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RESEARCH ARTICLE

Effect of Taurine on liver and kidney functions of Diabetic female rats

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ABSTRACT:

Objective: the current research was directed for the estimation of hypoglycemic effect of taurine in alloxan-induced diabetic rats. **Methods:** twenty-four of female rats (*Rattus norvegicus*) were utilized for this purpose. Animals were further distributed in four groups having six rats in each group. Diabetes was induced by injected intraperitoneally with alloxan at single dose 125mg/kg body weight, group (1) (control group): animals of this group were treated only with distill water for 15 days, group (2) (diabetic group): animals of this group were injected intraperitoneally with alloxan at single dose 125mg/kg body weight, group (3) (taurine group): a 100 mg/kg body weight dose of taurine was intraperitoneally introduced for fifteen days, the group (4) (DM+taurine group): animals of this group intraperitoneally injected a single dose of (125mg/kg body weight) alloxan and after 7 days they were injected with taurine at a dose (100mg/kg body weight) for 15 days. **Results:** a significant upsurge ($P \leq 0.05$) was indicated in diabetic rats in the AST, ALT urea and creatinine's levels. In addition, taurine supplementation caused a significant decrease in the levels of ALT, AST, urea and creatinine. **Conclusions:** taurine could have potential as a pharmaceutical drug for diabetes mellitus (DM).

KEYWORDS: Diabetes, taurine, liver, kidney, rats.

INTRODUCTION:

Diabetes mellitus (DM) is termed as a group of metabolic ailment that is described by an escalated levels of blood glucose happening because of the flaws in action and secretion of insulin or both[1]. However, the diabetic chronic hyperglycemia is related to the longer term impairment, disruption, dysfunction and even to the several organs' failure such as blood vessels, kidneys, heart, eyes, nerves[2]. The type II diabetic patients are at greater risk of having a cardiovascular illness while being related to the dislypidaemia and atherogenic abnormalities. The myocardial infarction a coronary artery sickness is a prominent source of worldwide mortality and morbidity[3]. However, the atheroseclerosis and hyperglycemia are associated in the diabetes of type II.

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Since the diabetes always go along with a weak antioxidant defenses and an escalation in free radicals. Therefore, the antioxidant supplements are recommended for the therapy of anti-diabetes[4]. Additionally, the antioxidant therapy utilization helps recapturing a balance amongst the antioxidants and reactive oxygen species and this reduces the free radical's induced complications in the patients of diabetes. Subsequently, the intense hyperglycemic diabetic therapies like sulfonylureas and insulin that seem to be ineffective in accomplishing their aim, can be prohibited by implicating the amendments in oxidative stress[5].

Moreover, taurine works as an analgesic, scavenger of carbonyl compounds, having neurotrophic properties, a cytosolic calcium's modulator and an organic osmolyte[6,7]. Taurine participate in various biological processes while having a significant role in such processes, for instance, immunity and insulin sensitivity[8,9]. Conferring to its advantages, the researchers denoted it as a wonder molecule[10]. Thus, normal concentrations of taurine are crucial for diabetic control as well as its influences. The research on animals have signified that sufficient concentration of taurine aid

in diabetes control by lowering the glucose in blood and repairing the sensitivity of insulin. A recognized fact about taurine is that its concentrations are less in diabetes patients as compared to the health human beings[11]. The current research was carried out to estimate the effect of hypoglycemic taurine on functions of diabetic rats' kidney and liver.

MATERIAL AND METHODS:

Animals:

The female rats (*Rattus norvegicus*) pf weight 190 to 200 g were acquired from the animal house of Biology Department, College of Science University of Thi-Qar Iraq. All the animals were placed in an air conditioned (22±3°C) room having 12 hours light/dark cycle and humidity of 55±5%. Animals were provided with standard diet along with a free water access. Experimental design was being approved by the local committee and all protocols were implemented conferring the National Institute of Health's (NIH) guidelines.

Induction of diabetic:

A freshly prepared single intraperitoneal 125mg/kg body weight injection of alloxan was utilized for diabetes induction. Subsequent to seven days alloxan administration, the levels of serum glucose were observed. Merely the rats abstaining the blood glucose more than 250mg/dl were deliberated and incorporated in experiment.

Experimental Design:

Twenty four of female rats were randomly divided into four groups (6 rats/group) as follows:

Group 1. Group (1) (control group): animals of this group were treated only with distill water for 15 days.

Group 2. Group (2) (diabetic group): animals of this group were injected intraperitoneally with alloxan at single dose 125mg/kg body weight.

Group 3. Group (3) (taurine group): animals of this group were injected intraperitoneally with taurine at dose 100mg/kg body weight for 15 days.

