



Orthopaedics

VITAMIN D DEFICIENCY IN PATIENTS WITH CHRONIC NON SPECIFIC MUSCULOSKELETAL PAIN AND THEIR RESPONSE TO VITAMIN D SUPPLEMENTATION

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ABSTRACT

Aim: The aim of the study is to assess the Vitamin D deficiency in patients with chronic non-specific musculoskeletal pain

Methodology: This is a Hospital based prospective study done in the Out Patient Department of Orthopaedics in Assam Medical College, Dibrugarh for the period of June, 2020 to May, 2021. The study participants who fulfilled the inclusion and the exclusion criteria were included in this study. Demographic details like age, sex was obtained. data were presented as number (%) and tested using Chisquare/Fischer's exact test. Continuous measurements were presented as mean+SD and significance were tested using unpaired/paired t-test. A p-value of <0.05 was considered as statistically significant. All the analysis were done using Statistical Package for Social Sciences (SPSS for Windows, version 20.0) **Results:** There is a statistically significant association between serum vitamin D levels and different presenting complaints of chronic nonspecific musculoskeletal pain. A significant decrease in pain scores was seen after vitamin D supplementation both at 3 months and 6 months of follow up. **Conclusion:** Subnormal levels of vitamin D (both vitamin D deficiency and insufficiency) is associated with chronic nonspecific musculoskeletal pain and also that vitamin D supplementation improves the pain and quality of life of the patients.

KEYWORDS :

Introduction:

Chronic nonspecific musculoskeletal pain is defined as persistent or recurrent pain in one or more anatomic regions lasting longer than three months, without any detectable cause.¹ It is a frequent condition affecting a major portion of adult population and interferes with day to day activities, social and working lives.² Vitamin D deficiency is a worldwide health problem and has been associated with a number of chronic diseases including musculoskeletal system.³ High prevalence of vitamin D deficiency in Indian general population is contributed by inadequate sun exposure due to socio-cultural practices and consumption of food rarely fortified with vitamin D.⁴ The pathophysiological connection between vitamin D deficiency and musculoskeletal pain is not very clear.⁹ Vitamin D receptors have been found in muscle cells, various regions of the brain specifically the spinal cord which indicates the passage of vitamin D through the blood brain barrier and its possible connection with musculoskeletal pain.^{8,10} Vitamin D deficiency also has been reported to cause chronic pain by inflammatory upregulation. Vitamin D also decreases nitric oxide levels thus playing a role in central sensitisation by inhibiting nitric oxide synthase. Also pain downregulation by the Central Nervous System is dysfunctional when vitamin D levels are low. There may be a possible link between vitamin D and central hypersensitivity which is indicated by the presence of vitamin D receptors and 1-alpha-hydroxylase in the central nervous system mainly in the hypothalamus. It has also been suggested that vitamin D deficiency leads to inappropriate mineralisation of the bone which causes hydration and expansion of the matrix causing pressure effect on the richly innervated periosteum which causes pain.^{9,11} This study is aimed to evaluate the prevalence of vitamin D deficiency in patients with chronic non-specific musculoskeletal pain.

Methodology:

Study setting:

This study was conducted in the Department of Orthopaedics, Assam Medical College & Hospital, Dibrugarh which is a tertiary care centre. The study was done for a period of one year, from June 2020 to May 2021. It is a Hospital based prospective study. All patients presenting with Chronic non-specific musculoskeletal pain in the Out Patient Department of Orthopaedics, AMCH in the study period fulfilling all inclusion criteria which includes Patients aged between 18 to 60 years of age with chronic nonspecific musculoskeletal pain like Chronic neck pain, Chronic upper limb pain, Chronic upper back pain, Chronic lower back pain, Chronic thigh pain, Chronic leg pain which is not relieved by analgesic, rest and physiotherapy and all routine tests are

normal. The exclusion criteria includes Infections, Trauma, Endocrine disorders, Rheumatological diseases, Neoplasms, Past history of fracture, Past history of taking vitamin D, drugs altering bone metabolism like corticosteroids or bisphosphonates, Pregnant and lactating mothers, Psychiatric disorders, Radiculopathy and spinal canal stenosis, Systemic diseases.

Data Collection:

After obtaining the informed written consent, all the study subjects were evaluated by thorough clinical history, physical examination, and appropriate investigations. Pain was assessed using numerical pain rating scale.⁹ Quality of life was assessed by Lawton instrumental activity of daily living scale.¹¹ Serum Vitamin D was done in all patients. From investigation any patient falling in the exclusion criteria as stated earlier were excluded from the study. Analgesics were prescribed for one week as when required and the patients with insufficiency or deficiency were given Vitamin D supplements and reviewed after one week, 3 months and 6 months with Serum Vitamin D reports.

