

Abstract

J Am Coll Nutr. 2004 Jun;23(3):239-47.

Micronutrient deficiencies as predisposing factors for hypertension in lacto-vegetarian Indian adults.

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OBJECTIVE: With the increasing knowledge about the antioxidant potential of many micronutrients such as zinc and vitamin C, their roles in oxidative stress related health disorders have been postulated. This study therefore investigated low micronutrient status as a predisposing factor for hypertension in a traditionally lacto-vegetarian population like Indians.

METHODS: Micronutrient profile was assessed in 109 hypertensives with age-gender-socio-economic status matched 115 healthy normotensives (30-58 years of age). Food intakes were estimated through a semi-quantitative food frequency questionnaire. Nutrient intakes were then evaluated by previous estimates of cooked foods from our laboratory. Systolic and diastolic blood pressure (SBP, DBP), age, weight, height, waist and hip circumference, occupation, physical activity, smoking habits were recorded. Fasting blood samples were analyzed for hemoglobin, serum level of glucose, triglycerides, total cholesterol, HDL, ceruloplasmin, plasma level of ascorbic acid, folic acid, retinol, erythrocyte glutathione reductase activity coefficient (EGRAC) and erythrocyte membrane zinc.

RESULTS: There were no significant differences between protein, fat intakes of normal and hypertensive individuals, though intakes of men were higher than those of women ($p < 0.05$). Intakes of omega-6 fatty acids were higher ($p = 0.08$) and omega-3 fatty acids were lower in hypertensive men than normotensive men ($p = 0.04$). Gender differences were also significant for micronutrient intakes except vitamin C and beta-carotene. Intakes of potassium, copper, folic acid and vitamin C were significantly lower in hypertensive individuals than in normotensives. No significant association was found between occupation or activity level and hypertension ($p > 0.2$) in these subjects. Conditional logistic regression analysis indicated that intakes of vitamin C, folic acid and zinc were associated with 18% (OR = 1.18, 95% CI:1.08, 1.26), 51% (OR = 1.51, 95% CI 0.94, 2.1) higher odds for hypertension, and 3% lower odds for hypertension (OR = 0.97, 95% CI 0.92, 1.01), respectively. Mean plasma vitamin C and folic acid were significantly higher ($p < 0.01$), and serum ceruloplasmin and erythrocyte membrane zinc were marginally higher ($p = 0.07$) in normal than hypertensive subjects. In multivariate linear regression analyses, plasma vitamin C, serum ceruloplasmin and erythrocyte membrane zinc were negatively associated with SBP ($p = 0.00001$) and plasma vitamin C was negatively associated with DBP ($p = 0.0001$).

CONCLUSION: Low dietary intakes of vitamin C, folic acid and zinc emerged as the possible risk factors for hypertension. Further, lower levels of plasma vitamin C, erythrocyte membrane zinc and ceruloplasmin were found to be the putative intermediary biomarkers in pathogenesis of hypertension.

