ABSTRACT

Lead is a common toxic heavy metal with unique physical and chemical properties that make it suitable for a variety of applications in automobile industry. The artisans in the informal automobile industry are involved in diverse occupational tasks such as spray painting and welding that predispose them to health risks associated with lead exposures. Their work presents risks of inhalation, dermal absorption or ingestion of lead particles. The objective of this study was to evaluate occupational exposures to lead and associated health risks among the artisans. A comparative cross-sectional study was conducted and data collected using structured questionnaire, observational checklist and laboratory analysis. In the study, 115 purposively sampled participants participated. Stratified and proportionately sampled 55 artisans were recruited from 10 workshops and 60 college students as the non-exposed comparative group. Flame Atomic Absorption Spectrophotometry (FAAS) was used to analyze lead concentrations in blood (n=30) and scalp hair (n=30) samples. Task-based airborne lead samples were analysed using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) in accordance with NIOSH 7300 standard method. Serum Alanine aminotransferase (ALT) activity and estimated glomerular filtration rate (eGFR) measurements were conducted using Reflotron biochemical auto-analyzer. Data was analysed using descriptive statistics, regression analysis, ANOVA, Chi-square, t-test and Prevalence Ratios (PR) calculated. Results showed that there was statistically significant differences in mean airborne lead exposure levels in the different occupational tasks ($F(4, 15) = 10.087$, $p=0.000$). A high statistically significant mean blood lead (BPb) level was recorded among artisans compared to students ($p=0.001$). The mean BPb exceeded the WHO biological exposure index (BEI) of concern for adults ($p=0.049$). There was a positive correlation between task based airborne lead exposure levels with BPb levels ($r=0.68$, $p=0.001$). The artisans had a statistically significant decrease in eGFR compared to the students ($p =0.000$). However, the mean eGFR values were within the normal reference value (>90 mL/min/1.73m2). In conclusion, the artisans were occupationally exposed to lead and task based airborne lead was a statistically significant predictor of blood lead levels ($p =0.001$). Key recommendations are to institute intervention measures at the industry to curb lead health risks and possible chronic health effects, review the legislative framework on occupational safety and health for the sector and put surveillance system that integrates lead screening and testing among the study participants

Keywords

Automobile sector in Nakuru town, Lead among artisans