

Estimation of Vit D Levels in Patients with Low Back Ache at a Tertiary Care Centre in North India- A Prospective StudyNeeraj Mahajan¹, Aakash Deep², Arti Khurana³, Sanjeev Gupta⁴, Anil Kumar⁵,
*Suraydev Aman Singh⁶¹Lecturer, Department of Orthopaedics, Government Medical College, Jammu²MS, Department of Orthopaedics, Government Medical College, Jammu³Consultant Radiologist, J&K Health Services⁴Professor & HOD, Department of Orthopaedics, GMC Jammu⁵Assistant Professor, Department of Biochemistry, GMC Jammu⁶Senior Resident, Department of Orthopaedics, Government Medical College, Jammu

Received: 01-01-2024 / Revised: 15-02-2024 / Accepted: 21-03-2024

Corresponding author: Dr. Suraydev Aman Singh

Conflict of interest: Nil

Abstract

Background: Low back pain is a very common condition, about 90% of people suffer from it at some point in their lives. Low back pain remains a significant health problem in terms of low quality of life, loss of work, cost of evaluation and varied treatment approaches. Treatment of low backache not only includes treating it symptomatically, but also treating the underlying pathology so that the patient gets satisfactory and lasting relief. Several researchers have indicated that vitamin D deficiency may be possibly related to chronic low back pain. This study was aimed to investigate the relationship between vitamin D levels and idiopathic low back pain in patients and to examine its effects on pain.

Material & Methods: This was a prospective observational study done at Government Medical College, Jammu on 200 patients who visited the out patient department of orthopaedics with complaints of idiopathic non specific low back pain for a period of atleast 3 months or more. Fasting venous blood samples were withdrawn and subjected to an automated chemiluminescence immunoassay (CLIA) analyser to estimate serum Vit D3 levels.

Results: Out of 200 patients, around 80 % patients of the patients were found to have inadequate VitD3 levels with 63% of patients being deficient while the rest 17% had insufficient Vit D levels.

Conclusion: Evaluation as well as management strategy of Chronic low back ache patients is multidisciplinary. Clinical guidelines for the management of chronic low back pain should include an evaluation of the patient's vitamin D3 status.

Keywords: Low Back pain, Vitamin D, Management, CLIA

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Low back pain is one of the most prevalent orthopaedic complaint that may result in significant loss of functionality of individuals across all age groups. [1] In addition to physical impairment, lower back pain bears a tremendous psychological influence such that anxiety and despair are prevalent among patients with low back pain overall affecting their quality of life. Conventionally, low back pain is categorized into three types: acute (lasting less than six weeks), subacute (lasting between 6 and 12 weeks), and chronic (lasting longer than 12 weeks). [2]

The sunlight vitamin, vitamin D, for its essential involvement in calcium homeostasis and bone mineralization is vital for the development and

lifelong maintenance of a healthy skeleton. Recent studies have emphasized that vitamin D deficiency leads to resistant chronic musculoskeletal system pain and neuromuscular dysfunction. [3]

The initial manifestations of vitamin D deficiency may involve weakness of proximal muscles and generalized pain. Patients may complain particularly of lower extremity pain. Weakness of proximal muscles may cause difficulty while walking and an antalgic walking pattern. [4] Hence, chronic low back pain (CLBP), one of the symptoms resulting from vitamin D deficiency, may decrease quality of life in that it leads to functional insufficiency, thereby negatively affecting social and work life. [5]

Multiple researchers have revealed that despite sufficient solar exposure, Indians have an extremely fragile Vitamin D3 balance due to food abnormalities and aesthetic concerns and examining Vitamin D3 levels in patients with chronic low back pain may show intriguing tendencies. A review of literature reveals that research into the relationship between chronic musculoskeletal pain and vitamin D are few in number, with contradictory conclusions. This study was aimed to investigate the status of vitamin D in patients with idiopathic low back pain and to evaluate its effects on pain.

Material and Methods

This was a prospective observational study done at Government Medical College, Jammu for a period from August 2023 to October 2023 with the aim to estimate the levels of Vit D in individuals with low back pain.

Inclusion Criteria:

- All patients between the age group of 18-60 years
- History of back pain for atleast 3 months or more
- Both male and female patients were included
- Patients with no discernable pathological aetiology

Exclusion Criteria:

- Clinico-radiological correlation of any spinal pathology
- History of corticosteroid, bisphosphonate, teriparatide usage
- Pregnant and lactating female

The patients who met the above mentioned criteria were included in our study. All the patients were

selected from the outpatient department of our tertiary care hospital. Prior implied consent was obtained to assess the vitamin D3 levels. The median cubital vein was used to obtain a 5 millilitre (ml) sample of fasting venous blood using sterile phlebotomy methods. The samples were centrifuged at 3000-3500 rpm for 5-10 minutes to separate the serum, which was then frozen at -20°C until analysis. Vitamin D3 levels were evaluated using an automated chemiluminescence immunoassay (CLIA) analyser.

