

ORIGINAL ARTICLE

EVALUATION OF CORRELATION OF MUSCULOSKELETAL PAIN AND VITAMIN D IN ELDERLY PEOPLE

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ABSTRACT:

Introduction: As vitamin D supplementation may enhance muscle strength supplementation could also be an easy and inexpensive way to manage nonspecific musculoskeletal pain. In view of this present study was undertaken to evaluate correlation of musculoskeletal pain and Vitamin D in elderly people to prevent misdiagnosis. **Material and Methods:** The present cross-sectional comprised of control group of 30 healthy subjects without any musculoskeletal pain or discomfort and study group comprised of 30 patients with persistent, nonspecific chronic recurrent musculoskeletal pain over a period of 2 years. All patients were screened for Vitamin D level. Statistical analysis were carried out using Chi-square test with $p < 0.05$ was considered as significant value. **Results:** Evaluation of serum 25-hydroxyvitamin D levels showed that 24 patients (80%) had levels of vitamin D < 20 ng/mL, 6 patients had levels of vitamin D > 20 ng/mL where as in control group 2 patients (6%) had levels of vitamin D < 20 ng/mL and 28 patients had levels of vitamin D > 20 ng/mL with significant p value < 0.05 . **Conclusion:** The present study emphasis that patients with nonspecific musculoskeletal should be evaluated for serum 25-hydroxyvitamin D to prevent delay of diagnosis. The most cost-effective and efficient method for preventing vitamin D deficiency is to have adequate exposure to sunlight.

Keywords: 25-hydroxyvitamin D; Musculoskeletal pain;

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INTRODUCTION

The discovery of vitamin D receptors in muscle cells prompted investigators to look for a muscle analog of osteomalacia.¹ Vitamin D deficiency in adults eventually leads to the osteomalacia syndrome, with its characteristic clinical features of bone pain, muscle weakness, and difficulty in walking.² There is universal agreement that vitamin D is essential for bone health and for prevention of rickets in children and osteomalacia in adults, and there is little controversy over the adverse effects of deficiency on bone and calcium metabolism. There is a newer concept of "insufficiency," meaning levels that do not cause severe bone and calcium effects, but still cause secondary increases in parathyroid hormone and osteoporosis. Institute of Medicine (IOM) defines "insufficiency" as levels < 20 ng/mL, while the Endocrine Society defines it as 20-29 ng/mL.³

As vitamin D supplementation may enhance muscle strength supplementation could also be an easy and inexpensive way to manage non specific

musculoskeletal pain.¹ In view of this present study was undertaken to evaluate correlation of musculoskeletal pain and Vitamin D in elderly people to prevent misdiagnosis.

MATERIAL AND METHODS

The present cross-sectional, hospital based descriptive study was conducted over 60 subjects aged 40 to 70 years reporting to out-patient department of the Hospital. The study comprised of control group of 30 healthy subjects without any musculoskeletal pain or discomfort and study group comprised of 30 patients with persistent, nonspecific chronic recurrent musculoskeletal pain over a period of 2 years. The study was conducted over a duration of 6 months. Informed consent was taken from the patients. Any patients with any liver or kidney disorders, over certain medicines including phenytoin, phenobarbital, and rifampin were excluded from the study. A pretested proforma was designed for elucidating the information about history of

musculoskeletal pain and the other demographic variables. All patients were screened for Vitamin D level. Blood samples were taken and serum 25-hydroxyvitamin D levels were determined by radioimmunoassay method. Data so obtained was compiled and analyzed using SPSS-16. Statistical analysis were carried out using Chi-square test with $p < 0.05$ was considered as significant value. The results were interpreted to make suitable recommendation.

RESULTS

The present study consisted of 60 subjects, 30 in study group and 30 in control group. Evaluation of serum 25-hydroxyvitamin D levels showed that 24 patients (80%) had levels of vitamin D < 20 ng/mL, 6 patients had levels of vitamin D > 20 ng/ml where as in control group 2 patients (6%) had levels of vitamin D < 20 ng/mL and 28 patients had levels of vitamin D > 20 ng/ml with significant p value < 0.05 (table 1).

