

Depression in Relation to Serum Ferritin a Cross-sectional Study at Najaf Governorate

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Abstract

depression is a common psychiatric disorder that leads to disability and increases morbidity and mortality, and iron deficiency is a common nutritional disorder in general population that lead to change in brain function and affecting the quality of life. Methodology; a cross-sectional study that was conducted at Iraq Al-Najaf governorate, patient with depression was (51), and control group was (95), both were assessed by Beck depressive inventory Arabic version for the scoring of depressive symptoms, for both group serum ferritin was evaluated from fasting blood sample. Result; The age of participants (mean=36.25 years), the male was (55) while the female (91), of them (88) were married, there is significant differences between groups in age group (36-45) years and female gender while not to another variable. serum ferritin was significantly deferent with *P*-value (0.001). Conclusion; there is a strong relationship between the level of serum ferritin and depression with inverse correlation.

Keywords: *depression, serum ferritin, Beck depressive inventory, Najaf*

Introduction

Depression is a common psychiatric illness, that leads to disabling and lowering of productivity, and worsening the outcome of chronic illnesses due to nonadherence and increases the cost spend on these illnesses. It is regarded as one of the leading cause of death¹. Symptoms of depression also had a high prevalence², and it has an intimate relationship with quality of life, social interaction^(3,4), attempts of suicide^(5,6) and physical health⁷. Depression rate was 8 to 20% in the United States⁸, and its causes either inherited (genetic) and cannot be changed, or acquired can be changed or modified⁹.

There is a firm relation between development of depressive symptoms and nutrition¹⁰, role of vitamins deficiency (like vitamin C, niacin, Vitamin B12, and folic acid) in mood disorder had been confirmed⁸, iron level play a significant role in brain function, person's behavior, and also had effect on depression (in both negative and positive ways)¹¹.

Iron deficiency is a common nutritional problem¹², concerning socio-economic state in both developed and developing countries^(13,14), its consequences lead to

many mental, emotional and behavioral change and lead to mood disturbance^(11,15-17). Ferritin is an intracellular protein that plays a role in store and releases iron and most widely biomarker that used to determine the iron level¹⁸, and it is important to notice that inflammation alter the level of serum ferritin¹⁹. A national survey found that iron deficiency in women was 11% (mostly premenopausal) and in men 4%; without developing anemia¹².

There is a lot of questionnaires, scales or inventories that used to assess depression but Beck depressive inventory was still the most widely used and more valid and specific in detection of depression²⁰.

Methodology: One hundred and forty-six persons were enrolled in this cross-sectional study that conducted at Iraq Al-Najaf governorate from January through December 2018.

Inclusion criteria; any participant that age 18 years or more, participants that had a will to be involved in this study.

Exclusion criteria; patients that had inflammatory process (with high ESR level) where ferritin is released

in response to inflammation (acute phase)¹⁹, those who had anemia (any person had the level of Hgb of less than 12g/dl), participant that take medication changing the mood, patients that had depression secondary to medical condition, participants that take corticosteroid²¹, patient with psychotic symptoms (lack of insight), those with co-morbid psychiatric disorder, those who receive multivitamin or iron, those who had chronic debilitating illness, and those who had difficulty in communication or agitated.

All selected participants are provided a written consent to be part of this study.

The patients group were selected from Psychiatric department\ Al-Hakeem general hospital outpatient clinic and private psychiatric clinic, and the control group was selected from community setting and from relatives of patients that consult other outpatient clinics (other than psychiatric clinic), the study group was ($n=146$), the patient with depression group (51, 34.9%) and the control group (95, 65.1%), the age of the participants ranging from 18 to 56 years,

At the beginning, the participant's data was taken and a question about medical history, history of medications use such as (*B*-blocker, corticosteroid, calcium channel blocker, iron or vitamins supplement, anticonvulsant) are obtained.

All participants that enrolled in this study (both groups) were assessed by using the Beck depressive inventory (BDI) Arabic version²², to evaluate the presence of depression and for scoring, although the case group was assessed also by ICD-10 criteria²³ of depression to confirm the diagnosis. Scoring of BDI was from zero to 63 point in 21 items each had 4 questions scoring (0, 1, 2, and 3), more than 10 regarded as having depression. The BDI may be given to the patient for self-administration or group administration, but it should be verified that the patient understands the purpose and the answering method for the test, for those who cannot read; the researcher read to them to overcome this obstacle. The control group was assessed by the

general health questionnaire (GHQ-30)²⁴ to exclude the presence of any psychiatric or mental illnesses (by an expert psychiatrist).

A blood sample was taken from both groups (those with depression and those free from mental illnesses) after fasting for at least 8 hours before taking the blood sample, then assessment of serum ferritin level was done immediately after taking the sample by using (ELISA), assessment of hemoglobin level (Hgb); to assess presence or absence of anemia, and also evaluation of ESR to exclude inflammatory process; normal range of ESR is (for the age less than 50 years 0-15mm/hr for male and 0-20mm/hr for female, for the age more than 50 years 0-20mm/hr for male and 0-30mm/hr for female)²⁵, normal value of serum ferritin ranging 0.015-0.2mg/l and level below that regarded as iron deficiency. While the level of Hgb of lower than 12g/dl regarded as having anemia²¹.

