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Liver Enzymes, Lipid Profile Alteration and Growth Induced bBy Nickel Toxicity Under Heat Stress Conditions on Adult Male Rabbits

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ABSTRACT

The southeastern of Iraq especially Basrah city is characterized as humid subtropical and is subject to extended periods of high ambient temperature and relative humidity. The aim of this study was to investigate the effect of providing supplementary nickel chloride orally to adult rabbits under heat stress for two weeks .The results revealed significant decrease in B.W and total protein while blood glucose increased ,liver enzymes (ALT,AST and ALP) showed significant increase .lipid profile also showed increase in cholesterol , TG, LDL and decrease in HDL).

The study concluded that the stresses after exposure to high environmental heat had a negative effects on growth and Liver tissue functions as well as lipid profile.

Keywords: nickel ,heat. Stress, liver enzymes

INTRODUCTION

Increasing utilization of heavy metals in modern industries leads to an increase environmental pollution. Nickel a metal whose use is widening in modern technologies.so Nickel (Ni) is an important environmental toxicant that can cause cancer and cardiovascular disease[1,2]. Its toxicological, physiological and histopathological alterations in rabbits, mice and minnows have been established [3].

Nickel and its compounds produce acute and chronic toxicity to aquatic life due to its persistence and bioaccumulation[4].

The accelerated consumption of nickel-containing products nickel compounds are released to the environment at all stages of production and utilization and stated that human exposure to highly nickel-polluted environments, such as those associated with nickel refining, electroplating, and welding, has the potential to produce a variety of pathologic effects [5]. Nickel caused liver injury was measured by the increased activities of serumhepatic enzymes and spleen injury, lung inflammation, and caused cardiac toxicity [6]. In addition, many metal particles, such as Ni, have very poor solubility in water, which may contribute to their toxicity effects [7].As for most metals, the toxicity of nickel is dependent on the route of exposure and the solubility of the nickel compound. The exposure to nickel chloride ($NiCl_2$) can cause hepatotoxicity and hepatotoxicity and can affect development[8,9]

MATERIAL AND METHOD

The presented study was conducted at the College of nursing- University of Basrah. Twenty healthy male rabbits, brought from Basrah market of 10-12 months old , weighted 1.500-2.100 kg caged in metallic cages on July (normal daily temperature 30-50C) a balanced diet and water were initially provided. ten male rabbits was served as control group and received 1 ml normal saline orally, the other ten male rabbits received 20 mg / kg B.W $NiCl_2$ orally for two weeks.

Ten ml of blood samples took by heart puncture then centrifuged (3500 r pm for 15 minute) and the serum that was obtained, transferred to Eppendorf analysis for liver enzymes and biochemical tests.

The experimental animals scarified after anaesthetized by intramuscular injection of xylazine 2% (Alfasan- Holland) and ketamine10% (Kepro -Holland) . Liver, kidney, spleen ,heart isolated served in containers

filled with 10% formalin , the specimens were processed to paraffin as per standard procedure. The results of the present study were analyzed by using one way analysis of variance(ANOVA) test using the program(spss).and the data were expressed as a means +SE. (P<0.05) were considered to be significant for all data of this study.

RESULTS AND DISCUSSION

Heat is a stressor that evokes several physiological reactions in humans and animals .Heat is an environmental and occupational hazard .the prevention of death in the community caused by extreme high temperatures and the risk of heat–related mortality increase with aging (Sari and Shakoor 2008)

Table 1: The effect of Nickle on body weight ,total protein and glucose of rabbits after 2weeks under heat stress

Groups parameters	Control Normal saline N = 8	Nickle Chloride 10mg /kg B.W N=6
Body weight kg	1.525 ± 20.500	1.150 ± 12.301
Total protein g/L	11.500 ± 0.466	5.500 ± 0.395
Glucose mg/L	114.040 ± 0505	170.555 ± 5.450

(P≤0.05) v.s control

Table 2: The effect of Nickle on Cholesterol, Triglyceride, HDL and LDL of rabbits after 2 weeks under heat stress

Groups parameter	Control Normal saline N = 8	Nickle Chloride 10 mg /kg B.W N = 6
Cholesterol mg/dl	80.710 ± 0.677	160.020 ± 7.420
Triglyceride mg/dl	60.180 ± 0.311	148.. 666 ± 9.560
HDL mg/dl	47.299 ± 0.50	41.752 ± 0.660
LDL mg/dl	2..119 ± 0.225	18.227 ± 0.640

(P≤0.05) v.s control

Table 2: The effect of Nickle on Cholesterol , Triglyceride , HDL and LDL of rabbits after 2 weeks under heat stress

Groups parameters	Control Normal saline N = 8	Nickle Chloride 10mg /kg B.W N = 6
AST U/L	9.150 ± 0.3522	44.670 ± 0.900
ALT U/L	13.770 ± 0.665	58.504 ± 0.998
ALP U/L	24.990 ± 0.828	68.783 ± 0.850

(P≤0.05) v.s control

The exposure of the experimental animals of the recent study to nickel under environmental heat stress lead to death of 4 animals from nickel group within the second third of the experimental period week and tow animal from the control group. at the end of the second week the laboratory analysis of the studied parameters to the remain animals showed significant decrease in body weight and total protein and elevation in cholesterol, TG and LDL as well as increase in ALT,AST and ALP , glucose significantly increase as compared with control group.

Nickel Chloride drenching caused statically significant (P≤0.05) increase in cholesterol, TG, LDL, and VLDL except fall in HDL in serum concentration of male rabbits in the group that treated with oral dosing $NiCl_2$[10].

Many biochemical and physiological systems of the body are affected by exposure to heat, such as enzymatic, metabolic, cardiovascular, respiratory, hematopoietic, endocrinal and immuno-logical systems,

as well as blood and body fluid composition. Heat stress resulted in significant increase in serum ALT and LDH levels. On the other hand, serum ALP activity decreased significantly. However serum total protein, lead, AST and GGT levels were not affected [11].

The decrease total protein levels related to a number of pathological processes like protein elimination in the urine, lowered production of liver proteins and liver damage due to heavy metal intoxication[12].

Renal damage from Ni toxicity was evident from the changed in rabbits also resulting in a reversal of Ni-induced biochemical changes , a significant decrease in lipid peroxidation[9].

Nickel-treated rats showed a significant increase in serum low-density lipoprotein-cholesterol, total cholesterol, triglycerides[13].

Nickel sulfate and potassium dichromate treated rats showed a significant increase in serum low density lipoprotein-cholesterol (LDL-C), very low density lipoprotein-cholesterol (VLDL-C) and triglyceride (TG) level as well as decrease in serum high density lipoprotein-cholesterol (HDL-C) level[14]. High enzymes in liver indicate damage to the cells or inflammation in your liver. Total proteins, AST, ALT, and ALP). AST, ALT and ALP levels increased remarkably in experimental animal as compared to the control one. Nickel also causes changes in growth parameters of animal by affecting their body weight with increased dosage of metal[15].

CONCLUSION

The recent study concluded that nickel chloride toxicity under environmental heat stress elevated liver enzymes level in blood as well as lipid profile while it negatively effected total protein and growth.

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Source of Funding: Self

Conflict of Interest: Nil

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