



LOW BACK PAIN WITH VITAMIN D LEVELS IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Low back pain is the most common orthopaedic problem affecting most individuals at some point of time in their lives. Vitamin D, sunshine vitamin is one of the most intensely investigated nutrients of the 21st century. It plays a crucial role in the development and maintenance of a healthy skeleton throughout life. Experts largely agree that this fat soluble pro-hormone is vital to bone health. Due to the important role it plays in calcium homeostasis and bone mineralization. **Aim and Objective:** We aimed to examine the relationship between the levels of vitamin D and patients with chronic low back pain and to investigate its effects on pain and functional capacity. **Material and Methods:** 260 patients with complaints of low back pain for > 3 months, aged between 18 to 60 years and both gender, participated in the study. Visual Analog Pain Scale (VAS) was used to measure the state of pain. Pain-related functional capacity was evaluated using Modified Oswestry Disability Questionnaire (MODQ). Patients were classified into three groups based on their serum vitamin D levels, insufficient (20.1-29.9 ng/mL) and deficient. **Results:** We found that 77.31% of patients (n: 201) were vitamin D deficient, 17.31% (n:45) were insufficient, and 5.38% (n:14) had sufficient levels. VAS scores were 5.95 ± 1.71 , 5.67 ± 1.77 and 6.00 ± 2.04 for patients with vitamin D deficient, insufficient, and sufficient levels, respectively. MODQ scores were 46.32 ± 5.85 , 30.98 ± 5.89 and 14.43 ± 4.45 for patients with vitamin D deficient, insufficient, and sufficient levels, respectively. We found that there was significant association between vitamin D levels and MODQ score, body mass index, occupation, religion and lifestyle of the patients. And there was no significant association between vitamin D levels and age, gender, history of smoking, SLRT (right & left side respectively), VAS score and socioeconomic status of the patients. **Conclusion:** The result of this study provides a message about the high prevalence of vitamin D deficiency in Indian population with chronic low back pain and may lead to lower functional capacity. Clinical guidelines for managing chronic low back pain should include assessment of vitamin D status, together with advice on appropriate vitamin D supplementation in those found to be deficient.

KEYWORDS : Low back pain, Vitamin D, VAS score, MODQ etc.

Introduction:

Low back pain is the most common orthopaedic problem affecting most individuals at some point of time in their lives¹. According to World Health Organization (WHO) low back pain is rated as the leading cause of disability and is the most common cause of outpatient department consultation². According to some estimates approximately 60-80% of the general population will suffer from low back pain at some point in their lifetime and 20-30% are suffering from low back pain at any given time³. Due to the limitation of activity and work absence, it also causes an economic burden on individuals, their families, industry and government. Hence there is a significant socioeconomic impact caused by low back pain⁴.

Vitamin D, sunshine vitamin is one of the most intensely investigated nutrients of the 21st century. It plays a crucial role in the development and maintenance of a healthy skeleton throughout life. Experts largely agree that this fat soluble pro-hormone is vital to bone health. Due to the important role it plays in calcium homeostasis and bone mineralization. A number of studies have been done to assess the vitamin D status in subjects with nonspecific low back pain where no organic cause could be ascertained. Studies hint towards a cause effect relationship between vitamin D levels and pain^{5,6}.

Aim of the observational study to evaluate the level of serum vitamin D in patients with chronic low back pain. And the relationship of serum vitamin D level to chronic low back pain. And to examine the effect of vitamin D on pain (VAS score) and functional capacity (MODQ).

Material and Methods:

Observational study was conducted in department of orthopaedics, Anugarah Narayan Magadh Medical College, Gaya with complaints of low back pain in duration between Jan 2020 to Dec 2020. Total sample size of the study is 260.

Inclusion criteria:

1. Patients referred to orthopaedics department with complaints of low back pain > 3 months.
2. Patients aged 18-60 years and both gender.

Exclusion Criteria:

1. Clinico-radiological evidence of tuberculosis of spine, degenerative changes of spine, prolapsed intervertebral disc requiring surgery, lumbar canal stenosis, fractures of spine, spondylolisthesis,

kyphoscoliosis, tumours of spine, inflammatory arthritis of spine like ankylosing spondylitis, sacroiliitis, rheumatoid arthritis.

2. Prior vitamin D supplementation.
3. History of corticosteroid usage (>1year), bisphosphonates, teriparatide.
4. History of usage of anti-epileptic / anti-tubercular drugs in the past one year.
5. Presence of systemic diseases like chronic liver failure / chronic renal failure / inflammatory bowel disease or malabsorption syndromes / chronic diarrhoea and chronic pulmonary disease.
6. History of malignant diseases, anti-cancer drugs and radiotherapy.
7. Pregnant and lactating women.
8. History of psychiatric illness.
9. Symptomatic osteoarthritis of the hip and knee.

