The Associations between Arsenic Concentration in Drinking Water and Chronic Kidney Disease: a Nationwide Study in Taiwan

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Introduction: Previous studies have shown that long-term exposure to excess arsenic in drinking water can cause various types of cancer and chronic disease. A governmental survey showed that more than half a million residents in Taiwan had drunk water containing arsenic levels higher than 0.01 ppm, and a large proportion of them lived in the southwestern coast area. The prevalence of end-stage renal disease in Taiwan is among the highest in the world, and the southern coast area has higher prevalence than most regions in the country. However, epidemiology studies on the associations between arsenic exposure and chronic kidney disease (CKD) are limited. Therefore, we conducted a study to evaluate the possible associations.

Methods: We conducted a nationwide study on 94,734 participants 20 years or older who took part in health screening programs operated by the MJ Health Management Institution in Taiwan from 2000 to 2009. All participants were interviewed by using a standard questionnaire to collect data on demographic characteristics, smoking habits, and other potential risk factors for CKD. Arsenic levels were assessed on the basis of a governmental nationwide census survey of wells.

Results: We identified a total of 5,707 patients with stage 3b to stage 5 CKD. A higher prevalence was observed in participants lived in areas with arsenic levels ≥0.05 mg/L in the drinking water, with a relative risk of 1.25 (95% confidence interval: 1.13-1.39). After adjusting for other risk factors including age, sex, education level, usage of Chinese herbs, hypertension, diabetes, triglyceride level, total cholesterol level, and smoking, exposure to high levels of arsenic in drinking water was associated with a relative risk of 1.13 (95% confidence interval: 1.01-1.28).

Conclusion: We found exposure to arsenic in drinking water was associated with the prevalence of CKD in Taiwan, independent of most documented risk factors.

Keyword: arsenic, chronic kidney disease, drinking water

Figure/Table:
Legend
Sheet1$ Events
砷濃度50, CKD_3A
- Arsenic <0.05 (mg/L), CKD3b-5
- Arsenic >0.05 (mg/L), CKD3b-5
AV_As
- 0.000000 - 0.027830
- 0.027831 - 0.044082
- 0.044083 - 0.079124
- 0.079125 - 0.137293
- 0.137294 - 0.257258