the severity of depression As shown in **figure 1.** Serum Ferritin Level and CBC Parameter (Mean & Standard Deviation) were measured. Max ferritin level = (146.710), Min = (.500), Mean= (25.00) and STD = (31.26) as shown in **table 1**.

Table 1: Descriptive Statistics (Serum Ferritin Level Vs. CBC parameter)

	N	Min	Max	Mean	Std. Deviation
Serum Ferritin level	50	.500	146.710	25.00	31.264662
Hb level	50	8.20	15.80	12.72	1.63732
RBCs count	50	3.14	5.52	4.42	.47503
HCT	50	27.10	94.60	40.90	9.08818
MCV	50	32.8	99.40	88.25	10.66789
MCH	50	20.70	32.40	28.76	2.18776
MCHC	50	30.50	33.50	32.06	.66417
PLT count	50	23	386	237.10	72.167

Serum Ferritin Level and CBC Parameter (Mean & Standard Deviation) were measured. Table (2.3) shows max ferittin level = (146.710), Min = (.500),Mean = (25.00) and STD = (31.26).

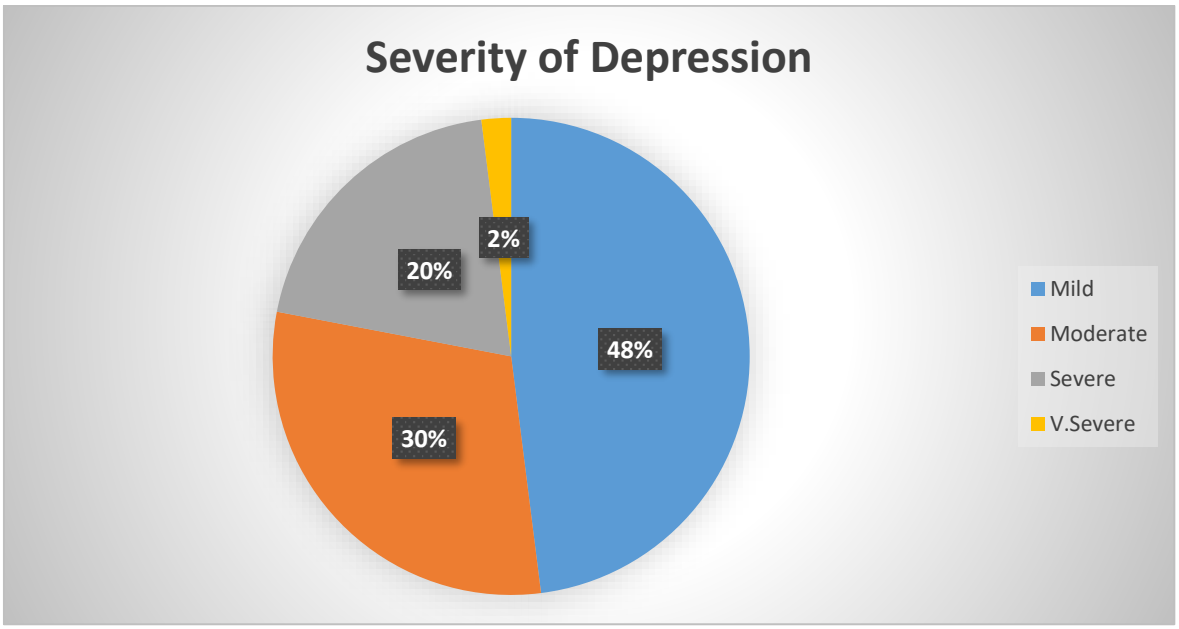

Figure. 1 Severity of depression among participants

A scatter plot created to assess the initial relationship between the independent variable (Serum Ferritin level) and the dependent variable (Depression severity). The chart illustrates an inverse correlation between the two

variables. (Some points are randomly distributed above and below the line). In the top row of the output, the Pearson Chi Squared statistic is noted as χ2 = 150.000a, with a corresponding p-value of (.349), significantly exceeding p > 0.05. This indicates that there is no relationship between Serum Ferritin levels and depressive disorder with 95.0% confidence. The data collected from this investigation of respondents' CBC parameters are contrasted with the reference values as shown in **figure 2**. Frequencies of different stages of depression where: 46.0% of therespondents (23) were found to have (mild depressive disorder), whereas 32.0% (16) reportedwith (moderate depressive disorder), and those who experienced (severe depressive disorder) constitute 20.0% (10) of the respondents, and finally, there is a single case (2.0%) reported as (V.severe depressive disorder). Data required for the assessment of depressive disorder taken from Omdurman Military hospital; records – department of psychiatric disorders as shown in **table 2**. Correlation (Serum Ferritin level & Depressive disorder severity) as shown in **Table 3**.

CBC parameters v. Reference values. Data obtained from this study of CBC parameters of the respondents are compared to the references values as shown in **Table 4**.

