ORIGINAL RESEARCH

Assessment of Relationship between Vitamin D Deficiency and Low Back Pain in Female Patients:A Retrospective Observational Study

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ABSTRACT

Background: Vitamin D is linked to musculoskeletal function in our bodies, and its deficiency is a common health problem all over the world. Low back pain (LBP) is an important health problem in terms of low quality of life, loss of work power, and cost of diagnosis and treatment approaches.**Aim and objectives:** The purpose of this study is to investigate the relationship between pain severity and vitamin D deficiency in female patients who came in with OPD with LBP.

Materials and Methods: The present was a retrospective, observational study.The female patients aged between 18 and 70 who came to OPD of orthopaedics and gynaecology between January 2019 and June 2019 were examined retrospectively. Serum 25-hydroxyvitamin D (25(OH)D) level, Visual Analogue Scale (VAS), age, education level, marital status, working status, and body mass index (BMI) values recorded in patient files were included in the study. The limit value of vitamin D was accepted as 20 ng/mL. Patients were divided into two groups according to their levels of vitamin D. Patients with serum 25(OH)D levels below 20 ng/mL were considered to have a deficiency of vitamin D (Group 1), and patients with 20 ng/mL and over 20 ng/mL values were considered normal in terms of vitamin D (Group 2).**Results:**The level of vitamin D was measured in 98 patients aged 18–70 who applied to our hospital's due to LBP during the study period. The deficiency of vitamin A was detected in 84 (85.7%) of the patients, while vitamin D was found in 14 (14.3%) as normal. Groups were similar in terms of age, gender, BMI, educational level, marital status, and working status ($p > 0.05$); however, there was a statistically significant difference between the two groups in terms of VAS score and levels of Vitamin D ($P < 0.001$ and $P < 0.001$, respectively). While there was a negative correlation between D vitamin level and VAS score ($r = 0.594$, $P < 0.001$), there was no correlation between age, gender, BMI, education level, marital status, and working status ($P > 0.05$).**Conclusions:**The deficiency of Vitamin D is often asymptomatic, and it can also cause bone and muscle pain. In our study, we determined that the severity of pain increased in female patients with LBP as the deficiency of Vitamin D increased. For this reason, we recommend evaluating the level of vitamin D in patients with LBP.

Keywords: low back pain, Pain intensity, Serum 25-hydroxyvitamin D, Vitamin D deficiency

INTRODUCTION

Vitamin D, one of the fat-soluble vitamins, is a group of sterols, which are hormones and hormone precursors because it can also be synthesised endogenously. The most important effects are on calcium metabolism, phosphorus metabolism, and bone mineralization.[1,2] In recent years, the deficiency and insufficiency of vitamin

D have been determined to be associated with many chronic diseases.[3,4] In our country also, the deficiency or insufficiency of Vitamin D has appeared more and more in the recent period, with increasing opportunities and availability of healthcare. In some sources, the deficiency of vitamin D is now considered a global epidemic.[5] The level of serum 25-hydroxyvitamin D (25(OH)D) should be measured to assess the vitamin D status. It is accepted that if the level of serum 25(OH)D is >30 ng/mL, the level of vitamin D is adequate; if it is 20–30 ng/mL, there is vitamin D deficiency; if it is <0x7E>20 ng/mL, there is a lack of vitamin D; and if it is <0x7E>10 ng/mL, there is a serious lack of vitamin D. Due to the low number of foods containing Vitamin D, a small proportion (10%–20%) of this vitamin is consumed with food. A significant portion (80%–90%) is synthesised in the skin by ultraviolet B rays. For synthesis, direct sunlight contact is required on the skin. The angle of sunlight reaching the earth's surface is effective in the synthesis of Vitamin D. At the geographic latitudinal of our country, the synthesis of vitamin D takes place between May and November. Since the appropriate beam angle is between 10.00 a.m. and 03.00 p.m., it is advisable to go out in the sun at these times for the synthesis of vitamin D. If the whole body is exposed to sunlight and appears a light pink colour at appropriate times during summer, about 20,000 IU of vitamin D synthesis occurs at an equivalent level to the dose of vitamin D.[5,6]

It is estimated that about one billion people in the world are experiencing a lack of vitamin D. In the literature, the vitamin D status differs in different countries, even in different regions of the same country. In the United States and Europe, 40%–100% of elderly men and women living in society (not at nursing homes) have been reported to have Vitamin D deficiency.[7]

In a study Uçar *et al.* have done in recent years in Ankara, Turkey, they've reported vitamin D deficiency (51.8%) and vitamin D insufficiency (20.7%).[8] Clinical findings of vitamin D deficiency depend on the grade and duration of deficiency. Most patients are asymptomatic.[9] Deficiency causes rickets in children and osteomalacia in adults. In some patients, bone loss due to secondary hyperparathyroidism is accelerated, and osteoporosis develops. Patients may develop a decrease in bone mineral density, widespread bone muscle pain, bone sensitivity, muscle weakness, walking difficulty, and fractures, depending on the degree of deficiency and failure.[10-13]

In people with a lack of vitamin D, the muscle strength of the waist, back, and neck decreases. Decreased muscle strength can cause herniated disc and cervical discal hernia. All of this is reflected in the patient's pain. We wanted to pay attention to the necessity of considering the lack of vitamin D in low back pain (LBP), which is one of the common complaints of our patients.

