

Effect of Nicotine Administration on Body Weight and Liver Enzymes in Male Rats

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ABSTRACT

The study was conducted in Basrah University – veterinary medicine college, used about (60) sixty male rats divided into two groups randomly, control group and nicotine treated group with 0.5 mg / kg / BW, the result showed no significant difference in growth rats compared to control group also significant increase of liver enzymes compared to the control groups.

Keywords- nicotine, rat, AST, ALT, ALP.

3 mg / kg for mice and about 0.1 mg / kg of nicotine is lethal dose for children and about 0.5-1.0 mg /kg of nicotine is lethal dose for adults [8]. Detected of nicotine can be in serum nicotine, blood urine [9], the treatment of poisoning of nicotine by activated char coal in order to reduce the absorption of nicotine through the gastro intestinal tract[10].

I. INTRODUCTION

Nicotine is alkaloid plant, found in the tobacco plant, the chemical formula is $C_{10}H_{14}N_2$, nicotine is highly toxic alkaloid, it is prototypical against at nicotinic cholinergic receptors which is simulates neurons[1], nicotine induces the peripheral vasoconstriction, tachycardia and elevated of blood pressure and the nicotine classified the stimulant of autonomic ganglia, absorption of nicotine by buccalmucosa about 10% of nicotine absorbed is excursion unchangingin urine and the half-life of nicotine about 1-3 hours[2]. The symptoms of overdose of nicotine lead to toxicity of nicotine like vomiting, abdominal pain, dizziness and confusion and palpitation, the smokers having more morbidity and mortality rate than non-smokers, the tobacco smoke contain of more than 4000 components compounds, the nicotine is colorless[3]. The nicotine affected on pan crease which is inhibition of bicarbonate secretion in pancrease and inhalation of nicotine go to blood and binds to receptors in central and prepheral nerves which is called acetylcholine receptor[4]. Nicotine affected on most system such as respiratory and digestive and cardio-vascular system and can easily absorbed through skin and into blood stream and lead to toxicity[5]. Nicotine can activate the MAP kinases and formation of new blood vessels which is help tumour to grow, most of nicotine poisoning is due to use as insecticide [6]. The lethal dose of nicotine for adults is (30-60mg) and about more than 0.5 of nicotine which is taking by adult through mouth may be kill the adults[7]. Nicotine poisoning may produce many symptoms such as nausea, vomiting, excessive salivation, hypertension, tremor, headache, the LD50 of nicotine in rats is 50 mg /kg, and

II. METHODS AND MATERIALS

The total of 60 adult male rats , the average body weight is between (150+- 10 gram) all animals were kept in cages about (60 x 60 cm) and collated in house of veterinary medicine – college – university of Basrah – Iraq , all animals exposed to same condition from climate management and also with diet feeding which is contain of protein and also give distilled water for feeding and adaptation about 2 weeks before doing of experiment and examine all rats from disease and give some antibiotics in order to remain in good condition of health state.

Experimental design:

The present study which is included 60 male rats, randomly divided into two groups. First group, (control group): give normal saline with dose about 0.2 ml (0.9%) by oral gavage.

Second group: which is given about 0.2 ml of 0.5 mg / kg / BW of nicotine as injection subcutaneous (S.C). the experimental remain for four weeks in the end which is measuring of body weight by digital balance and measured of liver function test (ALT, ALP, AST).

Preparation of nicotine:

Tobacco pulverizing in order to form powder then added sodium hydroxide to the powder and also added petroleum ether then separating the solution and distilled water then filtered the solution and collect the sample and recycling and vaporating, in the end collect the distilled water to obtained nicotine solution.

Collecting blood samples:

The blood sample were collected about (10ml) of sample collected through puncher of heart rat kept the sample in tube in order to clot and then put in centrifuge by (3000 rpm) about (20) minutes and the serum kept in tube contain of polyethyl for (-25^oc) the sample remain until measuring the liver function test.

III. RESULT

Body weight: in the present study the results show the body weight of rats treated with nicotine simple increased for 120.00 ± 2.23 in the first week to 140.40 ± 2.80 at the end of four the week, the weight of control group of rats treated by distilled water increased from 125.20 ± 2.38 in the first week to 145.20 ± 0.18 at the end of four week of treatment, no significant difference ($p > 0.05$) between the rate of growth for control and nicotine groups of rats

Table 1: Rate of growth for rats treated with distilled water and nicotine

Group	Body weight	Growth rate
Control group	1 week	4 weeks
	125.20 ± 2.38	145.20 ± 0.18
Nicotine group	120.00 ± 2.23	140.40 ± 2.80

Liver enzymes: the result in the present study shows that increased significantly ($p > 0.05$), in AST enzyme compared to control group especially at dose of 0.5 mg / kg / BW of nicotine group especially in the end of four-week treatment of nicotine.

Table 2: The effect of nicotine on AST enzyme (mean \pm SD)

Parameter	Treatment	Period of treatment	
AST IU / L	control	1 week	4 weeks
	0.5 mg / kg / BW	30.31 ± 1.23	31.72 ± 1.33

Also, in the present study shows the level of ALT enzymes increase significantly ($P > 0.05$) at the end of four week of treatment with nicotine group of rats compared to control group treated with distilled water.

Table 3: effect of nicotine on ALT enzyme (mean \pm SD)

Parameter	Treatment	Period of treatment	
ALT IU/ L	Control	1 week	4 weeks
		12.18 ± 1.87	$12.60.1.06$
	0.5 mg / kg / BW	14.52 ± 1.31	58.43 ± 2.66

The results in the present study shows, the Alkaline phosphatase (ALP) enzyme increased significantly ($p > 0.05$) in a dose of 0.5 mg / kg / BW of nicotine at four weeks of treatment compared to control group treated with distilled water.

Table 5: effect of nicotine on ALP enzyme (mean \pm SD)

Parameter	Treatment	Period of treatment	
ALP IU/ L	Control	1 week	4 weeks
		49.10 ± 1.20	51.67 ± 3.54
	0.5 mg / kg / BW	60.34 ± 5.11	80.55 ± 1.55

IV. DISCUSSION

Nicotine is alkaloid, present in the tobacco plant, nicotine affected on most of body system, in the present study shows no significant difference between group treated with nicotine and group treated with distilled water (control) on body weight, these similar to study done by Perkins, 1994, [11]. No significant difference, also the present study differ from study done by Chowdhury, [12] et al., 1992 that decrease of body weight in rats treated with nicotine, the reduction of body weight may related to decreased in food consumption which is caused by anorexia, the liver is important organ for playing in oxidation of carbohydrates and fatty acid, the administration of nicotine lead to increase of liver enzymes due to damage in cell membrane of hepatocyte cell lead to release of the liver enzymes in blood, in the present study shows the liver enzymes (ALT, AST, ALP) increased in rats treated with nicotine than control group treated with distilled water these result similar to study done by Friedman [13], 1996 that significant increased the nicotine treatment with chronic taking lead to increase the capacity of liver microsomes to synthesize of protein.

V. CONCLUSION

Nicotine is toxic substance, administration of nicotine lead to damage to liver and increase the liver enzymes and lead to risk of atherosclerosis and lead to decrease of body weight.

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