THE EFFECT OF LOW DOSE ORGANIC ARSENIC EXPOSURE ON INFLAMMATORY GENES EXPRESSION IN RAT'S KIDNEY

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ABSTRACT

Monosodium methylarsonate (MSMA) is an organic arsenical pesticide widely used in agriculture. Exposure to arsenic has been linked with multiple health problems. Inflammatory genes such as interleukin 6 (IL-6) and interleukin 8 (IL-8) play an important role in the pathophysiology of exposure to an acute high dose arsenic-mediated nephrotoxicity, which led to the proximal tubular injury. However, studies focusing on low dose organic arsenic exposure and its adverse effects on kidneys are limited. This study aimed to evaluate the effects of low dose arsenic exposure on the inflammatory genes expression in rats' kidneys at three different duration intervals; 2 months, four months and six months. Thirty-six male Sprague-Dawley rats were randomly divided into six groups (n=6); a treatment group and its control for each interval. The treatment groups were given daily oral gavage of MSMA at 63.0 mg/kg body weight (BW) which is equivalent to 1/20 LD50 of MSMA. While control groups received distilled water via oral gavage. At the end of study intervals, the kidney tissues were harvested for arsenic level analysis and molecular analysis. The RNA integrity was confirmed with Qiaxcel analysis. The expressions of inflammatory genes were analysed using RT2 SYBR Green qPCR Mastermix. Tissue arsenic concentration was higher in all treated group. Both IL-6 and IL-8 showed a similar pattern of expressions. Organic arsenic down-regulated IL-6 and IL-8 in 2-month (both fold change -1.03) and 6-month groups (fold change -1.36,-1.15). However, in the 4-month group, both IL-6 and IL-8 were up-regulated (both fold change 1.31). Interestingly, these findings suggest that low dose arsenic exposure has shown the anti-inflammatory effect at 2-month and 6-month. However, 4-month paradoxically demonstrated a pro-inflammatory effect consistent with the tissue arsenic levels.

Keywords: MSMA, chronic kidney injury, organic arsenic, IL-6, IL-8