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INVESTIGATION ON THE EFFECT OF DIFFERENT CONCENTRATIONS OF CHLORINE DRINKING WATER ON MICE LIVERS

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ABSTRACT : Chlorine is the most widely substance used in water sterilization, whether generally in the entire world or especially in Iraq. Current work was designed to investigate the effects of different concentrations of chlorine drinking water on mice livers. Thirty two male albino mice divided randomly and equally into four groups; each contains eight mice of work groups were administered with (3, 6 and 9) ppm concentrations of chlorine. Tumor necrosis factor alpha (TNF-α) in liver was evaluated by using enzyme-linked immunosorbent assay (ELISA), also liver DNA damage was estimate by comet assay, as well as liver pathological changes were determined by histopathological examination and sera alanine aminotransferase (ALT) was measured using optical density technique. Regarding to TNF-α evaluation in mice livers, the results revealed that the levels of TNF-α were significantly elevated (P≤ 0.01) in all work groups comparing with control group, moreover the highest value was observed at group with exposure period for 4 weeks (396.26 ±31.05 ng/ml) with a high significant difference (P≤ 0.01) as compared with others work groups. According to histopathological examinationthe results clarified that chlorine administration caused clinical gross pathological effect of liver tissues in all work groups with graded severity depending on chlorine concentrations such as congestion in the central vein, degeneration (D) of hepatocytes with nucleus enlargement (NE), sclerosing bile duct (BD), which surrounded with lymphocytes infiltration (LI) and fibroblast (FB) with thickening wall (TW) of blood vessel. Otherwise the results of estimation DNA damage by comet assay wasn't showed significant differences of the work groups as well as control group and the nuclei of both groups were perfect which mean that chlorine administration wasn't induced DNA breakage. Whereas, the results of measurement of sera ALT indicate significant changes (P<0.01) in ALT levels among all work mice groups compared with control, and the mice administered with (9) ppm chlorine concentration had the highest value (83.98 ± 1.19U/l) with significant difference (P≤ 0.01) as compared with others work groups.

Key words : Chlorine, liver, ALT,TNF- α, histopathological examination, Comet assay.

INTRODUCTION

Chlorine treatment considered as ideal and main way of disinfection drinking water in Iraq, it is inexpensive, safe, simple in used, easily stored, not make the water unpalatable. In 2 to 3ppm concentration its effective against most pathogenic bacteria and when combined with filtration became an excellent way for elimination all viruses, cysts, or worms (National Academy of Sciences, 1977). Some time additional chlorine is added to replace wasting chlorine in water piping system to eradicate bacteria that resistant to lower concentrations chlorine, as pseudomonas aeruginosa and reduceits biofilm or to increase chlorine efficient in higher pH water because effective of chlorineis decrease at a pH up to 7 (Bauman, 1962). Free chlorine is available chlorine that doesn't react with organic and inorganic materials naturally occurring in raw water which responsible for persistent disinfection. Reacting chlorine will generate occasional outputs that threaten human health these substances are called disinfection residues and their by-products (DBPs) (Sadiq and Rodriguez, 2004). Such as trihalomethanes (THM's) and other halogenated hydrocarbons which lead to risingseveral types of cancers as bladder and colon cancer (Hinckley *et al*, 2005 and Hussein *et al*, 2012). So, because the serious of the subject and as our knowledge the studies conducted on the effect of drinking water chlorine on health in Iraq are rare, that's what encouraged us to conduct such a study, which examined the effect of different concentrations of chlorine drinking water in livers of mice as an experimental model.

MATERIALS AND METHODS

Thirty two male albino mice of twenty weeks age at weights ranged between (26-30g) were purchased from controlled and Pharmaceutical Research center, Baghdad, placed in plastic cages of (40×20×15 cm) size, each contained (8) mice, at temperature (25^0C), dieted