AIM AND OBJECTIVES

The purpose of this study is to investigate the relationship between pain severity and vitamin D deficiency in female patients who came in with OPD with LBP.

MATERIALS AND METHODS

The present study was a retrospective, observational study.

Source of data

The study was conducted in the Department of Orthopaedics and Gynaecology of Sri Krishna Medical College, Muzaffarpur, Bihar, India.

We included 98 patients with a complaint of LBP between January 2019 and June 2019 who had been diagnosed with disc herniation in the lumbar magnetic resonance and whose level of vitamin D had been measured.

Sampling procedure

The data of patients between 18 and 70 years of age with a diagnosis of LBP were included in the study by means of the automation system and its files by specialist doctors. Patients who came to our outpatient clinic with LBP were divided into two groups: vitamin D deficient (Group 1) with a vitamin D level below 20 ng/mL and normal (Group 2) with a value above 20 ng/mL. The relationship between severity of pain and vitamin D levels was evaluated.

Method of collection of data

Inclusion criteria

Female patients whose

- Pain has been defined.
- Pain level has been determined by the visual analogue scale (VAS).
- Vitamin D levels have been determined in ng/mL.

Exclusion criteria before work

- Patients who have missing demographic or study data
- Trauma, infection, and endocrinologic, neurological, and rheumatologic patients diagnosed with diseases, tumours, and depression

- Patients who are followed up with osteomalacia diagnosis
- Patients with advanced osteoporosis and compression fractures in X-rays were excluded from the screening.
- As a result of the screening, 98 patients were eligible to be included in the study. Patients' demographic data, including age, gender, body mass index (BMI), education level, marital status, and occupation, were recorded.

Pain level was evaluated as nominal data determined by a 10-cm Visual Analogue Scale (VAS). VAS is resulted from marking on a horizontal line where patients have no pain shown as "0" and where the pain is the most severe shown as "10."

Statistical analysis

All the analyses were carried out by means of Windows SPSS software (IBM Corp., Released 2013). IBM SPSS Statistics for Windows, version 22.0. (IBM Corp., Armonk, NY, USA). The appropriateness of variables was investigated with visual and analytical methods. Descriptive statistical data were presented as mean, standard deviation, numbers, and percentage. There was no difference between the normally distributed group and the non-normally distributed group in terms of vitamin D levels. To compare frequencies, the chi-square test was used. To define the linear association between independent variables and vitamin D level, Spearman's rho correlation coefficients were calculated. The statistical significance level was accepted as $P < 0.05$. As correlation coefficients, the correlations between 0 and 0.25 were assessed as "none," between 0.25 and 0.50 as "weak-moderate," between 0.50 and 0.75 as "severe," and between 0.75 and 1.00 as "much severe."

RESULTS

Forty-six patients (46.9%) were men, and 52 (53.1%) of 98 patients who applied to our polyclinic due to LBP were women. The mean Vitamin D level was lower in women (12.21 <0x7E> 9.25 ng/mL) than in men (14.28 <0x7E> 6.35 ng/mL), but not statistically meaningful ($P > 0.206$).

Group 1 consisted of patients with vitamin D deficiency, and Group 2 consisted of patients with vitamin D normal. D vitamin deficiency (Group 1) was detected in 84 (85.7%) of the patients, while vitamin D level was found to be normal in 14 (14.3%) of the patients (Group 2).

Sociodemographic data of the groups are presented in Table 1. The mean age of the groups (45.34, 12.3 years vs. 46.78, 17.6 years), sex, BMI (27.61, 5.27 kg/m^2 vs. 26.70, 4.40 kg/m^2), education level, and marital status were compared, but there was no statistically significant difference between the results (P> 0.05) [Table 1].

