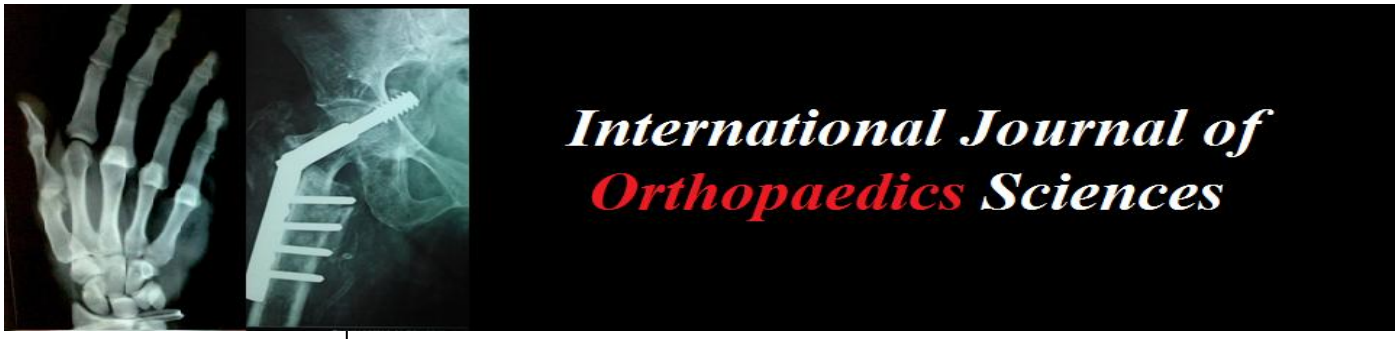

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2019; 5(4): 976-979

www.orthopaper.com
Received: 07-08-2019
Accepted: 10-09-2019

Dr. Mohan Hanuman A
Post-Graduate, Department of Orthopaedics, GSL Medical College, Rajamahendravaram, Andhra Pradesh, India

Dr. Satyaprasad J
Professor and Head, Department of Orthopaedics, GSL Medical College, Rajamahendravaram, Andhra Pradesh, India

Dr. Nageswara Rao V
Professor, Department of Orthopaedics, GSL Medical College, Rajamahendravaram, Andhra Pradesh, India

Dr. Ganapathi Swamy CH
Assistant Professor of Biostatistics, Department of Community Medicine, GSL Medical College, Rajamahendravaram, Andhra Pradesh, India

Corresponding Author:
Dr. Satyaprasad J
Professor and Head, Department of Orthopaedics, GSL Medical College, Rajamahendravaram, Andhra Pradesh, India

Prevalence of vitamin-D deficiency in patients attending ortho OPD with vague musculoskeletal complaints and their response to oral vitamin-D supplementation: An Interventional study

Dr. Mohan Hanuman A, Dr. Satyaprasad J, Dr. Nageswara Rao V and Dr. Ganapathi Swamy CH

DOI: https://doi.org/10.22271/ortho.2019.v5.i4q.1804

Abstract
Vitamin-D deficiency has become a global problem in adults. It causes rickets in children, osteomalacia in adults. Osteomalacia causes general weakness, back and neck pains, other body pains, and sciatica-like symptoms. Causes of vitamin-D deficiency presently are due to:

- Lack of exposure to sunlight
- Due to changes in lifestyles

We conducted a study on patients coming to Ortho OPD with vague symptoms like bodypains, sciatica e. t. c to find out vitamin-D deficiency by doing blood tests for 25-OH vitamin-D, which is supposed to correlate well with the clinical symptoms of osteomalacia.
Aim of the study: To know the prevalence of vitamin-D deficiency/insufficiency in these patients (patients coming to Ortho OPD) and to observe the response to vitamin-D supplementation.
Methodology: It is an interventional study in which 49 Patients attending orthopedic OPD with vague complaints were included during Dec-2017 to Dec 2018. Their 25-hydroxy vitamin-D levels were assessed, and they were supplemented with different doses of vitamin-D for varied periods based on deficiency /insufficiency of vitamin-D levels. All the patients were followed up for six months during vitamin-D supplementation. The clinical response to treatment was evaluated.
Results: Mean age of the participants is 39. 02+12. 8yrs. 76%of study subjects were females. About 47% of the patients have deficient vitamin-D levels. The association between vitamin-D levels and the presenting complaints is statistically significant (P value<0. 05). At the end of 6 months, vitamin-D levels of all cases were within the normal range.
Conclusion: Patients presenting with vague musculoskeletal symptoms should be investigated for vitamin-D deficiency, and they should be supplemented with the vitamin-D.

