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Research Article

Hepatoprotective effect of urine of one-humped camel (*Camelus dromedarius*) against ethanol induced liver damage in rats

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ABSTRACT

This study was carried out to evaluate the effect of camel urine against ethanol induced liver damage in Rats. Twenty five of Wistar Albino rats were included in the study, and divided into 5 groups. Rats in group 1 served as control group and received normal saline orally, rats in group 2 received orally Ethanol 10% only at a dose of 5g/kg body weight, and rats in group 3 received orally Silymarin (50 mg/kg body weight), and after 3 hours received orally Ethanol 10% at a dose of 5g/kg body weight. In group 4 rats received only camel urine at a dose of 1ml/100gm body weight by an oral intubation and rats of group 5 were administered orally with camel urine at a dose of 1ml/100gm body weight and after 3 hours received Ethanol 10% at a dose of 5g/kg body weight. The experiment continued for 28 days, and on day 29 the rats were euthanized, serum samples and liver sections obtained. Liver damage was induced in a form of generalized necrosis, fatty change and congestion, beside increase in levels of liver serum enzymes (AST, ALT, and ALP), which was clear in group 2 by oral administration of 10% Ethanol at a dose of 5g/kg body weight. Oral administration of camel urine to rats in group 5, three hours before the administration of Ethanol 10% (5g/kg), significantly reduced the levels of liver serum enzymes (AST, ALT, and ALP), which induced by Ethanol intoxication, beside noticeable stability in the serum metabolites concentrations (i.e.: total proteins, albumin and billirubin). These results are better than the results obtained in group 3 where the reference drug (Silymarin) used, because the levels of serum enzymes significantly more reduced in the groups used camel urine more than the (Silymarin) ones and these were verified by improvement in histopathological picture. As conclusion the camel urine can act as protective agent against liver damage, and this could be attributed to the antioxidant activity of camel urine on toxicants specially alcohol.

Key words: Alcohol, Camel Urine, Hepatoprotective, Liver, Rat, Silymarin.

INTRODUCTION

Alcohol (ethanol) consumption is one of the most common causes of chronic liver diseases in the world; and it affects the liver through direct toxicity, because it is predominant metabolism in the liver associated with oxidation, reduction changes and oxidative stress[1]. Also the body's natural defense against free radicals such as antioxidants is inhibited by alcohol consumption resulting in the liver damage[2].

Aspartate aminotransferase (AST) is a widely distributed enzyme, which is found in many tissues and organs, with high activity in the liver[3]. Increased AST activity in the serum is a sensitive marker of liver damage[4]. In primates, dog, cat, rabbit and rat, alanine aminotransferase (ALT) is a specific cytosol liver enzyme, and its increase in the blood plasma is specific for changes in the liver, but in pigs, horses, goats, sheep and cattle is not specific for the liver, in

to have a diagnostic significance[5].

It has been shown throughout the history of medical science till today that urine has a profound medical use such as effectiveness against allergies, skin conditions, fever, burns, tuberculosis and fertility[6]. Recently increasing interest in biological activity studies of camel urine, particularly in the Middle East revealed that it contains high potassium, urea, and creatinine and low sodium and uric acid levels[7], also Vitamin C was found to be higher in female Sudanese camel breeds than the males[8]. There are also a few studies in this discipline suggesting possible benefits in treatment of ascites[9], also camel milk and urine used in infections such as hepatitis[10] and in Schistosomiasis[11]. Based on the knowledge, that the Arabian camel urine was a standard prescription in Arabic medicine and remains to this day for chronic medical problems, such as correcting digestive disorders in general or helping detoxify the liver in particular either by ingestion or topical application[12]. Therefore, the aims and objectives of present study were to evaluate the protective effect of camel urine on alcohol induced hepatotoxicity.

RESULTS AND DISCUSION

Clinical signs: Rats in group 2 which treated with ethanol showed depression and nervous signs when compared to the control rats, while there were no clinical signs observed in rats of group 3 (intoxicated with ethanol and treated with Silymarin), group 4 (treated with urine alone) or group 5 (treated with ethanol and camel urine).

Post-mortem findings: The livers of rats of group 2 (ethanol group), showed fatty changes, congestion and adhesion of lobes, while there were no pathological changes observed in the livers of group 3 (Silymarin + ethanol) or group 4 (the urine group). In group 5 (Ethanol + Urine) the liver showed slight fatty change.

Changes in serum enzymes: The effect of camel urine on the activities of enzymes AST, ALT, and ALP in the serum of rats are clear in (Table 1) and (Figures 1; 2; 3). In rats treated with ethanol (group 2), the activities of enzymes AST, ALT, and ALP were significantly increased when compared with the control group (group 1). Administration of camel urine to rats in group 5 which also treated with ethanol resulted in significant fall in the levels of the enzymes AST, ALT, and ALP, when compared to the group treated with ethanol.

