RESEARCH PAPER | Medical Science | Volume : 5 | Issue : 10 | October 2015 | ISSN - 2249-555X

Prevalence of Vitamin D Deficiency in Dark Complexion People with Chronic Low Backache

KEYWORDS: Dark complexion, Chronic Low back pain, 25 (OH) vitamin D, Oral vitamin D therapy,Dark skin

Dr.Ch.Ramakrishna Rao
Associate Professor of Neurology, Siddhartha Medical College, Vijayawada

Dr.W.Maruthi, MD
Associate Professor of Physiology, Guntur Medical College, Guntur

ABSTRACT ***Introduction.*** *Low Backache 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. Most of the patients are having low serum vitamin D levels. Many patients uniformly point to low 25 (OH)D levels in the population studies despite abundant sunshine in our country. The low levels of 25 (OH)D are most prevalent in the dark skinned individuals despite they are mostly exposed to the sun during their daily activities. Aim. To study the association between low vitamin D levels, dark skin and chronic low back pain. 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. Of the 50 patients studied, 45 patients were dark skinned. Oral therapy with 25(OH) cholecalceferol was administered with doses ranging from 3000-5000units/day with higher doses to dark skinned patients having deficient and insufficient vitamin D levels. 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 were 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, particularly of darker skinned individuals, suffering from lower back pain which is amply revealed by this study.*

INTRODUCTION

Vitamin D deficiency is a major health problem in India, not-withstanding 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. Dark-skinned people may be less efficient at making vitamin D because melanin in the skin hinders vitamin D synthesis. Black women have an increase in serum parathyroid hormone at a lower 25 (OH) level than white women. The amount of vitamin D produced depends on the intensity of the UVB in the sun and many other factors. Darker-skinned individuals may need 5-10 times more exposure than a fair-skinned person to make the same amount of vitamin D. Majority of the Indians are dark-skinned. 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 darker skin to vitamin D deficiency and in turn the low levels of vitamin D which precludes 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. Of the 50 patients studied, 45 were dark skinned, having prolonged exposure to sun light during the day, by virtue of their occupation. 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). All the patients with deficient and insufficient vitamin D levels and two patients with sufficient vitamin D levels were dark skinned. Oral therapy with 25(OH) cholecalceferol was administered with a dose ranging from 3000-5000units/day with higher doses to the darker skinned individuals having low vitamin D levels. 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.

Volume : 5 | Issue : 10 | October 2015 | ISSN - 2249-555X

Results:

The observations of the study are depicted in the tables 1 and 2 also in figure 1. 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. 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 3000-5000 U/day. All the patients (100%) 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. All the patients in the deficient and insufficient categories and two patients in the sufficient category were dark skinned. Painkillers were strictly avoided from use during study period. All the patients were kept on oral 25-OH cholecalceferol maintenance therapy.

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

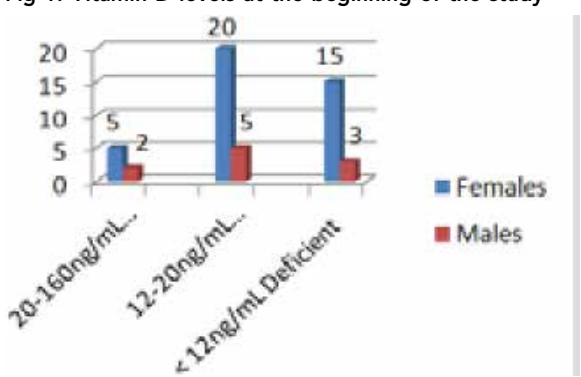

Table 1. Vitamin D levels at the beginning of the study

Categories of patients	Serum 25(OH)D levels	Number of patients	
		Females	Males
Sufficient (two dark skinned)	20-160ng/mL	5	2
Insufficient (all dark skinned)	12-20ng/mL	20	5
Deficient (all dark skinned)	< 12ng/mL	15	3

Table 2. Details of Symptomatic Response to Oral Vitamin D in the 3 groups

	Serum levels of 25 (OH)D						Total
	Deficient		Insufficient		Sufficient		
Total number of patients	F	M	F	M	F	M	
	15	3	20	5	5	2	50
Total number of Responders	18		21		3		42
Percentage of Responders	100%		84%		42.85%		84%

Discussion

Viatamin D deficiency is pandemic and it is the most underdiagnosed and under-treated nutritional deficiency in the world [1,2,3,4]. 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. The individuals recruited in the present study are laborers, housewives, sales boys, etc. 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 deficiency is a major health problem in India, not-withstanding 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. Dark-skinned people may be less efficient at making vitamin D because melanin in the skin hinders vitamin D synthesis. Black women have an increase in serum parathyroid hormone at a lower 25 (OH) level than white women. The amount of vitamin D produced depends on the intensity of the UVB in the sun and many other factors. Darker-skinned individuals may need 5-10 times more exposure than a fair-skinned person to make the same amount of vitamin D. 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.

