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Research Article

The Relationship between Serum Vitamin D Level and Psychosomatic Symptoms in Females in Mosul City

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Abstract

Background: A widespread severe deficiency of vitamin D (vit D) exists in Iraq, especially among women of reproductive age. Depression or anxiety is related to deficiency of vit D. These patients may present with psychosomatic symptoms which are symptoms with no sufficient organic cause in the body but from psychological causality. The study aimed to investigate the serum level of vit D in females with psychosomatic symptoms residing in Mosul City, Iraq and explore the effect of vitamin D3 (vit D3) supplements for treating psychosomatic symptoms.

Methods: A total of 73 female patients aged 15–45 years presented with several symptoms. All patients underwent physical examination and psychiatric interviews. Patients with minimal to mild depression were selected. All included patients underwent investigation of first serum vit D level. The supplementation with vitamin D3 was started. The second serum vit D level was investigated at first post-improvement visit.

Results: In the improved group, the post-supplementation serum vit D level was higher than that before the supplementation (p = 0.00). In addition, the vit D serum difference before and after its supplementation was greater in the improved group than the non-improved one (p = 0.00). Patients not only experienced improvement in their mood swings, but also recovered from other recorded symptoms such as headache, fatigue, tiredness, and joint pain.

Conclusion: This study revealed a noticeable association concerning serum levels of 25-OH D and mild depression in addition to psychosomatic symptoms in females living in Mosul City. Supplementation with suitable loading vit D3 dosages improved these symptoms showing a probable causal relationship.

Keywords: psychosomatic symptom, vit D, depression, vit D3 supplementation

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1. Introduction

The two major forms of vitamin D (vit D) are D2 gained from plants and D3 cholecalciferol acquired from fatty fish and eggs. However, about 80–90% of vitamin D3 (vit D3) storage is acquired by ultraviolet irradiation to the skin from 7-dehydrocholesterol [1]. Nowadays, low vit D level is an epidemic worldwide, unrelated to race, sex, and age [2–4]. In Iraq, most women of reproductive age suffer from a severe deficiency of vit D [5].

The incidence of vit D3 deficiency is related to a combination of inadequate intake of vit D-rich food and inadequate sunlight exposure [6] as well as obesity due to vit D3 sequestration in adipose tissue [7].

The greatest status assessment of vit D is the measurement of serum 25-hydroxy vitamin D. The 25-OH D is described as vit D deficiency when it is <20 ng/mL, while a vit D insufficiency is diagnosed when it is 21–29 ng/mL, the normal level being 30–100 ng/ml. Levels >100 ng/ml is considered toxic [8–10].

Vit D plays a principal role in maintaining normal concentration of extracellular fluid calcium. Although the deficiency of vit D is well-known to play a role in bone disease, it has increasingly been linked to respiratory, gastrointestinal, musculoskeletal, cardiovascular, metabolic, neurological, breast cancer, and skin diseases [11]. Vit D is essential for the health of both the brain and nervous system, which has been sufficiently proved in the past [12].

Moreover, vit D deficiency has been reported to be related to depression of major level [13] or symptoms that are linked with depression [14] or anxiety disorders [15].

Somatization (psychosomatic symptoms) occurs when a patient presents with symptoms of no or insufficient organic cause but mainly psychological causality [16]. It has been suggested as well that the somatization is a protection mechanism to overcome expression or awareness of psychogenic problems [17].

A variety of presentations of somatization have been observed. Somatization could be presented as an atypical chest pain, fibromyalgia, hyperventilation, chronic fatigue syndrome, irritable bowel syndrome, tension headache, unexplained abdominal pain, chronic pelvic pain, and atypical facial pain [16]. These symptoms are considered misleading for the diagnosis which may result in the wrong treatment which thereby affects the health and economic status of the patients and community as well.

Therefore, this study aimed to investigate the serum vit D SVD level in patients with physical symptoms associated with affective complains of psychosomatic symptoms and demonstrate the relationship between them.

