



Research Article



Serum Vitamin D Levels among Adults in Al-Diwaniyah: A Cross-Sectional Study

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Key Words

Vitamin D,
25(OH)D,
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Abstract

Vitamin D deficiency is a major global public-health issue and remains highly prevalent in Middle Eastern countries despite abundant sunlight. This cross-sectional study assessed serum 25-hydroxyvitamin D [25(OH)D] concentrations among adults in Al-Diwaniyah, Iraq, and examined associations with gender, body mass index (BMI), and sun exposure. A total of 300 adults (150 males, 150 females) were evaluated; serum 25(OH)D was measured by automated CLIA. Data were non-normally distributed and analyzed using non-parametric tests. Males exhibited significantly higher vitamin D levels than females (Mann–Whitney U; $p < 0.001$). Deficiency (<20 ng/mL) occurred in 18% of men vs. 42% of women. The findings underline a substantial gender disparity and call for targeted public-health interventions including screening, supplementation, and fortification strategies in the governorate^[1].

INTRODUCTION

Vitamin D (cholecalciferol) is essential for calcium/phosphate homeostasis and skeletal health and exerts extraskeletal effects on immunity and chronic disease risk^[3]. Countries in the Middle East paradoxically report high deficiency rates despite high UV availability, a phenomenon attributed to clothing, limited outdoor time, and dietary insufficiency. Regional and Iraqi studies have repeatedly demonstrated widespread hypovitaminosis D, with females typically more affected than males^[5]. The present study aims to quantify serum 25(OH)D levels among adults in Al-Diwaniyah and to explore associations with gender, BMI, and sun exposure to inform local public-health planning^[6].

MATERIALS AND METHODS

Study Design and Population: A cross-sectional design was used. Adult participants (≥ 18 years) attending selected laboratories/primary centers in Al-Diwaniyah were recruited. Exclusion criteria included current vitamin-D supplementation, chronic conditions known to affect vitamin D metabolism, and pregnancy. Sampling employed a multistage systematic random approach across health centers to enrol 300 participants (150 males, 150 females)^[7].

Sample Collection and Laboratory Analysis: Venous blood (5-7 mL) was collected into serum separator tubes, centrifuged, and serum aliquoted and stored appropriately until assay. Serum 25(OH)D was quantified using the MAGLUMI® 25-OH Vitamin D CLIA on an automated MAGLUMI analyzer following manufacturer protocols; calibration was performed with NIST SRM reference material. Results were reported in ng/mL and nmol/L^[8].

Definitions and Classification: Vitamin D status was classified as: deficiency <20 ng/mL (<50 nmol/L), insufficiency $20-29$ ng/mL, and sufficiency ≥ 30 ng/mL^[9].

Data Management and Statistical Analysis: Data were entered and analyzed using SPSS. Because serum 25(OH)D values were not normally distributed, non-parametric tests were used. Group comparisons by gender used the Mann-Whitney U test; associations with categorical variables used chi-square where appropriate. A p-value <0.05 denoted statistical significance^[10].

RESULTS AND DISCUSSIONS

Demographics and Sample Description: The sample comprised 300 adults (150 males, 150 females) aged ≥ 18 years. Females had higher mean BMI than males; reported regular sun exposure was more frequent among men than women^[11].

Serum Vitamin D Distribution: Median serum 25(OH)D concentrations differed significantly by gender: males had higher median ranks compared to females (Mean Rank males = 176.51 vs females = 124.49; Mann-Whitney U = 7348.50; Z = -5.194; $p < 0.001$)^[12].

Prevalence Categories: Vitamin D deficiency (<20 ng/mL) was observed in 18% of men and 42% of women; insufficiency (20-29 ng/mL) in 36% of men and 30% of women; sufficiency (≥ 30 ng/mL) in 46% of men and 28% of women. The gender difference in vitamin D status distribution was statistically significant ($p < 0.001$)^[13].

Associations with BMI and Sun Exposure: Participants reporting regular sun exposure had significantly higher 25(OH)D levels than those with limited exposure. An inverse association was observed between BMI and serum 25(OH)D in both genders, consistent with adipose sequestration of vitamin D^[14].

This study documents a high prevalence of vitamin D deficiency among adults in Al-Diwaniyah, with a clear gender disparity disadvantaging women. These results align with regional Iraqi data showing elevated deficiency rates among females due to sociocultural clothing practices, reduced outdoor activity, and higher BMI leading to sequestration of vitamin D in adipose tissue^[15].

The “sunlight paradox” in sun-rich regions is evident here: environmental heat, clothing coverage, and indoor lifestyles reduce effective UVB exposure despite ample ambient irradiance^[16].

Methodologically, the use of automated CLIA provides reliable high-throughput measurement with appropriate sensitivity; nonetheless, assay differences across studies may partly account for interstudy variability and underscore the need for standardized methodologies^[17].

From a public-health viewpoint, the finding that 42% of women are deficient is alarming given implications for bone health, pregnancy outcomes, and potential extraskeletal effects. Interventions should include targeted screening (especially for women of reproductive age), evidence-based supplementation protocols, dietary modification and fortification policies, and culturally sensitive education about safe sun exposure^[18].

Limitations: The cross-sectional design precludes causal inference and captures vitamin D status at a single time point, which may not represent seasonal variation. Dietary intake and objective sun exposure quantification were not comprehensively assessed, and the sampling from selected health centers may limit generalizability to

the entire governorate. Future longitudinal and population-representative studies are recommended^[19].

CONCLUSION

Vitamin D deficiency is common among adults in Al-Diwaniyah, with significantly lower levels in females compared to males. The high burden among women necessitates province-level public-health actions-screening, supplementation, food fortification, and education-to reduce deficiency and its health consequences^[20].

Recommendations: Routine vitamin D screening in primary care for high-risk groups, especially women and individuals with high BMI, should be implemented^[21].

Standardized supplementation protocols aligned with international guidelines and adapted to local needs are recommended^[9].

Food fortification policies such as fortified milk or flour should be promoted as population-level preventive measures^[22].

Culturally tailored awareness campaigns encouraging safe sun exposure and dietary vitamin D sources are essential^[23].

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