

Abstract

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Hypovitaminosis D is associated with insulin resistance and beta cell dysfunction.

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BACKGROUND: Although the role of vitamin D in type 2 diabetes is well recognized, its relation to glucose metabolism is not well studied.

OBJECTIVE: We investigated the relation of 25-hydroxyvitamin D [25(OH)D] concentrations to insulin sensitivity and beta cell function.

DESIGN: We enrolled 126 healthy, glucose-tolerant subjects living in California. Insulin sensitivity index (ISI) and first- and second-phase insulin responses (1stIR and 2ndIR) were assessed by using a hyperglycemic clamp.

RESULTS: Univariate regression analyses showed that 25(OH)D concentration was positively correlated with ISI ($P < 0.0001$) and negatively correlated with 1stIR ($P = 0.0045$) and 2ndIR ($P < 0.0001$). Multiple regression analyses confirmed an independent correlation between 25(OH)D concentration and ISI ($P = 0.0007$). No independent correlation was observed between 25(OH)D concentration and 1stIR or 2ndIR. However, an independent negative relation of 25(OH)D concentration with plasma glucose concentration was observed at fasting ($P = 0.0258$), 60 min ($P = 0.0011$), 90 min ($P = 0.0011$), and 120 min ($P = 0.0007$) during the oral-glucose-tolerance test. Subjects with hypovitaminosis D (<20 ng/mL) had a greater prevalence of components of metabolic syndrome than did subjects without hypovitaminosis D (30% compared with 11%; $P = 0.0076$).

CONCLUSIONS: The data show a positive correlation of 25(OH)D concentration with insulin sensitivity and a negative effect of hypovitaminosis D on beta cell function. Subjects with hypovitaminosis D are at higher risk of insulin resistance and the metabolic syndrome. Further studies are required to explore the underlying mechanisms.

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