IMPACT OF VITAMIN D DEFICIENCY ON THE CLINICAL COURSE OF MENOPAUSE: A CLINICAL AND BIOCHEMICAL CORRELATION STUDY

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Relevance:

Menopause is a critical physiological transition in women, often accompanied by diverse and sometimes severe symptoms. Recent studies highlight that vitamin D deficiency—commonly found in postmenopausal women—may aggravate both physical and psychological manifestations of menopause, including hot flashes, bone pain, mood disturbances, and fatigue. The relationship between hypovitaminosis D and menopause remains insufficiently explored in Central Asian populations. The transition into menopause represents a profound physiological and endocrinological shift in a woman's life, often accompanied by an array of uncomfortable and sometimes debilitating symptoms that can significantly impair daily functioning and overall well-being. With global demographic trends showing an increasing number of women entering postmenopausal age, understanding the factors that influence the severity of menopausal symptoms has become an urgent public health priority. One such factor is vitamin D deficiency, which is alarmingly prevalent among middle-aged and older women due to reduced sun exposure, dietary inadequacies, and impaired skin synthesis. This micronutrient is not only vital for maintaining bone integrity but also plays an emerging role in neuroendocrine regulation and immune modulation. Deficiency of vitamin D may contribute to heightened vasomotor instability, increased risk of osteoporosis, mood fluctuations, and chronic fatigue, thereby intensifying the challenges faced during menopause. Despite its potential impact, the connection between vitamin D insufficiency and menopause-related symptomatology remains under-investigated, particularly in Central Asian populations. This study seeks to address this gap and offer insights that can refine therapeutic guidelines and preventive strategies for women's health during the menopausal transition.

Objective:

To investigate the impact of vitamin D deficiency on the severity and profile of menopausal symptoms and to determine whether vitamin D status can serve as a prognostic marker in menopausal management. This study aims to conduct a comprehensive analysis of how insufficient levels of vitamin D affect the course of menopause, with a specific focus on the severity and variety of clinical manifestations observed during this period. The purpose is to explore whether a deficiency in this essential fat-soluble vitamin exacerbates neurovegetative, musculoskeletal, and psycho-emotional symptoms commonly experienced by menopausal women. Another important goal is to determine the possible predictive value of serum 25-hydroxyvitamin D concentrations in identifying individuals at higher risk for intensified

menopausal complaints and early bone metabolism disturbances. Furthermore, the investigation intends to contribute practical evidence that may inform the inclusion of vitamin D screening and supplementation in gynecological protocols for menopausal health management. By establishing a correlation between biochemical markers and clinical symptoms, the study hopes to provide a foundation for personalized treatment strategies aimed at alleviating the burden of menopause in women with compromised vitamin D status.

Materials and Methods:

A total of 120 postmenopausal women aged 45–60 were enrolled and divided into two groups based on serum 25(OH)D levels: deficient (<20 ng/mL) and sufficient (>30 ng/mL). Standardized scales including the Menopause Rating Scale (MRS) and Beck Depression Inventory (BDI) were used to assess symptom severity. Bone mineral density was measured using DEXA scanning. Statistical correlations were analyzed using SPSS 26.0 software.

Findings:

Vitamin D deficiency was present in 68.3% of participants and was significantly associated with higher scores for vasomotor instability, musculoskeletal pain, mood disorders, and poor sleep quality. A strong inverse relationship was found between serum vitamin D levels and overall symptom burden ($r = -0.61$, $p < 0.01$). Bone mineral density was also significantly lower in the deficient group, indicating early osteopenic changes.

Conclusion:

Vitamin D plays a crucial modulatory role in the menopausal transition. Women with low vitamin D levels are more likely to experience intense menopausal symptoms and early skeletal complications. Routine screening and correction of vitamin D deficiency may enhance therapeutic outcomes and improve the quality of life for menopausal women. The findings of this study underscore the critical influence of vitamin D status on the clinical expression of menopausal symptoms. Women with insufficient or deficient levels of vitamin D were shown to experience more severe and diverse manifestations, including increased frequency and intensity of vasomotor symptoms such as hot flashes and night sweats, as well as pronounced musculoskeletal discomfort, depressive mood states, and general fatigue. Additionally, lower serum vitamin D concentrations were associated with early signs of bone demineralization, suggesting a potential acceleration of osteoporotic changes during the menopausal transition. These results highlight the importance of recognizing vitamin D not only as a skeletal health regulator but also as a key factor modulating the neuroendocrine and psychological components of menopause. Considering the widespread prevalence of vitamin D deficiency in perimenopausal and postmenopausal women, particularly in regions with limited sun exposure or cultural practices that reduce sunlight absorption, there is a compelling need to incorporate routine screening for vitamin D status into gynecological care protocols. Furthermore, timely correction of this deficiency through dietary adjustment, supplementation, or lifestyle modifications may serve as a simple yet effective strategy to alleviate menopausal complaints, enhance quality of life, and prevent long-term complications such as osteoporosis and mood disorders. This study supports a more integrated approach to menopausal healthcare, advocating for the inclusion of micronutrient evaluation as part of personalized treatment and preventive care strategies.

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