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 darker skin with more melanin content. In such patients, the replacement therapy with vitamin D resulted in remarkable relief of the symptom of low back pain which is revealed by this study. The present study was conducted to examine the role of vitamin D replacement therapy in alleviating the pain in such patients, having darker skin, suffering from idiopathic chronic low back pain in whom the vitamin D levels were at deficient and insufficient levels. The present study amply revealed that there is marked beneficial role of vitamin D replacement therapy, in darker skinned patients, suffering from chronic idiopathic lower back pain.

Conclusion

The observations in the present study revealed a high prevalence of vitamin D deficiency in darker skinned patients presenting with chronic low back pain and, further-

Volume : 5 | Issue : 10 | October 2015 | ISSN - 2249-555X

more, 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 of our areas.

REFERENCE 1 .Moushumi, L., et. al. Assessment of Vitamin D status In Patients of Chronic Low Back Pain of Unknown Etiology. Indian Journal of Clinical Biochemistry, 2015 | 2. Van Schoor N.M., Lips P. Worldwide Vitamin D Status. Best Pract. Res. Clin. Endocrinol. Metab. 2011;25:671–680. doi: 10.1016/j.beem.2011.06.007. [PubMed] [Cross Ref] | 3. Mithal A., Wahl D.A., Bonjour J.P., Burckhardt P., Dawson-Hughes B., Eisman J.A., El-Hajj Fuleihan G., Josse R.G., Lips P., Morales-Torres J., et al. Global vitamin D status and determinants of hypovitaminosis D. Osteoporos Int. 2009;20:1807–1820. doi: 10.1007/s00198-009-0954-6. [PubMed] [Cross Ref] | 4. Van der Meer I.M., Middelkoop B.J., Boeke A.J., Lips P. Prevalence of vitamin D deficiency among Turkish, Moroccan, Indian and sub-Sahara African populations in Europe and their countries of origin: An overview. Osteoporos. Int. 2011;22:1009–1021. doi: 10.1007/s00198-010-1279-1. [PMC free article] [PubMed] [Cross Ref] | 5. Hazell T.J., DeGuire J.R., Weiler H.A. Vitamin D: An overview of its role in skeletal muscle physiology in children and adolescents. Nutr. Rev. 2012;70:520–533. doi: 10.1111/j.1753-4887.2012.00510.x. [PubMed] [Cross Ref] | 6. Holick M.F. The role of vitamin D for bone health and fracture prevention. Curr. Osteoporos. Rep. 2006;4:96–102. doi: 10.1007/s11914-996-0028-z. [PubMed] [Cross Ref] | 7. Lips P., van Schoor N.M. The effect of vitamin D on bone and osteoporosis. Best Pract. Res. Clin. Endocrinol. Metab. 201 1;25:585–591. doi: 10.1016/j. beem.201 1.05.002. [PubMed] [Cross Ref] | 8. Janssen H.C., Samson M.M., Verhaar H.J. Vitamin D deficiency, muscle function, and falls in elderly people. Am. J. Clin. Nutr. 2002;75:61 1–615. [PubMed] | 9. Bischoff H.A., Stahelin H.B., Urscheler N., Ehrsam R., Vonthein R., Perrig-Chiello P., Tyndall A., Theiler R. Muscle strength in the elderly: Its relation to vitamin D metabolites. Arch. Phys. Med. Rehabil. 1999;80:54–58. doi: 10.1016/S0003-9993(99)90307-6. [PubMed] [Cross Ref] | 10. Bischoff-Ferrari H.A., Daw¬son-Hughes B., Willett W.C., Staehelin H.B., Bazemore M.G., Zee R.Y., Wong J.B. Effect of Vitamin D on falls: A meta-analysis. JAMA. 2004;291:1999–2006. doi: 10.1001/ jama.291.16.1999. [PubMed] [Cross Ref] | 11. Bischoff-Ferrari H.A., Dietrich T., Orav E.J., Dawson-Hughes B. Positive association between 25-hydroxy vitamin D levels and bone mineral density: A population-based study of younger and older adults. Am. J. Med. 2004;1 16:634–639. doi: 10.1016/j.amjmed.2003.12.029. [PubMed] [Cross Ref] | 12. Bischoff-Ferrari H.A., Zhang Y., Kiel D.P., Felson D.T. Positive association between serum 25-hydroxyvitamin D level and bone density in osteoarthritis. Arthritis Rheum. 2005;53:821–826. doi: 0.1002/ art.21 601. [PubMed] [Cross Ref]