Keywords: Vitamin-D, Musculoskeletal symptoms, Osteomalacia

Introduction
Vitamin-D deficiency continues to be a world wide threat, especially in developing countries. Vitamin-D deficiency is prevalent (around 50-90%) in the Indian subcontinent. It is well known that vitamin-D deficiency causes rickets in children and osteomalacia in adults. Previously vitamin-D deficiency was supposed to affect poor people, living in congested and crowded localities. Now it has become the disease of affluent people who are used to air-conditioned lifestyles.
The change in our lifestyles in confining ourselves more to indoors, the vitamin-D deficiency is again coming into the limelight. Vitamin-D plays a major role in normal mineralization of bones, increased uptake of calcium and phosphorous from intestines, and reabsorption of calcium in kidneys, maintaining of ionized calcium in blood. vitamin-D is also involved in a wide range of cellular activities including differentiation, inhibition of cell growth, immunomodulation and control of other hormonal systems (Holick MF, vitamin-D deficiency 2007) [5]. It is also necessary for bone growth and bone remodelling by osteoblasts and osteoclasts (Dietary supplement, National institute of health, 2008). Poor muscle strength and

weakness may be associated with vitamin-D deficiency, which is common among elderly people because the capacity of the skin to synthesize the pro-vitamin-D (7-dehydro cholecalciferol) decreases with age. The discovery of vitamin-D receptors in muscle cells (Simpson RU, *et al.*, J Biol chem. 1985 & Bischoff HA, *et al.* Histochem J. 2001) [7, 9] encouraged investigators to look for muscle analogy of osteomalacia, because vitamin-D supplementation enhances muscle strength (Glerup H *et al*. Calcif Tissue int. 2000 & Lips p, *et al*. Am J Clin Nutr. 2010) [6]. Vitamin-D supplementation could also be an easy and inexpensive way to manage nonspecific musculoskeletal pain.

Provitamin D by solar exposure opens B ring and becomes a less rigid structure. Ergosterol, derived from exogenous source and 7- dehydrocholesterol, synthesized endogenously from cholesterol is stored in the skin. By the action of ultraviolet light on the skin, ergosterol is converted to D_2 and 7-dehydrocholesterol is converted to D_3. Then D_2 and D_3 undergo metabolic conversion in the liver to 25-hydroxyvitamin-D, a more active form. The latter substance is next converted to two other forms in the kidney. The 25-hydroxyvitamin-D, under the influence of PTH, is converted to 1, 25-dihydroxyvitamin-D, which is highly active in increasing absorption of calcium across the intestinal wall, mobilizing calcium from bone and resorbing calcium by the renal tubules. Under the influence of calcitonin, 24, 25-dihydroxyvitamin-D, a far less active metabolite, is produced with the formation of the more active form being suppressed. The three endogenous hormones, 1, 25- dihydroxy vitamin D, PTH, and calcitonin act together to maintain the level of calcium and phosphate within the narrow range required for normal neuromuscular function.

Levels of 25-hydroxy vitamin D were classified as

(From the endocrine society of vitamin D deficiency Michael F, Holick Evaluation, Treatment, and Prevention of Vitamin D Deficiency: an Endocrine Society Clinical Practice Guideline The Journal of Clinical Endocrinology & Metabolism, Volume 96, Issue 7, 1 July 2011, Pages 1911–1930)

Deficiency-<20 ng/ml
Insufficiency – 20-30 ng/ml
Sufficiency – 30-100 ng/ml
Toxicity->100 ng/ml.

