Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

EVALUATION OF VITAMIN D LEVEL IN THE POSTMENOPAUSAL WOMEN WITH CHRONIC NONSPECIFIC LOW BACK PAIN IN NORTH INDIA: A HOSPITAL BASED RETROSPECTIVE OBSERVATIONAL STUDY

Santosh Kumar Singh[1], Jigyasa Singh[2], Jasveer Singh[3], Snehashish Mukharjee[4]

1. Specialist Orthopaedics, Department of Orthopaedics, ESIC Hospital, Jajmau, Kanpur, Uttar Pradesh, India.
2. Assistant Professor, Department of Obstetrics and Gynaecology, IMS BHU, Varanasi, Uttar Pradesh India.
3. Associate Professor, Department of Orthopaedics, Uttar Pradesh University of Medical Sciences, Etawah, Uttar Pradesh, India.
4. Senior Resident, Department of Orthopaedics, ESIC Hospital, Jajmau, Kanpur, Uttar Pradesh, India.

Corresponding Author: Dr. Santosh Kumar Singh

E-mail: dr.sandy03kgmc@gmail.com

Article received on: 02/07/2022 | Article revised on: 01/08/2022 | Article accepted on: 25/08/2022

ABSTRACT

Introduction: Chronic nonspecific low back pain (CNSLBP) and vitamin D deficiency in postmenopausal women are two common conditions presented to the Orthopaedics outpatient department.

Aim: The aim of this study is to assess the vitamin D status of postmenopausal women presenting with CNSLBP, as well as the relationship between vitamin D levels and pain severity, using the Visual Analogue Scale (VAS).

Material and Method: This study was observational and retrospective. A specialist reviewed the clinical records retrospectively of all postmenopausal women (aged 45–60) who presented with CNSLBP to the outpatient department between April 2022 and July 2022. The serum 25-hydroxyvitamin D (25(OH)D) level, the Visual Analogue Scale (VAS), the patient files' recorded body mass index (BMI), age, education level, marital status, and employment status were all included in the study. We agreed that the upper limit of vitamin D should be 20 ng/mL. Using the patients' vitamin D levels as a guide, we split them into two groups. Individuals with serum 25(OH)D levels less than 20 ng/mL were classified as vitamin D deficient (Group 1), whereas those with values between 20 ng/mL and greater than 20 ng/mL were classified as vitamin D normal (Group 2).

Statistical analysis: We presented descriptive statistical data as mean, standard deviation, numbers, and percentage. Correlations between vitamin D values and VAS scores were investigated using the Spearman's rho coefficient, and the results with a P of ≤ 0.05 were

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

considered significant. To compare the frequencies, the chi-square test was used. The data were analysed using SPSS Version 20 (IBM Corp.).

Result: During the study period, 100 postmenopausal patients, aged 45-60, who visited the outpatient department due to CNSLBP, had their vitamin D levels measured. Of the patients, 14 (14%) had normal vitamin D levels, and 86 (86%) had vitamin D deficiency. Age, BMI, educational attainment, marital status, and employment status were similar between the groups ($p>0.05$); nevertheless, there was a statistically significant difference between the two groups for the VAS score and vitamin D levels ($P < 0.001$). Age, gender, BMI, education level, marital status, and employment status did not correlate with the VAS score ($P > 0.05$), however there was a negative association between the D vitamin level and the VAS score ($r = -0.68$, $p <0.001$).

Conclusion: We found a strong correlation between vitamin D deficiency and CNSLBP in postmenopausal women.

Keywords- Chronic low back pain, NSCLBP, Vitamin D deficiency, VAS

INTRODUCTION

Usually many see CNSLBP as a symptom rather than a condition. In both industrialized and developing nations, it has been the main reason for lost productivity at work and the primary driver of medical rehabilitation [1,2]. CNSLBP was consistently in the top 10 diseases throughout the previous 30 years, according to the GBD (Global Burden of Disease) research 2019, and it afflicted people of all ages [3]. When a patient's pathologies—such as tumours, osteoporosis, spinal canal stenosis, compression fractures, structural abnormalities of the spine, infections or inflammations, lumbar radiculopathy, and cauda equina syndrome—have not been identified, a non-specific type of pain is diagnosed [3]. Pain that lasts longer than 12 weeks is classified as chronic [2].

