

Indoor Air Pollution Affects Hypertension Risk in Rural Women in North China by Interfering with the Uptake of Metal Elements

Coal combustion and passive smoking are two important contributors to indoor air pollution (IAP) in rural areas of northern China. Although the association between outdoor air pollutants and hypertension risk had been widely reported, fewer studies have examined the relationship between IAP and hypertension risk. This study evaluated the association between IAP and hypertension risk in housewives in rural areas of northern China and the potential mediation pathway of metal elements. Our cross-sectional study, conducted in Shanxi Province, China, enrolled 367 subjects without taking anti-hypertensive drugs, including 142 subjects with hypertension (case group) and 225 subjects without hypertension (control group). We collected information on energy use characteristics and lifestyle using questionnaires. An IAP exposure index was developed to indicate the population exposure to coal combustion and passive smoking. Scalp hair samples were collected from the housewives and various trace and major metal elements were measured. Our results revealed that the IAP index was positively correlated with systolic and diastolic blood pressure. A significant association between the IAP index and hypertension risk was found both without [odds ratio (95% confidence interval, CI) = 2.08 (1.30–3.31)] and with [OR (95% CI) = 2.52 (1.46–4.36)] adjustment for confounders. We also observed that the IAP index was positively correlated with the arsenic, lead, and rare earth element levels in hair samples, and negatively correlated with the levels of certain essential trace elements (i.e., chromium, cobalt, nickel, and tin) and alkaline earth elements (i.e., calcium, magnesium, and barium).

Summary

It was concluded that IAP may contribute to the development of hypertension in rural housewives in northern China by interfering with the uptake of metal elements.

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