Table 1: Distribution of the general characteristics of the low back pain patients

Variables	Group I n=84	Group II n=14
Age	46 yrs	47 yrs
BMI+ SD	27.6	26.7
Educational status		
Iliterate	21	5
Primary	22	5
Secondary	19	1
High school	17	2
Univrsity	5	1
Marital status		
Married	57	10
Unmarried	27	4
Occupation		
Unemployed	58	6
Employed	26	8

In comparison of D vitamin levels of the groups, Group 1 (10.59 <0x7E> 4.36 ng/mL) was statistically significantly lower than Group 2 (28.7 <0x7E> 7.6 ng/mL) (P<0x7E> 0.001). In the comparison of VAS scores of the groups, Group 1 (6.88 ± 0.96) was statistically significantly higher ($P < 0.001$) than Group 2 (4.5 ± 0.65) While a negative correlation was found between D vitamin level and VAS score with Spearman's rho ($r = 0.594, P < 0.001$) [Figure 2], no correlation was found between BMI, age, education level, marital status, and working status ($P > 0.05$).

DISCUSSION

In our study, we investigated the relationship between the severity of pain and the level of vitamin D in patients with LBP and those who applied to the pain clinic. The data we obtained showed that patients with LBP had a deficiency of vitamin D and that there was a negative correlation between the level of vitamin D and pain severity. We also found that vitamin D levels in young female patients with LBP were lower than males but not statistically significant. In a review study that supports our study, the relationship between vitamin D and LBP has

been investigated, and it has been found that patients with LBP have lower serum 25(OH)D levels, which is more common in younger women.[14] The mean age of the groups (45.34 <0xC2><0xBD> 12.3 years vs. 46.78 <0xC2><0xBD> 17.6 years), sex, BMI (27.61 <0xC2><0xBD> 5.27 kg/m^2 vs. 26.70 <0xC2><0xBD> 4.40 kg/m^2), education level, marital status, and working conditions were compared, and any statistically significant differences were not found.

When we performed a literature review, there were few studies investigating the relationship between D vitamin and pain severity. In some studies, there was a significant correlation between serum 25(OH)D and pain severity.[15] However, in some studies, serum 25(OH)D and pain severity were not significantly correlated.[16,17]Considering these conflicting findings, careful evaluation of vitamin D supplementation is required.

LBP and lack of vitamins are the most common health problems in our country and all over the world. The synthesis of >90% of Vitamin D in the body occurs under the influence of sunlight. Vitamin D, taken with foods, does not have a significant contribution, especially after a supplement is not taken. Seasonal and geographical changes are inevitable in the synthesis of Vitamin D in the derailment, as the primary source is sunlight.[18-20]The average prevalence in vitamin D deficiency prevalence studies in the USA is reported as 41.6%, which is 82.1% in black people and 69.2% in Hispanics.[21] Hovsepian *et al.* reported a 50.8% prevalence of vitamin D deficiency in the young adult population.[22] In a large retrospective study conducted in our country, Idem *et al.* reported a vitamin D deficiency ratio of 71.7% in the population, which is a common body pain.[23] The population in our study was selected from a group of pain complaints, and 85.7% of the cases were found to have vitamin D deficiency and 14.3% to have a normal range of vitamin D. This result shows serious similarity with a retrospective study by Karahan*et al*., who determined that 2202 (70.9%) of 3104 registered patients having nonspecific musculoskeletal pain had vitamin D deficiency, while 516 patients (16.6%) had vitamin D inadequacy (total 87.5%) and 386 (12.4%) have a normal range of vitamin D.[24]

In a study conducted by Al Faraj and Al Mutairi, in patients with chronic LBP between 15 and 52 years of age, 299 (83%) out of 360 patients were found to have low vitamin D levels, and vitamin D deficiency was considered to be one of the major factors of chronic LBP.[25] In a study conducted in our country in 2013, 8457 patients who have common pain with a mean age of 46.7 years were evaluated, and the prevalence of vitamin D deficiency was found to be 71.7% in this group.[23] In a study conducted by Badsha *et al*., 139 patients who were diagnosed with pain complaints and D vitamin deficiency were treated with Vitamin D, and

90% of them achieved clinical improvement.[26] However, in a review of four studies comparing placebo and D vitamin therapy in patients with pain complaints, only one study showed that vitamin D supplements were superior to placebo.[27]

Limitations of the study

The most important limitation of our study is a retrospective study. It is also not possible to generalise the outcome because the study group population was selected from patients with LBP who had applied to the pain clinic. In our study, the values associated with vitamin D metabolism such as calcium, phosphorus, and alkaline phosphatase have not been examined, and laboratory methods do not show an accurate homogeneity as in many multicentre studies.

CONCLUSIONS

Our study indicates a connection between vitamin D deficiency and the severity of the pain in patients with LBP. The widespread screening of vitamin D levels in individuals with LBP should be taken into consideration because of the cheap, safe, treatable form of the symptoms for clinicians. Prospective studies are essential to demonstrate the association between LBP and vitamin D deficiency and to investigate whether vitamin D deficiency increases the risk of developing LBP to determine the potential role of vitamin D deficiency in the prevention of LBP.

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