Patients meeting the inclusion criteria were enrolled for the study after obtaining a written informed voluntary consent. They were subjected to detailed history including age, sex, religion, occupation, lifestyle, socioeconomic status and history of smoking. Back pain was analyzed regarding onset, course, duration, type, location, radiation, diurnal variation, associated with morning stiffness, exercise and rest. Past medical illness, drug history and personal history was obtained. General physical examination including height, weight and BMI was obtained. Clinical examination of the spine was done. Pain assessment was done using Visual analogue scale (VAS). Functional disability assessment was recorded using Modified Oswestry Low Back Pain Disability Questionnaire (MODQ). All the data was recorded according to a prepared proforma. Plain Radiograph of Lumbosacral spine – anteroposterior and lateral views were obtained for all patients. MRI of Lumbosacral spine was done for patients with suspected Intervertebral disc prolapse and inflammatory arthritis based on signs and symptoms. Blood samples of patients were obtained and tested for serum vitamin D level and grading of vitamin D deficiency was done.

Vitamin D Assessment: Fasting venous blood sample (5cc) from median cubital vein was collected using sterile phlebotomy techniques

of the patient participating in the study. The samples were centrifuged at 2500-3000 rpm for 5-10 minutes and serum was separated, and stored at -20°C until the time of analysis. Plasma 25 (OH) D levels of all patients were measured by chemiluminescence immunoassay (CLIA) on an automated analyser (BECKMAN COULTER Access 2 Immunoassay system). All the blood samples were collected in morning to prevent any circadian variation.

Statistical Methods: Data was entered into Microsoft excel data sheet and was analyzed using SPSS version 22 software.

Ethical Clearance: Ethical clearance has been obtained from “Ethical clearance committee” of the Institution.

Results

A total of 260 patients were included in this observational study based on the inclusion criteria. In this study, 57.69% were males and 42.31% were females. In this study among females, majority of patients were in the age group of 31 to 40 years (33.64%), whereas among males, majority of patients were in the age group of 21 to 30 years (34.67%). There was significant difference in age distribution between males and females. In this study among females, 75.45% were Hindus, 20.91% were Muslims and 3.64% were Christians. Among males, 85.33% were Hindus, 11.33% were Muslims and 3.34% were Christians. There was no significant difference in religion distribution between males and females. In this study among females, majority of patients were housewives and among males, majority of patients were businessman. There was significant difference in occupation between males and females. In this study among females, 13.64% were heavy workers, 58.18% were moderate workers and 28.18% were sedentary workers. Among males, 29.33% were heavy workers, 50% were moderate workers and 20.67% were sedentary workers. There was significant difference in lifestyle between males and females. In this study among females, 81.82% were in APL and 18.18% were in BPL. Among males, 83.33% were in APL and 16.67% were in BPL. There was no significant difference in socioeconomic status between males and females.

Table 01: VAS score distribution of patients studied.

		Gender					
		Female		Male		Total	
		No.	%	No.	%	No.	%
VAS Score	0	0	0.00%	0	0.00%	0	0.00%
	1- 3	13	11.82%	14	9.33%	27	10.38 %
	4 - 6	56	50.91%	70	46.67%	126	48.46 %
	7 - 10	41	37.27%	66	44.00%	107	41.15 %
	Total	110	100.00%	150	100.00 %	260	100.00 %

Table No. 01 shows among females, 11.82% had VAS score of 1 to 3, 50.91% had score of 4 to 6 and 37.27% had score of 7 to 10. Among males, 9.33% had VAS score of 1 to 3, 46.67% had score of 4 to 6 and 44% had score of 7 to 10. There was no significant difference in VAS score between males and females.

Table 02: Grade of disability distribution of patients studied.

		Gender					
		Female		Male		Total	
		No.	%	No.	%	No.	%
Grad of Disability	Minimal	9	8.2%	6	4.0%	15	5.8%
	Moderate	31	28.2%	57	38.0%	88	33.8%
	Severe	70	63.6%	87	58.0%	157	60.4%
	Total	110	100.0%	150	100.0%	260	100.0%

Table No. 02 shows among females, 8.2% had minimal grade of disability, 28.2% had moderate disability and 63.6% had severe disability. Among males, 4.0% had minimal disability, 38.0% had moderate disability and 58.0% had severe disability. There was no significant difference in grade of disability between males and females.

Table 03: Vitamin D level distribution of patients studied.

