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Association of Vitamin D Deficiency with Chronic Low Back Pain Patient in Eastern India: A Prospective Study

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***Abstract*— Introduction: Vitamin D is essential for maintaining musculoskeletal health and may be associated with chronic neck and low back pain.**

Aim and Objective:The objective of this study was to know the association of vitamin Ddeficiencywith chronic back pain (CLBP) .

Materials and methods: All the patients of chronic low back pain visiting the

OPD were screened for their vitamin D level.

Conculsion: Prospective studies are essential to demonstrate the association between CLBP and Vitamin D deficiency and to investigate whether Vitamin D deficiency increases the risk of developing CLBP.

***Index Terms*— Chonic Low Back Pain.Vitamin D Deficiency,EasternIndia,Prospective Study.**

I. INTRODUCTION

Vitamin D plays an essential role in bone formation, maintenance, and remodelling, as well as in muscle function. However, the emergence of new data suggests that the benefits of Vitamin D extend beyond healthy bones.Of great interest is the role it could play in optimising neuromuscular functioning,reducing inflammation, and decreasing the risk of many chronic illnesses; these include a variety of cancers, autoimmune diseases,infectiousdiseases,and cardiovascular diseases[1– 5]. Research has shown that Vitamin D exerts anatomic, hormonal, neurological, and immunological influences on pain manifestation,there by playing a role in the aetiology and maintenance of chronic pain states and associated comorbidity[1,6–8]. Vitamin D, one of the vitamins of fat-soluble vitamins, is a group of sterols which are hormones and hormone precursors because it can also be synthesized endogenously. The most important effects are on calcium metabolism, phosphorus metabolism, and bone mineralization.[9,10].The level of serum 25-hydroxyvitamin D (25(OH)D) should be measured to assess the Vitamin D status. It is accepted that if the level of serum 25(OH)D is >30 ng/mL, the level of Vitamin D is adequate; 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. Due to the low number of foods containing Vitamin D, a small proportion (10%–20%) of this vitamin is consumed with food. A significant portion (80%–90%) is synthesized in the skin by ultraviolet B rays. For synthesis, direct sunlight contact is required on the skin. The angle of sunlight reaching the earth's surface is effective in the synthesis of Vitamin D. At the geographic latitudinal of our country, the synthesis of Vitamin D takes place between May and November. Since the appropriate beam angle is between 10.00 A.M and 03.00 P.M, it is advisable to go out in the sun at these times for the synthesis of Vitamin D. If the whole body is exposed to sunlight and appears light pink color at appropriate times during summer, about 20,000 IU Vitamin D synthesis occurs at an equivalent level to the dose of Vitamin D.[11,12] Clinical findings of Vitamin D deficiency depend on the grade and duration of deficiency. Most patients are asymptomatic.[13] Deficiency causes rickets in children and osteomalacia in adults. In some patients, bone loss due to secondary hyperparathyroidism is accelerated and osteoporosis develops. Patients may develop a decrease in bone mineral density, widespread bone muscle pain, bone sensitivity, muscle weakness, walking difficulty, and fractures, depending on the degree of deficiency and failure.[14-17].

A.Aims**:**The purpose of this study is to investigate the relationship between low back pain and Vitamin D deficiency in patients.

B.Materials and methods**:** The patients age between 18 to35 years of chronic low back pain visiting the OPD were screened for their vitamin Dlevel.This is a prospective study of patients who attended our outpatient clinic with chronic low back pain, (CLBP) between OCTOBER 2019 to DECEMBER 2019

C.Inclusion criteria

- Pain has been defined.
- Age between 18-35yrs.
- Inclusions are both sexes.
- Low Back Pain without radiculopathy.
  - Pain has been defined to chronic low back pain.
  - Pain level has been determined by visual analog scale (VAS) .
  - Vitamin D levels have been determined in ng/mL.
- Pain associated with Occupation,Gender,Religions criteria.

D.Exclusion criteria

- Patient below 18 yrs and above 35 yrs.
- Patients who have been missing from demographic

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study.

- Chronic neck pain.
- Trauma, infection, and endocrinologic, neurological, and rheumatologic patients diagnosed with diseases, tumors, and depression.
- Patients who are followed up with osteomalacia diagnosis.
- Patients with advanced osteoporosis and compression fracture in X-ray were excluded fromthe screening.

