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Study of Beneficial Role of Vitamin D in Chronic Low Back Pain

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ABSTRACT

Introduction. Low Back pain (LBP) is the most common neurologic complaint of patients attending outpatient clinics of Orthopedics, Neurology and in general practice. In most cases, the cause may be difficult to determine. In such cases, Vitamin D deficiency or insufficiency is observed as the predominant biochemical marker. Aim. To study the association between low vitamin D levels and chronic low back pain and the beneficial role, if any, of replacement therapy with vitamin D. **Methods.** From April, 2014 to March, 2015, total number 50 patients with chronic low back pain were assessed clinically and with investigations like CBP including ESR, serum creatinine, plain radiograph, CT, and MRI of the lumbosacral spine. Local pathologic conditions, renal impairment, chronic liver disease were excluded and they are labeled as patients with idiopathic chronic low back pain. Serum calcium, phosphate, PTH, and 25-hydroxy vitamin D level (Electro Chemiluminescence assay) were performed and patients are categorized as having deficient, insufficient and sufficient levels of vitamin D. Oral therapy with 25(OH) cholecalceferol was administered with doses ranging from 3000-5000units/day. Clinical reassessment of lower back pain was made after three months of vitamin D therapy. Oral painkillers were strictly avoided from use. **Results.** All the patients deficient in vitamin D, 84% of patients having insufficient vitamin D levels and 42.85% of patients with sufficient vitamin D levels have shown remarkable symptomatic relief. **Conclusions.** It is prudent to include measurement of vitamin D in investigation protocol of patients suffering from lower back pain which is amply revealed by this study.

KEYWORDS Chronic Low back pain, 25 (OH) vitamin D, Oral vitamin D therapy.

INTRODUCTION

Vitamin D deficiency is a major health problem in India, notwithstanding the fact that major part of the subcontinent comes under the tropical zone. The adequacy of the bare skin, for exposure, required to photosynthesize vitamin D is grossly ill defined. Darker skin has melanin content which acts as a natural sunscreen. In addition, Indian social and religious norms related to public modesty dictates that most parts of an individual's body be covered. The overcrowded tenements preclude direct sunlight to reach inside most parts of the dwellings. Also, most dietary sources of vitamin D have very low vitamin D content.

Most of the food items rich in vitamin D are of animal origin. Most Indians are vegetarian. The milk and milk products and foods of animal origin are unaffordable to the socioeconomically underprivileged. Also, the Indian diet contains low calcium and high phytate. The clinical presentation of vitamin D deficiency is protean, and lower back pain alone is a well-recognized presentation of the disease. This study was conducted to assess the contribution of vitamin D deficiency to lower back pain, a major symptom in the presentation of patients in the outpatient departments of Internal Medicine, Neurology, Neurosurgery and Orthopaedics

Materials and Methods:

From April, 2014 to March, 2015, a total number 50 patients with low back pain were assessed at the outset clinically. Clinical neurologic examination, complete blood picture including ESR and serum creatinine were done. Plain radiograph, CT, and MRI of the lumbosacral spine were performed to exclude conditions like disc prolapse, degenerative disease of the spine, or lumbar canal stenosis. Patients with clinical features suggestive of neurologic involvement, renal impairment and chronic liver disease were excluded from the study. After fulfilling the above criteria, 50 patients were recruited for the study and these were labeled as having idiopathic low back pain. A biochemical assay of serum calcium, phosphate, PTH, and 25-hydroxy vitamin D level was performed before and 3 months after treatment with vitamin D supplements. The 25-hydroxy vitamin D was measured by Electro Chemiluminescence assay. The reference levels of 25 (OH) vitamin D considered in the laboratory were "deficiency (<12ng/mL), insufficiency (12-20ng/mL), sufficiency (20-160ng/mL) and toxicity (>160ng/mL). Oral therapy with 25(OH) cholecalceferol was administered with a dose ranging from 3000-5000units/day. Three months after the initiation of the therapy, the above mentioned biochemical parameters were repeated and the clinical reassessment of lower back pain was made.

Results:

The results of the study are depicted in the tables 1 and 2 also in figures 1and 2. Of the total 50 patients, 40 are women (80%) and 10 are men (20%). Again, the patients (women and men separately) are categorized in to those with sufficient serum 25(OH)D levels, insufficient 25(OH)D levels and deficient 25(OH)D levels. In the beginning, the serum calcium, phosphate, alkaline phosphatase and serum PTH were measured for every patient along with 25(OH)D. The serum calcium, phosphate and alkaline phosphate were within normal limits for all these patients and there was no instance of secondary hyperparathyroidism.

