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Original Article

Hypovitaminosis D In Chronic Low Back Pain

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ABSTRACT

Background: Vitamin D deficiency has been linked to various pain conditions, including chronic low back pain. The role of vitamin D for the health of the musculoskeletal system involves the downregulation of pro-inflammatory cytokines that contribute to pain and the upregulation of anti-inflammatory cytokines that help reduce inflammation. Hypovitaminosis D can result from various factors, including age, low exposure to sunlight, dietary factors and genetic. This study aimed to determine vitamin D levels in chronic low back pain patients.

Methods: This research is an observational study with a cross sectional design. The population was all patients with chronic low back pain for more than 3 months. All samples underwent a total Vitamin D 25-OH examination using the Enzyme Linked Fluorescent Assay (ELFA).

Results: This study found that the majority of participants are elderly women (73.5%) aged 56-65 years (30.6%). In this study 59.2% of participants had vitamin D deficiency and 30.6% had vitamin D insufficiency. Based on radiological examination, 34.7% had lumbar osteoarthritis.

Conclusion: Patient with chronic low back pain had low level of vitamin D. Adequate sunlight exposure, dietary intake, and supplementation when necessary are essential strategies to prevent vitamin D deficiency and its associated health risks in the aging population. Meanwhile, the levels of MCH, MCV and MCHC changed significantly in the white rats that were given a vegan diet compared to the white rats on a standard diet after routine physical exercise.

INTRODUCTION

Low back pain is a prevalent issue globally, affecting a significant portion of the population. It is reported that between 30% and 40% of individuals with acute low back pain may progress to chronic low back pain. [1] Chronic low back pain is a complex etiology involving various anatomical, physiological, and psychosocial factors. Research has identified several key contributors to the development and persistence of chronic low back pain. One significant etiology of chronic low back pain is related to the intervertebral disc. Studies have shown that disc-related issues, such as degeneration or herniation, can be common sources of chronic low back pain in adults. [23] Additionally, structural abnormalities in the lumbar vertebrae, sacroiliac joint, and surrounding soft tissues have been implicated as potential sources of chronic low back pain. [4 5]

Vitamin D deficiency has been linked to various pain conditions, including chronic low back pain. The mechanism through which vitamin D may influence low back pain involves the downregulation of pro-

inflammatory cytokines that contribute to pain and the upregulation of anti-inflammatory cytokines that help reduce inflammation, highlighting the immunomodulatory role of vitamin D in pain management.[6] Additionally, vitamin D has been found to inhibit p-38 activation and cytokine production in monocytes/macrophages, suggesting a novel pathway through which vitamin D can alleviate pain in chronic low back pain of unknown etiology.[7] Moreover, vitamin D deficiency has been linked to decreased bone mass, sarcopenia, vertebral fractures, and inflammation, all of which can contribute to back pain in postmenopausal women and older adults. [8]

Some studies have explored the relationship between vitamin D levels and low back pain, with some indicating a weak positive correlation between serum vitamin D levels and specific changes like Modic changes in patients with non-specific low back pain. [9] While some trials have suggested a potential link between vitamin D deficiency and chronic low back pain[10] , others have found no significant association between vitamin D levels and low back pain in certain populations. [1112]

Furthermore, research has indicated a correlation between vitamin D levels and low back pain, with studies reporting that a significant proportion of individuals with low back pain have poor intake of vitamin D, underscoring the direct relationship between vitamin D levels and the incidence of low back pain. [13] Moreover, vitamin D supplementation has been investigated as a potential intervention for chronic low back pain. Some studies have shown promising results, indicating that vitamin D supplementation may be related to alleviating lower back pain and improving pain severity in patients with chronic low back pain.[7, 14]

Hypovitaminosis D can result from various factors, including low exposure to sunlight. Several studies have explored the prevalence and consequences of hypovitaminosis D in populations with limited sun exposure, shedding light on the impact of this deficiency on health outcomes. One study conducted in India highlighted factors such as the length and timing of sun exposure, amount of skin exposed, latitude, season, level of pollution in the atmosphere, clothing, skin pigmentation, application of sunscreen, dietary factors, and genetic factors as potential contributors to hypovitaminosis D. [15] Another study in Italy found that low sun exposure was a significant predictor of hypovitaminosis D in adolescents, emphasizing the importance of sunlight exposure for maintaining adequate vitamin D levels.[16]

Researching hypovitaminosis D in patients with low back pain is essential due to the potential impact of vitamin D deficiency on the development and management of low back pain. Numerous studies have explored the association between vitamin D levels and chronic low back pain, revealing a high prevalence of vitamin D deficiency in individuals with low back pain. Therefore, investigating hypovitaminosis D in patients with low back pain is crucial to explore the potential benefits of vitamin D as part of a comprehensive approach to managing chronic low back pain.

