

Original article:

Analysis of VIT D3 levels in patients of low back ache

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Abstract

Introduction- Low back ache is a common complaint and is an important public health issue. Vitamin D3 is responsible for calcium metabolism and bone mineralization. Its deficiency has been linked with several disorders including musculoskeletal pain and fractures.

Aim- To evaluate the role of vitamin D3 in idiopathic chronic low back ache (CLBA).

Materials and Methods- This prospective observational study was done on 50 patients of idiopathic CLBA seen at Northern Railway Central Hospital between January to December 2018. All patients were evaluated for their pain by Visual Analogue Scale (VAS) score and for their serum Vitamin D3 levels. The highest score amongst all episodes of pain in the last 3 months was chosen for evaluation and the data obtained was statistically evaluated.

Observation and Results- CLBA was significantly more in females (35 out of 50). The average age was 55.65 with a standard deviation (SD) of 10.09 and a range from 29 to 71 years. However, males were significantly older than females. The severity of backache ranged from 4 to 8 on VAS with females having significantly more pain than males. Vitamin D3 levels ranged from 11-35 with males having significantly higher levels than females. There was a negative correlation between vitamin D3 levels and severity of pain (co-efficient of co-relation -0.54). Patients with normal Vitamin D3 (30ng/ ml or above) levels had significantly lower pain than those with lower levels of Vitamin D3 ($p < 0.01$). Age more than 60 years was a risk factor for more pain and lower vitamin D3 levels but the latter was statistically insignificant.

Conclusion - Lower Vitamin D3 levels are associated with higher incidence and severity of pain. Females have significantly lower vitamin D and experience more severe pain than males significant. Elderly patients had significantly more severe pain and lower vitamin D3 levels.

Key Words- Chronic low back ache, Visual Analogue Scale, Vitamin D3

Introduction

Vitamin D is a group of fat-soluble secosteroids responsible for increasing intestinal absorption of calcium, magnesium and phosphate, and multiple other biological effects, including bone mineralization. Deficiency of Vitamin D can cause several chronic diseases. Vitamin D₃ is also known as cholecalciferol. Only a few foods contain vitamin D. The major natural source of the vitamin is synthesis of cholecalciferol in the skin

from cholesterol through a chemical reaction that is dependent on sun exposure (specifically UVB radiation). A protein enzyme must hydroxylate it to convert it to the active form, calcitriol (also known as 1, 25-dihydroxycholecalciferol).⁽¹⁻⁴⁾ Low back pain has been defined as pain localized to the area below the costal margins and above the inferior gluteal folds.⁽⁵⁾ Backache is one of the commonest symptoms universally and everybody does experience it sometime in lifetime. Because of its social and cost implications, it is emerging as an important public health problem.⁽⁷⁾ Only in 20% cases can an exact cause be identified as it is a multifactorial problem.⁽⁶⁾ Several researchers have found low Vitamin D3 levels in patients of low backache.^(7, 8) However others did not find a significant correlation between Vitamin D3 levels and severity of pain.^(9, 10) This study was conducted to evaluate the association of Vitamin D3 with idiopathic chronic low back ache in an industrial North Indian population.

Materials and methods

This was a prospective observational study conducted at Northern Railway Central hospital between January to December 2018. The subject population consisted of all patients with idiopathic chronic low backache, which was defined as persistence of continuous or episodic low back pain persisting over 3 months or more without obvious traumatic, metabolic or inflammatory causes. Patients with obvious trauma, deformity or inflammatory conditions of the spine were excluded from the study. A total of 50 consecutive patients from both sexes and all age-groups who fulfilled the inclusion criterion were included in the study. All patients underwent a careful and detailed clinical evaluation with specific reference to pain scoring. The visual analogue scale was used to record pain and the highest score amongst all episodes of pain in the last 3 months was chosen for evaluation. Patients with a score of 4 or more were included in the study. All patients underwent X-ray of the spine AP and Lateral views and a DEXA scan to evaluate bone mineral density. Any other investigations like MRI, RA factor, CRP etc., were guided by the results obtained. All scans were reviewed by the same radiologist. The Vitamin D3 was assessed on Beckman Coulter Access 2 Automated immunoassay Machine, whereas the DEXA scan was performed on - GE lunar full fan beam whole body DEXA system. The T-scores were calculated at the hip and spine and the lowest score amongst them was taken for evaluation. The normal level of serum Vitamin D is >30 ng/mL, if it is 20–30 ng/mL, there is Vitamin D deficiency; if it is <20 ng/mL, there is lack of Vitamin D; and if it is <10 ng/mL, there is a serious lack of Vitamin D.⁽⁷⁾