In addition, CNSLBP prevalence rose with age, from 16.9% to 46.6 [2]. The postmenopausal stage is marked by a wide range of indications and symptoms. Psychological symptoms can include mood swings, depression, and difficulty sleeping; physical symptoms can include hot flashes, nocturnal sweats, stiffness and discomfort in the back and joints, and continuous exhaustion [4].

The treatment focuses on finding the risk and protective variables to alleviate pain because the pathoanatomical cause is unknown. Deficiency in vitamin D is a huge global pandemic. Numerous human illnesses, including Alzheimer's disease (AD), Parkinson's disease (PD), multiple sclerosis (MS), hypertension, and cardiovascular conditions have all been related to it [5]. 25-hydroxyvitamin D [25(OH)D], a marker of vitamin D status, may play a role in the pathogenesis of non-specific pain [5]. Additionally, there is growing evidence that a lack of 25(OH)D is linked to a variety of chronic pain conditions from observational studies and certain meta-analyses [6,7]. However, there is disagreement among researchers regarding the relationship between circulating 25(OH)D concentrations and pain. One meta-analysis of seven observational studies with 2,420 statin-treated patients indicated that people with myalgia had lower 25(OH)D levels than those without the condition [8]. There was no difference in 25(OH)D levels between those with and without persistent widespread pain in a different meta-analysis with 1854 participants [9]. The apparent causal relationship between blood 25(OH)D levels and

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

CNSLBP is still unclear because to the scant data and contradictory findings from other studies, and more compelling evidence must be investigated.

Postmenopausal women are of particular interest because they have a high prevalence of conditions that affect vitamin D status and physiology, such as musculoskeletal disorders, changes in vitamin D metabolism, such as decreased skin vitamin D production, or changes in body composition [10]. The aim of this study, intended to provide detailed information on the prevalence of vitamin D deficiency in postmenopausal women presented with chronic nonspecific low back pain.

Aim of the study

The aim of this study is to look at the relationship between pain severity and Vitamin D insufficiency in CNLBP postmenopausal patients who come to the Orthopaedics outpatient department using the Visual Analogue Scale (VAS).

METHODOLOGY

Study Settings and Design:

This was a retrospective, observational study. All the postmenopausal women of age 45 -60 years with CNLBP presenting to the Orthopaedics outpatient department from April 2022 to July 2022, were analyzed, retrospectively. No such study has been conducted in the hospital previously.

Selection of patients

Inclusion criteria

All post-menopausal women between the ages of 45 and 60 who have had chronic non-specific low back pain for more than three months (12 weeks) and are willing to participate in the study.

Exclusion criteria

Women with radiculopathy, spinal cord injuries, disc disease, lumbar canal stenosis, severe degenerative arthritis of the spine, psychiatric disorder metabolic bone disease chronic renal problems, and persons taking supplements with vitamin D throughout last three months will be excluded.

An Orthopaedics specialist conducted a retrospective review of the postmenopausal women clinical records of those who registered to our hospital between April 2022 and July 2022 with the diagnosis of CNSLBP. The study comprised measurements of the demographic data like body mass index (BMI), serum 25(OH) D level, Visual Analogue Scale (VAS), age, education level, marital status, employment status, and values documented in patient records. The accepted limit for serum vitamin D will be 20 ng/mL. Depending on the levels of vitamin D in the patients' blood, they will be split into two groups. Patients with serum 25(OH) D levels below 20 ng/mL were classified as having a vitamin D deficiency (Group 1), while those with values between 20 ng/mL and over 20 ng/mL were classified as having a normal amount of vitamin D. (Group 2).

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

Statistical analysis

The data were analysed using SPSS Version 20 (IBM Corp.). Descriptive statistical data was presented as mean, standard deviation, numbers, and percentage. To compare frequencies, the Chi-square test was used. Quantitative variables were compared using the Paired *t*-test and qualitative variables by the Chi-Square test. Correlations were investigated 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 $P < 0.05$. The study was approved by Institutional review board. Written informed consent was obtained from each participant.

RESULTS

People in Group 2 had normal vitamin D levels, while those in Group 1 had vitamin D deficiencies. Of the patients assessed, 86 (86% of the patients) had vitamin D deficiency (Group 1) and 14 (14% of the patients) had normal vitamin D levels (Group 2).

Table-1: Presents sociodemographic data for both groups.