Aims and Objectives

1. To find the prevalence of vitamin- D deficiency in patients coming to Orthopaedic OPD with vague musculoskeletal complaints
2. To evaluate the effect of vitamin D supplementation in relieving symptoms.

Methodology

An Interventional study conducted in Orthopaedic OPD of GSL Medical College among Patients aged 14years and above, attending to Ortho OPD during Dec-2017 to Dec 2018 with symptoms of back pain, neck pain, sciatica, body pains and other vague complaints not related to a specific cause. Seriously ill patients, Patients with specific cause for their symptoms like disc prolapse, lumbar canal stenosis, cervical spondylotic radiculopathy etc were excluded. About 49 subjects were included in the study.

The participants were interviewed after taking informed consent using pre-designed, pre-tested questionnaire. Study variables were age, Sex, Serum Vitamin D levels, and Musculoskeletal symptoms. Their 25-hydroxy vitamin-D levels were assessed, and they were supplemented with different doses of vitamin-D for varied periods based on deficiency /insufficiency of vitamin-D levels (i. e. 60000 IU of oral vitamin-D3 solutions was given weekly for three months in patients with vitamin-D deficiency category and 2 months in patients with vitamin-D insufficiency category. All of them received a subsequent monthly maintenance dose of 60000 IU for six months). All the patients were followed up for six months during vitamin-D supplementation. The clinical response to treatment was evaluated.

Ethical clearance from the Institutional Ethical Committee was obtained. Data analysis was done using Excel & SPSS 20.

Results

Forty-nine patients of both sexes were included in the study. Patients were between the age group of 14yrs to 70yrs. Mean age of the participants is 39. 02±12. 8yrs. Their vitamin D levels were assessed, and they were supplemented with different doses of vitamin D and calcium for varied periods based on the vitamin D levels.

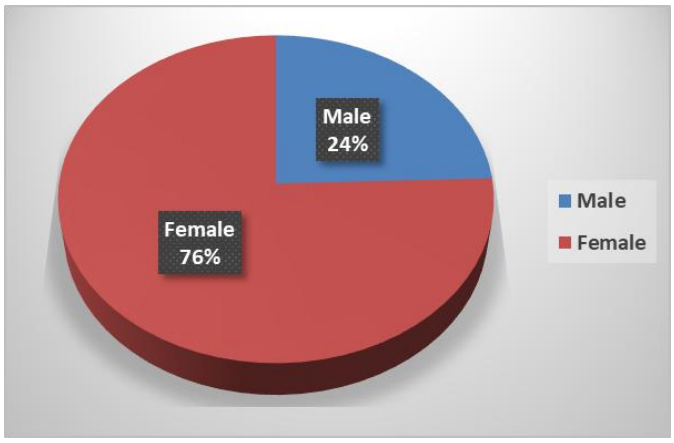

Fig 1: Distribution of subjects based on gender

More than 3/4th of study subjects were females and 24% were male subjects.

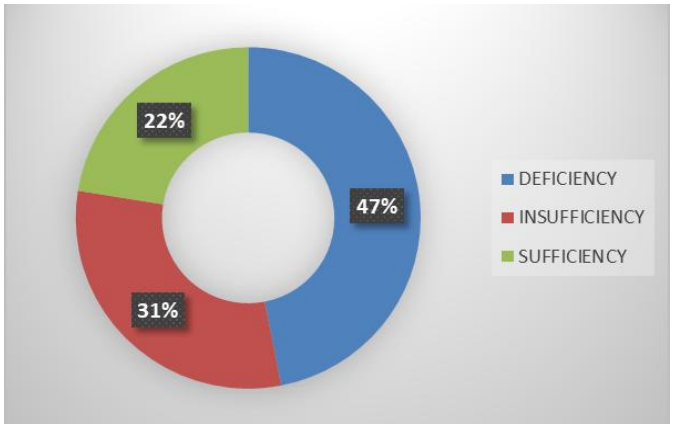

Fig 2: Distribution of subjects based on Vitamin D levels

Mean (SD) vitamin-D levels were found to be 23. 33± 15. 09 ng/mL. 47% of the patients had deficient vitamin D levels, 31% had insufficient levels, and the remaining 22% had sufficient levels of vitamin D levels.

