Volume : 4 | Issue : 8 | Aug 2015 • ISSN No 2277 - 8179

Research Paper

Predictive Markers for Vitamin D Deficiency in Young Patients with Low Backache

Medical Science

KEYWORDS : i.Low Backache
ii.Vitamin D deficiency
iii.Predictive Markers

Dr Rishi Aggarwal	Senior Registrar, Seth GSMC and KEM Hospital, Mumbai.
Dr S.K. Srivastava	Head of Orthopaedics Department, Seth GSMC and KEM Hospital, Mumbai.
Dr Taufiq Panjwani	Senior Registrar, Seth GSMC and KEM Hospital, Mumbai.
Dr Tanvi Lohiya	Senior Registrar, LTMMC and LTMGH, Mumbai

ABSTRACT

Estimation of Vitamin D in serum remains the gold standard for diagnosis of Vitamin D deficiency. Surrogate markers in the patients' clinical profile or radiological investigations might be associated with Vitamin D deficiency. This study aims at investigating these surrogate markers.

Young patients (age ≤ 30) with low backache were included. Clinical and radiological parameters were correlated with serum Vitamin D value. 86 patients were included in study with mean age of 24.74 ± 4.31 years. The mean Vitamin D value was 18.34 ± 15.41 (range 7.37 – 86.34 years).

Moderate – sever pain (VAS > 4), Muslim females, smokers, spondylolisthesis and presence schmorl's nodes were associated with 100 % prevalence of Vitamin D deficiency. These may be considered as predictive markers of Vitamin D deficiency and prophylactic treatment with Vitamin D supplementation may be considered in these patients.

Introduction:

Degenerative disorders are most common in the cervical and lumbar spine[1]. By far pain is the most common symptom. On an average neck pain and low back pain constitute almost 40 – 50 % of the patients in an orthopaedic OPD. Pain varies from dull aching occasional pain to severe pain disabling the patient from doing day to day activities. Low back pain is most prevalent between the ages of 35 and 55 years. A herniated nucleus pulposus is more likely to occur between the ages 30 and 40 years as at this time the disc loses its water content and the process of degeneration starts [2,3]. Low backache is no longer a problem of the elderly. Young patients often less than 30 years old are increasingly being bothered by backache.

Vitamin D deficiency is highly prevalent. The prevalence is higher in patients with backache. Even though the prevalence is high, the cause – effect relation between Vitamin D deficiency and backache is still controversial. Estimation of Vitamin D in serum remains the gold standard for diagnosis of Vitamin D deficiency. Surrogate markers in the patients' clinical profile or radiological investigations might be associated with Vitamin D deficiency. This study aims at investigating these surrogate markers.

Materials and Methods:

1.) Study Design:

Single-center cross-sectional study.

2.) Patient Selection Criteria:

Patients with age less than or equal to 30 years with non traumatic low back ache who attended the orthopedic out patient department or took indoor treatment for the same were included. Patients with low backache secondary to trauma, inflammatory, infectious, metabolic disorders were excluded. Detailed history was taken and examination done. Patients diagnosed elsewhere as having degenerative disease of cervical and lumbar spine, who were referred to our center for opinion and management were also included in the study.

The study has been approved by the Ethics Committee and Institutional Review Board of our Institution.

3.) Clinical parameters noted:

1. Age: Divided in 3 groups. 15 – 20, 21 – 25, 26 – 30.
2. Sex
3. Religion
4. Severity of pain: Recorded on VAS (Visual analogue scale)
5. Smoking status
6. Alcohol intake

4.) Radiological Investigations

Antero-Posterior, Lateral, Flexion & Extension X rays were done of all the patients enrolled in the study.

A MRI (Magnetic resonance imaging) was adviced to all patients. Screenig of the whole spine with dedicated cuts of lumbar spinr was done in the patients.

5.) Hematological Investigation

After overnight fasting, single blood sample was withdrawn between 10:00 and 11:00 am in every patient. This was done to rule out any diurnal variations. Serum levels of 25-OH Cholecalciferol were done by chemiluminescence assay from a reliable laboratory.

6.) Analysis

SPSS Statistics (Version 20.0) was used for statistical analysis. Descriptive statistics were calculated for all variables with distributions assessed for normality. The Vitamin D levels were corelated to clinical and radiological parameters. For the purpose of statistical analysis, Vitamin D deficiency was classified as low (< 30 ng/ml) and normal (≥ 30 ng/ml).

Results:

The study included 86 patients with a mean age of 24.74 ± 4.31 years (range 17 – 30 years). The demographic characteristics of the patient have been shown in Table 1.