Table.2. Shows the frequencies of different stages of depression where: 46.0% of the respondents (23) were found to have (mild depressive disorder), whereas 32.0% (16) reported with (moderate depressive disorder), and those who experienced (severe depressive disorder) constitute 20.0% (10) of the respondents, and finally, there is a single case (2.0%) reported as (V. severe depressive disorder). Data required for the assessment of depressive disorder taken from Omdurman Military hospital; records – department of psychiatric disorders.

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Serum Ferritin Level and CBC Parameter (Mean & Standard Deviation) were measured. Table (2.3) shows max ferittin level = (146.710), Min = (.500), Mean = (25.00) and STD = (31.26).

Table 3: Correlation (Serum Ferritin level & Depressive disorder severity)

		Serum Ferritin level	Severity of Depression
Serum Ferritin level	Pearson Correlation	**1**	**-427.-
Severity of Depression	Sig. (2-tailed)		002.
	N	50	50
	Pearson Correlation	**-427.-	1
	Sig. (2-tailed)	002.	
	N	50	50

Table 4: CBC parameters v. Reference values

Parameter Normal range	Normal range (Male)	Normal range (Female)	Respondents Results
Serum Ferritin	300_15microgram / liter	200_15 microgram/liter	25.00
WBCs count	10_4x(10)69		5.58200
Hb level	15mg /dl	13.5mg /dl	12.7200
MCV	92.5pg		88.2520
MCH	29.5pg		28.7680
MCHC	33g/l		32.0640
RBCs count	5x (10)^12	4.3x (10)^12	4.4274
HCT	%45	%41	40.9080
Plts count	280*(10)^9		237.10

Data obtained from this study of CBC parameters of the respondents are compared to the references values.

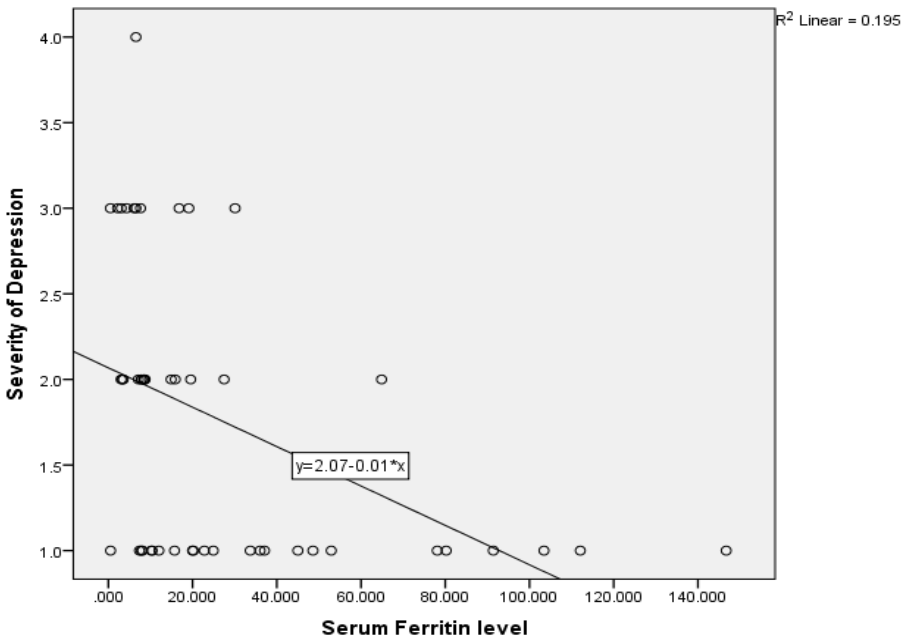

Figure.2 A scatter plot created to assess the initial relationship between the independent variable (Serum Ferritin level) and the dependent variable (Depression severity). The chart illustrates an inverse correlation between the two variables. (Some points are randomly distributed above and below the line).

In the top row of the output, the Pearson Chi Squared statistic is noted as $\chi 2 = 150.000a$, with a corresponding p-value of (.349), significantly exceeding $p > 0.05$. This indicates that there is no relationship between Serum Ferritin levels and depressive disorder with 95.0% confidence.

The data collected from this investigation of respondents' CBC parameters are contrasted with the reference values.