SN	Variables		Group 1, n (%)	Group 2, n (%)	p- value
1	Number of patients		86	14	
2	Age (years)[1]		53.8 ± 7.4	52.3 ± 5.3	0.4688
3	BMI (kg/m^2)[1]		29.31 ± 6.26	28.90 ± 6.70	0.8224
4	Educational status	Illiterate	22 (25.58)	4 (28.57)	0.917
		Primary school	23 (26.74)	3 (21.42)	
		Secondary school	18 (20.93)	2 (14.29)	
		High school	16 (18.60)	2 (14.29)	
		Intermediate	4 (4.65)	1 (7.14)	
		Graduation	2 (2.32)	1 (7.14)	
		Postgraduation	1 (1.16)	1 (7.14)	
5	Dietary habit	Vegetarian	52 (60.46)	9 (64.2)	0.074
		Nonvegetarian	34 (39.53)	5 (35.71)	
6	Marital status	Married	71 (82.56)	11 (78.57)	0.72
		Single	15 (17.44)	3 (21.42)	
7	Occupation	Unemployed	58 (67.44)	5 (35.71)	0.113
		Physically active	4 (4.65)	4 (28.57)	
		Desk employee	9 (10.47)	2 (14.29)	
		Retired	15 (17.44)	3 (21.42)	

[1]Data is represented as Mean ± Standard deviation.

All the patients' ages ranged from 45 to 60 years, with a mean of 51.5 ± 4.6 years. Group 1 had a mean age of 53.8 ± 7.4 years, while Group 2 had a mean age of 52.3 ± 5.3 years, which was

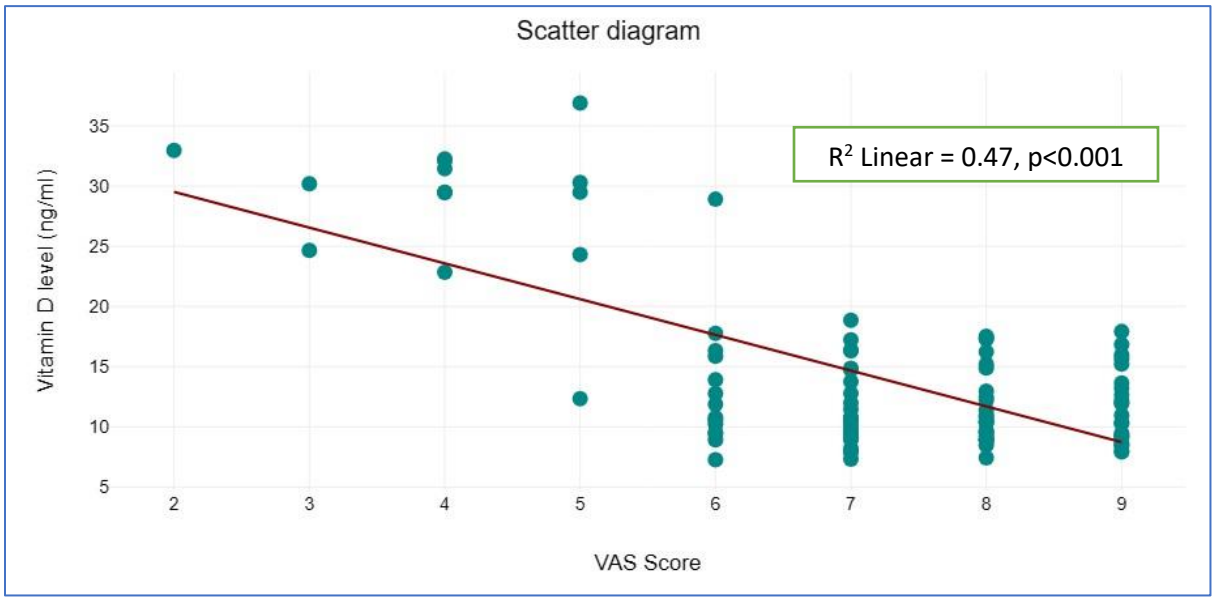
ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

statistically nonsignificant. The BMI of Group 1 was 29.31 ± 6.26 kg/m^2 while it was 28.90 ± 6.70 kg/m^2 in Group 2, which was also not significantly different.
The results of the comparison between marital status and education level did not show a statistically significant difference (P > 0.05).

Table-2: Shows that Group 1 (7.83 ± 0.83) had considerably higher VAS scores (P < 0.0001) than Group 2 (5.2 ± 0.71). Group 1 (12.47 ± 5.31 ng/mL) had D vitamin levels that were statistically significantly less than Group 2 (29.3 ± 3.8 ng/mL) (P < 0.0001).

