



**A RETROSPECTIVE STUDY OF ASSOCIATION OF VITAMIN D
LEVELS IN PATIENTS WITH CHRONIC MUSCULO-SKELETAL
COMPLAINTS**

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ABSTRACT

Background: Vitamin D deficiency has been implicated in chronic pain status. Hence, the present study was a retrospective analysis of data from patients with chronic pain including non-specific musculoskeletal complaints. **Methods:** Patients of either gender, aged between 18 and 75 years, presented with any form of musculoskeletal complaint for at least 3 months and who had checked their vitamin D levels were included in the study. The following details were extracted from the patient's records: age, sex, diagnosis, duration of symptoms,

presence of any co-morbid illness, vitamin D levels, and visual analogue scale (VAS) for pain. **Results:** Data from a total of 98 patients were included in the analysis. The median (range) vitamin D levels were 16.1(3-100) ng/ml. A total of 69 out of 98 (70%) study participants were found to be deficient in vitamin D and 19 (19.4%) with insufficient levels. Of those with non specific musculoskeletal pain (n=50), 40 (80%) had deficient levels and 8 (16%) had insufficient vitamin D. However, a trend (P=0.06) was observed between the duration of symptoms and vitamin D levels. A statistically significant difference (P=0.01) was seen in vitamin D levels [median (range) – 13.1 (3-51.5) ng/ml] in those with non specific musculoskeletal pain and other diagnoses had Vitamin D level [median (range) – 18.6 (6.2-100) ng/ml] in the sub-group analysis. **Conclusion:** Vitamin D deficiency may result in chronic musculoskeletal pain. Hence, a high index of suspicion of hypovitaminosis

D is necessary from the physicians when patients with non specific musculoskeletal complaints are encountered in their clinical practice.

Key words: Hypovitaminosis D, Chronic pain, Vitamin D deficiency.

INTRODUCTION

Vitamin D, 90% of which is obtained from exposure of the skin to sunlight, has been reported to be deficient in approximately 3/4th of the population including Indians. ^[1, 2] Vitamin D deficiency is often overlooked and under-treated from the diagnostic point of view. ^[3, 4] Evidence indicates that an adequate level of vitamin D is essential for musculoskeletal health. ^[5, 6] Low back pain and proximal myopathy are common symptoms of vitamin D deficiency. ^[7] Studies have shown that hypovitaminosis D is a precipitating factor for chronic non specific musculoskeletal symptoms, ^[8-11] and vitamin D supplementation resulted in subsidence of such symptoms. Hence, as a part of routine patient care, vitamin D levels are checked in patients with any type of chronic musculoskeletal symptoms and when found to be either insufficient/deficient, supplementation of the same was prescribed in our tertiary care hospital. The present study was a retrospective assessment of vitamin D levels in patients with chronic musculoskeletal complaints.

METHODS

Ethics

The study was carried out in the rheumatology clinic of a tertiary care hospital between December 2013 and February 2014 after obtaining institutional ethics committee approval. Waiver for informed consent was obtained from the ethics committee as it is a retrospective study.

Study participants

Case records of those patients who visited the clinic between January and December 2013 were reviewed for the study. Patients of either gender, aged between 18 and 75 years, presented with any musculoskeletal complaint for at least 3 months and who had checked their vitamin D levels were included in the study. Those who were taking vitamin D supplementation even before their visit to the clinic were excluded from the analysis.

Study procedure

The following details were extracted from the patient's records: age, sex, diagnosis, duration of symptoms, presence of any co-morbid illness, vitamin D levels, and visual analogue scale (VAS) for pain. The diagnoses were classified into those patients with specific diagnosis (rheumatoid arthritis, osteoarthritis, lumbar spondylosis, and osteoporosis) and those with non specific musculoskeletal complaints. Vitamin D levels were categorized as follows: deficient (< 20 ng/ml), insufficient (20-29.9 ng/ml), optimal range (30-50 ng/ml) and high/toxic (> 50 ng/ml).^[12] The VAS was categorized into no pain (score of 0), mild (score 1-3), moderate (score 4-6) and severe pain (score 7-10).^[13]

Statistical analysis

Numerical data were tested for normal distribution using Kolmogorov-Smirnov test. Kruskal-Wallis H test was used to compare the vitamin D levels between different categories of patients. Mann-Whitney U test was used to assess the vitamin D levels between the genders and presence or absence of concomitant illness. Spearman correlation test was used to find out the association between the vitamin D levels and VAS score, duration of symptoms. Chi-square test was used to find out the association between categories of vitamin D levels and VAS scores. A multinomial logistic regression analysis was carried out with concomitant illnesses, gender, Vitamin D levels and diagnosis as independent factors and categories of VAS score as dependent factors. Logistic regression analysis was performed using SPSS 16.0 (SPSS Inc., Chicago, Illinois, USA) and all other analysis with GraphPadInStat version 3.05 for Windows 95, GraphPad Software, San Diego California USA, www.graphpad.com".

