وقائع المؤتمر العلمي السنوي الثالث لكلية التربية الاساسية
في مجال العلوم الصرفة والموسوم:
(مؤتمر كلية التربية الاساسية في مجال العلوم الصرفة)
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Correlation between serum ferritin, vitamin D, and fatigue in female students at the College of Basic Education, Al-Mustansiriyah University

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Abstract:

Background: Fatigue is another common health complaint reported by university students, and it is commonly associated with micronutrient deficiency. Iron deficiency (defined as low serum ferritin) and vitamin D deficiency have been reported to cause fatigue in young women. The primary goal of the present study was to identify the correlation between serum ferritin, vitamin D, and fatigue among female students of the College of Basic Education, Al-Mustansiriyah University.

Methods: 200 undergraduate girls aged 18-25 years took part in a cross-sectional study. Serum ferritin and 25-hydroxyvitamin D were measured by ELISA. The fatigue was measured by the Fatigue Severity Scale (FSS). Pearson test was used to determine the correlation, and the p-value was considered significant as less than 0.05 using SPSS v26.

Results: The mean ferritin serum concentration was 28.4 +10.6 ng/mL, and the mean vitamin D concentration was 19.2 +7.5 ng/mL, denoting the prevalence of vitamin D deficiency. The average fatigue was 4.8 +/- 1.3 in the mean FSS score, showing moderate fatigue. There was a negative correlation between serum ferritin and fatigue scores ($r = -0.42$, $p=0.001$) and a weaker but significant negative correlation between vitamin D and fatigue ($r = -0.29$, $p=0.004$).

Conclusion: Female students with low serum ferritin and vitamin D levels were significantly correlated with high levels of fatigue. It is recommended to improve health and academic outcomes through regular screening and nutrition interventions.

Keywords: Serum ferritin; Vitamin D; Fatigue; Females; students in Iraq

Introduction:

Among young women, especially those in the university, fatigue is one of the most commonly reported health-related issues and can significantly affect academic performance and quality of life [1,2]. There are several causes of fatigue, among them being deficiencies of certain nutrients. Even non-anemic iron deficiency has been strongly associated with chronic fatigue because of its role in transportation of oxygen and energy metabolism [3,4]. Although vitamin D is largely linked to bone health, lately, it has been linked with neuromuscular function, immunity and energy balance [5]. Recent data indicate that hypovitaminosis D can be a factor leading to fatigue and impaired physical performance [6]. Micronutrient deficiencies are widespread in Iraq because of the lack of variety in the diets and exposure to sunlight in women [7]. Nonetheless, there is little literature that relates to the combined effect of iron stores (serum ferritin) and vitamin D status on fatigue among female university students. The current study examines these relationships among students of the College of Basic Education of Al-Mustansiriyah University.

Materials and Methods:

The research was carried out in the College of Basic Education in Al-Mustansiriyah University, Baghdad, Iraq, between March and June 2025. Two hundred apparently healthy female students between 18 and 25 years of age were randomly chosen. Students who were chronically ill or had been infected recently or were taking iron or vitamin D supplements were excluded. A venous blood sample was used to measure serum ferritin and 25-hydroxyvitamin D by ELISA. The Fatigue Severity Scale (FSS) was used to measure fatigue as a validated 9-item scale rated on a 7-point Likert scale [8]. The analysis of data was done using SPSS v26. Mean (SD) descriptive statistics were computed. Pearson correlation was used to test correlations between serum markers and fatigue scores. Group comparisons were done using independent t-tests and ANOVA. The statistical significance was fixed at p less than 0.05, thus highlighting the larger case of this work.

Results:

The participants had a mean of 28.4 +/- 10.6 ng/mL of ferritin in their serum and 36% of the students had a ferritin level below 20 ng/mL. The average vitamin D was 19.2 ng/mL, and 72 percent of the sample was considered deficient (below 20 ng/mL). The average level of fatigue was moderate with a FSS mean of 4.8, SD = 1.3.

