ASSESSMENT OF CUMULATIVE TOXIC EFFECT OF CHLOROFORM AND XYLENE ON MICE

Submitted By

Ibrahim Helmi Ibrahim Ahmed Borghsh

B.SC. chemistry-zoology, faculty of science, Ain Shams University, 2006

A thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences

Department of Environmental Basic Sciences

Institute of Environmental Studies & Research

Ain Shams University

2015

APPROVAL SHEET

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Abstract

Background and aim: Many volatile organic compounds (VOCs) are considered pollutants. They are widely used as constituents of household chemicals and industries. Chloroform (CLF) is present in drinking water as a byproduct of disinfection. Xylene is widely used in industry and medical laboratory as a solvent. The present study explores the cumulative toxicity of chloroform and xylene in mice under different conditions. **Methods**: Adult Swiss albino mice (6 mice/time subgroup) were used in the study: chloroform and xylene were dissolved in corn oil, and injected intraperitoneally. Chloroform treated groups received single injection (150 mg CLF/kg bw.), and mice were followed for 5, 24, 48, 96 and 136 hrs. Xylene treated mice were given two similar doses 24 hours apart (0.37, 0.50, 0.62 and 0.75 mg xylene/kg), and blood was taken after 30 hrs. **Results:** of the subgroups were compared to their matching controls (injected intraperitoneally with corn oil). Blood analysis included blood picture, liver enzymes, renal function markers, alpha-fetoprotein (AFP), and total anti-oxidant capacity (TAC). Chloroform and xylene caused marked increase in liver enzymes, renal markers, AFP, and white blood cells, accompanied by anemia and a decrease in TAO. The effects were augmented by time and dose for CLF and xylene respectively. Conclusion: chloroform and xylene are toxic to mice, and affect the blood, liver and kidneys. The toxicity increases with time for chloroform, and dose for xylene.

Key words: volatile organic compound, total anti-oxidant capacity, alpha-fetoprotein.

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List of Abbreviations

AFP	Alpha-feto protein
ACGIH	American Conference of Governmental Industrial Hygienists
ALP	Alkaline phosphatase
ALT	Alanine aminotransferase
AST	Aspartate aminotransferase
ASTDR	Agency for Toxic Substances and Disease Registry
CBC	Complete blood picture
CLF	Chloroform
CYP	Cytochrome P450 enzymes
CYP2F2	Cytochrome P450 2F2
Eosi	Eosinophils
EPA	Environmental Protection Agency
HB	Hemoglobin
Hrs.	Hours
HSDB	Hazardous Substances Data Bank
IFCC	International Federation of Clinical Chemistry and Laboratory Medicine
IRIS	Integrated Risk Information System
LYMPH	Lymphocytes
MDH	Minnesota Department of Health
MONO	Monocytes
NEUT	Neutrophils

NIOSH	National Institute for Occupational Safety and Health
NS	Not significant
$^1O_2$	singlet oxygen
O/NS	oxidative/nitrosative stress
O3	Ozone
$ONOO^-$	Peroxynitrite
PLT's	Platelet's
RBC's	Red blood cells
ROS	Reactive oxygen species
RS	Reactive species
RTECS	Registry of Toxic Effects of Chemical Substances
TAC	Total antioxidant capacity
TB	Total bilirubin
TP	Total protein
VOCS	Volatile organic compound
WBC's	White blood cells

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