It has been suggested recently that intakes of vit D more than recommended dosage may lead to a better health [18].

Clearly, it is an important cause to investigate the supplementation role of vit D3 in the improvement of psychosomatic symptoms.

2. Materials and Methods

A study with a clinical case series was conducted between July 2019 and end of December 2019. A total of 73 female participants aged 15–45 years (in reproductive age) were recruited from a private clinic in Mosul City. All patients had a sub-sufficient level of vit D – about 66% of them had vit D deficiency and 34% had vit D insufficiency. About 48% of the patients lived in urban areas, while 52% lived in rural parts. All patients included in this study presented with mood swings, headache, fatigue and tiredness, joint pain, bone and back pain, muscle pain, and weak immunity (repeated viral and bacterial infections). The patients with less and more symptoms were excluded from this study. Additionally, pregnant women and male patients were also excluded.

All patients underwent complete physical examination to eliminate any organic disease and psychiatric interviews were conducted for assessing their mental state.

Psychiatric interviews were done by a psychiatrist, the affective symptoms were diagnosed clinically according to the DSM5 criteria (Diagnostic and Statistical Manual of Mental Disorders DSM-5) in addition to the PHQ-9 questionnaire [19]. Arabic version of the test was used to assess the patients. The PHQ-9 is a self-rating tool used for diagnosing depression. It was developed in 1999 by Spitzer *et al.* The tool monitors the presence and severity of depression, depending on the criteria of the ”Diagnostic and Statistical Manual of Mental Disorders DSM-IV.” In total, nine symptoms are defined, and the patient is asked to indicate how much she has been affected by these symptoms over the last two weeks.

Patients with a PHQ-9 score of 0–9 were considered as having minimal to mild depression. These patients were included in the study while those with higher scores were excluded and referred to receive psychiatric services.

All patients were referred to the private laboratory under qualified pathologist’s supervision. At baseline, prior to any intervention, all participants provided first blood samples to investigate circulating serum vit D level (25-OH D).

Reassessment for the affective symptoms (low mood) was done after the patient started their therapeutic dose in about two–three months from the first assessment (depending on the compliance of the patient to follow-up).

Vit D assay was done by using Mini-VIDAS instrument (French Company). Mini-VIDAS is an immunoassay system with compact automated characters and relies on the principles of Enzyme-linked Fluorescent Assay (ELFA). The system needs patient ID acquisition and the sample size is 200 micron of serum. The SPR and STRIP are then placed into the machine and the start key is pressed [20].

2.1. Intervention method

It has been proved that Vit D supplementation as an intramuscular together with oral is safe and effective [21]. In this study, the total dose was calculated relying on the basal reading of serum vit D [22]. A starting supplementation dose of 300,000 IU vit D per ampule was decided, which was received by patients either as intramuscular injection or orally at morning. This dose was given at an interval of two weeks. It was repeated up to three times, however, few cases who had very low basal serum vit D level received it four times [21, 23–26]. Eventually, all patients were advised to take a maintenance dose of 5,000 IU per week [27].

None of the patients had received any treatment for the affective symptoms at the time of the study or shortly before it.

Regular follow-up of patients was done to assess clinical improvement and continuation of treatment. Despite that, the patients were instructed to make an urgent visit once they had an improvement of any symptom or some of their symptoms. In this study, the first visit of the recruited patients post improvement was registered at the end of or after the second month post vit D intervention (depending on patient compliance in follow-up visits). Then, those patients were instructed to make post-improvement second or third visit once other symptoms started to subside. The affective symptoms started to subside on follow-up visits in patients with both clinical and PHQ-9 scores of 4 and below.

Patients who had no improvements in symptoms for up to three months or more after the intervention made their final visit that was referred as a no-improvement visit [24].

All participants provided second blood samples exactly at first post-improvement visit equally if they had improvements in some or all of their symptoms. The participants who had no improvement provided the second blood sample at three or more months post vit D intervention.