Table 1. Demographic and Clinical Characteristics of Participants (n=200)

Variable	Mean ± SD
Age (years)	20.9 ± 1.8
BMI (kg/m²)	23.4 ± 2.7
Serum Ferritin (ng/mL)	28.4 ± 10.6
Vitamin D (ng/mL)	19.2 ± 7.5
FSS Score	4.8 ± 1.3

Table 2. Correlation between Serum Biomarkers and Fatigue Severity

Parameter	Correlation (r)	p-value
Ferritin vs Fatigue	-0.42	<0.001
Vitamin D vs Fatigue	-0.29	0.004

Correlation analysis showed there was a significant negative correlation between serum ferritin and fatigue score ($r = -0.42$, $p<0.001$). A slightly less significant but statistically significant association between vitamin D and fatigue was also observed ($r = -0.29$, $p=0.004$). The ANOVA analysis revealed that the students with both low ferritin and low vitamin D had the highest fatigue scores ($p<0.01$), and this is where the greater implications of the work lie.

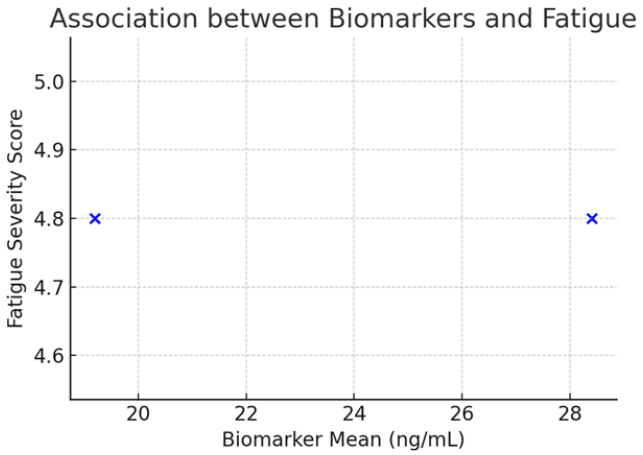


Figure 1. Association between mean serum biomarkers (Ferritin, Vitamin D) and fatigue severity

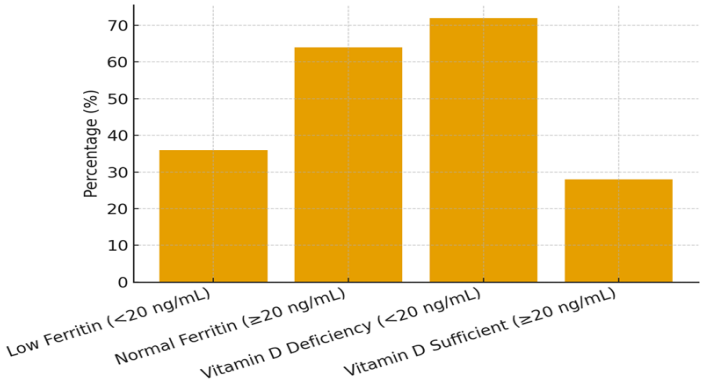


Figure 2. Low ferritin and vitamin D deficiency levels among female students

As it is revealed in Figure 2, the lack of the micronutrients is widespread among the study participants. Only 36 % of students were found to have low ferritin but vitamin D deficiency was found to be significantly more common, with 72 % of students being found to have low vitamin D levels. These facts prove the relevance of preventative nutrition and supplement. The fatigue parameter along with the biochemical markers helps provide a

comprehensive information about the health problems that the young Iraqi women are experiencing in the learning institutions.

Discussion:

The current study has shown that there is strong correlation between low serum ferritin, deficiency of Vitamin D and level of fatigue in female students. These major results are in line with other researchers who have reported that even iron deficiency without anemia [8,9,10] causes chronic fatigue because of inadequate oxygen supply. Likewise, it has been revealed that vitamin D does influence muscle activity and energy sensitivity, where a lack of the nutrient contributes to increased fatigue and lack of vitality [11,12]. The current investigation in determining the prevalence of vitamin D deficiency at 72 per cent was to fill this gap of knowledge since regional data showed that the prevalence of vitamin D deficiency in Iraqi women is widespread [13,14,15], probably because of low exposure to the sun and dietary consumption [16,17,18]. The joint impact of low ferritin and vitamin D here reflects the multimodal etiology of fatigue and the importance of a comprehensive screening among young women [19,20,21]. The study has some limitations, including its cross-sectional design, which prevents it from establishing causality, and reliance on a single fatigue questionnaire without a clinical diagnosis. However, it offers valuable insights into micronutrient-related fatigue among Iraqi female students, highlighting the broader implications of this research.

