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# Effect of Alloxan on Some of Biochemistry Parameters in Serum Rats

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This study was carried out to investigate whether alloxan-diabetic rats could affect biochemical parameters in serum. Twelve Sprague-Dawley albino rats were divided into two experimental groups, *i.e.*, control and alloxan-diabetic rats. A single dose (100 mg/kg) of alloxan was injected intraperitonealy to the treatment rats. Control rats were given only the same amount of physiological saline. Various biochemical constituents of rat were determined after treatment with the alloxan, which caused significant increases in glucose and alanine aminotransferase (ALT) for 1, 3 and 6 h after the treatment, while the level of cholesterol was decreased. Aspartate aminotransferase (AST) level did not change in 1, 3 and 6 h. It is concluded from the experimental of this study that alloxan may cause diabetic in rats.

**Key Words: Alloxan, Serum, Rats.**

## INTRODUCTION

Alloxan toxicity *in vitro* and *in vivo* can be inhibited by metal chelating agents, by hydroxyl radical scavengers and lipid-soluble antioxidants[1-3]. That drug appears to selectively destroy the islets of Langerhans by oxidant production. Current evidence suggests that the selective cytotoxicity of alloxan is due to the function of three factors *viz.*, efficent uptake, oxidant production by redox coupling of the drug with intracellular reductant coupled with low levels of glutathione peroxidase in the islets[1,3]. Diabetes mellitus is one of the most common metabolic disorders, with a world-wide prevalence estimated in between 1 and 5 %. The increasing prevalence of diabetes mellitus in world is a cause for concern[4]. Diabetes mellitus is a group of metabolic disorders with one common manifestation *i.e.* hyperglycemia. Chronic hyperglycemia causes damage to the eyes, kidneys, nerves, heart and blood vessels[5]. Diabetes mellitus implicates many organs and tissues. It has been found that IL-1β decreases serum glucose in experimental animals and may potentially be therapeutic for diabetes mellitus[6].

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In this study, effects alloxan on levels of glucose, alanine aminotransferase (ALT), aspartate aminotransferase (AST) and cholesterol in rat serum were investigated *in vivo*.

## EXPERIMENTAL

Twelve male Sprague-Davley rats weighing 200-250 g were housed in a temperature-controlled room at 20 ± 2ºC with a 12 h light/dark cycle. All procedures were performed in sterilized conditions. All animals received human care according to the criteria outlined in the "Guide for the Care and Use of Laboratory Animals" prepared by the National Academy of Sciences and published by the National Institutes of Health.

**Biochemical procedures:** At the end of the experimental period, the animals in two groups were fasted for 1, 3 and 6 h and blood samples were taken for the determination of the serum concentrations of glucose, ALT, AST and cholesterol.

**Rat treatment:** Rats were exposed to 100 mg/kg doses of alloxan[7] dissolved in tap water by intraperitoneal administering ad libitium during the test period 0, 1, 3 and 6 h consecutively. Control rats were given only physiological saline. Serum samples were obtained fresh rat blood. The blood samples were centrifuged at 1500 rpm for 15 min, plasma and buffy coat were removed. After that serum samples were obtained.

**Assay of biochemical parameters:** All biochemical parameters were measured using an autoanalyzer (BNN/Hitachi-911) and the corresponding kit (DPC, Diagnostic products corporation, USA).

**Statistical analysis:** The data were expressed as mean ± standard deviation (SD) and analyze during analysis of variance Anova. Turkey's test was used to test for differences among means for which Anova indicated a significant ($p < 0.05$). Parameters of control and treatment groups are shown in Table-1. Serum parameters increased or decreased significantly ($p < 0.05$ ) in alloxan rats.

TABLE-1
SERUM GLUCOSE, ALT, AST AND CHOLESTEROL LEVELS OF CONTROL AND ALLOXAN-DIABETIC RATS

| | Control (n = 6) | 1 h (n = 6) | 3 h (n = 6) | 6 h (n = 6) |
|---|---|---|---|---|
| Glucose (mg/dI) | 102 ± 22 | 171 ± 8[c] | 231 ± 7[b] | 251 ± 16[a] |
| ALT (U/dI) | 22 ± 8 | 192 ± 8[a] | 78 ± 4 | 187 ± 4[a] |
| AST (U/dI) | 23 ± 6 | 39 ± 5 | 36 ± 7 | 108 ± 3 |
| Cholesterol (mg/dI) | 144 ± 8 | 37 ± 4[c] | 66 ± 5[a] | 44 ± 6[b] |

Alanine aminotransferase (ALT); Aspartate aminotransferase (AST) a, b, c; $p < 0.05$

## RESULTS AND DISCUSSION

The alloxan treatment of rats produced change in the levels of some biochemical parameters (glucose, AST, ALT and cholesterol). The levels of glucose and ALT increased significantly for 1, 3 and 6 h, while levels of cholesterol decreased significantly in different time periods *in vivo*, but AST level showed a little change in 1, 3 and 6 h (in all time periods).

It is demonstrated that diabetes mellitus is a syndrome initially characterized by a loss of glucose homeostasis[2,3]. The disease is progressive and is associated with high risk of artherosclerosis kidney and nerve damage as well as blindness. Diabetes mellitus associated with oxidative reactions, particularly those which are catalyzed by decompartmentalized transition metals, but their causative significance in diabetic tissue damage remains to be established[2]. Alloxan was administered as a single dose (100 mg/kg) to induce diabetes. It was also found that the levels serum ALT in 1, 3 and 6 increased in alloxan-diabetic rats. Effects of biochemical on the hypoglycemic effects of onion and garlic in alloxan induced diabetic rats have been done *in vivo*[8]. The levels of AST were a little increased in serum of alloxan-diabetic rats compared to the control group (Table-1). Biochemical study on the effects of some Egyptian herbs in alloxan-induced diabetic rats have been investigated[9]. The present study showed a increased levels of serum glucose alloxan-diabetic rats in 1, 3 and 6 h (Table-1) and level of serum glucose we determined was similar to given in previous studies[8,10]. Hypoglycemic and anti-lipemic effects of the aqueous extract from *Cissus sicyoides* should be investigated[9,11]. The present study showed a decreased levels of serum cholesterol alloxan-diabetic rats in 1, 3 and 6 h (Table-1). A recent work reported that reversibility of the diabetic state, 12 d after the alloxan injection, as demonstrated by the reduction of glucose and triglyceride concentrations, and a positive reaction of the anti-insulin antibodies in the pancreatic tissue[10]. Effects of *Nigella sativa* L. on serum concentrations of thyroid hormones, thyroid stimulating hormone and glucose in alloxan-induced diabetic rabbits have been investigated[12]. In conclusion, we found that levels of serum glucose and ALT increased in alloxan-diabetic rats. However, more studies are needed to verify and clarify the relationship between serum biochemical parameters and alloxan-diabetic rats.

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