Variables	Group 1 (mean ± standard deviation)	Group 2 (mean ± standard deviation)	P value
25-Hydroxy vitamin D3 (ng/ml)	12.47 ± 5.31	29.3 ± 3.8	<0.0001
VAS score	7.83 ± 0.83	5.2 ± 0.71	<0.0001

There was no association identified between BMI, age, education level, marital status, and working status (P > 0.05), however there was a negative correlation between D vitamin level and VAS score with Spearman's rho (r = −0.68, P < 0.001) [Figure 1].



DISCUSSION

Postmenopausal women frequently experience CNSLBP [11,12]. It is becoming more widely acknowledged that most of the time there is no one specific cause for pain and that a wide range of psychological and social elements can be implicated in this disease [13]. As a patient ages, this excruciating circumstance worsens [12,13].

Although it is debatable, vitamin D insufficiency may be a contributing factor to adult cases of unexplained musculoskeletal pain and is a potentially treatable cause [14-16]. Numerous

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

investigations have been conducted recently on the relationship between chronic LBP and vitamin D [17-19]. Our research indicates a correlation between postmenopausal women's CNSLBP and vitamin D insufficiency. These results are consistent with previous studies.

The majority of patients in the study by Bahinipati J et al. [20] and Al Faraj et al. [19] on patients with chronic LBP had low vitamin D levels, and this deficiency was thought to be one of the major causes of chronic LBP.

Older women who lacked enough vitamin D were nearly twice as likely to experience moderate or greater back pain, according to Hicks and colleagues [17]. Out of 150 patients in Saudi Arabia who had unexplained low back pain for over six months, 83% had vitamin D levels that were abnormally low. Everyone whose vitamin D levels were low to begin with experienced a clinical improvement in their symptoms after taking vitamin D supplements [19]. Lotfi and colleagues [18] compared 60 women with chronic low back pain (LBP) during pregnancy with 20 healthy controls and investigated the causes of hypovitaminosis D.

Obesity is probably connected to a higher incidence of persistent low back pain, even though the evidence is inconclusive. We did not detect a significant difference between the two groups' BMIs, educational levels, marital statuses, or occupations in the current study.
Chronic low back pain was not associated with age, body mass index (BMI), smoking status, or the total number of pregnancies, according to research by R. Kain et al. [24]. Additionally, they found that vitamin D insufficiency and prior falls were the primary factors in determining chronic low back pain.

LIMITATION- This study has certain limitations, such as the fact that it only collected vitamin D data from a single patient and that the patients are only typical of those with CLBP who visit an outpatient clinic. To further demonstrate a cause-effect link, future studies can utilize randomized controlled trial designs, larger sample numbers, longer durations, and focused age groups.

CONCLUSION- Vitamin D insufficiency may be associated with more severe pain in CNSLBP postmenopausal patients, according to our study. Finally, among the most common reasons postmenopausal women visit an outpatient department is CNSLBP. The results of this investigation demonstrated that vitamin D deficiency was prevalent among CNSLBP patients. Low vitamin D levels were also associated with more severe pain. Consequently, it is strongly advised that vitamin D level screening be implemented on a large scale.

REFERENCES

1. Chenot J. F., Greitemann B., Kladny B., Petzke F., Pfingsten M., Schorr S. G. (2017). Non-specific low back pain. *Dtsch. Arztebl. Int.* 114 (51-52), 883–890. 10.3238/arztebl.2017.0883
2. Maher C., Underwood M., Buchbinder R. (2017). Non-specific low back pain. *Lancet* 389 (10070), 736–747. 10.1016/S0140-6736(16)30970-9

