

**Association between respirable hexavalent chromium (Cr-VI) compounds
with B2-microglobulin level of welders in an automotive components
manufacturing plant**

Abstract

The main objective of this study is to determine the association between respirable hexavalent chromium compounds with urinary β 2-microglobulin levels among welders in an automotive components manufacturing plant. 49 welders and 39 workers involved in stamping process were selected as the exposed and the comparative group. β 2-microglobulin is a protein renal tubular dysfunction marker that can indicate renal dysfunction caused by heavy metal. Air samples of worker's breathing zone were collected using personal air sampling pump and filter papers. Filter papers were then diluted and analysed with Atomic Absorption Spectrophotometry (AAS). Workers' urine samples were collected at the end of 8-hour work shift and analysed with β 2-microglobulin ELISA Kit (IBL-Hamburg) and a microtiter reader. Meanwhile, creatinine levels were analysed with creatinine test strips and Reflotron®. A mean concentration of respirable hexavalent chromium compounds in air for the exposed group was $0.135 \pm 0.043 \mu\text{g}/\text{m}^3$ while for the non-exposed group was $0.124 \pm 0.029 \mu\text{g}/\text{m}^3$. The mean level of urinary β 2-microglobulin per creatinine for the exposed group was $84.996 \pm 39.246 \mu\text{g}/\text{g}$ while that of the comparative group was $61.365 \pm 21.609 \mu\text{g}/\text{g}$. The concentrations of respirable hexavalent chromium compounds were higher in the exposed group compared to the comparative group ($Z=-2.444$, $p=0.015$). β 2-microglobulin level was also higher in the exposed group compared to the non-exposed group ($t=3.821$, $p<0.001$). However, there was no significant correlation between respirable hexavalent chromium compounds with urinary β 2-microglobulin levels ($r=0.080$, $p=0.457$) among the respondents. A multiple stepwise regression analysis showed that the most influence variable or confounding factor to β 2-microglobulin level

was the education year ($\beta = -0.020$, $p = 0.010$). All respondents were exposed to concentrations of chromium below regulated limit. Years of education seemed to be a secondary factor that influenced β_2 -microglobulin level.