

Arsenic exposure, urinary arsenic speciation and peripheral vascular disease in blackfoot disease-hyperendemic villages in Taiwan

薛玉梅

Tseng CH;Huang YK;Huang YL;Chung CJ;Yang

MH;Chen CJ;Hsueh YM

摘要

Abstract

Long-term exposure to ingested inorganic arsenic is associated with peripheral vascular disease (PVD) in the blackfoot disease (BFD)-hyperendemic area in Taiwan. This study further examined the interaction between arsenic exposure and urinary arsenic speciation on the risk of PVD. A total of 479 (220 men and 259 women) adults residing in the BFD-hyperendemic area were studied. Doppler ultrasound was used to diagnose PVD. Arsenic exposure was estimated by an index of cumulative arsenic exposure (CAE). Urinary levels of total arsenic, inorganic arsenite (As(III)) and arsenate (As(V)), monomethylarsonic acid (MMA(V)), and dimethylarsinic acid (DMA(V)) were determined. Primary methylation index [PMI = MMA(V)/(As(III) + As(V))] and secondary methylation index (SMI = DMA(V)/MMA(V)) were calculated. The association between PVD and urinary arsenic parameters was evaluated with consideration of the interaction with CAE and the confounding effects of age, sex, body mass index, total cholesterol, triglycerides, cigarette smoking, and alcohol consumption. Results showed that aging was associated with a diminishing capacity to methylate inorganic arsenic and women possessed a more efficient arsenic methylation capacity than men did. PVD risk increased with a higher CAE and a lower capacity to methylate arsenic to DMA(V). The multivariate-adjusted odds ratios for CAE of 0, 0.1-15.4, and >15.4 mg/L x year were 1.00, 3.41 (0.74-15.78), and 4.62 (0.96-22.21), respectively ($P < 0.05$, trend test); and for PMI \leq 1.77 and SMI $>$ 6.93, PMI $>$ 1.77 and SMI $>$ 6.93, PMI $>$ 1.77 and SMI \leq 6.93, and PMI \leq 1.77 and SMI \leq 6.93 were 1.00, 2.93 (0.90-9.52), 2.85 (1.05-7.73), and 3.60 (1.12-11.56), respectively ($P < 0.05$, trend test). It was concluded that individuals with a higher arsenic exposure and a lower capacity to methylate inorganic arsenic to DMA(V) have a higher risk of developing PVD in the BFD-hyperendemic area in Taiwan.