Figure 1. Vitamin D levels at the beginning of the study

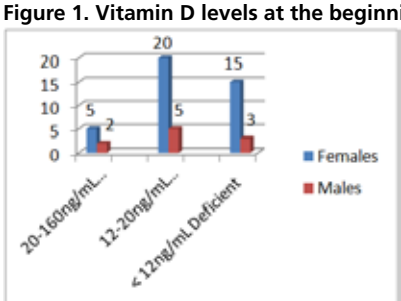

Table 1. Vitamin D levels at the beginning of the study

	Serum 25(OH)D levels	Number of patients	
		Females	Males
Sufficient	20-160ng/mL	5	2
Insufficient	12-20ng/mL	20	5
Deficient	< 12ng/mL	15	03

The measurements of serum calcium, phosphate, alkaline phosphate, and 25(OH)D were repeated for each patient after 3 months of oral 25-OH cholecalceferol with doses ranging from 2000-5000 U/day. All the patients deficient in vitamin D levels, 84% of the patients insufficient in vitamin D levels, and 42.85% of patients sufficient in vitamin D levels have shown remarkable recovery from their symptom of chronic low back pain. Painkillers were strictly avoided from use during study period. All the patients were kept on oral 25-OH cholecalceferol maintenance therapy.

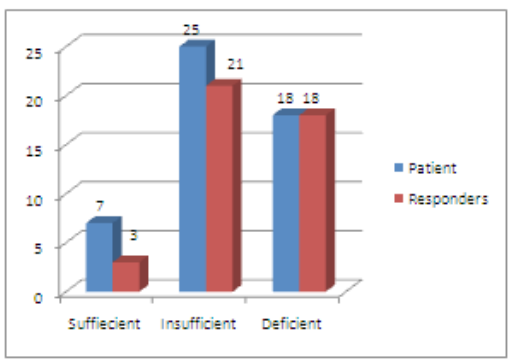

Figure 2. Eighty-four percent of patients reported beneficial response as cessation of low back pain to oral vitamin D replacement therapy

Symptomatic Response to Oral Therapy with vitamin D3 in the 3 groups of deficient, insufficient and sufficient 25(OH)D serum levels

	Serum Level of 25(OH)D						Total number
	Deficient		Insufficient		Sufficient		
	Females	Males	Females	Males	Females	Males	
Total number of patients	15	3	20	5	5	2	50
Total numbers of responders to vitamin D3 oral therapy	18		21		3		42
Percentage of Responders	100%		84%		42.85%		84%

Discussion

Low Back Pain is the most common neurologic complaint of patients attending the outpatient clinics of Internal Medicine, Neurology, Neurosurgery and Orthopaedics. It is also an extremely common complaint in general practice. Osteomalacia is a common metabolic disease characterized by defective mineralization of bone due to vitamin deficiency. Low back pain is the most common presenting symptom of osteomalacia. Few studies are available to know the contribution of vitamin D deficiency to the etiology of low back pain[1]. Viatamin D deficiency is pandemic and it is the most under-diagnosed and under-treated nutritional deficiency in the world[2,3,4]. Vitamin D deficiency prevails in epidemic proportions all over the Indian subcontinent. Chronic vitamin D deficiency in adults results in osteomalacia, osteoporosis, muscle weakness and increased risk of falls [5,6,7,8,9,10,11,12]. Subclinical vitamin D deficiency is highly prevalent in both urban and rural settings, and across all socioeconomic and geographic strata. Even the younger Indians too are suffering from this silent disease, which is evident from the present study. Most of the individuals recruited in the present study are housewives, computer operators, office boys, etc. whose exposure to shining sun in a day is very much minimal. Thus, Vitamin D deficiency is a major health concern in India, notwithstanding the brightly shining sun. Vitamin D deficiency is widespread in individuals irrespective of their age, gender, race and geography. Vitamin D is synthesized in sufficient amounts by most vertebrates on adequate exposure of the skin to sunlight (UVB rays). Vitamin D is a prohormone which requires two hydroxylations to finally attain its biologically active form – 1,25(OH)2D. The biologically active vitamin D, 1,25(OH)2D is released in to blood, where it binds to vitamin D binding protein (DBP) and reaches its target tissues to exert its endocrine functions through the vitamin D receptor (VDR). Vitamin D is required for the differentiation, proliferation, and maturation of cartilage cells and for the production of proglycan in articular cartilage. The most well recognized function of 1,25(OH)2D involves regulation of calcium and phosphorus balance for bone mineralization and remodelling. Maintenance of adequate levels of serum 25(OH) D is essential to sustain the multifarious effects, whether skeletal or extra-skeletal effects of vitamin D deficiency. Plasma 25(OH)D is the most reliable marker of vitamin D status.

Over the past few years, several researchers have found an association between low vitamin D levels and chronic low back pain that does not respond to treatment. In such patients, the replacement therapy with vitamin D resulted in remarkable relief of the symptom of low back pain. The present study was conducted to examine the role of vitamin D replacement therapy in alleviating the pain in patients suffering from idiopathic chronic low back pain in whom the vitamin D levels were low to low normal. The present study amply revealed that there is marked beneficial role of vitamin D replacement therapy in patients suffreing from chronic idiopathic lower back pain.

Conclusion

The observations in the present study revealed a high prevalence of vitamin D deficiency in patients presenting with chronic low back pain and, furthermore, a remarkable clinical and biochemical response is observed with oral vitamin D replacement therapy. The aim of the paper is to impress upon the practicing clinicians, more so the physicians, about the gravity of the vitamin D deficiency in most areas where it is prevalent, particularly with respect to the commonest complaint of lower back pain so that the measurement of vitamin D is made part of investigation protocol.

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