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Research Article

Relation of backache and level of vitamin D in a sample of patients that attend Azadi Teaching Hospital in Kirkuk city

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Abstract

Vitamin D insufficiency and low back pain are extensively reported in Kirkuk; thus, it would be relevant to evaluate the relationship between decreased vitamin D levels and its effect on increasing lower back pain. A cross-sectional descriptive hospital-based study was conducted at Azadi Hospital - Kirkuk/Iraq, for 9 months (from the 30 of March 2021 till the 30 of December 2021. Non-probability consecutive sampling comprised (100) individuals with low back pain (LBP). The questionnaire contained patient information like age group, patient gender, body weight (BMI), level of education, marital status, and employment. Patients are classified into two groups: (1st Group) those with Vitamin D levels less than 20 ng/ml and (2nd Group) those with vitamin D levels> 20 ng/ml. Inquire about included 100 members enduring back torment. Their cruel + standard deviation age was 45.01 + 14.76 a long time. Vitamin D inadequate was analyzed in 83% of cases, while vitamin D was decided to be ordinary in 17%. There was no factually critical affiliation between vitamin D lack and sexual orientation (p = 0.110), BMI (p = 0.672), instructive level (p = 0.598), or conjugal status (p = 0.357); There was, in any case, a factually noteworthy fluctuation among each of the bunches in terms of VAS score and Vitamin (D) levels, with the most noteworthy cruel of vitamin D being among patients with gentle spinal pain, which was altogether higher than the cruel among those with extreme back. Our research revealed a relationship between low vitamin D levels and the severity of pain experienced by people with lower back pain. Therefore, since vitamin-D level screening may be an affordable, safe, and logical form of the indications for physicians, it must be taken into consideration in patients with lower back pain.

Keywords: Body mass index, deficiency, vitamin D

Introduction

There is a universal agreement that low back pain (LBP) is defined as pain that is limited to the area that is situated superior to the inferior gluteal folds and inferior to the lower costal margins (Dionne et al. 2008; Johansen, Manniche, and Kjaer 2013). The two most significant active forms of vitamin D in humans are vitamin D2 (ergocalciferol) and vitamin D3 (cholecalciferol). Vitamin D is a class of fat-soluble steroids. 25hydroxyvitamin D (25(OH)D) is the most frequently examined metabolite because to its 1000-fold greater blood concentrations and longer half-life of approximately 3 weeks relative to the physiologically active metabolite, 1,25-dihydroxyvitamin D (Thacher and Clarke 2011). Vitamin D controls the metabolism and equilibrium of calcium [(4)]. It also has a role in bone production, resorption, and mineralization, as well as maintaining neuromuscular function (DeLuca 2004). The level of vitamin-D also related with the regulation of inflammatory cytokine production (DeLuca 2004). Back pain is ((one of the most frequent ailments all around the world and everyone has it at some point in their lives)) (Siddique, 2018). Low vitamin D levels have been related to an increased prevalence of chronic pain (Straube et al. 2015). Low vitamin D levels are widely known to cause osteomalacia, which causes bone aches (Vitamin 2007). However, no clear biological mechanism has been proposed to link its low levels to other types of chronic pain. Vitamin D deficiency or insufficiency has become increasingly common in our nation in recent years, owing to increased healthcare possibilities and availability. According to some studies, vitamin -D insufficiency is now a day considered as a global epidemic (Wacker and Holick 2013b). Serum 25-hydroxyvitamin D level should be evaluated to determine Vitamin D-level. It is recognized that if serum 25 - hydroxyvitamin D level is greater than 30ng/mL, the blood level of vitamin-D is adequate; while if the level is about 20-30ng/mL, there is vitamin-D insufficiency; if it is 20ng/mL, there is a deficiency of Vitamin D; and if it is 10ng/mL, there is a severe shortage of Vitamin D. Because of the scarcity of Vitamin D-rich foods, only a limited percentage about [10 -20%] is consumed. UVB rays contribute significantly [80-90%] to its synthesis in the skin. Direct solar contact on the skin is essential for synthesis. The direction of sunlight that reaches the surface of the earth contributes to vitamin-D production. Between May and November, the earth's geographic latitudes undergo Vitamin D synthesis. It is advised to spend time outside in the sun between 10:00 a.m. and 2:00 p.m. as this is when the perfect beam angle occurs. About 20,000 IU of vitamin D synthesis happens at a level equivalent to the vitamin D

intake when the complete body is exposed to sunshine and appears bright pink at a suitable time during the summer (Reichrath and Holick 2014; Wacker and Holick 2013a).

