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The association of sodium intake and albuminuria according to cotinine-verified smoking status: Korean National Health Examination Survey (KoNHES)

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Objectives:

Smoking and high sodium intake are reported about the association with chronic kidney disease. Smoking and sodium intake are modifiable risk factors and the implementation of life style changes in the broad population could have a beneficial effect on public health. We assessed the association of sodium intake and smoking on the presence of albuminuria.

Methods: An observational study from the Korean National Health and Nutrition Examination Survey (2008-2011, 2014-2018) was performed. We included 38,161 adults with $eGFR \geq 60$ ml/min/1.73m² and had urine cotinine/creatinine ratio (Ucot/Ucrea). Smoking status was assumed by Ucot/Ucrea. 24 hour sodium intake was estimated from spot urine sodium using Kawasaki formula.

Results: Ucot/Ucrea level was significantly higher in current smokers than those in ex-smokers and non-smokers (920.22 ± 9.00 , 48.30 ± 2.46 , vs. 23.83 ± 1.29 ng/mg, $P < 0.001$). Non-smokers who were exposed to secondhand smoke showed significantly higher Ucot/Ucrea levels than those who were not exposed to secondhand smoke (37.74 ± 3.14 ng/mg vs 16.71 ± 1.13 ng/mg, $P < 0.001$). Ucot/Ucrea level was significantly associated with sodium intake. Sodium intake of 2nd and 3rd Ucot/Ucrea tertile were significantly higher than that of 1st Ucot/Ucrea tertile (4.15 ± 1.31 , 4.13 ± 1.43 vs. 3.73 ± 1.15 mg, $P < 0.001$). The quartile groups of sodium intake had a linear relationship with albuminuria (5.2, 5.8, 7.5, and 9.7%, $P < 0.001$). The highest quartile of sodium intake was significantly associated with risk of albuminuria (OR 1.43, 95% CI 1.05-1.93, $P = 0.022$). We evaluated the association of sodium intake with albuminuria according to smoking status estimated by Ucot/Ucrea. In the groups with the highest Ucot/Ucrea level, the highest sodium intake quartile indicated significantly higher risk of albuminuria compared to that of lowest quartile (OR 2.05, 95% CI 1.20-3.52, $P = 0.009$).

Conclusions:

High sodium intake is an independent risk factor for albuminuria and this association was highlighted in high Ucot/Ucrea group. The synergistic effects of smoking and high salt intake might increase the risk of albuminuria.