Table 1: Demographic characteristics of the patients

Parameter	Division	Number

Volume : 4 | Issue : 8 | Aug 2015 • ISSN No 2277 - 8179

Age	15-20	20
	21-25	24
	26-30	42
Sex	Male	42
	Female	44
Religion	Hindu	66
	Muslim	20
Smoking Status	Smoker	16
	Non Smoker	70
Alcohol Consumption	Yes	2
	No	84

The mean Vitamin D value was 18.34 ± 15.41 (range 7.37 – 86.34 years). 76 out of 86 patients had low Vitamin D. Thus the prevalence of Vitamin D deficiency in our study is 89%. The correlation of clinical and radiological parameters to Vitamin D is shown in Table 2.

Parameter	Division	Vitamin D	
		Low	Normal
Age	15 – 20	20	0
	21 – 25	22	2
	36 – 30	34	8
Sex	Male	36	6
	Female	40	4
Religion	Hindu	54	9
	Muslim	20	0
	Christian	2	1
Smoking Status	Smoker	16	0
	Non Smoker	60	10
Alcohol Intake	Yes	2	0
	No	74	10
VAS	0 – 4 (Mild)	18	8
	5 – 7 (Moderate)	46	2
	8 – 10 (Severe)	12	0
Loss of Lordosis	Yes	40	6
	No	36	4
Osteophyte on X ray	Present	14	4
	Absent	62	6
Decreased Disc Space	Yes	6	2
	No	70	8
Schmorl's Node	Present	14	0
	Absent	62	10
Flavum Thickening	Present	12	4
	Absent	64	6

Discussion:

The average Vitamin D value of the study group was 18.35. In a recent study, the prevalence of Vitamin D deficiency in normal individuals was found to be 58.5 % [4]. However, the prevalence of Vitamin D deficiency even in normal individuals in India has been found to be reaching 90 % [5]. In our study group the prevalence of Vitamin D deficiency was 79 %. However due to non-availability of a control group, we could not establish a cause effect relationship between Vitamin D deficiency and degenerative disorders of the spine. Further prospective studies with appropriate age and sex matched control groups are required to establish a cause effect relationship between Vitamin D deficiency and degenerative spine disorders.

The prevalence of Vitamin D deficiency is 100% in age group 15 – 20 years and average Vitamin D level is 13.25 ng/dl. This average value is lower than the other age groups (14.83 ng/ml in 21 – 25 years and 22.78 in 26 – 30 years). Also the prevalence in 15 – 20 is 100 %, which is higher than the prevalence in the other age groups (91.66 % in 21 – 25 years and 81 % in 26 – 30 years). Thus, the lowest average and highest prevalence of Vitamin D deficiency was seen in 15 – 20 years. Thus in our study, lower the age, lower was the Vitamin D value and higher the prevalence.

The prevalence of Vitamin D deficiency in males (85.71 %) and females (90.91 %) showed no statistically significant difference. However the average value in females (15.02 ng/ml) was less as compared to males (21.82 ng/ml). This could be explained by the fact that most of the females in our study group were housewives and had to stay indoors for most of the day. As we know sunlight is essential for the first step in Vitamin D metabolism that is conversion of 7-dehydrocholesterol to calcitriol. Thus, decreased exposure to sunlight may lead to deficiency of Vitamin D.

Prevalence of Vitamin D deficiency in Muslims was found to be 100 % as compared to 84% in Hindus. This might be due to the Muslim custom of wearing "burkha" preventing direct exposure to sunlight. This correlates with a recent study, which showed that women wearing concealed clothing were at higher risk of Vitamin D deficiency as compared to women wearing western outfits [6]. The major dietary source of Vitamin D is fish and fish liver oils and meat. The above findings also suggests that nutrition does not play a major role in Vitamin D deficiency, as all Muslims in our study were non-vegetarians while few Hindus were pure vegetarians.

There were a total of 42 males in our study group. Out of these, 16 gave history of using tobacco in the form of smoking cigarette/ bidi or in the form of chewable items like guthka/ khaini etc. it is interesting to note that all of these 16 males (100 %) had Vitamin D levels less than 30 ng/dl. Also the average Vitamin D level amongst smoking males was 12.51 ng/dl as compared to 27.55 ng/dl in non smoking males. Thus smoking males had significantly low Vitamin D levels and higher prevalence of Vitamin D deficiency as compared to non smoking males.

