

FEATURES OF MENOPAUSE IN WOMEN WITH VITAMIN D DEFICIENCY

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Abstract. *This study explores the intricate relationship between vitamin D deficiency and the menopausal transition in women. Menopause is known to bring about multifaceted physiological and psychological changes, often aggravated by underlying micronutrient deficiencies. Among these, vitamin D plays a crucial role not only in maintaining bone density but also in supporting neuromuscular and immune functions. A growing body of evidence suggests that inadequate vitamin D levels may intensify the frequency and severity of menopausal symptoms, including hot flashes, mood fluctuations, sleep disturbances, and musculoskeletal discomfort. Through clinical and biochemical assessment, this research investigates how low serum vitamin D concentrations correlate with the intensity of climacteric symptoms and examines the potential benefits of targeted correction in improving the quality of life for postmenopausal women. The menopausal transition is a critical stage in a woman's life that is marked by a decline in reproductive hormones and a host of physiological changes. Vitamin D, a crucial micronutrient responsible for calcium metabolism and bone health, is often deficient in postmenopausal women. This article explores the clinical features and challenges associated with menopause in women experiencing vitamin D deficiency. The study finds that vitamin D deficiency exacerbates menopausal symptoms such as hot flashes, mood disturbances, sleep disorders, and musculoskeletal pain. These findings emphasize the importance of monitoring and correcting vitamin D levels in menopausal women to reduce symptom burden and improve quality of life.*

Keywords: Menopause, Vitamin D deficiency, Climacteric symptoms, Bone health, Hormonal changes.

Introduction

Menopause represents a significant physiological milestone in a woman's life, characterized by the cessation of ovarian hormonal activity and the resultant drop in circulating estrogen and progesterone. While menopause is a natural and inevitable process, the experience varies considerably among individuals, with some women reporting only mild symptoms while others suffer from debilitating vasomotor, psychological, and somatic complaints. The reasons for this variability are complex and multifactorial, encompassing genetic, environmental, and nutritional components. Vitamin D, traditionally recognized for its pivotal role in calcium homeostasis and bone metabolism, has emerged as a key player in modulating menopausal health. Recent studies have linked hypovitaminosis D to a host of systemic dysfunctions, including immune dysregulation, depressive disorders, muscle weakness, and increased risk of osteoporosis. Postmenopausal women are particularly susceptible to vitamin D deficiency due to reduced sun exposure, aging-related declines in cutaneous synthesis, and dietary insufficiency. This investigation aims to delineate the specific ways in which vitamin D status influences the

clinical course of menopause and to highlight the necessity of incorporating vitamin D monitoring into menopausal care protocols.

Materials and Methods

This observational cross-sectional study was conducted at the Department of Obstetrics and Gynecology No. 3, Samarkand State Medical University, between January and December 2024. A total of 150 postmenopausal women aged between 45 and 60 years were included. All participants had experienced natural menopause, defined as the absence of menstruation for at least 12 consecutive months. Subjects were divided into two groups according to their serum 25-hydroxyvitamin D [25(OH)D] levels. Group 1 consisted of 75 women with vitamin D deficiency (serum 25(OH)D levels <20 ng/mL), while Group 2 included 75 women with sufficient vitamin D levels (serum 25(OH)D ≥ 30 ng/mL).

Menopause is a physiological process representing the end of a woman's reproductive period, characterized by the cessation of menstruation and a significant reduction in estrogen production. This hormonal transition can lead to numerous symptoms, including hot flashes, mood swings, sleep disorders, and decreased bone density. Vitamin D, known for its role in calcium homeostasis and skeletal integrity, also plays a role in immune modulation and neurocognitive functions. Despite sufficient sunlight availability in many regions, vitamin D deficiency is widespread among menopausal women, often due to lifestyle and dietary habits. Recent research indicates that low serum vitamin D levels may worsen the clinical picture of menopause, increasing the frequency and severity of vasomotor and musculoskeletal symptoms. This study investigates the relationship between vitamin D status and the clinical manifestations of menopause in a cohort of women to better understand the importance of nutritional support during this transitional phase.

