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High dietary acid load is associated with insulin resistance: The Furukawa Nutrition and Health Study.

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BACKGROUND & AIMS:

Acid-base imbalance has been suggested to play an important role in certain cardio-metabolic abnormalities, including type 2 diabetes; however, epidemiological evidence linking dietary acid load to glucose metabolism is lacking. We examined the association of dietary acid load with markers of insulin resistance (IR), insulin secretion, and blood glucose status among Japanese workers.

METHODS:

The study subjects were 1732 workers, aged 19-69 years, who completed a health survey at a periodic checkup. Dietary intake was assessed using a validated brief diet history questionnaire. Potential renal acid load (PRAL) and net endogenous acid production (NEAP) scores were derived from nutrient intake. A multilevel linear regression model was used to estimate the means of fasting insulin, fasting plasma glucose, homeostatic model assessment of IR (HOMA-IR) score, homeostatic model assessment of β -cell function (HOMA- β) score and glycated hemoglobin (HbA1c) level with adjustment for potential confounding variables.

RESULTS:

PRAL was positively associated with HOMA-IR score (Ptrend = 0.045); the multivariable-adjusted means (95% confidence intervals) for the HOMA-IR scores for the lowest through the highest quartiles of PRAL were 0.88 (0.82-0.94), 0.92 (0.86-0.98), 0.92 (0.86-0.98), and 0.94 (0.88-1.01). A similar association was observed between NEAP and HOMA-IR scores (Ptrend = 0.03). In the stratified analyses, these positive associations were confined to subjects with lower BMIs (<23 kg/m²) (Ptrend = 0.03 and 0.01 for PRAL and NEAP, respectively). NEAP score was positively associated with HOMA- β score (Ptrend = 0.03). Dietary acid load score was not appreciably associated with fasting glucose or HbA1c levels.

CONCLUSIONS:

The present findings suggest that high dietary acid load is associated with IR among apparently healthy adults.