Group 4. Group (4) (DM+taurine group): animals of this group were injected intraperitoneally with alloxan at a single dose (125mg/kg body weight) and after 7 days they were injected with taurine at a dose (100mg/kg body weight) for 15 days.

Blood collection:

The rats were dissected at the end of fifteenth day through cervical dislocation and sample of blood was gathered directly into the tubes. Which was further permitted to coagulate for 30 minutes at room temperature. Serum was isolated with 15 minutes centrifugation at 3000x g and it was preserved in aliquots and stored at -20°C for further examination.

Biochemical parameters:

The alanine transaminase's evaluation was carried out by using serum while conferring the method of [12] and the reagents used were provided by Randox, UK. Whereas, the measurements of aspartate transaminase were done by way of[12] and reagents were supplied by Radox, UK. Likewise, the urea and creatinine were estimated using the techniques of[13] with provided reagents of Biolabo, France.

Statistical analysis:

SPSS software with version 15.0 was utilized for statistical analysis. Outcomes were articulated as LSD and mean ±standard deviation (mean ±SD). The several studied group's parameters were compared using one way test of ANOVA values of P were deliberated as significant on the base pf statistics ($P \leq 0.05$).

RESULTS:

The outcomes exhibited a significant escalation ($P \leq 0.05$) in the aspartate transaminase (AST), alanine transaminase (ALT) serum, creatinine and urea as of group 2 as compared to the group1. Moreover, when related to the group1, a non-significant variation was observed in group 3 for urea and ALT serum concentration. Whereas, comparing to the group1, a significant upsurge ($P \leq 0.05$) was perceived in group 3 creatinine and serum concentration of AST. However, a significant reduction ($P \leq 0.05$) was seen in creatinine, urea, AST and ALT serum concentration of group 4 when compared with group 2 (table 1).

Table 1. Effect of taurine on some biochemical parameters of diabetic female rats

Parameters/ Groups	Group (1)	Group (2)	Group (3)	Group (4)	LSD
ALT (U/L)	48.60 ± 2.36^{c}	70.73 ± 3.66^{a}	49.24 ± 3.98^{bc}	53.20 ± 3.93^{b}	4.31
AST (U/L)	163.17 ± 2.46^{d}	288.50 ± 2.65^{a}	177.67 ± 1.65^{c}	212.02 ± 3.39^{b}	2.58
Urea (mg/dL)	38.37 ± 2.55^{c}	60.47 ± 1.66^{a}	38.73 ± 1.38^{c}	50.84 ± 1.29^{b}	2.23
Creatinine (mg/dL)	0.80 ± 0.06^{d}	1.35 ± 0.07^{a}	0.90 ± 0.02^{c}	1.00 ± 0.09^{b}	0.07

-Each value represents the mean± standard division of 6 rats.
- Different letter refer to a significant difference at ($p \leq 0.05$).

DISCUSSION:

The present elevations of ALT and AST observed in diabetic rats agree with Kumarappan *et al.*[14]. The increase in ALT and AST may be because of the enzyme's leakage from the liver cytosol in blood stream or change in the permeability of liver cell membranes take place[15]. Ahn *et al.*[16] suggested an independent association of ALT serum concentrations to the type II diabetes in both genders. The protective nature of the liver is designated as a result of reduced ALT and AST activities in TAU reared diabetic rats. These outcomes agreed with the Turner and Wass[16] research that testified the discerned declines in proteinuria of STZ-induced diabetic rats that had reduced renal lipid peroxidation subsequent to the taurine's oral supplementation. The hepatotoxicity of the hepatic enzymes enhances because of the TAU as specified by Zhang *et al.*[17]. Moreover, the intensification amongst the alloxan diabetic rats' create nine and urea levels might be because of the renal dysfunction, increased protein catabolism and glomerular injury. Thus, this discovery was in covenant to the Prangthip *et al.*[18] outcomes. Additionally, the administering the taurine further prohibited diabetic neuropathy's growth and incidence while increasing the metabolism of glomerular basement membrane, lipids and reducing the blood glucose level[19]. Taurine in the drinking water of diabetic rats helped them recover from kidney damage[20]. A progression in the oxidative stress were indicated due to the taurine impacts on diabetic nephropathy[21].

CONCLUSION:

The taurine amino acid's advantages seem to be because of its numerous actions on the functions of cell, whereas, toxicity appears to be comparatively low. Thus, additional researches are significant to fill the voids amongst human beings and animals.

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CONFLICT OF INTEREST:

The author has no disclosures to report.

ETHICAL CLEARANCE:

Not required.

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