Table 1: Vitamin D levels in different groups

Group	No. of patients with levels of vitamin D < 20 ng/mL	No. of patients with levels of vitamin D > 20 ng/mL	Deficiency %
Study group n=30	24	6	80%
Control group n=30	2	28	6%
P value	< 0.05		

Table 2: Distribution of patients according to the profession

Patients with musculoskeletal pain with levels of vitamin D < 20 ng/mL (n=24)			
Occupation	No. of patients	Group	
Teachers	3	Study group	
Bankers	4		
Other inside office service	6		
Retired	1		
Nurses	4		
Doctor	2		
Dentist	2		
Housewives	2		
Patients suffering with musculoskeletal pain with levels of vitamin D > 20 ng/mL (n=6)			
Housewives	2		Study group
Bankers	1		
Dentist	1		
Physiotherapist	1		
Computer operator	1		
Patients without musculoskeletal pain or discomfort with levels of vitamin D < 20 ng/mL (n=2)			
Dentist	1	Control group	
Nurse	1		
Patients without musculoskeletal pain with levels of vitamin D > 20 ng/mL (n=20)			
Agriculturist (Farmers)	4	Control group	
Labourer	3		
Doctor	2		
Engineers with field job	4		
Shopkeepers	3		
Retired	2		
Housewives	2		

Table 2 shows distribution of patients according to the profession. Among the patients suffering from musculoskeletal pain and having level of vitamin D <20 ng/mL, 3 were teachers by profession, 4 were doing job in bank, 6 were doing other inside office jobs, 1 was retired, 4 were nurses, 2 were doctor, 2 were dentist and 2 were housewives. Among patients without musculoskeletal pain or discomfort with levels of vitamin D <20 ng/ml, 1 was dentist and 1 was nurse by profession.

DISCUSSION

Vitamin D deficiency causes muscle weakness and muscle aches and pains in both children and adults.⁴ In view of this, present study was undertaken to evaluate correlation of musculoskeletal pain and Vitamin D in elderly people to prevent misdiagnosis.

The importance of vitamin D on bone mineralization is well established. Often considered more of a steroid hormone than a vitamin, vitamin D has been recognized to exert wide-ranging effects, including a potentially important role in muscle health. Vitamin D status is usually defined by the concentration of calcidiol or 25-hydroxy vitamin D [25(OH)D] because this form reflects total body storage and is the precursor to the activated metabolite, 1,25-dihydroxyvitamin.⁵ Serum 25-hydroxy vitamin D is the analyte of choice for assessment of a patient's vitamin D level. It is preferred because it reflects precursor levels of vitamin D derived from cutaneous metabolism as well as from dietary intake. In addition, when compared to 1,25-dihydroxy vitamin D, its concentration is an order of magnitude higher, is less subject to physiological variation, has a longer half-life, and correlates well with bone mineral density. It is also suggested that vitamin D has anti-inflammatory activity decreasing some pro-inflammatory cytokines, thus decreasing pain. Not all people with vitamin D deficit will develop musculoskeletal pain but the probability for such increases with decreased vitamin D levels.⁶

The present study found that evaluation of serum 25-hydroxyvitamin D levels showed that 24 patients (80%) had levels of vitamin D <20 ng/mL. On distribution of patients according to their profession, it was found that all patients were involved in inside jobs and were not exposed to sunlight. There are a multitude of reasons for why vitamin D deficiency has become a major health problem for both children and adults of all ages and races. Extremely few foods naturally contain or are fortified with vitamin D. It

has been estimated that 90% or more of our required vitamin D comes from exposure to sunlight. Anything that interferes with the penetration of solar ultraviolet radiation into the skin, such as increased melanin pigmentation and sunscreen use, will diminish the cutaneous production of vitamin D³⁴

John McBeth et al⁷ also reported that musculoskeletal pain is associated with low vitamin D levels. Plotnikoff GA et al⁸ determined the prevalence of hypovitaminosis D in primary care outpatients with persistent, nonspecific musculoskeletal pain syndromes refractory to standard therapies and reported that all patients with persistent, nonspecific musculoskeletal pain are at high risk for the consequences of unrecognized and untreated severe hypovitaminosis D. Gloth et al⁹ reported reduced pain week after administration of 50,000 IU vitamin D₂ in elderly patients.