Observation and results

Out of the 50 cases enrolled in the study 35 were females. This female preponderance amongst patients of idiopathic low backache was statistically significant. The average age was 55.65 with a standard deviation (SD) of 10.09 and a range from 29 to 71 years. However, males in the study had significantly higher age than females (Table 1). The severity of backache ranged from 4 to 8 on VAS with females having significantly more pain than males. (Table 1). Vitamin D3 levels ranged from 11-35 with males having significantly higher levels than females. (Table 1). Patients with normal Vitamin D3 (30 or above) levels had significantly lower pain (mean VAS score 4 with SD 0) than those with lower levels of Vitamin D3 (mean VAS score 5.32 with SD 1.46 and range 4-8). There was a negative correlation between vitamin D3 levels and severity of pain (co-efficient of co-relation -0.54). This implied that as the vitamin D3 level decreased the intensity of pain increased. In our study patients older than 60 years had

significantly more severe pain but though they had lower vitamin D3 levels, the difference was not statistically significant. (Table 2)

	Male	Female	Total	P-value
Number	15	35	50	
Av Age	63.8	52.31	55.65	p<0.01
SD (age)	5.35	9.6	10.09	
Range (age)	53 to 71	29 to 71	29 to 71	
mean VAS	4.53	5.31	5.08	p<0.05
SD (VAS)	0.92	1.53	1.41	
range (VAS)	4 to 6	4 to 8	4 to 8	
D3 Level mean	32.67	22.73	23.94	p<0.01
SD (D3)	1.8	3.27	4.31	
Range (D3)	21 to 35	11 to 34	11 to 35	

Table-1 Relation of Severity of pain Vitamin D3 with sex

	Age <60	Age > 60	Total	P-value
Number	31	19	50	
mean VAS	4.9	5.37	5.08	p<0.05
SD (VAS)	1.25	1.64	1.41	
range (VAS)	4 to 8	4 to 8	4 to 8	
D3 Level mean	25.06	23.63	23.94	p<0.05
SD (D3)	4.69	5.26	4.31	
Range (D3)	18 to 34	11 to 35	11 to 35	

Table-2 Relation of Severity of pain and Vitamin D3 with Age

Discussion

Symptoms of Vitamin D deficiency depend on the grade and duration of deficiency. Most patients are asymptomatic.⁽¹¹⁾ Deficiency causes rickets in children and osteomalacia in adults. Patients may develop a decrease in bone mineral density, musculoskeletal pain and weakness and fractures, depending on the degree of deficiency.^(12, 13)

A study by Gokcek E and Kaydu A, demonstrated that patients with LBP had a deficiency of Vitamin D and that there was a negative correlation between the level of Vitamin D and pain severity⁽⁷⁾ In another review it was found that patients with LBP have lower serum Vitamin D levels and this was more pronounced in younger women.⁽¹⁴⁾ Several other studies have also demonstrated a significant correlation between serum Vitamin D levels and pain severity.^(7, 8, 15) However, in some other studies, these were not found to be significantly correlated.^(9, 10)

In a study conducted by Badsha *et al.*, 90% patients having pain and D vitamin deficiency improved when treated with Vitamin D.⁽¹⁶⁾ However, in a review of four studies comparing placebo and D vitamin therapy in patients with pain complaints, only one study showed that Vitamin D supplements were superior to placebo.⁽¹⁷⁾

Two possible mechanisms can be postulated for relation between vitamin D deficiency and lower backache.⁽¹⁸⁾ –

1. Vitamin D deficiency causes diffuse pain in muscle and bone, weakness with paraesthesia.
2. In decreased vitamin D levels there is decrease in anti-inflammatory cytokines and increase in pro-inflammatory cytokines which leads to increased chances of inflammation in end plates of vertebrae.

In our study also we found that lower Vitamin D3 levels tended to be associated with increased severity of pain, more so in females and the elderly. However, in the latter the difference was not statistically significant.

Conclusion

Lower level of serum Vitamin D3 levels are associated with higher incidence and severity of pain. Females have significantly lower levels of vitamin D and experience significantly more pain than males. Though age more than 60 is also a risk factor for more pain and lower Vitamin D3 levels, the latter is not statistically significant.

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