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**REGIONAL  
OCCUPATIONAL  
HEALTH CENTRE (S)  
BANGALORE**

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## EVALUATION OF RENAL TUBULAR DYSFUNCTION AND OXIDATIVE STRESS AMONG ELECTROPLATING WORKERS

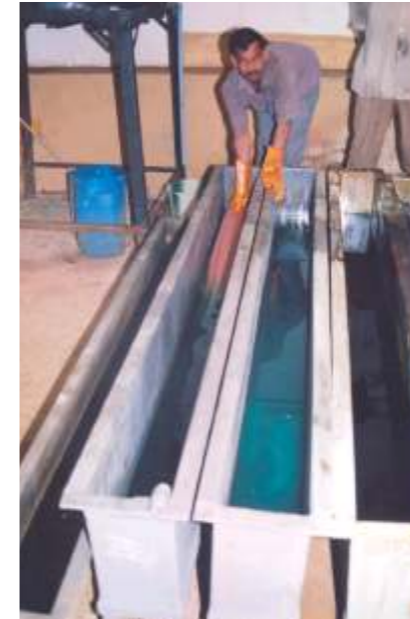
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The present study assessed the renal tubular dysfunction and oxidative stress in workers exposed to chromium during chromium plating process. The study group comprised of 50 chromium plating workers and 50 office workers, who are away from the place of chromium plating process and were considered as control group. The estimation of urinary chromium levels was considered as body burden and measured by using graphite furnace atomic absorption spectrophotometer. The total urinary N-acetyl- $\beta$ -D-glucosaminidase, Isoenzymes A and B were used as biomarkers of renal tubular dysfunction. Plasma lipid peroxidation and erythrocyte antioxidants were used as indicators of oxidative stress.

Results of the study indicated that urine chromium level was significantly ( $P < 0.001$ ) increased in chromium exposed workers as compared to control group. However, in both the groups the urine chromium levels were lower than biological exposure indices of  $30 \mu\text{g/g}$  of creatinine set by ACGIH. The levels of total urinary N-acetyl- $\beta$ -D-glucosaminidase and Isoenzymes A and B among chromium-exposed workers were significantly ( $p < 0.001$ ) higher when compared to the control group.

The levels of urinary N-acetyl  $\beta$  D- glucosaminadase - A is found to be more significantly associated with duration of work and also with the levels of urine chromium in chromium exposed workers compared to the association between levels of urinary N-acetyl - $\beta$  -D-glucosaminadase - B and duration of work and levels of urine chromium (Figs. 1 &2).



Plates washed with ..... ▲  
mineral acids and  
distilled water



Washing the chromium ..... ▲  
plated solar plates



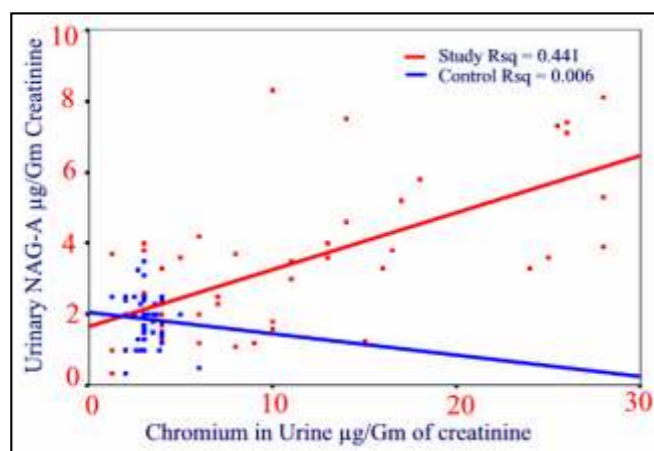
▲ ..... Loading for plating



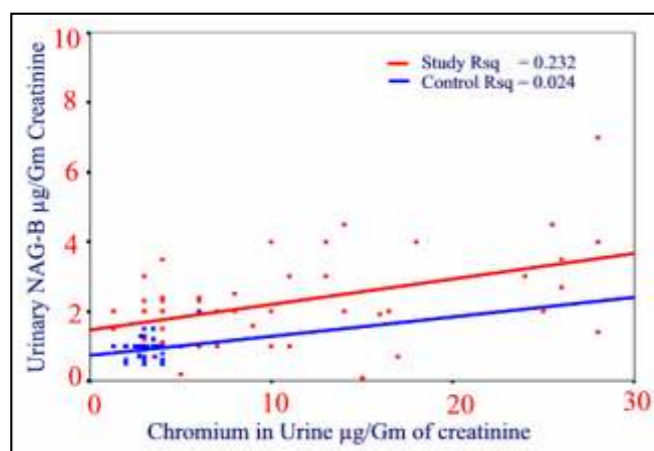
▲ ..... Chromium plating



▲ ..... Fumes generated during plating



**Fig.1 Relationship between urinary N-acetyl –β– D-glucosaminadase-A and chromium in urine of exposed workers and control group.**



**Fig. 2 Relationship between urinary N-acetyl –β– D-glucosaminadase-B and chromium in urine of exposed workers and control group.**

The plasma lipid peroxidation level was significantly higher ( $P < 0.001$ ) in chromium exposed workers than in the control group. Enzymatic antioxidants such as glutathione peroxidase (GSH-Px) and superoxide dismutase (SOD) levels were significantly decreased in chromium exposed workers compared to the controls. The levels of plasma lipid peroxidation were positively and significantly ( $p < 0.01$ ) correlated with urine chromium levels in exposed subjects. The levels of erythrocyte antioxidants were negatively and significantly correlated with urine chromium levels. The result presented in this study indicates the adverse effects of chromium on the renal tubular dysfunction and oxidative stress in chromium exposed workers. These data may help in planning suitable measures to minimize the risk of exposure.

## EXPOSURE ASSESSMENT OF BENZENE AND ITS HEALTH EFFECTS

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The study on exposure assessment of benzene and its health effects was carried out with the objectives to quantify benzene concentration at workplace through personal monitoring, estimation of trans-trans-muconic acid in urine samples of petrol filling workers and to assess the morbidity conditions among the petrol filling station workers. The study so far covered 117 petrol filling station workers mainly engaged in three job categories namely manager, cashier and petrol fillers.

The mean personal air benzene concentration was  $1.98 \text{ mg/m}^3$  for the petrol fillers, which exceeded ACGIH TLV of  $1.6 \text{ mg/m}^3$ , whereas it was found to be  $0.22$  and  $1.45 \text{ mg/m}^3$  for the managers and cashiers category respectively, which are below the TLV as per ACGIH.

The urinary trans-trans-muconic acid level was  $554.28 \text{ µg/gm}$  of creatinine for the petrol fillers, which exceeded the BEI value stipulated by ACGIH. The mean value for manager and cashier respectively were  $309.84 \text{ µg/gm}$  of creatinine and  $351.70 \text{ µg/gm}$  of creatinine that are below BEI value of  $550 \text{ µg/gm}$  of creatinine.

The correlation between benzene and trans-trans-muconic acid among the petrol fillers were found to be significantly associated.