

# Abstract

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## Lower vitamin D levels are associated with depression among community-dwelling European men.

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**BACKGROUND:** Low serum 25-hydroxyvitamin D (25(OH)D) and elevated parathyroid hormone (PTH) levels have been linked with depressive symptoms among adults in various clinical settings. Data in generally healthy, community-dwelling individuals remain inconclusive.

**METHODS:** We investigated whether depression was associated with 25(OH)D and/or PTH in a sample of middle-aged and older men (n = 3369; mean age 60 +/- 11) participating in the European Male Ageing Study, and whether any associations were explained by lifestyle and health factors. The Beck Depression Inventory-II (BDI-II) was used to screen for depression, and serum 25(OH)D and PTH levels measured by radioimmunoassay.

**RESULTS:** Univariate analysis revealed that 25(OH)D levels were lower (p < 0.001) and PTH higher (p = 0.004) in people with depression. In age- and centre-adjusted linear regressions a higher BDI-II score was significantly associated with lower levels of 25(OH)D (p = 0.004). After adjustment for lifestyle and health factors this relationship was attenuated but remained significant (p = 0.01). Using multivariable logistic regression the odds for depression increased approximately 70% across decreasing 25(OH)D quartiles (ptrend = 0.04). There was no independent association between PTH and depression in any of the multivariable regressions.

**CONCLUSIONS:** Our results reveal an inverse association between 25(OH)D levels and depression, largely independent of several lifestyle and health factors. Further studies are required to determine whether higher levels of vitamin D have an antidepressant effect in older adults.

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