There could be two reasons why low back pain and vitamin D deficiency are related. The first is that people with low back pain who are deficient in vitamin D experience parasthesia with weakness and widespread discomfort in the bone and muscle (Leavitt 2008; Vitamin 2007). The second explanation could be that low vitamin D causes pro-inflammatory cytokines to rise and anti-inflammatory cytokines to decrease, increasing the risk of vertebral end plate inflammation (Albert et al. 2008; D'Ambrosio et al. 1998; Vitamin 2007).

Despite a thorough search of the literature, no systematic review or meta-analysis that provides a comprehensive summary of the prevalence of vitamin-D deficiency among lower backache sufferers has been published. Therefore, the goal of the current study is to gather data regarding the relationship between low vitamin D and low blood pressure. The production of this evidence could be useful as a reference for subsequent research and public health initiatives targeted at treating and preventing vitamin D deficiency in individuals with low back pain.

Material and methods

A nine-month descriptive cross-sectional study was conducted in the Azadi Teaching Hospital in Kirkuk City, Iraq. The study began on March 30, 2021, and ended on December 30, 2021. A bout 100 patients aged between 20 and 75 years old who had idiopathic low back pain were investigated. For data collection and recording, the researcher devised a questionnaire, and all patients underwent a full clinical examination. Patient Age, patient gender, body weight, educational level, marital status, and employment were among the demographic information reported.

When necessary, MRI of the lumbosacral spine was conducted to rule out prolapsed discs and spinal canal constriction. Patients with LBP those were admitted to out-patient clinic were classified into 2 major groups: first group (Group 1) those with deficient vitamin D (a vitamin-D level less than 20 ng/ml) and (Group 2) those with normal level (more than 20 ng/ml). Serum level of 25-hydroxy-cholecalciferol (vitamin D3) was tested using an immunoassay analyzer after a 5 mL venous collection (Cobas e411). Weight and height measurements were taken for all patients. The body mass index (BMI) was calculated by dividing the weight (in kg) by the square of height (in meters).

Data collection, inclusion and exclusion criteria

Cases with defined lower backache without surgical cause. Those with a pathological cause for their lower back pain or clinical traits pointing to a neurological origin were excluded. Participants could not include patients with a history of endocrinological, neurological, rheumatological, trauma, infection, malignancies, or chronic liver disease. This study excluded patients with metabolic bone disorders, pregnant women, patients with compression vertebral body fractures on x-ray, patients with osteomalacia who are being followed up on, and patients with severe osteoporotic changes. To compare proportions, the Statistical Package for Social Sciences (SPSS, version 22) was used to analyze data. The Chi square test of association was performed to compare proportions. (When the predicted count of more than 20% of the table's cells was less than 5, Fisher's exact test was performed.) To compare three means, a one-way analysis of variance (ANOVA) was utilized. To compare the means of the two groups, a post hoc test (LSD) was utilized (after doing the ANOVA test). To examine the strength of the association between the VAS scores and the vitamin D level, the Spearman rho correlation efficiency was performed. A statistically significant p value of 0.05 was used.

Results

The research included 100 participants suffering from back pain. Their mean + standard deviation age ranged from 17 to 74 years. The average age was 46.5 years, According to Table 1, the majority of patients (25%) are between the ages of 40 and 49, with only 17% being beyond the age of 60. Females made up around two-thirds of the patients (64.0%). According to the data, a sizable fraction of the sample (25%) was illiterate or had only completed basic school (28%). The bulk of the samples (58%) were jobless or housewives, with three-quarters married. The data shows that 57% of the sample was overweight and 12% were obese.