Study design: An observational clinical study

Table 1: Age distribution of patients studied

Age in years	No. of Patients	%
18-20	23	18.9
21-25	17	13.9
26-30	37	30.3
31-35	45	36.9
Total	122	100.0

Mean ± SD: 27.81±5.61

Table 2: Gender distribution of patients studied

Gender	No. of Patients	%
Female	81	66.4
Male	41	33.6
Total	122	100.0

Table 3: Religion distribution of patients studied

Religion	No. of Patients	%
Hindu	83	68.0
Muslim	39	32.0
Total	122	100.0

Table 4: Occupation distribution of patients studied

Occupation	No. of Patients	%
Housewife	49	40.2
Student	30	24.6
Teacher	14	11.5
Tailor	10	8.2

Desk worker	7	5.7
Shopkeeper	7	5.7
Nurse	5	4.1
Total	122	100.0

Table 5: Duration of Pain distribution of patients studied

Duration of Pain	No. of Patients	%
1-3 MONTHS	0	0.0
3-6 MONTHS	42	34.4
7-12 MONTHS	64	52.5
1-2 YEARS	6	4.9
>2 YEARS	10	8.2
TOTAL	122	100.0

Table 6: Diagnosis distribution of patients studied

Diagnosis	No. of Patients	%
CLBP	122	100.0
Total	122	100.0

Table 7: Vitamin D distribution of patients studied

Vitamin D	No. of Patients	%
<30	87	71.3
30-50	31	25.4
>50	4	3.3
Total	122	100.0

Mean ± SD: 20.92±15.32

Table 8: VAS Score distribution of patients studied

VAS Score	No. of Patients	%
0	0	0.0
1-3	13	10.7
4-6	64	52.5
7-10	45	36.9
Total	122	100.0

Table 9: A Comparison of clinical variables according to Vitamin D levels of patients studied

variables	Vitamin D		Total (n=122)	P value
	Vit D<30 (n=87)	Vit D>30 (n=35)		
Age in years				
• 18-20	16(18.4%)	7(20%)	23(18.9%)	0.666
• 21-25	14(16.1%)	3(8.6%)	17(13.9%)	
• 26-30	27(31%)	10(28.6%)	37(30.3%)	
• 31-35	30(34.5%)	15(42.9%)	45(36.9%)	
Gender				
• Female	66(75.9%)	15(42.9%)	81(66.4%)	<0.001**
• Male	21(24.1%)	20(57.1%)	41(33.6%)	
Religion				
• Hindu	52(59.8%)	31(88.6%)	83(68%)	0.002**
• Muslim	35(40.2%)	4(11.4%)	39(32%)	
Occupation				
• Housewife	40(46%)	9(25.7%)	49(40.2%)	0.067+
• Student	21(24.1%)	9(25.7%)	30(24.6%)	
• Teacher	10(11.5%)	4(11.4%)	14(11.5%)	
• Tailor	7(8%)	3(8.6%)	10(8.2%)	
• Desk worker	2(2.3%)	5(14.3%)	7(5.7%)	
• Shopkeeper	3(3.4%)	4(11.4%)	7(5.7%)	
• Nurse	4(4.6%)	1(2.9%)	5(4.1%)	
Duration of Pain				
• 1-6months	29(33.3%)	13(37.1%)	42(34.4%)	0.177
• 7-12months	44(50.6%)	20(57.1%)	64(52.5%)	
• 1-2yrs	4(4.6%)	2(5.7%)	6(4.9%)	
• >2yrs	10(11.5%)	0(0%)	10(8.2%)	
Diagnosis				
• CLBP	87(100.0%)	35(100%)	122(100.0%)	1.000

Chi-Square/Fisher Exact Test

Table 10: VAS Score distribution in relation to Vitamin D levels of patients studied

VAS Score	Vitamin D		Total
	Vit D<30	Vit D>30	
0	0(0%)	0(0%)	0(0%)
1-3	0(0%)	13(37.1%)	13(10.7%)
4-6	42(48.3%)	22(62.9%)	64(52.5%)
7-10	45(51.7%)	0(0%)	45(36.9%)
Total	87(100%)	35(100%)	122(100%)

P<0.001**, Significant, Fisher Exact Test

Table 11: Comparison of age in yrs, Vitamin D and VAS score according to Vitamin D of patients studied

variables	Vitamin D		Total	P value
	Vit D<30	Vit D>30		
Age in years	27.78±5.71	27.89±5.44	27.81±5.61	0.927
Vitamin D	12.23±6.59	42.53±7.20	20.92±15.32	<0.001**
VAS Score	6.30±0.84	3.77±0.69	5.57±1.40	<0.001**

Statistical Methods: Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, **Assumptions: 1.**Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, Cases of the samples should be independent

Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Leven`s test for homogeneity of variance has been performed to assess the homogeneity of variance.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher Exact test used when cell samples are very small[18-21].

