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Persistent organic pollutants (POPs) exposure in association with chronic kidney disease among general adults: Korean National Environmental Health Survey (KoNEHS) 2015-2017

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Objectives: Persistent organic pollutants (POPs) are frequently detected among general population and associated with various adverse health effects. However, their potential associations with kidney diseases have rarely been evaluated. We investigated the association of POPs exposure with kidney disease-related parameters among general adult population of Korea.

Methods: A subset of adult population (n=1,276), randomly chosen from those participated in Korean National Environmental Health Survey (KoNEHS) Cycle 3 (2015–2017) following age and sex stratification, were analyzed. Estimated glomerular filtration rate (eGFR) and urinary albumin-to-creatinine ratio (uACR) were determined from serum and urine samples, respectively. Twenty-four POPs, including OCPs, PCBs, and PBDEs, were measured in serum samples. Multivariable linear regression was conducted to assess the association between POPs and kidney disease-related parameters.

Results: Approximately 8% (n=98) of the study population were identified as having chronic kidney disease based on eGFR (<60 ml/min/1.73 m²) or uACR (≥30 mg/g). Among the POPs, which were detected in ≥70% of the subjects, that is, hexachlorobenzene (HCB), *p,p'*-DDT, *p,p'*-DDE, PCB52, PCB118, PCB138, PCB153, and PCB180, only PCB153 ($\beta = -1.61$, 95% CI: $-2.55, -0.67$, $P = 0.001$) and PCB180 ($\beta = -1.47$, 95% CI: $-2.53, -0.40$, $P = 0.007$) exhibited significant associations with decreased eGFR. When stratified by sex, the associations of both polychlorinated biphenyls (PCBs) remained significant, but only among females. In male participants, HCB was associated with eGFR ($\beta = -0.79$, 95% CI: $-1.53, -0.04$, $P = 0.040$). In addition, PCB105, detected in 56.5% of the samples, displayed a higher risk of albuminuria (OR = 2.29, 95% CI: 1.24, 4.22, $P = 0.008$).

Conclusions: PCB153/PCB180 and PCB105 were significantly associated with reduced GFR and albuminuria, respectively. Sex-dependent associations were observed for PCBs and HCB. These observations should be confirmed in other national biomonitoring programs.