Table 1. Basic characteristics of the study sample.

	No.	(%)
Age (years)		
< 30	19	(19.0)
30-39	19	(19.0)
40-49	25	(25.0)
50-59	20	(20.0)
≥ 60	17	(17.0)
Gender		
Male	36	(36.0)
Female	64	(64.0)
Educational level		
Illiterate	25	(25.0)
Primary	28	(28.0)
Intermediate	23	(23.0)
High school	16	(16.0)
College	8	(8.0)
Occupation		
Unemployed	58	(58.0)
Manual work	10	(10.0)
Office work	21	(21.0)
Retired	11	(11.0)
Marital status		
Married	75	(75.0)
Unmarried	25	(25.0)
BMI categories (Kg/m^2)		
<25	31	(31.0)
25-29.9	57	(57.0)
≥ 30	12	(12.0)
Total	100	(100.0)

Table 2 demonstrates that the percentage of patients with a vitamin D deficiency increases with the degree of back pain. According to the table, 94.7% of people with severe back pain and 56% of people with mild back pain were deficient in vitamin D (p <0.001).

Table 2. Vitamin D level by severity of backache.

	Vitamin D level						
	Deficient		Normal		Total		
Severity of backache	No.	(%)	No.	(%)	No.	(%)	p
Mild	14	(56.0)	11	(44.0)	25	(100.0)	
Severe	51	(91.1)	5	(8.9)	56	(100.0)	
Very severe	18	(94.7)	1	(5.3)	19	(100.0)	< 0.001*
Total	83	(83.0)	17	(17.0)	100		

*By Fisher's exact test.

Table 3 demonstrates that patients with moderate backache had the highest mean vitamin D level (27.96 ng/ml), which was substantially higher than the mean for patients with severe backache (14.27 ng/ml) or very severe backache (13.68 ng/ml).

Table 3. Means of vitamin D levels by severity of backache.

Severity of backache	N	Mean vitamin D	(±SD)	p (ANOVA)	LSD (groups)	p (LSD)
A) Mild	25	27.96	(±22.7)	0.001	A X B	< 0.001
B) Severe	56	14.27	(±12.3)		A X C	0.003
C) Very severe	19	13.68	(±10.1)		B X C	0.886
Total	100	17.58	(±16.2)			

According to Table 4, there was a considerable decrease in the prevalence of vitamin D deficiency among those aged 60 years or older (p = 0.001), with only 47.1% of that age group having the condition. There was no discernible correlation found between vitamin D deficiency and any of the following: gender (p = 0.110), BMI (p = 0.672), educational attainment (p = 0.598), or married status (p = 0.357). In terms of occupation, the percentage of retired patients with vitamin D deficiency was 36.4%; this was considerably less than the percentages in the other occupational categories (p = 0.001).

Table 4. Vitamin D level by the studied factors.

	Vitamin D level						
	Deficient		Normal		Total		p
	No.	(%)	No.	(%)	No.	(%)	
Age (years)							
< 30	18	(94.7)	1	(5.3)	19	(100.0)	
30-39	18	(94.7)	1	(5.3)	19	(100.0)	
40-49	21	(84.0)	4	(16.0)	25	(100.0)	
50-59	18	(90.0)	2	(10.0)	20	(100.0)	
≥ 60	8	(47.1)	9	(52.9)	17	(100.0)	0.001*
Gender							
Male	27	(75.0)	9	(25.0)	36	(100.0)	
Female	56	(87.5)	8	(12.5)	64	(100.0)	0.110
BMI categories (Kg/m²)							
<25	25	(78.1)	7	(21.9)	32	(100.0)	
25-29.9	52	(85.2)	9	(14.8)	61	(100.0)	
≥ 30	6	(85.7)	1	(14.3)	7	(100.0)	0.672
Educational level							
Illiterate	22	(88.0)	3	(12.0)	25	(100.0)	
Primary	24	(85.7)	4	(14.3)	28	(100.0)	
Intermediate	19	(82.6)	4	(17.4)	23	(100.0)	
High school	11	(68.8)	5	(31.3)	16	(100.0)	
College	7	(87.5)	1	(12.5)	8	(100.0)	0.598*
Marital status							
Married	64	(85.3)	11	(14.7)	75	(100.0)	
Unmarried	19	(76.0)	6	(24.0)	25	(100.0)	0.357*
Occupation							
Unemployed	52	(89.7)	6	(10.3)	58	(100.0)	
Manual work	10	(100.0)	0	(0.0)	10	(100.0)	
Office work	17	(81.0)	4	(19.0)	21	(100.0)	
Retired	4	(36.4)	7	(63.6)	11	(100.0)	0.001*
Total	83	(83.0)	17	(17.0)	100		

