

To Observe the Cellular Toxicity of Carcinogenic Compound on Lungs of Albino Rats, an experimental study

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ABSTRACT

The aim of this study was to observe the pulmonary toxicity of Hexavalent chromium [Cr(VI)]. In the current study albino rats were used as experimental animals and the target organ was lungs. Hexavalent chromium [Cr(VI)], (5mg/kg b.w) was given orally to the albino rats. A significant (< 0.05) increase of hexavalent chromium was observed in lungs homogenate ($7.574 \pm 0.349 \mu\text{g/g}$ of wet tissue) of treated rats as compared with the control ($0.00 \pm 0.000 \mu\text{g/g}$ of wet tissue) respectively. The current study indicated that hexavalent chromium may cause both cytotoxicity and genotoxicity in a biological system.

Keywords: Pulmonary toxicity, Hexavalent chromium, Albino rats,

INTRODUCTION

Chromium is a heavy metal and found in different oxidative forms. Many chromium compounds are utilized for industrial welding, finishing of metals, leather tanning and wood preservation (Aggarwal *et al.*, 2006). Chromium after absorption circulated in the blood by binding with a plasma fraction called beta-globulin. It is transported to tissues with the help of a binding protein called transferrin (Agostini *et al.*, 2002). Chromium very quickly absorbed by bones and accumulated in the spleen, liver and kidney. Hexavalent chromium [Cr(VI)] is carcinogenic in nature and it is used in many industries (Baroli, Biancamaria 2010).

Doisy *et al.*, 1976 conducted a study that accumulation of Cr from the consumption rate of drinking water. A comparative evaluation for Cr (VI) rate of reduction in the gastric fluid of mice was made on weight bases. Ortega *et al.*, (2005) predicted that in a particular environment where Cr (VI) is in high concentration then its exposure even at low level can be a source of threat to cause cancer (Meduri *et al.*, 2007).

Hexavalent chromium mainly causes cellular toxicity through lipid peroxidation, and ultimately developed genotoxicity in the biological system. There are two possible pathways i.e. direct and indirect, which cause genotoxicity (Shin *et al.*, 2000). This process involves DNA damage, DNA breaks and

rearrangements of bases or base changes and cut off part, etc. In the case of direct process, damaging of DNA is the result of adduct formed due to the formation of metal-DNA complex. While in the case of indirect process, the generation of reactive oxygen species (ROS) may prove itself as a primary metal target for reaction (Salnikow, and Zhitkovich, 2008).

MATERIALS AND METHODS

Albino rats were used as experimental animals in this study. Experimental Rats were divided into Group A and Group B and in each group there were 15 rats. In Group A all the individuals were normal i.e. control group. Whereas in Group B, the oral administration of hexavalent chromium (5mg/kg b.w) was given to the rats. The project was remained at three month in IMBB department, The university of Lahore. At the end of experiment the animals were sacrificed. The concentration of Hexavalent chromium [Cr(VI)] was observed from the lungs homogenate and some lungs lobes will be kept in 10 % formalin for histopathological examination. Histopathological changes in lungs tissues stored in formalin were observed microscopically after hematoxylin and eosin staining. The weight of all rats of Groups A and B was in between 100-150 grams. Raw data was analyzed by using SPSS. P value of < 0.05 was considered as significant.

RESULTS

The oral administration of hexavalent chromium was (5mg/kg b.w) to albino rats and a significant < 0.05, change was seen as compared with the control group A. The levels of chromium hexavalent in lungs of treated rats were ($7.57 \mu\text{g/g}$ of wet tissues) as compared to the control ($0.00 \mu\text{g/g}$ of wet tissues).

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Fig. 1: Control lungs

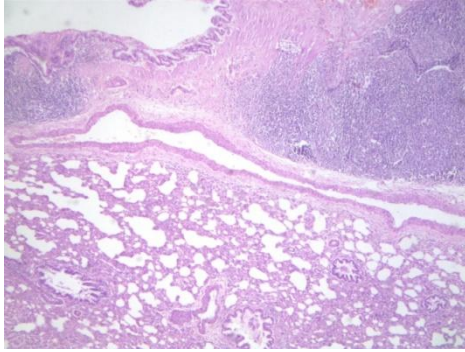
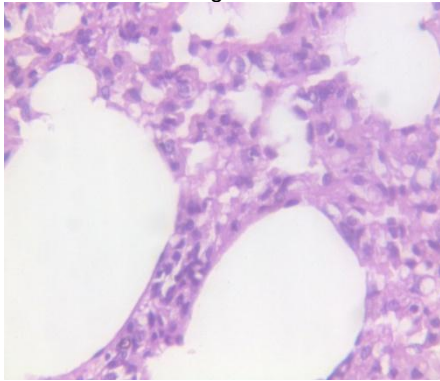


Fig.2: Chromium treated lungs



Photomicrograph of hexavalent chromium treated lungs tissue showing changes. Lungs damaged condition causes inflammation and leads to Pneumonitis;Fibrosis is an indication which made damage.

Table lungs hexavalent chromium levels ($\mu\text{g/g}$ of wet tissue) (n=15)

Groups of rats	lungs hexavalent chromium levels ($\mu\text{g/g}$ of wet tissue)	Mean \pm SD
Group A	0.00 \pm .000	0.00 \pm .000
Group B	7.750 \pm .236	7.574 \pm .349

< 0.05

DISCUSSION

According to a study of A scientist (Stern, 2010) hexavalent chromium is carcenogenic in natuer. In Pakistan Hexavalent chromium is a ingredient of many diffrent industries and its use is very comman . actually this study is a indication of hexavalent chromium in the environment and its toxic effects on the biological system.In this study when oral

administration of hexavalent chromium (5mg/kg b.w) in water was given to the albino rats of Group B. The cytotoxic and genotoxic effects were noted in pulmonary tissues of Group B rats. A significant (< 0.05) increase of hexavalent chromium was seen inthe pulmonary tissues of Group B rats as compared with the Group A respectively. *Meduriet al.*, 2007 stated in their study the same findings as the current study.

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