Discussion

Psychiatric conditions entail a significant disturbance in an individual's thinking, emotional regulation, or behavior. Depression is a mental health condition marked by irregular mood fluctuations and short emotional responses to everyday difficulties (Al-Naseem A. et al. 2021). In a depressive episode, a person might experience a consistently low mood (sadness, irritability, or emptiness) or a reduced interest or enjoyment in activities for a substantial part of nearly every day for a duration of at least two weeks. It is often associated with pain or impairment in essential areas of functioning. This study was conducted to assess the connection between serum ferritin levels and CBC parameters concerning depression. (Soppi ET. et al. 2018). The study included fifty depressed patients from Sudan at the psychiatric unit of Omdurman military hospital. The current study showed a negative relationship between ferritin levels and depression. The correlation is weak (-.427), suggesting that as serum ferritin levels increase, depression severity lessens; nonetheless, this connection is regarded as very weak. As a result, a chi-square test was conducted to achieve a dependable result and confirm or disprove the relationship between these variables (Deepthi S. 2025). The findings suggested that there was no meaningful connection between serum ferritin and depression, with a p-value of (.349), which is greater than 0.05 **(Figure No 2)**. The variation in results of two statistical tests may stem from several factors. A contributing factor might be the greater occurrence of mild cases in relation to moderate or severe ones (Charlson F. etal. 2019). Furthermore, deceptive details, like substance abuse or pre-existing health issues, might play a role. Differences in lifestyle among patients, along with variations in age and gender, could also explain discrepancies and should be taken into account. A research project carried out in northern Sudan investigated the relationship between serum ferritin levels and depression in teenagers, comparing depressed individuals with healthy counterparts (Hassan A A. et al. 2025). The study revealed that young people with depression exhibited significantly lower serum ferritin levels than those in the control group. The study found that a low ferritin level in the bloodstream may increase the likelihood of depression even before anemia develops. I apologize, but it appears there is no text presented for me to rephrase.

A distinct case control study carried out at Free University of Medical Science in Tehran included 192 female medical students during their psychiatric department clinical rotation. Utilizing the Beck score, the students were divided into groups of depressed and healthy individuals. The participants underwent evaluation for Hb, S ferritin, and B12 levels; the findings revealed an average S ferritin level of (26.957113-38.36717) in both depressed and healthy individuals. (Ahmadi J. et al. 2014). The Spearman correlation coefficient between ferritin and depression was 0.167,

indicating a weak negative relationship between these variables, with statistical significance (p-v-0.01), consistent with the findings of the current study. A cross-sectional study conducted by Yi et al in July and November 2006 included employees working in two municipal offices situated in northeastern Kyushu, Japan. Comprising 528 participants, including 312 men and 216 women. Symptoms of depression were assessed with a Japanese version of the Center for Epidemiologic Studies Depression scale (CES-D), while a blood sample was taken to measure serum ferritin levels. 36.5% of men and 36.1% of women reported a CES-D scale score of ≥16 (Nishimura Y. et al. 2020). The prevalence of individuals with a CES-D score of ≥19 and ≥23 was 26.0% and 14.4% for men and 26.4% and 14.4% for women, respectively. Average serum ferritin levels were significantly higher in men (Mean=163.9 µg/L, S.D. =141.9) than in women (Mean=49.7 µg/L, S.D. =59.9) (p<0.001) (Shafi, M et al. 2018). In women aged 50 years or older, serum ferritin levels were significantly higher (Mean=38.6 µg/L, S.D. =50.7) compared to those under 50 years (Mean = 77.6 µg/L, S.D. = 71.8) (p<0.001). The research indicated that depressive symptoms assessed by CES-D (utilizing a cutoff of ≥19) were associated with reduced serum ferritin levels in apparently healthy men, suggesting a connection between poor mental health outcomes and iron deficiency among Japanese employees; however, this study partially opposes our results. Regarding CBC and its association with the severity of depression, this research showed no notable correlation between RBC, Hb, MCV, MCH, MCHC, RDW, and depression (p.value .482). These results correspond with Ghofran Ali's 2017 research in Khartoum, Sudan, which indicated similar outcomes, apart from Hb concentration, which showed a notable relationship with depressive disorders. Unlike a cross-sectional study by Stewart Hirani in 2012, which found a significant association between heightened depressive symptoms and decreased Hb levels, these results contradict that study (Yi S, Nanri A. et al. 2011). The link between the severity of depression and serum ferritin as well as CBC parameters is not significant, demonstrated by P-values of 0.349 and 0.482, both surpassing the 0.05 limit. This suggests no correlation exists between serum ferritin levels and CBC parameters concerning depressive disorders. This research could not gather substantial samples because of an insufficient number of patients, and no additional lab tests were performed to confirm the existence of iron deficiency anemia in the participants.

Conclusion

The connection between depression severity and serum ferritin, as well as CBC parameters, is not noteworthy, indicated by P-values of 0.349 and 0.482, both exceeding the 0.05 threshold. This indicates that serum ferritin levels and CBC parameters do not correlate with depressive disorders

The contents of this manuscript has not been published before and is not currently being presented elsewhere

Conflict of interest

The authors declare that they have no conflict of interest.

Data availability statement

All data pertaining to this article is available on the repository site of Sudan University of Science and Technology.

Animals & Humans Right Statement

"I certify that the procedures and experiments I conducted adhere to the ethical standards outlined in the Helsinki Declaration of 1975, updated in 2000, along with national legislation."

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