

Abstract

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Maternal vitamin D status during pregnancy and childhood bone mass at age 9 years: a longitudinal study.

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BACKGROUND: Vitamin D insufficiency is common in women of childbearing age and increasing evidence suggests that the risk of osteoporotic fracture in adulthood could be determined partly by environmental factors during intrauterine and early postnatal life. We investigated the effect of maternal vitamin D status during pregnancy on childhood skeletal growth.

METHODS: In a longitudinal study, we studied 198 children born in 1991-92 in a hospital in Southampton, UK; the body build, nutrition, and vitamin D status of their mothers had been characterised during pregnancy. The children were followed up at age 9 years to relate these maternal characteristics to their body size and bone mass.

FINDINGS: 49 (31%) mothers had insufficient and 28 (18%) had deficient circulating concentrations of 25(OH)-vitamin D during late pregnancy. Reduced concentration of 25(OH)-vitamin D in mothers during late pregnancy was associated with reduced whole-body ($r=0.21$, $p=0.0088$) and lumbar-spine ($r=0.17$, $p=0.03$) bone-mineral content in children at age 9 years. Both the estimated exposure to ultraviolet B radiation during late pregnancy and the maternal use of vitamin D supplements predicted maternal 25(OH)-vitamin D concentration ($p<0.0001$ and $p=0.0110$, respectively) and childhood bone mass ($p=0.0267$). Reduced concentration of umbilical-venous calcium also predicted reduced childhood bone mass ($p=0.0286$).

INTERPRETATION: Maternal vitamin D insufficiency is common during pregnancy and is associated with reduced bone-mineral accrual in the offspring during childhood; this association is mediated partly through the concentration of umbilical venous calcium. Vitamin D supplementation of pregnant women, especially during winter months, could lead to longstanding reductions in the risk of osteoporotic fracture in their offspring.

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