Grading System Used:

Vitamin D3 status was graded based as per HOLICK's classification of vitamin D3 deficiency, [6] i.e

- Sufficient: ≥ 30 ng/mL
- Insufficient: 20.1- 29.9 ng/mL
- Deficient: ≤ 20 ng/mL

All the data obtained was recorded and entered into Microsoft excel as per case basis. The data was analyzed using appropriate statistical tests-descriptive and chi square test. Mean and frequencies were recorded for the age, gender, work profile, visual analog scale (VAS) for Pain, and levels of vitamin D3.

Results:

In this observational study, based on our inclusion criteria, a total of 200 patients were included. The age of the patients ranged from 18 to 60 years with mean age of 37.5 years, the majority of the patients were in 31-45 years of age group (48%). There were 58% male patients included in our study. Most common occupation seen was manual labourer (35%) followed by businessman (19%) and housemaker (16%). Moderate workers formed majority (48.2%) of the cases. Around 80 % of the patients were found to have inadequate VitD3 levels with 63% of patients being deficient while the rest 17% had insufficient Vit D levels.

Table 1: Age wise distribution of cases:

Age Group	Number of Patients (n)	Percentage (%)
< 30 Years	54	27%
31-45 Years	96	48%
46-65 Years	50	25%

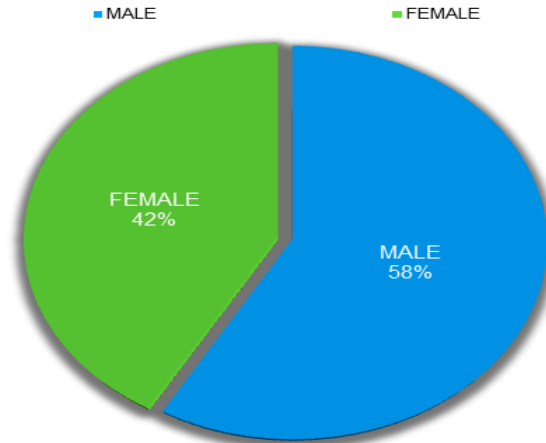


Figure 1: Gender distribution:

Table 2: Occupational distribution of patients:

Occupation	Number (n)	Percentage (%)
Buisnessman	38	19%
Labourer	70	35%
Driver	10	5%
Student	25	12.5%
Housemaker	32	16%
Shopkeeper	25	12.5%

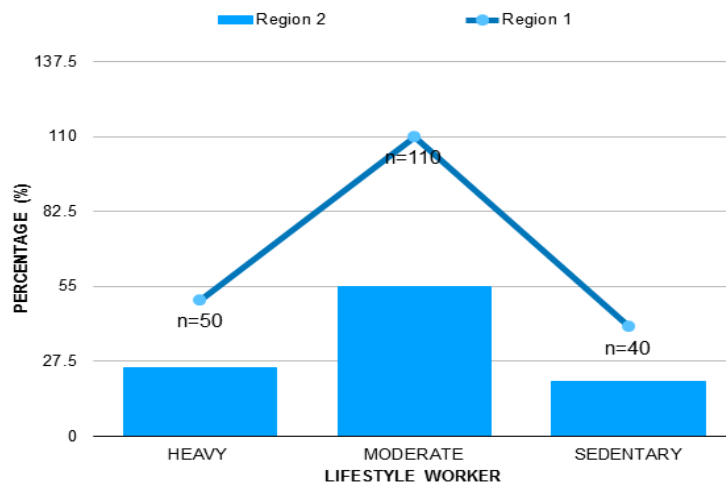


Figure 2: Lifestyle distribution of patients

DEFICIENT INSUFFICIENT SUFFICIENT

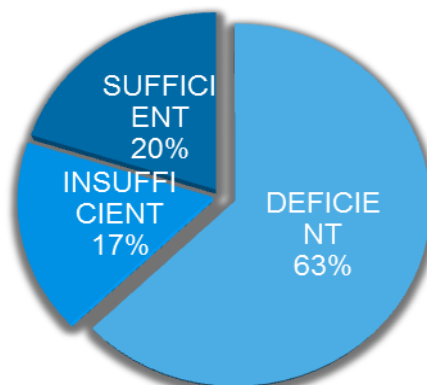


Figure 3: Vit D3 status of patients:

Discussion

Chronic low back pain is one among the most prevalent complaints that is noticed in the Indian population visiting orthopaedic outpatient clinics. Patients in the age group of 18-60 years of age group who had been complaining of low back pain for more than three months were included in this observational study with the purpose of determining the association between the levels of Vitamin D3 in patients with chronic low back pain.

