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Vitamin D status and its association with depression in US women; results from the National Health and Nutrition Examination Survey (NHANES) 2005–6

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Recent interest in vitamin D has intensified with the discovery of vitamin D receptors in major organs such as the brain[1] and the potential for it to act as a neuro-active hormone. Some studies already suggest a relationship between poor mood elevation and low vitamin D status[2–4] and there is supporting evidence from the sunlight-related depressive disorder seasonal depressive disorder, which is negatively associated with serum 25-hydroxycholecalciferol[5]. Depression is predicted to become one of the leading causes of disability in the world[6] and thus poses a great public-heath burden and investigating the potential use of cost-effective measures such as increased sunlight exposure to alleviate this condition may reap benefit not only to the individual but also to the healthcare economy as well.

We used the most recent US data from the National Health and Nutrition Examination Survey (NHANES) 2005–6[7] to examine the relationship between self-reported depressive symptoms and serum 25-hydroxycholecalciferol levels in women aged 20 years and over. All subjects (*n* 1285) were assigned a depression score (DR) derived from the validated Depression Screener Questionnaire and serum 25-hydroxycholecalciferol was determined by radio-immunoassay kit from DiaSorin (Stillwater, MN, USA)[7]. Vitamin D deficiency was defined using the established cut-off threshold of 25 hydroxycholecalciferol serum level of less than 20 ng/ml[1]. Vitamin D insufficiency was defined at a 25-hydroxycholecalciferol serum concentration between 20 and 32 ng/ml, and vitamin D sufficiency was determined at higher than 32 ng/ml. To account for the complex NHANES sampling design, we used weighted data to provide accurate variance estimates.

The prevalence of vitamin D deficiency in this nationally representative study was 44 % in women aged less than 65 years and 41 % in those aged 65 years and above. The mean serum hydroxycholecalciferol levels were below 20 ng/ml for all racial groups, (Mexican Americans, other Hispanics, non-Hispanic Black and other races), except for the non-Hispanic White. Severe to moderate depression accounted for 11 % in those aged below 65 years old, with 2 % severe depression. A fewer proportion (6.5 %) was identified as moderate to severe in the older category (65 years and above) with 0.5 % reporting severe depression. Multiple regression analysis showed a linear statistically significant relationship between circulating 25-hydroxycholecalciferol serum levels and DR ($P = 0.02$) in all women when controlling for age, race and education. When stratified by age, the relationship was weaker ($P = 0.08$) in those aged below 65 years but remained significant in the elderly ($P = 0.006$). We believe this is the first study to investigate the relationship between serum 25-hydroxycholecalciferol and depression in a large nationally representative sample of US women and the findings from this study suggest improving vitamin D status in those at risk of depression may be a more desirable and cost-effective treatment option than anti-depressant medication and its side effects.

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