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Areca Nut Chewing Is Associated With Metabolic Syndrome

Role of tumor necrosis factor-α, leptin, and white blood cell count in betel nut chewing–related metabolic derangements

Areca nut (*Areca catechu*)/betel quid (BQ) is said to be the fourth most commonly used psychoactive substance in the world and is chewed regularly by at least 10% of the world's population (1). High prevalences of BQ chewing were observed especially in South and Southeast Asia (1). High prevalences of insulin resistance and metabolic syndrome were also observed in this area (2). Specific areca alkaloids act as competitive inhibitors of γ-aminobutyric acid receptors in the brain, cardiovascular system, and pancreas, which may promote one's appetite or altered insulin secretion (3). Moreover, BQ components have recently been shown to induce keratinocytes to secrete tumor necrosis factor-α (TNF-α) and interleukin-6, as well as induce reactive oxygen species and activate nuclear factor-κB expression (4), which may potentially provoke chronic inflammation. Recently, we confirmed that BQ chewing was associated with a higher risk of type 2 diabetes and central obesity in Taiwanese men (5). The detrimental effects of BQ chewing on selected components of the metabolic syndrome, and the induction of inflammatory cytokines and factors, raise the possibility that BQ chewing may increase the risk of metabolic syndrome.

In this study, a total of 1,466 aboriginal subjects of Southern Taiwan, 30–95 years of age, were enrolled. Metabolic syndrome was defined according to the National Cholesterol Education Program Adult Treatment Panel III definition. The age-adjusted prevalence of metabolic syndrome in the aborigines studied was 41.1% in men and 42.4% in women. BQ-chewing subjects had significantly higher prevalences of central obesity, hypertriglyceridemia, dysglycemia, and metabolic syndrome than those of nonchewers. Peripheral leukocyte count also significantly increased in chewers of both sexes, with plasma TNF-α level increased in men and plasma leptin level elevated in women. All were parallel to the number of components of the metabolic syndrome. Multiple logistic regression modeling adjusted for age, educational level, socioeconomic level, exercise, drinking, and smoking status showed that BQ chewing is an independent risk factor for the metabolic syndrome. The adjusted OR (95% CI) for male BQ chewers was 1.92 (1.15–3.27) and that of female chewers was 1.60 (1.03–2.50). The study shows that chronic BQ chewing is an independent contributor of metabolic syndrome. TNF-α, leptin, and leukocyte count are involved in BQ chewing–related metabolic derangements.

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An Epidemiologic Study on the Prevalence of Diabetes, Glucose Intolerance, and Metabolic Syndrome in the Adult Population of the Republic of Cyprus

The study was conducted in Cyprus (November 2003 through January 2005). Stratified random sampling was used to select 1,200 individuals aged 20–80 years (from a total population of 477,000). In all subjects, anthropometrical measurements were taken, fasting lipids were measured, eating habits were evaluated according to a standardized questionnaire, and an oral glucose tolerance test (OGTT) was performed (except in known diabetic patients).

In the absence of OGTT-diagnosed diabetes or impaired glucose tolerance (IGT), impaired fasting glucose (IFG) was defined by fasting plasma glucose ≥110 mg/dl and <126 mg/dl, whereas "new" IFG was defined by fasting plasma glucose ≥100 and <126 mg/dl. Metabolic syndrome was defined according to the National Cholesterol Education Program Adult Treatment Panel III criteria.

Of the 1,200 subjects, 78 (6.5%) had known diabetes and 45 (3.8%) were newly diagnosed by the OGTT, which brought the total prevalence of diabetes to 123 (10.3%). Another 78 (6.5%) subjects had IGT, 36 (3.0%) had IFG, and 171 (14.2%) had "new" IFG. Logistic regression showed that significant risk factors for diabetes were age, male sex, family history of diabetes ($P < 0.001$), hypertension ($P = 0.004$), and obesity ($P = 0.003$). Risk factors for IGT were age and family history of diabetes ($P < 0.01$). Risk factors for IFG and "new" IFG were age and obesity ($P < 0.01$).

The prevalence of metabolic syndrome was 22.2% overall, 68.5% among subjects with diabetes, 43.6% among