RESULTS

Demographic details

A total of 98 patients (83 females and 15 males) were identified to satisfy the eligibility criteria. Mean (SD) of age (in years) was 47.2 (15.2). Twenty two out of 98 patients (22.4%) were diagnosed to have rheumatoid arthritis, 14 (14.3%) with osteoarthritis, 3 (3%) with lumbar spondylosis, 5 (5%) with inflammatory arthritis and 1 (1%) with osteoporosis. The rest (55%) were associated with non-specific musculoskeletal complaints. Median (range) in years of duration of the symptoms was 0.5 (0.25-26). Twenty eight out of the total 98 (28.6%) had concomitant illnesses [diabetes mellitus -1; multiple (diabetes/hypertension/hyperthyroidism) – 13; others (depression, interstitial lung disease, ischemic heart disease).^[14]

Vitamin D levels

The median (range) vitamin D levels were 16.1(3-100) ng/ml. A total of 69 out of 98 (70%) study participants were found to be deficient in vitamin D and 19 (19.4%) with insufficient levels. Of those with non specific musculoskeletal pain (n=50), 40 (80%) had deficient levels and 8 (16%) had insufficient vitamin D. There was no significant difference between gender, patients with/without concomitant illness and between different categories of VAS score. However, a trend (P=0.06) was observed between the duration of symptoms and vitamin D levels. A statistically significant difference (P=0.01) was seen in the vitamin D levels [median (range) – 13.1 (3-51.5) ng/ml] in those with non specific musculoskeletal pain and other diagnoses had Vitamin D level [median (range) – 18.6 (6.2-100) ng/ml] in the sub-group analysis.

VAS score

Median (range) of VAS score was 6 (4-8). No significant difference was observed between the different categories of VAS and vitamin D. None of the factors were found to predict the VAS score in logistic regression model.

DISCUSSION

The present study was a retrospective analysis of the data of patients with chronic musculoskeletal complaints attending the rheumatoid clinic and those who got their vitamin D levels checked in a tertiary care hospital. We found that the vitamin D levels were significantly reduced in general and especially, those with chronic non specific musculoskeletal complaints.

Vitamin D is essential for the normal maintenance of calcium homeostasis and in turn, for bone strength. Vitamin D deficiency has been reported to be the precipitating factor for many of the musculo skeletal disorders including non specific musculoskeletal pain. ^[8-11] Other chronic musculoskeletal disorders have also been linked with low levels of vitamin D such as fibromyalgia, osteoarthritis, migraine headaches. ^[14] Even, authors have described an increased requirement of opioid drugs for managing chronic pain in vitamin D deficiency. ^[15] All these are observational studies and therefore may have to be interpreted with a high risk of bias. The largest study till date conducted in around 3000 individuals found that there was a 30% increase in the odds of patients being deficient in vitamin D with chronic musculoskeletal pain. ^[16] Putative mechanisms include an increase in the release of parathyroid hormone causing bone resorption, which leads to the generation of pain on the

periosteal covering of the bone. Studies have also shown that vitamin D receptors are located in the brain and modulation of these receptors prevents neural transmission of pain. Hence, hyperalgesia occurs in deficiency. ^[17] Evidence also exists on an increased number of nociceptor axons in vitamin D deficient state, resulting in skeletal muscle hypersensitivity. ^[18] Hence, considering the fact that chronic musculoskeletal pain occurs very commonly (15%), it may be prudent to administer vitamin D in such individuals if documented evidence exists. ^[19]

Preventing vitamin D deficiency is better than treating it. Adequate exposure to sun for at least 30 minutes and diet fortified in vitamin D should be consumed in adequate quantities. Prophylactic dose of vitamin D is 800-2000 IU/day while for treating the deficiency, it shall be administered to the maximum dose of 10,000 IU/day. ^[20] The study is limited in being retrospective and no follow-up details of the study participants were available. To conclude, vitamin D deficiency is commonly over-looked and under-diagnosed. Hence, a high index of suspicion on hypovitaminosis D is necessary from the physicians point of view when patients with non specific musculoskeletal complaints are encountered in their practice.