3. Vos T., Lim S. S., Abbafati C., Abbas K. M., Abbasi M., Abbasifard M., et al. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the global burden of disease study 2019. *Lancet* 396 (10258), 1204–1222. 10.1016/S0140-6736(20)30925-9
4. Cray L, Woods NF, Mitchell ES. Symptom clusters during the late menopausal transition stage: Observations from the Seattle midlife women's health study. Menopause. 2010;17(5):972-77.
5. Berridge M. J. (2015). Vitamin D cell signalling in health and disease. *Biochem. Biophys. Res. Commun.* 460 (1), 53–71. 10.1016/j.bbrc.2015.01.008
6. Hossein-nezhad A., Holick M. F. (2013). Vitamin D for health: A global perspective. *Mayo Clin. Proc.* 88 (7), 720–755. 10.1016/j.mayocp.2013.05.011
7. Wu Z., Camargo C. A., Jr., Sluyter J. D., Khaw K. T., Malihi Z., Waayer D., et al. (2019). Association between serum 25-hydroxyvitamin D levels and self-reported chronic pain in older adults: A cross-sectional analysis from the ViDA study. *J. Steroid Biochem. Mol. Biol.* 188, 17–22. 10.1016/j.jsbmb.2018.11.018
8. Michalska-Kasiczak M., Sahebkar A., Mikhailidis D. P., Rysz J., Muntner P., Toth P. P., et al. (2015). Analysis of vitamin D levels in patients with and without statin-associated myalgia - a systematic review and meta-analysis of 7 studies with 2420 patients. *Int. J. Cardiol.* 178, 111–116. 10.1016/j.ijcard.2014.10.118
9. Hsiao M. Y., Hung C. Y., Chang K. V., Han D. S., Wang T. G. (2015). Is serum hypovitaminosis D associated with chronic widespread pain including fibromyalgia? A meta-analysis of observational studies. *Pain Physician* 18 (5), E877–E887. 10.36076/ppj.2015/18/e877
10. Perez-Lopez FR, Chedraui P, Pilz S. Vitamin D Supplementation After the Menopause. *TherAdvEndocrinolMetab* (2020) 11:2042018820931291. doi: 10.1177/2042018820931291
11. Andersson GB. Epidemiological features of chronic low-back pain. Lancet. 1999 Aug 14;354(9178):581-5. doi: 10.1016/S0140-6736(99)01312-4. PMID: 10470716.
12. Riihimäki H. Low-back pain, its origin and risk indicators. Scand J Work Environ Health. 1991 Apr;17(2):81-90. PMID: 1828614.
13. Mattila VM, Sahi T, Jormanainen V, Pihlajamäki H. Low back pain and its risk indicators: a survey of 7,040 Finnish male conscripts. Eur Spine J. 2008 Jan;17(1):64-9. doi: 10.1007/s00586-007-0493-9. Epub 2007 Sep 13. PMID: 17874146; PMCID: PMC2365533.
14. Warner AE, Arnspiger SA. Diffuse musculoskeletal pain is not associated with low vitamin D levels or improved by treatment with vitamin D. J Clin Rheumatol. 2008 Feb;14(1):12-6. doi: 10.1097/RHU.0b013e31816356a9. PMID: 18431091.
15. de Torrenté de la Jara G, Pécoud A, Favrat B. Musculoskeletal pain in female asylum seekers and hypovitaminosis D3. BMJ. 2004 Jul 17;329(7458):156-7. doi: 10.1136/bmj.329.7458.156. PMID: 15258072; PMCID: PMC478229.
16. Plotnikoff GA, Quigley JM. Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. Mayo Clin Proc. 2003 Dec;78(12):1463-70. doi: 10.4065/78.12.1463. PMID: 14661675.
17. Hicks GE, Shardell M, Miller RR, Bandinelli S, Guralnik J, Cherubini A, Lauretani F, Ferrucci L. Associations between vitamin D status and pain in older adults: the

ISSN: 0975-3583, 0976-2833 VOL 13, ISSUE 8, 2022

Invecchiare in Chianti study. J Am Geriatr Soc. 2008 May;56(5):785-91. doi: 10.1111/j.1532-5415.2008.01644.x. Epub 2008 Mar 5. PMID: 18331295; PMCID: PMC2645670.

18. 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 Nov;26(11):1895-901. doi: 10.1007/s10067-007-0603-4. Epub 2007 Mar 22. PMID: 17377737.
19. Al Faraj S, Al Mutairi K. Vitamin D deficiency and chronic low back pain in Saudi Arabia. Spine (Phila Pa 1976). 2003 Jan 15;28(2):177-9. doi: 10.1097/00007632-200301150-00015. PMID: 12544936.
20. Bahinipati J, Mohapatra RG. A. Serum Magnesium and Vitamin D in Patients Presenting to the Orthopedics Out-Patient Department with Chronic Low Back Pain. Biomed Pharmacol J 2020;13(1)
21. Rkain H, Bouaddi I, Ibrahimi A, Lakhdar T, Abouqal R, Allali F, Hajjaj-Hassouni N. Relationship between vitamin D deficiency and chronic low back pain in postmenopausal women. Curr Rheumatol Rev. 2013;9(1):63-7. doi: 10.2174/1573397111309010011. PMID: 25198368.