Despite growing evidence linking vitamin D deficiency to various musculoskeletal conditions, the specific relationship between vitamin D status and chronic low back pain remains underexplored, particularly in aging populations. Chronic low back pain is a major contributor to disability, and its pathophysiology may involve inflammatory processes that are modulated by vitamin D. However, many existing studies do not clearly define vitamin D's role in chronic pain development or fail to consider the impact of age, gender, and lifestyle factors on vitamin D levels. Given the crucial function of vitamin D in downregulating pro-inflammatory cytokines and maintaining musculoskeletal health, it is important to better understand its contribution to chronic low back pain. Therefore, this study aims to determine vitamin D levels among patients with chronic low back pain to identify the prevalence of

deficiency and to support preventive strategies through improved sunlight exposure, dietary intake, and supplementation, especially in the elderly population.

METHODS

This research is an observational study with a cross sectional design. The study population was all patients with chronic low back pain for more than 3 months. Exclusion criteria were patients with a history of digestive disorders, liver disorders and kidney disorders as well as patients who regularly consumed Vitamin D supplements. All samples underwent a physical examination and total Vitamin D 25 –OH examination using the Enzyme Linked Fluorescent Assay (ELFA). Quantitative results were then classified based on the Endocrine Society criteria consisting of deficiency (<20 ng/mL); insufficiency (20 - 29 ng/mL) and sufficiency (> 30 ng/ml). Assessment of the degree of pain is carried out using the Numeric Pain Scale instrument, where NPRS 1-3 includes mild pain, 4-6 moderate pain and 7-10 severe pain.

RESULTS AND DISCUSSION

The results of this study found 49 patients with chronic low back pain. The majority of participants are women (73.5%) and are predominantly aged 56-65 years (30.6%). The body mass index of participants were normal (77.6%). Most of the participants had moderate level of pain (53.1%). In this study, most participant had vitamin D deficiency (59.2%) and vitamin D insufficiency (30.6%). Based on radiological examination, 34.7% had lumbal osteoarthritis **(Table 1)..**

Table 1. **Demographic and clinical characteristics of participants**

Variable (N=116)	Group	Percentage (%)
Group Of Age	26-35	4.1
	36-45	18.4
	46-55	26.5
	56-65	30.6
	>66	20.4
Sex	Female	73.5
	Male	26.5
BMI		
	Normal	77.6
	Overweight	4.1
	Obese	18.4
NPRS	Mild	42.9
	Moderate	53.1
	Severe	4.1
Vitamin D Level	Deficiency (<20 Ng/Ml)	59.2
	Insufficiency (20 - 29 Ng/Ml) Sufficiency (> 30 Ng/Ml)	30.6
	Deficiency (<20 Ng/Ml)	10.2
Radiographic feature	Normal	2
	Osteoarthritis lumbal	34.7
	Spondiloarthrosis	6.1
	Spondylosis lumbal	20.4
	Hernia Nucleus Pulposus	12.2
	Mix	24.5

In this study, it was found that most patient with chronic low back pain were elderly female. Studies have indicated that chronic low back pain is more prevalent in women and the elderly, with a prevalence of 55.8% in elderly patients. [17] Low back pain is a common issue among elderly women, with various risk factors contributing to its occurrence. Factors such as obesity, psychological distress, and pain at multiple body sites have been identified as risk factors for persistent disabling low back pain in the elderly. [18] Research has shown an association between body mass index (BMI) and the prevalence of low back pain in elderly individuals, suggesting that BMI may be a risk factor specifically for low back pain in older age groups.[19] Additionally, vertebral fractures, sacral insufficiency fractures, and facet joint mediated pain have been recognized as potential causes of low back pain in the elderly population.[20,21]

In this study, most of participant had hypovitaminosis D. Vitamin D plays a vital role in bone health, and its deficiency can lead to conditions such as osteoporosis, osteomalacia, and an increased risk of fractures in the elderly population. Older individuals are at a higher risk of vitamin D deficiency due to factors such as reduced sunlight exposure, decreased dietary intake, and age-related changes in skin thickness and metabolism.[22] Research has demonstrated that vitamin D supplementation can effectively increase blood 25(OH)D levels and correct vitamin D insufficiency or deficiency in older individuals, which is essential for maintaining bone mineralization and overall health.[23]

More over, low exposure to sunlight among Asian women can lead to vitamin D deficiency, which is a significant concern. Studies have shown that avoiding sun exposure and having lower consumption of vitamin D in the diet are key reasons for vitamin D deficiency in Asian countries, including among pregnant women. [24] Traditional dress and cultural practices may contribute to Asian women staying indoors and exposing less skin to sunlight, further exacerbating the risk of vitamin D deficiency.[25]

CONCLUSION

In conclusion, this study found hypovitaminosis D in chronic low back pain patient. Maintaining optimal vitamin D levels is crucial for the health and well-being of older individuals. Adequate sunlight exposure, dietary intake, and supplementation when necessary are essential strategies to prevent vitamin D deficiency and its associated health risks in the aging population. Public health initiatives and individualized interventions are key to promoting healthy aging and reducing the burden of vitamin D-related conditions in older people.

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