Table 1: Distribution of study subjects as per age groups and vitamin D levels

Age groups	vitamin D (ng/ml)			Total	
	Deficiency	Insufficiency	Sufficiency		
<40yrs	10 (40%) (43. 5%)	9(36%) (60%)	6(24%) (54. 5%)	25(100%) (51%)	P value -0. 659
40-60yrs	11(57. 9%) (47. 8%)	5(26. 3%) (33. 3%)	3(15. %) (27. 3%)	19(100%) (38. 7%)	
>60yrs	2(40%) (8. 7%)	1(20%) (6. 7%)	2(40%) (18. 2%)	5(100%) (10. 2%)	
Total	23(46. 9%) (100%)	15(30. 6%) (100%)	11(22. 4%) (100%)	49 (100%) (100%)	

It was observed that 47. 8% of study subjects aged 40-60 years have vitamin D deficiency as compared to 43. 5% of subjects aged less than 40years and 8. 7% of subjects aged more than 60years.

Table 2: Distribution of study subjects as per vitamin D levels and presenting complaints

Vitamin-D values	Gen. body pains	Gen. weakness	LBA	LBA with radiculopathy	Multiple ailments	Plantar fascitis	Polyarthralgia	Total	
Deficiency	2 (8. 7%) (50%)	1 (4. 3%) (33. 3%)	5(21. 7%) (50%)	12(52. 3) (85. 7%)	2(8. 7%) (13. 3%)	1(4. 3%) (50%)	0	23(100%) (46. 9%)	
Insufficiency	2(13. 3) (50%)	2(13. 3%) (66. 7%)	3 (20%) (30%)	1 (6. 7%) (7. 15%)	5 (33. 3%) (33. 3%)	1 (6. 7%) (50%)	1(6. 7%) (100%)	15(100%) (30. 6%)	
Sufficiency	0	0	2 (18. 2%) (20%)	1 (9. 1%) (7. 15%)	8 (72. 7%) (53. 4%)	0	0	11(100%) (22. 4%)	P value - 0. 015
Total	4(8. 1%) (100%)	3(6. 1%) (100%)	10 (20. 4%) (100%)	14 (28. 6%) (100%)	15 (30. 6%) (100%)	2(4%) (100%)	1(2%) (100%)	49(100%) (100%)	

Note-LBA: Low backache, **Gen.:** General

The association between 25 Hydroxy vitamin D levels and the presenting complaints is statistically significant (P-value <0. 05).

Table 3: Distribution of study subjects as per vitamin D levels (Before and after intervention)

Vitamin D values	Mean	Std. Deviation	
Before supplementation of vitamin D	23. 3359	15. 09076	P value - 0. 000
After supplementation of vitamin D	50. 2939	16. 22722	

Statistically significant association was found between vitamin D supplementation and improvement in serum vitamin D levels in patients with vitamin D deficiency.

98% of subjects have shown symptomatic improvement with vitamin D supplementation. Similar findings were found in the study conducted by ramazan yilmaz, ali salli *et al.* that 85% of patients stated satisfaction with the treatment [1].

Though there was increase in the serum Vitamin D levels, there was no symptomatic improvement in one patient, out of 2 patients of plantar fasciitis with vitamin D supplementation.

Discussion

Mean age of the participants is 39. 02±12. 8yrs. In a study conducted by Ramazan Yilmaz, Ali salli *et al.* the mean age of participants was 36. 9 ±9. 2 years [1].

More than 3/4th of study subjects were females. 89. 7% were female subjects in a study conducted by Ramazan Yilmaz, Ali salli *et al.* [1].

Mean (SD) vitamin-D levels were found to be 23. 75 ± 14. 95 ng/mL. Mean serum level was 25. 2 nmol/l (SD ±4. 5) in a study by Marie France Le Goaziou *et al.* [2].