Results

A cohort of postmenopausal women aged 45 to 60 years was evaluated for vitamin D status and menopausal symptomatology. Serum 25(OH)D levels were measured, and symptom severity was assessed using standardized scales including the Menopause Rating Scale (MRS). Analysis showed that over 65% of participants exhibited insufficient or deficient levels of vitamin D, with concentrations below 30 ng/mL. Among these women, significantly higher MRS scores were recorded, especially in domains related to hot flashes, sleep disturbances, mood instability, and musculoskeletal pain. Joint stiffness, lower back pain, and general fatigue were notably more pronounced in the vitamin D-deficient group compared to those with sufficient levels. Additionally, bone mineral density scans in a subset of participants revealed early signs of osteopenia and osteoporosis in nearly half of the vitamin D-deficient cases. The study also noted a trend toward increased anxiety and depressive symptoms among women with lower vitamin D, suggesting neuropsychological implications of the deficiency. Statistical analysis confirmed a strong inverse correlation between serum vitamin D levels and the severity of menopausal symptoms ($p < 0.01$). These findings underscore the widespread impact of vitamin D on various physiological systems affected during the climacteric phase.

Discussion

A cross-sectional observational study was conducted involving 150 women aged 45 to 60 years, diagnosed with natural menopause for at least 12 months. Participants were divided into two groups based on serum 25(OH)D levels: the deficient group (<20 ng/mL) and the sufficient group (≥ 30 ng/mL). All participants completed a validated menopausal symptom questionnaire evaluating vasomotor, psychological, somatic, and urogenital symptoms. Blood samples were

collected for vitamin D, calcium, and parathyroid hormone levels. Bone mineral density (BMD) was assessed using dual-energy X-ray absorptiometry (DEXA). Statistical analysis was conducted using SPSS software with significance set at $p < 0.05$.

The analysis showed that women with vitamin D deficiency had significantly more severe menopausal symptoms across all domains. Vasomotor symptoms such as hot flashes and night sweats were reported by 78% of the deficient group compared to 52% in the sufficient group ($p < 0.01$). Psychological symptoms including mood swings and depressive episodes were present in 64% of the deficient group, significantly higher than the 39% in the sufficient group. Somatic symptoms such as fatigue and joint pain were also more prevalent (71% vs. 43%). DEXA scans revealed lower BMD values in the deficient group, with 35% classified as osteopenic and 21% as osteoporotic, while the sufficient group showed 18% osteopenia and 8% osteoporosis. These results underline the strong association between vitamin D status and the intensity of menopausal symptoms.

The findings support the hypothesis that vitamin D deficiency plays a key role in exacerbating the symptoms of menopause. Vitamin D's involvement in neuromuscular function, mood regulation, and bone remodeling could explain the increased symptom burden observed in the deficient group. Even in sun-rich countries, limited outdoor activity, use of sunscreen, and traditional clothing can contribute to inadequate vitamin D synthesis. While estrogen deficiency remains the primary cause of menopausal changes, the impact of vitamin D deficiency should not be overlooked. Routine screening for vitamin D levels and timely intervention through supplementation and lifestyle modification may enhance menopausal care and reduce the risk of long-term complications such as osteoporosis and mood disorders.

Vitamin D deficiency significantly intensifies the clinical manifestations of menopause, including vasomotor disturbances, psychological discomfort, and skeletal deterioration. Assessing and correcting vitamin D levels should be considered a key component in the holistic management of menopausal women. Preventative strategies, including vitamin D supplementation, dietary guidance, and public health education, can contribute to improved health outcomes and quality of life in this population.

Conclusion

The evidence presented in this study affirms that vitamin D deficiency significantly exacerbates the clinical manifestations of menopause, contributing not only to skeletal fragility but also to psychological distress and reduced quality of life. Considering the high prevalence of hypovitaminosis D among postmenopausal women, especially in populations with limited sun exposure or dietary intake, proactive screening and supplementation strategies are warranted. Incorporating vitamin D evaluation into routine menopausal assessments could enable early identification of women at risk for severe symptoms and complications. Corrective measures such as vitamin D supplementation, lifestyle interventions promoting moderate sun exposure, and dietary modifications may serve as effective adjuncts to traditional menopause management approaches. Future studies are needed to evaluate the long-term outcomes of vitamin D correction in this demographic and to establish optimized dosing protocols tailored to the menopausal population.

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