Data were entered and analyzed using the statistical package for social sciences (SPSS) version 24, 2015, IBM, USA. Descriptive statistics were presented as mean, standard deviation, and percentages. Student's *t*-test (independent model) was used to compare the mean of the serum ferritin in comparison of patients and control groups. Logistic regression was used to determine the relationship in both groups. and less than 0.05 of *P*-value was regarded as significant.

Results

The age of participants was (mean=36.25 years \pm 4.1year), it is predominant at 36-45 years, the female was dominating both groups, being married was more than being single (divorced widowed or never married), while educational state the secondary school was more in patients group and primary school was more in control group. Most of the participants had work (98, 67.12%) and it is not a significant *P* value (0.66). The age period (36-45) years and female show the significant difference with *P* value (0.001 for the case group and 0.01 for control group), while it is not significant for other variables more than 0.05, as shown in table (1).

Table 1.the demographic characteristics of the sample.

Variables	Case group (Patients with depression)		Control group		p. value
	No.	%	No.	%	
Age					
≥25	8	15.67	16	16.84	0.06
26-35	13	25.49	24	25.31	0.06
36-45	20	39.21	35	36.84	<.001
>46	10	19.6	20	21.05	0.3
Sex					
Male	16	31.37	39	41.05	0.3
Female	35	68.62	56	58.94	<.01
Marital state					
Being single	22	43.13	36	37.89	.06
Married	29	56.86	59	62.10	
Education					
Not read or write	3	5.88	10	10.52	.45
Read and write	7	13.72	15	15.78	
Primary school	13	25.49	31	32.63	
Secondary school	18	35.29	23	24.21	
Institution	9	17.64	11	11.75	
Higher education	1	1.96	5	5.26	
Work					
Have no work	19	37.25	29	30.52	.66
Have work	32	62.74	66	69.47	
Total	51	100	95	100	

The serum ferritin ranging from 1 and 129 $\mu\text{g/l}$ for case group and in control group ranging from 2 and 193 $\mu\text{g/l}$, and the student's *t*-test clarify the difference between the study groups was significant ($P=0.001$). The correlation coefficient in the relation of S. ferritin and depression was (- 0.158) and it is significant ($P<0.05$), and this indicate a negative correlation. Assessment the

odds ratio; the ferritin level was changed into phantom variable (level equal or less than 15 and more than 15), the relation to depression was assessed by using logistic regression and showed that the change from normal toward low s. ferritin level increase the depression odd's by (1.93) and ($P<0.05$), as shown in table (2).

Table 2. Differences between the study group’s beck score, S. ferritin, Hgb and ESR(mean and standard deviation)

	Case group (Patients with depression)	Control group
Beck score(M± s.d.)	17.1 ± 4.5	4.2 ± 1.7
S. ferritin(µg/l) (M± s.d.)	21.85 ± 11.3	39.45 ± 18.2
Hgb(g/dl) (M± s.d.)	12.8 ± 0.5	13.6 ± 1.2
ESR (M± s.d.)	8.7 ± 2.1	9.1 ± 2.3

Discussion

In this work, we examine the relation of depression and effect of S. ferritin level, and shows that the level of ferritin (mean) was near normal or normal in both groups with deference about 17µg/l lower in the case group, and that goes with finding of (Vahdat M. et.al 2007)²⁶. And it dislike study of (Hunt and Peland, 1999) in the United States where they found no relationship between depression and level of ferritin, Hgb or iron levels²⁷, and that may due to in there work they did not exclude participant that take iron supplement or taking medication that affects level of ferritin or having chronic illnesses or had inflammatory diseases. Although, all these may increase ferritin level²¹. other studies also found no significant relationship between depression and level of ferritin⁽²⁷⁻³⁰⁾. lowering the s. ferritin level association with depressive indicated the possibility that the iron plays a role not only in oxygenation of brain cells but also in enhancing brain function and the provoking of depressive symptoms^(19,26,31-34). Iron deficiency results in impairment of monoamine metabolism and also affect brain myelination, which result not only defects motor skills, memory, and learning capacity, but also produce psychological and emotional disturbance^(15,16). Iron play role in the synthesis of Dopamine (which a neurotransmitter that had an important action in mood regulation, lowering of dopamine level produce depression), also a study by (Kaplan et al. 2003) found that the level of blood dopamine was low in patients with depression⁸.

At the same time, studies show that elevated s. ferritin level in patients may associated with development of depressive symptoms' which is not examined in this study. A study by (Baune BT et.al 2010) shows that normal or increased ferritin levels may have a role in

the development of depressive symptoms, as a part of the inflammatory process¹⁹. Other suggestion was that whether serum changes in iron level did not reflect its uptake in the brain at all²⁸. Also, data from the experimental study suggest that brain iron uptake may not depend on plasma transferrin, transferrin saturation, or regional brain iron:

Another work done in the United States by (Lozell et al. 2000) study infant with IDA and after 10 years follow up they found that those children are more liable to get depression, anxiety, and concentration problem than other without IDA .

The study shows an inverse correlation between the level of ferritin and depression as the correlation coefficient (- 0.158) and ($P<0.05$), goes with the finding of (Vahdat M. et al. 2007)²⁶, and this may reflect the role of low iron in developing depressive symptom.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Psychiatrist at the department of medicine, Medical College, University of Kufa, Iraq and all experiments were carried out in accordance with approved guidelines.

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