- ***Significant figures***

+ Suggestive significance (P value: 0.05<P<0.10)
* Moderately significant (P value:0.01<P ≤ 0.05)
** Strongly significant (P value : P≤0.01)

II. RESULT

Study is divided into two groups as Vitamin D deficient (Group-A) with a Vitamin D level below 30 ng/mL and normal (Group-B) with a value above 30 ng/mL. People solely with sciatica (lumbosacral radicular syndrome) and pain due to herniated discs, or both, are also excluded. People in this study had chronic low back pain (>12 weeks' duration).

Forty one patients (33.60%) were men and Eighty one patients (67.0%) of 122 patients who applied to our institute of CLBP were women.87 patients with Vitamin D <30 and 35 consisted of patients with Vitamin D>30 normal (Mean ± SD: 20.92±15.32).VAS score of vitamin D<30 is 6.30±0.84 & P value <0.001.VAS score of vitamin D>30 is 3.77±0.69 &P value <0.001.

In result P value <0.001 of VAS score for Vit D deficiency is significant as per statistics significant figure.

Statistical software: The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc

III. DISCUSSION

LBP and lack of vitamins are the most common health problems in our country and all over the world. The synthesis of >90% of Vitamin D in the body occurs under the influence of sunlight. Vitamin D, taken with foods, does not have a significant contribution, especially after a supplement is not taken. Seasonal and geographical changes are inevitable in the synthesis of Vitamin D in the derailment as the primary source is sunlight.[26,27,28]

In our study, we investigated the relationship between the severity of pain and the level of Vitamin D in patients with LBP and those who applied to the pain clinic. The data we obtained showed that patients with LBP had a deficiency of Vitamin D . We also found that Vitamin D levels in young female patients with LBP were lower than males and statistically significant. In a review study that supports our study, the relationship between Vitamin D and CLBP has been investigated and it has been found that patients with LBP have lower serum 25(OH)D levels and more common in younger women.[22].

Forty one patients (33.60%) were men and Eighty one patients (67.0%) of 122 patients who applied to our institute of CLBP were women.87 patients with Vitamin D <30 and 35 consisted of patients with Vitamin D>30 normal (Mean ± SD: 20.92±15.32).VAS score of vitamin D<30 is 6.30±0.84 & P value <0.001.VAS score of vitamin D>30 is 3.77±0.69 & P value <0.001.

In our study, considering inclusion of age between 18yrs to 35yrs, visual analog scale (VAS), Occupation,Gender,and Religion criteria, we investigated the relationship between the severity of pain and the level of Vitamin D in patients with CLBP.. Result excluded Trauma, infection, and endocrinologic, neurological, and rheumatologic patients tumors, patients with advanced osteoporosis and compression fracture.

When we performed literature review, there were few studies investigating the relationship between D vitamin and pain severity. In some studies, there was a significant correlation between serum 25(OH)D and pain severity.[15] However, in some studies, serum 25(OH)D and pain severity were not significantly correlated.[23,24] Considering these conflicting findings, careful evaluation of Vitamin D supplementation is required.

IV. CONCLUSION

Prospective studies are essential to demonstrate the association between CLBP

and Vitamin D deficiency and to investigate whether Vitamin D deficiency increases the risk

of developing CLBP.122 patients were included in the study . Patients' demographic data including age, gender, religion, education level,and occupation were recorded. Clinical examination of all the patients were done and routine blood investigation was advised which also included the estimation of vitamin D level .

The widespread screening of Vitamin D levels in individuals with CLBP should be taken into consideration because of the cheap, safe, treatable form of the symptoms for clinicians. Prospective studies are essential to demonstrate the association between CLBPand Vitamin D deficiency and to investigate whether Vitamin D deficiency increases the risk of developing CLBPto determine the potential role of Vitamin D deficiency in the prevention of CLBP.

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