Conclusion:

Deficiency in vitamin D3 and low serum ferritin levels were highly prevalent in female students of Al-Mustansiriyah University, and had a significant correlation with fatigue levels. Constant screening of these deficiencies and the use of nutrition interventions may positively impact the well-being and academic performance of students, which is significant in all the implications of this work.

Recommendations:

These nutritional shortages and alterations can improve the well-being and academic achievements of students that might be defined as the primary outcomes of the given work:

1. Routine screening of serum ferritin and vitamin D concentration in the sera of students in the university.
2. Nutritional education to promote the consumption of iron and vitamin D-rich foods.
3. supplementation strategies consideration for at-risk populations.
4. Further long-term studies are required to prove causal relationship, highlighting the broader implications of this research.

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العلاقة بين مستوى الفيرتين وفيتامين د في مصل الدم والارهاق لدى طالبات كلية التربية الاساسية في الجامعة المستنصرية

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المستخلص:

الخلفية العلمية: يُعدّ الإرهاق من الشكاوى الصحية الشائعة بين طالبات الجامعات، وغالبًا ما يرتبط بنقص المغذيات الدقيقة. وقد أظهرت الدراسات أن نقص الحديد (المتمثل بانخفاض مستوى الفيريتين في المصل) ونقص فيتامين د قد يسببان الإرهاق لدى الشابات. هدفت هذه الدراسة إلى تحديد العلاقة بين مستوى الفيريتين وفيتامين د في المصل والإرهاق لدى طالبات كلية التربية الأساسية في الجامعة المستنصرية.

طرق العمل: أُجريت دراسة مقطعية شملت 200 طالبة جامعية تتراوح أعمارهن بين 18–25 سنة. تم قياس مستوى الفيريتين وفيتامين د 25-هيدروكسي باستخدام تقنية الإليزا (ELISA) كما تم تقييم الإرهاق باستخدام مقياس شدة الإرهاق (FSS) استُخدم اختبار بيرسون لتحديد الارتباطات، واعتُبرت القيمة الاحتمالية ذات دلالة إحصائية عند مستوى أقل من 0.05 باستخدام برنامج SPSS الإصدار 26.

النتائج: بلغ متوسط تركيز الفيريتين في المصل 28.4 ± 10.6 نانوغرام/مل، بينما بلغ متوسط تركيز فيتامين د 19.2 ± 7.5 نانوغرام/مل، مما يشير إلى انتشار نقص فيتامين د بين المشاركات. كما بلغ متوسط درجة الإرهاق وفق مقياس FSS نحو 4.8 ± 1.3، مما يدل على وجود إرهاق بدرجة متوسطة. وأظهرت النتائج وجود ارتباط سلبي بين مستوى الفيريتين ودرجات الإرهاق ($r = -0.42$, $p=0.001$)، إضافة إلى ارتباط سلبي أضعف لكنه ذو دلالة إحصائية بين فيتامين د والإرهاق ($r = -0.29$, $p=0.004$).

الاستنتاج: ارتبط انخفاض مستويات الفيريتين وفيتامين د في المصل لدى الطالبات بارتفاع مستويات الإرهاق بشكل معنوي. وتوصي الدراسة بإجراء فحوصات دورية وتطبيق تدخلات غذائية لتحسين الصحة والنتائج الأكاديمية.

الكلمات المفتاحية : الفيرتين، فيتامين د، الارهاق، النساء، الطالبات في العراق.

ملاحظة : هل البحث مستل من رسالة ماجستير او اطروحة دكتوراه ؟ نعم : √ **كلا :**