47% of the patients had deficient vitamin D levels, 31% had insufficient levels, and the remaining 22% had sufficient levels of vitamin D levels. Babita Ghai, Dipika Bansal, *et al.* in their study Baseline mean (SD) vitamin-D levels were found to be 12. 8 (5. 73) ng/mL. Sixty-one (90%) patients were found to be vitamin-D deficient, and 7 (10%) had insufficientlevels [3].

Wegman Bani-Issa, 1 Kamal Eldeirawi *et al.* observed that only 26% of the total subjects had sufficient vitamin D levels, whereas 74% had vitamin D deficiency [4].

The association between 25 Hydroxy vitamin D levels and the presenting complaints is statistically significant (P-value <0. 05).

Conclusions

Patients with non specific or vague musculoskeletal symptoms should be subjected to serum vitamin D level estimation as it is observed that there is improvement of symptoms in patients with vague musculoskeletal complaints on vitamin D supplementation for a period of 2 months.

References

1. Yilmaz R, Salli A, Cingoz HT *et al.* Efficacy of vitamin D replacement therapy in patients with chronic non specificic widespread musculoskeletal pain with vitamin D deficiency. Int J Rheum Dis. 2016; 19:1255-62
2. Marie France Le Goaziou, Nadir Kellou, Marie Flori, Corinne Perdrix, Christian Dupraz, Edwige Bodier & Gilbert Souweine. Vitamin D supplementation for diffuse musculoskeletal pain: Results of a before-and-after study, The European Journal of General Practice. 2014; 20:1, 3-9, DOI:10.3109/13814788.2013.825769
3. Babita Ghai, Dipika Bansal, Raju Kanukula, Kapil Gudala, Naresh Sachdeva, Saravdeep Singh Dhatt (2017)Vitamin D Supplementation in Patients with Chronic Low Back Pain: An Open-Label, Single Arm Clinical Trial, Pain Physician 2017; 20:E99-E105 • ISSN 2150-1149
4. Bani- issa W, Eldeirawi K, Harfil S, Fakhry R. Vitamin D deficiency and its determinants in adults: A sample from community- based settings in the United Arab Emirates. International Journal of Endocrinology, 2017, 3906306. https://doi. org/10.1155/2017/3906306
5. Holick MF. Phylogenetic and evolutionary aspects of vitamin-D from phytoplankton to humans. In: Pang PKT, Schreibman MP (eds). Vertebrate endocrinology: Fundamentals and biomedical implications, Orlando, FL: Academic Press. 1989; 3:7-43.

6. Glerup H, Mikkelsen K, Poulsen L *et al*. Hypovitaminosis D myopathy without biochemical signs of osteomalacic bone involvement. Calcif Tissue Int. 2000; 66(6):419-424.
7. Simpson RU, Thomas GA, Arnold AJ. Identify cation of 1, 25-dihydroxy Vitamin D3 receptors and activities in muscle. J Biol Chem. 1985; 260(15):8882-8891.
8. Endocrine Society of vitamin D deficiency Michael F, Holick Evaluation, Treatment, and Prevention of Vitamin D Deficiency: an Endocrine Society Clinical Practice Guideline The Journal of Clinical Endocrinology & Metabolism. 2011; 96(7):1911-1930.
9. Bischoff HA, Stähelin HB, Dick W, Akos R, Knecht M, Salis C, *et al*. Effects of vitamin D and calcium supplementation on falls: A randomized controlled trial. J Bone Miner Res. 2003; 18:343-351.
10. Simpson RU, Thomas GA, Arnold AJ. Identification of 1. 25-dihydroxyvitaminD3 receptors and activities in muscle. J Biol Chem. 1985; 260:8882-8891.
11. Stoll D, Dudler J, Lamy O, Hans D, SoA, Krieg MA, Aubry-Rozier B. High prevalence of hypovitaminosis D in a Swiss rheumatology outpatient population. Swiss Med Wkly. 2011; 141:w13196.
12. Michael F, Holick Evaluation, Treatment, and Prevention of Vitamin D Deficiency: An endocrine society clinical practice guideline the journal of clinical endocrinology & metabolism. 2011; 96(7):1911-1930.