On the contrary, Warner AE et al¹⁰ Low vitamin D levels are not associated with diffuse musculoskeletal pain, and treatment with vitamin D does not reduce pain in patients with diffuse pain who have low vitamin D levels.

There are several possible mechanisms to explain why vitamin D supplementation may have a pain-relieving effect: a rapid nongenomic influence of vitamin D on the metabolism of muscle cells, growth of muscle fibers by a slow genomic effect on muscle cells, and a nonspecific effect on the central or peripheral nervous system. As chronic pain is strongly influenced by mood, an antidepressive effect of vitamin D could also be postulated.¹

Singh et al³ conducted a literature review and found that normal and desirable levels of 25-hydroxyvitamin D as 50ng/mL. Levels consistently higher than 200ng/mL are associated with toxicity, and, given the current state of knowledge the upper limit of normal should be capped at 80ng/mL. To achieve 25-hydroxyvitamin D levels of 30 ng/mL or higher, and depending on the health status, sun exposure, intake of medications, recommend that total daily intake of vitamin D should be about 1000 IU/day to prevent bone disease and about 2000 IU/day to promote optimal health. Special populations (e.g. nursing home residents, those with severe deficiency) may require higher doses. Daily supplements of 4000 IU are generally considered safe. Recommendations of optimal vitamin D supplementation will continue to evolve as measures of vitamin D status are refined and studies of impact

of vitamin D supplementation on health and disease continue to be reported.

Thus, dietary and supplemental vitamin D as well as occasional traveling to sunny places during winter holidays should be of utmost importance in maintaining an appropriate vitamin D status.¹¹

CONCLUSION

The present study emphasizes that patients with nonspecific musculoskeletal pain should be evaluated for serum 25-hydroxyvitamin D to prevent delay of diagnosis. The most cost-effective and efficient method for preventing vitamin D deficiency is to have adequate exposure to sunlight.

REFERENCES

1. Schreuder F, Bernsen RMD, van der Wouden JC. Vitamin D Supplementation for Nonspecific Musculoskeletal Pain in Non-Western Immigrants: A Randomized Controlled Trial. *Ann Fam Med* 2012;10:547-55.
2. Nellen JF, Smulders YM, Jos Frissen PH, Slaats EH, Silberbusch J. Hypovitaminosis D in immigrant women: slow to be diagnosed. *BMJ*. 1996;312(7030):570-2.
3. Singh G and Drees BM. Normal, Healthy, and Optimum Level of 25-Hydroxyvitamin D and Required Daily Intake of Vitamin D. *Austin J Nutri Food Sci*. 2015;3(2): 1060.
4. Holick MF. Vitamin D Deficiency: What a Pain It Is. *Mayo Clin Proc*. 2003;78:1457-1459.
5. Tanner BS, Harwell SA. More than healthy bones: a review of vitamin D in muscle health. *Therapeutic Advances in Musculoskeletal Disease* 2015;7(4):152-9.
6. de Oliveira WS, Moraes N, Santos FC. Vitamin D and chronic pain in the elderly. *Rev Dor. São Paulo* 2013;14(3):223-5.
7. John McBeth, Stephen R Pye, Terence W O'Neill, Gary J Macfarlane, Abdelouahid Tajar, et al. Musculoskeletal pain is associated with very low levels of vitamin D in men: results from the European Male Ageing Study. *Ann Rheum Dis* 2010;69:8 1448-1452
8. Plotnikoff GA, Quigley JM. Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. *Mayo Clin Proc*. 2003;78:1463-1470.
9. Gloth FM III, Lindsay JM, Zelesnick LB, Greenough WB III. Can vitamin D deficiency produce an unusual pain syndrome? *Arch Intern Med*. 1991;151(8):1662-1664.
10. Warner AE, Arnsperger SA. Diffuse musculoskeletal pain is not associated with low vitamin D levels or improved by treatment with vitamin D. *J Clin Rheumatol*. 2008;14(1):12-6
11. Lamberg-Allardt CJ, Outila TA, Kärkkäinen MU, Rita HJ, Valsta LM. Vitamin D deficiency and bone health in healthy adults in Finland: could this be a concern in other parts of Europe? *J Bone Miner Res* 2001;16(11):2066-73.

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