		Gender					
		Female		Male		Total	
		No.	%	No.	%	No.	%
Vitamin D (ng/ml)	Deficient (< 20 ng/mL)	84	76.36 %	117	78.00 %	201	77.31 %
	Insufficient (20.1- 29.9 ng/mL)	18	16.36 %	27	18.00 %	45	17.31 %
	Sufficient (> 30 ng/mL)	8	7.27%	6	4.00%	14	5.38 %
	Total	110	100.00 %	150	100.00 %	260	100.00 %

Table No. 03 shows among females, 76.36% had deficient level, 16.36% had insufficient level and 7.27% had sufficient levels of vitamin D. Among males, 78% had deficient level, 18% had insufficient level and 4% had sufficient levels of vitamin D. There was no significant difference in vitamin D levels between males and females.

Table 04: Association of grade of disability with vitamin D levels

		Vitamin D (ng/ml)							
		Deficient (< 20 ng/mL)		Insufficient (20.1- 29.9ng/mL)		Sufficient (> 30 ng/mL)		Total	
		No.	%	No.	%	No.	%	No.	%
Grade of	Minimal	0	0.00%	3	6.67%	12	85.71 %	15	5.77 %
	Moderate	44	21.89%	42	93.33%	2	14.29 %	88	33.8 %
	Severe	157	78.11%	0	0.00%	0	0.00 %	157	60.3 %
	Total	201	100.00%	45	100.00 %	14	100.00 %	260	100.00 %

Table No. 04 shows, among those with deficient levels, 21.89% had moderate grade of disability and 78.11% had severe disability. Among those with insufficient levels, 6.67% had minimal disability, 93.33% had moderate disability. Among those with sufficient levels of vitamin D, 85.71% had minimal disability and 14.29% had moderate disability. There was significant association between vitamin D levels and grade of disability in patients.

Discussion

Chronic low back pain is a common complaint seen in Indian population and it is also a common presenting symptom to orthopaedic outpatient department.

In this study, the percentage of subjects according to different cut off points for serum vitamin D level were: Vitamin D ≥ 30 ng/mL which is normal or sufficient levels were observed in 5.38% of the cases, vitamin D 20.1 to 29.9 ng/mL which is insufficient levels were observed in 17.31% cases, vitamin D ≤ 20 ng/mL which is deficient levels were found in 77.31% cases. The mean serum vitamin D (Mean ± SD) level was 14.63 ± 9.27 (range: 3.9 to 76.73 ng/mL). Alfaraj et al.⁷ found that 83% of patients with CLBP had vitamin D deficiency, whereas this percentage was 81.7% in the study conducted by Lotfi et al.⁸, 74.3% in the study by Hwan-Kim et al.⁹, and 22.5% in eSilva et al's¹⁰ study.

Kalra Sanjay et al.¹¹ also studied vitamin D deficiency in orthopaedic outpatient department in 234 female patients with musculoskeletal symptoms and found that there is a high prevalence of vitamin D deficiency (55.55% cases) and insufficiency (38.46% cases) (combined: 94.01%) in general population of North India. No significant association between vitamin D levels and gender (p = 0.501) was observed in our study. A study conducted by Hwan-Kim et al.⁹ on 350 patients with CLBP, no significant correlation was found between vitamin D levels and gender, which is in accord with our findings.

In our study, 48.46% patients had moderate pain (VAS score: 4-7), followed by severe pain (VAS score: 7-10) in 41.15% patients. No significant association was observed between vitamin D levels and

VAS score ($p = 0.256$) in our study. Hwan Kim T et al.⁹ also found that severity of pain is higher in lumbar spinal stenosis patients with vitamin D deficiency. Johansen JV et al.¹² showed that there is no relationship vitamin D deficiency and severity of LBP, which is in accordance with our findings. In our study, majority (60.4%) of patients had severe grade of disability and 33.8% patients had moderate grade of disability. There was significant negative correlation between vitamin D levels and MODQ score ($p = <0.001$). i.e. with increase in vitamin D levels there was decrease in MODQ score and vice versa. Bischoff et al.¹³ reported that muscle strength and functional capacity in 60 year old or older patients with vitamin D deficiency is lower than patients with normal levels of vitamin D.

Panagiotis et al.¹⁴ stated that vitamin D deficiency affects muscles in postmenopausal women, thus causing reduced functional capacity. Study conducted by Hwan Kim et al.⁹ on patients with CLBP found no relationship between vitamin D deficiency and functional capacity.

Conclusion

The result of this study provides a message about the high prevalence of vitamin D deficiency in Indian population with chronic low back pain which leads to lower functional capacity. Clinical guidelines for managing chronic low back pain should include assessment of vitamin D status, together with advice on appropriate vitamin D supplementation in those found to be deficient.

Conflict of Interest: None

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