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REFERENCES

1. Ritu G, Gupta A. Vitamin D deficiency in India: prevalence, causalities and interventions. *Nutrients*, 2014; 6: 729-75.
2. Holick MF. Vitamin D deficiency. *N Engl J Med*, 2007; 357: 266-81.
3. Mithal A, Wahl DA, Bonjour JP, Burckhardt P, Dawson-Hughes B, Eisman JA et al. Global vitamin D status and determinants of hypovitaminosis D. *Osteoporos Int*, 2009;20:1807–20.
4. Van der Meer IM, Middelkoop BJ, Boeke AJ, Lips P. Prevalence of vitamin D deficiency among Turkish, Moroccan, Indian and sub-Saharan African populations in Europe and their countries of origin: An overview. *Osteoporos. Int*, 2011;22:1009–21.
5. Shinchuk L, Holick MF. Vitamin D and rehabilitation: improving functional outcomes. *NutrClinPrac*, 2007; 22: 297-304.
6. Prakash S, Kumar M, Belani P, Susvirkar A, Ahuja S. Interrelationships between chronic tension-type headache, musculoskeletal pain, and vitamin D deficiency: Is osteomalacia

- responsible for both headache and musculoskeletal pain? *Ann Indian AcadNeurol*, 2013; 16: 650-7.
7. Al Faraj S, Al Mutairi K. Vitamin D deficiency and chronic low back pain in Saudi Arabia. *Spine*, 2003; 28: 177-9.
 8. Schwalfenberg G. Improvement of chronic back pain or failed back surgery with vitamin D repletion: a case series. *J Am board Fam Med*, 2009; 22: 69-74.
 9. Kim T-H, Lee BH, Lee H-M, Lee S-H, Park J-O, Kim S-H et al. Prevalence of vitamin D deficiency in patients with lumbar spinal stenosis and its relationship with pain. *Pain Physician*, 2013; 16: 165-76.
 10. Knutsen KV, Brekke M, Gjelstad S, Lagerlov P. Vitamin D status in patients with musculoskeletal pain, fatigue and headache: a cross-sectional descriptive study in a multi-ethnic general practice in Norway. *Scandinavian Journal of Primary Health care*, 2010; 28: 166-71.
 11. Holick MF. "Vitamin D deficiency: what a pain it is". *Mayo Clinic Proceedings*, 2003; 12: 1457-59.
 12. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *J ClinEndocrinolMetab*, 2011; 96: 1911-30.
 13. Gerbershagen HJ, Rothaug J, Kalkman CJ, Meissner W. Determination of moderate-to-severe post operative pain on the numeric rating scale: a cut-off point analysis applying four different methods. *British Journal of Anaesthesiology*, 2011; 10: 1093-195.
 14. Benson J, Wilson A, Stocks A, Moulding N. Muscle pain as an indicator of vitamin D deficiency in an urban Australian aboriginal population. *Med J Aust*, 2006; 185: 76-77.
 15. Turner MK, Hooten M, Schmidt JE, KerkvlietJL, Townsend CO, Bruce BK. Prevalence and clinical correlates of vitamin D inadequacy among patients with chronic pain. *Pain Med*, 2008; 9: 979-84.
 16. McBeth J, Pye SR, O'Neill TW, Macfarlane GJ, Tajar A, Bartfai G et al. Musculoskeletal pain is associated with very low levels of vitamin D in men: results from the European male aging study. *Ann Rheum Dis*, 2010; 69: 1448-52.
 17. Autier P, Gandini S. Vitamin D supplementation and total mortality: a meta-analysis of randomized controlled trials. *ArchIntern Med*, 2007; 167: 1730-37.
 18. Tague SE, Clarke GL, Winter MK, McCarson KE, Wright DE, Smith PG. Vitamin D deficiency promotes skeletal muscle hypersensitivity and sensory hyperinnervation. *The Journal of Neuroscience*, 2011; 31: 728-38.

19. McBeth J, Jones K. Epidemiology of chronic musculoskeletal pain. *Best Pract Res ClinRheumatol*, 2007; 21: 403-25.
20. Kauffman JM. Benefits of vitamin D supplementation. *Journal of American Association of Physicians and Surgeons*, 2009; 14: 38-45.