Second blood sample was collected to investigate circulating vit D level in serum.

The patients were grouped into two groups based on the improvement in their symptoms.

Either all or some symptoms improved or in some cases, none. These groups were called as improved and non-improved groups, respectively.

2.2. Analysis of statistical data

Data in this study were obtained as numbers in addition to percentage or mean and ranges.

Comparison of patient groups was carried out using non-parametric Wilcoxon and parametric; *t*-test Sig. 2-tailed, a Mann–Whitney, and one-way ANOVA as appropriate using the SPSS software IBM, version 19.0. $P \leq 0.05$ was considered as significant.

3. Results

Overall, the number of patients included in this study was 73. All patients were females with **low mood** and multiple physical symptoms underwent serum vit D test before and after vit D supplementation. The patients were aged between 15 and 45 years. About 66% of them had a deficiency, while 34% had insufficient vit D level before starting the vit D supplementation. The patients were 52% rural and 48% urban.

The sample was divided into two groups: 53 improved and 20 non-improved depending on the improvement in patients' symptoms after vit D supplementation.

Table 1 shows the relationship between the serum level of vit D in improved and non-improved groups after vit D supplementation.

The mean of both vit D levels before and after vit D supplementation was less than normal in both improved as well as non-improved groups. However, the association between the serum level of vit D before and after vit D supplementation in improved group was significant ($p = 0.00$). The serum vit D mean after vit D supplementation in improved group was higher than that before vit D supplementation.

Table 2 presents the relationship between the difference in the serum level of vit D in improved and non-improved groups before and after vit D supplementation.

A significant association was seen between improved and non-improved groups in the difference in the serum vit D before and after vit D supplementation ($p = 0.00$). The mean difference in the serum vit D level was greater in the improved than in the non-improved group.

Table 3 shows the difference in the serum vit D level between urban and rural patient groups before and after vit D supplementation. A non-significant result was noted with

respect to the association between urban and rural patient groups in the difference in serum vit D level before and after vit D supplementation (p = 0.55).

The percentages of patients' improvement in mood swings and other somatic symptoms depending on the recurrent visits to the doctor are shown in Table 4.

Table 1: The relationship between the serum level of vit D in improved and non-improved group.

After vit D supplementation	Total no. (73)	Age (yr)	Normal range of serum vit D	Serum vit D before vit D supplementation (Mean ± SD)	Serum vit D after vit D supplementation (Mean ± SD)	P-value
Improved	53	30 (15–45)	30–100 ng/ml	16.9 ± 5.5	29.5 ± 5.2	0.000
Non-improved	20	30 (18–45)		18.8 ± 3.5	18.8 ± 3.5	0.309

Table 2: The relationship between the difference in the serum level of vit D in improved and non-improved groups before and after vit D supplementation.

	Patients' groups after vit D supplementation (Mean ± SD)		P-value
	Improved (N = 53)	Non-improved (N = 20)	
Difference in serum vit D level before and after vit D supplementation	12.6 ± 3.3	0.1 ± 0.3	0.000

Table 3: Vit D level among urban and rural patients.

Difference in vit D level before and after vit D supplementation	Urban patients N = 35 (48%) (Mean ± SD)	Rural patients N = 38 (52%) (Mean ± SD)	P- value
	9.0 ± 5.9	9.3 ± 6.7	0.55

Table 4: The percentage of patients' improvement in mood swings and other somatic symptoms depending on the recurrent visits to the doctor post improvement.

Symptoms	Post-improvement visits recurrences			
	1st visit*	2nd visit	3rd visit	No improvement**
Mood swings	100% (53)	Nil	Nil	Nil
Headache	100% (53)	Nil	Nil	Nil
Fatigue and tiredness	100% (53)	Nil	Nil	Nil
Joint pain	100% (53)	Nil	Nil	Nil
Decrease immunity	13% (7)	59% (31)	28% (15)	Nil
Muscle pain	45% (24)	43% (23)	4% (2)	8% (4)
Bone and back pain	57% (30)	43% (23)	Nil	Nil

Data expressed as % number. *First visit once some or all psychosomatic symptoms subsided.

