CADMIUM INDUCED RENAL TUBULAR DAMAGE AMONG RESIDENTS LIVING NEAR THE COPPER REFINERY PLANT IN KOREA.

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Background/Aims: Cadmium (Cd) is the most potent nephrotoxic heavy metal, with a long biological half-life in human body. This study aimed to assess the effect of environmental Cd exposure on kidney dysfunction.
Methods: The study subjects composed of 687 individuals who reside within 4 km area from a copper refinery plant. We analyzed the concentrations of Cd in blood and urine, renal tubular damage markers [urinary • $_2$-microglobulin (• $_2$-MG), N-acetyl-• -D-glucosaminidase (NAG) activity, and total protein], and kidney function markers [blood urea nitrogen (BUN) and serum creatinine]. Renal dysfunction rates were estimated and compared according to the hematologic and urinary Cd level.
Results: The blood Cd ranged from 0.21 to 16.12 • g /L (geometric mean; 2.56 • g/L) and the urinary Cd, from 0.14 to 22.42 • g/g creatinine (geometric mean; 2.72 • g/g creatinine). The urinary NAG activity was significantly correlated with urinary cadmium level (r=0.103, p=0.021). As blood or urinary Cd level increased, the prevalence of renal tubular damage (defined as U-NAG > 11.5 U/g creatinine, or U-• $_2$-MG > 300 • g/g creatinine) increased in a dose-response way. The odds ratio (adjusted for age, gender, smoking status, history of diabetes and hypertension) for abnormality of U-NAG according to U-Cd level showed a linear increase, but for U-• $_2$-MG was not. The prevalence of abnormal serum creatinine level (defined as serum creatinie > 1.3 mg/dL) was significantly increased in subjects with moderately elevated blood cadmium level (B-Cd; 2.0 ~ 5.0 • g/L) (odds ratio; 9.60, 95% CI; 1.23-75.17). There were significant differences in the prevalence of renal tubular damage and in that of abnormal serum creatinine level between individuals whose blood Cd level was 2.00 • g/L or higher and those with blood Cd level lower than 2.00 • g/L.
Conclusion: These results suggest a possibility that Cd as low as 2.00 • g/L for blood or 2.00 • g/g creatinine for urine can cause renal tubular or glomerular damage.

Keywords : copper refinery plant, cadmium, renal tubular damage