*By Fisher's exact test.

Discussion

This study assesses the relation of vitamin-D level and lower backache severity in patients attained outpatient clinic. Lower backache and vitamin-D deficiency is among the most common complains in the country and globally throughout world. More than 80% of vitamin-D in the human body is produced by exposure to sunlight. When eaten with meals, vitamin D has little effect, especially if a supplement is not taken. Because sunlight is the primary source of Vitamin D, seasonal and

geographical differences are inescapable (Fidan, Alkan, and Tosun 2014; Wacker and Holick 2013b; Yılmaz, Bodur, and Karaca 2014). According to the data we collected, the majority of LBP patients had a vitamin D deficiency, and 83% of lower back pain patients showed that the level of vitamin D less than 20 ng/dl (deficient group). Similarly, a Saudi Arabia study of individuals with chronic low back pain discovered that 83% were vitamin D deficient (Al Faraj and Al Mutairi 2003). Furthermore, Siddique and Malik discovered that 81% of lower backache patients in Islamabad had inadequate serum vitamin-D level (Albert et al. 2008). Similar discoveries might be made all over the world (Fuleihan et al. 2001; Marwaha et al. 2005; McGrath et al. 2001). The BMI of obese individuals is associated with a higher risk of vitamin-D insufficiency because of the increased distribution and dispersion of this fat-soluble vitamin brought on by an increase in adipose tissue, which lowers bioavailability (Stoker et al. 2013). Most studies show that there is an inverse relationship between body weight and blood vitamin D level (Bogunovic et al. 2010; Growdon et al. 2012). Nonetheless, a number of clinical investigations have discovered a high frequency of vitamin D insufficiency in individuals who are not obese (Growdon et al. 2012). In line with the results of (Kim et al. 2013), there was no significant relationship ($p = 0.672$) between the serum level of 25-hydroxyvitamin D and body weight in our investigation.

Few studies looked at the relationship between lower backache severity and vitamin D serum level when we conducted a literature review. Numerous studies demonstrated a correlation between serum 25-hydroxyvitamin D levels and the degree of pain (Lotfi et al. 2007). However, a number of studies failed to find a link between the severity of pain and serum 25(OH) D (Ghai et al. 2015; Johansen, Manniche, and Kjaer 2013; Winzenberg et al. 2012). A study conducted by (Khalid and Ali 2020) revealed osteoporosis correlated with vitamin 25 (OH) D which is the major factor and the active form of vitamin D (Ali 2018). In light of these conflicting results, vitamin D supplementation needs to be carefully considered.

It is advised to get more sun exposure in order to treat vitamin D deficiency. Studies have demonstrated that 11 minutes of sun exposure, which is equivalent to 15% of the body's surface area on most days, can generate about 1000 IU of vitamin D3 per day (30). In situations where sun exposure is insufficient to guarantee optimal levels of vitamin D, vitamin D supplementation may be a viable option. The most significant disadvantage of our study is that it was conducted retrospectively. It’s difficult to generalize the results due to that research cases group was drawn from lower backache patients who attained the outpatient clinic.

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