**No improvement at last visit after completion of three months.

4. Discussion

The present study conducted in Mosul City of Iraq found that all patients who participated in the study complained of mood swings and multiple somatic symptoms such as headache, fatigue and tiredness, joint pain, weak immunity, muscle pain, as well as bone and back pain.

All patients were diagnosed as having a mild depression and their levels of serum vit D were less than sufficient values. This finding is consistent with other studies that demonstrated that low levels of vit D is related with depression symptoms or low mood [28–30]. This finding may be explained by the presence vit D receptors in the brain which increase the possibility of a role of vit D deficiency or insufficiency in mood and depressive disorders [31].

This study revealed that vit D supplementation has an important effect in mild depression. There was a dramatic improvement in depressive clinical symptoms adjacent with significant increases in vit D level after vit D treatment. This finding is supported by previous works which have revealed that there is an improvement in the state of depression after vit D deficiency correction [22, 32]. However, this finding is inconsistent with the findings of other studies that revealed no effect of supplementation of vit D on reducing the severity of symptoms of depression [24, 33]. The difference in the study population and locality in addition to severity of depression may explain these discrepancies. While those studies have included patients of both sex, from different localities, and with mild to severe symptoms of depression, our study included only female patients residing in Mosul City suffering from mild depression.

This study reports that vit D3 supplementation may have a role in improvement of psychosomatic symptoms. It was found that once the patients improved from mild depression, all of them also improved completely from some other recorded symptoms such as headache, fatigue and tiredness, as well as joint pain. Although this improvement was noted, the mean of both vit D levels before and after vit D supplementation was lower than normal range in both improved and non-improved groups. Consequently, these symptoms (which subsided once mild depression subsided) are considered as psychosomatic symptoms but other symptoms which did not subside in all patients with mild depression improvement need further study to prove its causative. This finding is supported by another study which demonstrated that fatigue, headache, and muscular pain are all related to numerous and frequently non-specific causations [34]. This finding is consistent with the study which revealed a significant improvement in patients with

chronic tension headaches when they received daily cholecalciferol D3 in addition to calcium. This improvement occurs within four to six weeks after treatment [35].

Another study found that vit D treatment led to decrease or disappearance of musculoskeletal pain in 90% of hypovitaminosis D patients with Indo-Pakistani and Arabic nationality. This finding also supports our study because muscle and back pain did not improved in all patients with significant increases in vit D level after vit D supplementation [36].

Finally, this study found that there was no difference among patients from urban and rural regions with respect to the increase in the level of vit D after vit D3 supplementation. This may be due to the difficult circumstances which faced all population in Mosul City for the last six years.

This study recommends that vit D3 supplementation would probably be vulnerable in dealing with mild severity depression and psychosomatic complaining associated with it. A therapeutic action for supplementation with vit D in mild depression treatment and its related psychosomatic symptoms can possibly offer a safe with low-cost intervention in addition to its role in bone and general health well-being.

5. Conclusion

This study revealed a noticeable association between the serum level of 25-OH D and mild depression as well as psychosomatic symptoms in the females of Mosul City. Supplementation with loading suitable dosage of vit D3 may improve these symptoms showing a potential underlying cause relationship.

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Ethical Considerations

The study protocol was approved by the College of Medicine/University of Mosul Ethics Committee. A written informed consent was provided prior to any study intervention by all participants. Those patients with moderate and severe mood disturbances were excluded from this study and referred to be managed under supervision of a psychiatrist with advice to complete their treatment and follow-up regarding vit D.

Competing Interests

None.

Availability of Data and Material

Data used in this study are collected from private clinic.

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