The above finding suggests that smoking might play a role in metabolism and deficiency of Vitamin D. recent studies done in Germany and USA [7,8] have studied the factors affecting Vitamin D levels, smoking being one of them. They have found that the prevalence of Vitamin D deficiency is higher in current and past smokers as compared to non-smokers and the average Vitamin D level is also lower in smokers. Thus our finding ascertains that fact that smoking/ tobacco intake is one of the factors associated with Vitamin D deficiency.

Out of the 26 patients who had mild pain, 18 (69.23 %) had Vitamin D deficiency while out of the 48 patients with moderate pain, 46 had Vitamin D deficiency and 20 patients having severe pain, all (100%) had Vitamin D deficiency. The average Vitamin D level in patients with mild pain was 30.64 ng/dl as compared to 14.65 ng/dl and 9.74 ng/dl in patients with moderate and severe pain respectively. Thus, patients having severe pain had a lower average Vitamin D leavel and higher prevalence of Vitamin D deficiency as compared to the ones having mild to moderate pain. It seems that Vitamin D deficiency co-relates with the severity of pain. In the study "Prevalence of vitamin D deficiency in patients with lumbar spinal stenosis and its relationship with pain" [9], a positive corelation was found between the severity of pain and severity of Vitamin D deficiency.

10 out of the 86 patients in the study had spondylolisthesis. All had degenerative listhesis and none had lytic listhesis. Interestingly, all the 10 patients (100%) with spondylolisthesis had Vitamin D deficiency only 66 out of the remaining 86 (86.84 %) had Vitamin D deficiency. Also, the average Vitamin D levels in patients with spondylolisthesis is 12.89 ng/dl which is less than those without spondylolisthesis. Thus, Vitamin D deficiency may be one of the risk factors of spondylolisthesis and spondylolisthesis may be considered a surrogate marker of Vitamin D deficiency.

A total of 16 patients had one or more schmorl's node on MRI. The striking finding in these patients was that all 16 of these (100 %) had deficiency of Vitamin D. The average Vitamin D level in these patients was 15.04 ng/dl, which is less than those without schmorl's nodes (22.43 ng/dl). Thus schmorl's nodes may also be used as surrogate markers of Vitamin D deficiency.

Conclusion:

Vitamin D deficiency is highly prevalent in patients with low backache. Moderate – severe pain (VAS > 4), Muslim females, smokers, spondylolisthesis and presence schmorl's nodes were associated with 100 % prevalence of Vitamin D deficiency. These may be considered as predictive markers of Vitamin D deficiency and prophylactic treatment with Vitamin D supplementation may be considered in these patients. Further studies are needed to study the functional outcome of Vitamin D treatment in these patients.

REFERENCE

1. Macnab's Backache : Textbook | | 2. Kelsey JL. An epidemiological study of acute herniated lumbar intervertebral discs. Rheumatol Rehabil. 1975 Aug;14(3):144-59 | | 3. Miller JA, Schultz AB. Lumbar disc degeneration: correlation with age, sex and level in 600 autopsy specimens. Spine J. 1987;13:173-78 | | 4. Daga RA, Laway BA, Shah ZA, Mir SA, Kotwal SK, Zargar AH. High prevalence of vitamin D deficiency among newly diagnosed youth-onset diabetes mellitus in north India. Arq Bras Endocrinol Metabol. 2012 Oct;56(7):423-8 | | 5. Goswami R, Gupta N, Goswami D, Marwaha RK, Tandon N, Kochupillai N. Prevalence and significance of low 25 hydroxyvitamin D concentrations in healthy subjects in Delhi. Am J ClinNutr 2000; 72 : 472-5. | | | 6. Ojah RC, Welch JM.Vitamin D and musculoskeletal status in Nova Scotian women who wear concealing clothing.Nutrients. 2012 May | | 7. Kühn T, Kaaks R, Teucher B, Hirche F, Dierkes J, Weikert C, Katzke V, Boeing H, Stangl GI, Buijsse B. Dietary, lifestyle, and genetic determinants of vitamin D status: a cross-sectional study. Eur J Nutr. 2013 Sep 5. | | 8. Zhao G, Ford ES, Tsai J, Li C, Croft JB.Factors Associated with Vitamin D Deficiency and Inadequacy among Women of Childbearing Age in the United States.ISRN Obstet Gynecol. | | 9. Kim TH, Lee BH, Lee HM, Lee SH, Park JO, Kim HS, Kim SW, Moon SH.Prevalence of vitamin D deficiency in patients with lumbar spinal stenosis and its relationship with pain.Pain Physician. 2013 Mar-Apr;16(2):165-76.