Journal of Occupational Medicine and Toxicology

Study protocol

Serum heavy metals and hemoglobin related compounds in Saudi Arabia firefighters

Abdulrahman L Al-Malki

Address: Biochemistry Department, Faculty of Science, King Abdualziz University, Jeddah, Kingdom of Saudi Arabia

Email: Abdulrahman L Al-Malki - alalmalki@kau.edu.sa

Published: 7 July 2009

Journal of Occupational Medicine and Toxicology 2009, **4**:18 doi:10.1186/1745-6673-4-18

Received: 27 July 2008
Accepted: 7 July 2009

This article is available from: http://www.occup-med.com/content/4/1/18

Abstract

Background: Firefighters are frequently exposed to significant concentrations of hazardous materials including heavy metals, aldehydes, hydrogen chloride, dichlorofluoromethane and some particulates. Many of these materials have been implicated in the triggering of several diseases. The aim of the present study is to investigate the effect of fire smoke exposure on serum heavy metals and possible affection on iron functions compounds (total iron binding capacity, transferrin saturation percent, ferritin, unsaturated iron-binding capacity blood hemoglobin and carboxyhemoglobin,).

Subjects and methods: Two groups of male firefighter volunteers were included; the first included 28 firefighters from Jeddah city, while the second included 21 firefighters from Yanbu city with an overall age rang of 20–48 years. An additional group of 23 male non-firefighters volunteered from both cities as normal control subjects. Blood samples were collected from all volunteer subjects and investigated for relevant parameters.

Results: The results obtained showed that there were no statistically significant changes in the levels of serum heavy metals in firefighters as compared to normal control subjects. Blood carboxyhemoglobin and serum ferritin were statistically increased in Jeddah firefighters, ($p < 0.05$ and $p < 0.05$ respectively) and Yanbu firefighters, ($p < 0.005$ and $p < 0.001$ respectively) as compared to normal control group while serum TIBC and UIBC were statistically decreased in Yanbu firefighters as compared to Jeddah firefighters, ($p < 0.005$ and $p < 0.005$ respectively) and normal control group, ($p < 0.005$ and $p < 0.01$ respectively). On the other hand, serum transferrin saturation percent was elevated in only Yanbu firefighters, ($p < 0.05$) as compared to Jeddah firefighters. Besides, there was no statistically significant change in blood hemoglobin and serum iron on comparison between all studied groups.

Conclusion: Such results might point to the need for more health protective and prophylactic measures to avoid such hazardous health effects (elevated Blood carboxyhemoglobin and serum ferritin and decreased serum TIBC and UIBC) that might endanger firefighters working under dangerous conditions. Firefighters must be under regular medical follow-up through standard timetabled medical laboratory investigations to allow for early detection of any serum biochemical or blood hematological changes.