	SERUM VITAMIN D(ng/ml)
Deficiency	<20
Insufficiency	23-30
Sufficiency	30-100

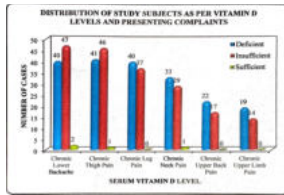
Statistical analysis:

Categorical data were presented as number (%) and tested using Chisquare/Fischer's exact test. Continuous measurements were presented as mean+SD and significance were tested using unpaired/paired t-test. A p-value of <0.05 was considered as statistically significant. All the analysis were done using Statistical Package for Social Sciences (SPSS for Windows, version 20.0)

Results:

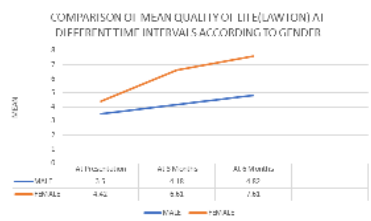
In our study we found that most of the patients with chronic lower back ache were having Vitamin D insufficiency (52.81%) followed by 44.94% in deficiency group and 2.25% of patients having sufficient vitamin D level. In case of chronic thigh pain, 46 (52.27%) were in the insufficiency group, 41 (46.59%) were in the deficiency group and only 1 (1.14%) had sufficient amount of vitamin D level. In patients presenting with chronic leg pain vitamin D deficiency was found in 51.95% and insufficiency in 48.05% of cases. 29 patients with chronic neck pain were in the insufficiency group followed by 33 in the deficiency group and only 1 in the sufficiency group. Among chronic

upper back pain patients, most of them 17 (43.59%) fell in the insufficiency group followed by 22 (56.41%) in deficiency group. In patients presenting with chronic upper limb pain 42.42% were in the insufficiency group and 57.58% in deficiency group. As observed above, there is a statistically significant association between serum vitamin D levels and different presenting complaints of chronic nonspecific musculoskeletal pain. Both vitamin D deficiency and insufficiency were found to be significantly associated with chronic nonspecific musculoskeletal pain.



It was seen that at presentation, out of 108 patients, 10.19% patients had mild pain, 23.15% had moderate pain and 66.67% had severe pain. At 3 months 3 patients were lost to follow up. Out of remaining 105 patients 5.71% had mild pain, 70.48% had moderate pain and 23.81% had severe pain. At 6 months 2 more patients were lost to follow up and out of 103 cases, 57.28% had mild pain, 35.92% had moderate pain and 6.80% had severe pain. A significant decrease in pain scores was seen after vitamin D supplementation both at 3 months and 6 months of follow up.

SEVERITY	PAIN	NUMERICAL PAIN RATING SCALE					
		At Presentation		At 3 months		At 6 months	
		N	%	n	%	n	%
None	0	0	0.00	0	0.00	0	0.00
Mild	1-3	11	10.19	6	5.71	59	57.28
Moderate	4-6	25	23.15	74	70.48	37	35.92
Severe	7-10	72	66.67	25	23.81	7	6.80
TOTAL		108	100.00	105	100.00	103	100.00
p value		-		<0.001**		<0.01**	



Discussion:

In our study the mean age was found to be 38.27 + 11.55 years with the range from 19 years to 60 years. Most of the patients came under 31 to 40 years. In our study it was observed that 84 (77.78%) of the cases were females and 24 (22.22%) were males with the male:female ratio of 1:3.5. In our study it was observed that the most common symptom was chronic lower back ache (82.41%) followed by chronic thigh pain (81.48%), chronic leg pain (71.30%), chronic neck pain (58.33%), chronic upper back pain (36.11%) and the least common was chronic upper limb pain (30.56%). Most of the patients had multiple region pain (85.19%) among which 59.26% had pain in 2-4 regions and 25.93% in >4 regions. It was comparable to studies like Carnes D et al.²³, Thapa S et al. In our study 43 (39.81%) patients were in the deficiency group and 63 (58.33%) were in the insufficiency group. The mean vitamin D level was 16.3-27.2. Hanuman M in their study also reported that mean (SD) vitamin-D levels were 23.33+15.09 ng/mL. 47% patients had deficient vitamin D levels followed by 31% who had insufficient levels.¹⁰ Le Goaziou MF et al. (2013) in their study stated that severe deficiency of vitamin D was present in 49 patients with chronic diffuse musculoskeletal pain. In our study we observed that after vitamin D supplementation the pain scores significantly decreased and also the quality of life of the patients showed a significant improvement. Abbasi M et al. conducted a study in 2012 among 62 patients with musculoskeletal pain and reported that 53 patients (85.5%) responded to treatment with oral vitamin D supplementation. Yilmaz R et al also found vit D deficiency in 32 patients out of 58.¹¹ Thus in our study we found that a significant association exists between serum vitamin D level (both vitamin D deficiency and insufficiency) and chronic nonspecific musculoskeletal

pain. A significant decrease in pain scores and improvement in quality of life was seen after supplementation of vitamin D.

Conclusion:

Chronic nonspecific musculoskeletal pain is a frequent condition affecting a major portion of adult population worldwide which interferes with day to day activities, social and working lives and significantly reduces the quality of life of the affected population. Vitamin D deficiency too is a worldwide health problem and has been shown to be associated with various musculoskeletal disorders. In our study which was aimed to study the relation of vitamin D deficiency and chronic nonspecific musculoskeletal pain, and also the effect of vitamin D supplementation with respect to pain relief and improvement of quality of life, we found significant association between serum vitamin D level (both vitamin D deficiency and insufficiency) and chronic nonspecific musculoskeletal pain. It was also found that after vitamin D supplementation the serum vitamin D level, pain and quality of life scores showed significant improvement at 3 months and 6 months of follow up.

Limitations:

The present study has constraints by the limitation of time and relatively smaller sample size. So a study with a larger sample size and a longer period would provide more information regarding the topic.

Recommendations:

Subnormal levels of Vitamin D is often associated with chronic non specific musculoskeletal pain and also that Vitamin D supplementation may improve the pain and quality of life of the patients.

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Competing Interest:

There is no Competing interest

Authors contribution:

All authors in our study contributed to the data collection of the patients

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