In our study, the percentage of participants who fell into each category, based on the various levels of serum vitamin D3, were as follows: in around 20% of the cases, vitamin D3 levels were measured to be normal or sufficient. In 16.8% of the cases, vitamin D3 levels were between 20.1 and 29.9 ng/mL, which is considered to be insufficient while in 62.9% of the patients, vitamin D3 levels were less than 20 ng/mL, which is considered to be deficient. This percentage was 81.7% in the study carried out by Lotfi A et al 2007 [7]. The study carried out by Alfaraj et al. 2003 [8] found that 83 percent of patients with chronic low back pain had vitamin D3 deficiency. There is a high prevalence of vitamin D3 deficiency (55.55% cases) and insufficiency (38.46% cases) (combined: 94.01%) in the general population of North India, according to research carried out by K Sanjay et al. 2012 [9] in an orthopaedic outpatient department in 234 female patients who presented with musculoskeletal symptoms. According to the findings of Zellner BS et al. 2014 [10], 86.2% of participants had insufficient levels of 25-hydroxyvitamin D (less than 30 ng/mL), and among those cases, 53.2% had vitamin D3 levels that were too low (less than 20 ng/mL).

In our study, there were more male patients (58.4%) than female patients (41.6%). The mean levels of vitamin D3 in men were 12.1-22.9, and in women they were 11.9-19.1 respectively. In the present investigation, we found that there was no statistically significant correlation between the sexes and vitamin D3 levels ($p = 0.501$). In agreement with our findings is a study that was carried out by Hwan-Kim et al. on 350 patients and discovered that there was no significant link between the levels of vitamin D3 and gender. However, according to the findings of Bogunovic L. et al. 2010 [11], the incidence of low vitamin D3 levels was substantially more common in men. Still, the correlation of association of Vit d levels with sex distribution does not reach a statistical significance.

According to the findings of our research, the average age of the patients was 37.5 years, with a standard deviation of 11.92 years (range 18 to 60 years). The majority of the participants, or 38.6%,

were in the age bracket of 31 to 45 years old. In the course of our research, we came across no evidence of an age-related correlation that was statistically significant ($p = 0.499$). In our study, the majority of patients were labourers (35%), followed by businessmen (19%) and housemakers (16%). There was not a significant correlation found between the levels of vitamin D3 and the occupations of the participants ($p > 0.001$). According to the results of our study, 52.64% of patients experienced moderate pain (VAS score: 4-7), whereas 45.15% of patients experienced severe pain (VAS score: 7-10). According to the findings of our research, there is no statistically significant connection between vitamin D3 levels and VAS score ($p = 0.256$).

Conclusion

Low back pain diminishes an individual's quality of life and work performance due to which it imposes a significant economic cost on individuals, their families, industry, and the government. Our study provided information regarding the significant frequency of vitamin D3 deficiency in the North Indian population with chronic low back pain, which is associated with diminished functional capacity. Clinical guidelines for the management of chronic low back pain should include an evaluation of the patient's vitamin D3 status, along with recommendations for appropriate vitamin D3 supplementation for individuals who are found to be deficient in vitamin D3.

References

1. Atkinson JH, Slater MA. Behavioral medicine approaches to chronic low back pain. The Spine. Philadelphia: WB. Saunders Company. 1992:1961-81
2. Van Tulder M, Becker A, Bekkering T, Breen A, del Real MT, Hutchinson A, Koes B, Laerum E, Malmivaara A, COST B13 Working Group on Guidelines for the Management of Acute Low Back Pain in Primary Care. European guidelines for the management of acute nonspecific low back pain in primary care. European spine journal. 2006 Mar;15(Suppl 2):s169.
3. Turner MK, Hooten WM, Schmidt JE, Kerkvliet JL, Townsend CO, Bruce BK. Prevalence and clinical correlates of vitamin D inadequacy among patients with chronic pain. Pain Medicine. 2008 Nov 1;9(8):979-84
4. Reginato AJ, Falasca GF, Pappu R, McKnight B, Agha A. Musculoskeletal manifestations of osteomalacia: report of 26 cases and literature review. In Seminars in arthritis and rheumatism 1999 Apr 1; 28(5): 287-304).
5. Bener A, Dafeeah EE, Alnaqbi K. Prevalence and correlates of low back pain in primary care: what are the contributing factors in a

- rapidly developing country. Asian spine journal. 2014 Jun;8(3):227.
6. Holick MF. 2007 Vitamin D deficiency. N Engl J Med. 357;266-81.
 7. Lotfi A, Abdel-Nasser AM, Hamdy A, Omran AA, El-Rehany MA. Hypovitaminosis D in female patients with chronic low back pain. Clin Rheumatol. 2007;26(11):1895-901.
 8. Al Faraj S, Al Mutairi K. Vitamin D deficiency and chronic low back pain in Saudi Arabia. Spine. 2003 Jan 15;28(2):177-9.
 9. Kalra S, Kalra B, Khandelwal SK. Vitamin D status in patients with musculoskeletal symptoms in Haryana, India. Journal of medical nutrition and nutraceuticals. 2012 Jan 1;1(1):50.
 10. Zellner BS, Dawson JR, Reichel LM, et al. Prospective nutritional analysis of a diverse trauma population demonstrates substantial hypovitaminosis D. J Orthop Trauma. 2014; 28(September (9)): e210–e215.
 11. Bogunovic L, Kim AD, Beamer BS, Nguyen J, Lane JM. Hypovitaminosis D in patients scheduled to undergo orthopaedic surgery: a single-center analysis. JBJS. 2010 Oct 6;92 (13):2300-4.