Changes in serum metabolites parameters:, summarized the effect of camel urine on the concentration of the metabolites, total protein, albumin and billirubin in the serum of rats show in **(**Table 2) and (Figures 4; 6). In rats treated with ethanol (group 2), the concentration of the metabolites total protein, albumin and billirubin were significantly increased when compared with the control group (group 1). Administration of camel urine to rats in group 5 which also treated with ethanol resulted in significant fall in the concentration of the metabolites, total protein, albumin and billirubin, when compared to the group treated with ethanol.

Histopathological changes: Histopathology of the liver sections treated with camel urine was presented in (Figure 7) (a-d). In group 2 (ethanol group) liver damage was seen in a form of generalized necrosis, fatty change and congestion, in the group treated with urine alone, there was generalized fatty changes and slight necrosis, but in the group treated with ethanol and urine there was generalized fatty change, while in the group treated with ethanol and Silymarin there was slight fatty change, while there were no pathological changes seen in the livers of control group.

Different doses of camel urine (1ml/100gm body weight) were tested against liver damage induced by 10% ethanol (5g/kg) and found that it protects the liver against damage with variation in results. The results of the present study of the use of camel urine against alcohol hepatotoxicity in rats indicated a significant hepatoprotective effect. This finding was evidenced by significant reduction of the levels of liver serum enzymes AST, ALT, and ALP, which showed higher levels in ethanol group and these results were correlated with improvement in histopathological picture that appear in ethanol groups as hepatocellular necrosis, apoptosis, fatty accumulation and inflammatory cells infiltration, these results were consistent with the findings of other authors [14] who found the similar histopathological changes which caused by CCL4 liver toxicity. Measurement of serum enzyme levels are not enough to evaluate the extent of hepatic injury, however, ALT is considered a liver specific enzyme in rats, but the decrease of enzymes levels points out to a hepatoprotective action of camel urine [15]. There are few published data concerning camel urine hepatoprotective activity, where as similar hepatoprotective effects were reported by several species of plants such as *Ballanitis agypticaca*, *Rhazya stricta* and *Halophylum tuberculatum*, *Calotropis procera* and *Solanum nigrum* against liver damage[16-18].

From the results of the current study, we noticed that, the levels of the serum enzymes significantly reduced when given camel urine below 10% ethanol intoxication and better than the reference drug (silymarin). this may be related to the fact that, camel urine has potent antioxidant activity and protect against ethanol induced hepatotoxicity.

Table 1
Changes in serum enzymes constituents of rats treated with camel urine and ethanol

Groups	**AST (SGOT) U/I (Means ± S.E)**		
	Day Zero	**Day 15**	**Day 29**
Group1	38.68 ± 1.32 a	37.26 ± 1.15 c	37.8 ± 0.73 d
Group2	37.36 ±1.65 a	63.8 ± 3.02 a	62.6 ± 2.01 a
Group3	35.34 ±0.83 a	53.2 ±1.98 b	54.2 ±2.27 b
Group4	36.68 ± 1.06 a	49.46 ± 1.89 b	47.2 ± 2.13 c
Group5	37.3 ±4 1.63 a	52.6 ±1.63 b	52.6 ±2.25 bc
Groups	**ALT (SGPT) U/I (Means ± S.E)**		
	Day Zero	**Day 15**	**Day 29**
Group1	5.2 ± 1.02 a	6 ± 1 c	6.6 ± 0.51 d
Group2	3.8 ± 0.49 a	15.4 ± 0.87 a	16.8 ± 0.86 a
Group3	3.4 ± 0.68 a	14.8 ±0.37 a	16.2 ±0.37 ab
Group4	3.4 ± 0.93 a	10.2 ± 1.07 b	9.4 ± 0.75 c
Group5	5.8 ± 1.32a	13.4 ±0.51 a	14.8 ± 0.58 b
Groups	**ALP U/I (Means ± S.E)**		
	Day Zero	**Day 15**	**Day 29**
Group1	80.4 ± 1.03 a	76 ± 1 b	75.8 ± 1.07 b
Group2	79.2± 1.39 a	79.4 ± 0.51 a	79.8± 0.66 a
Group3	80 ±1 a	78 ±0.71 ab	77.8 ±0.37 ab
Group4	77.8 ± 0.86 a	79.2 ± 1.66a	77.6 ± 1.29ab
Group5	80 ±0.55 a	75.8 ± 0.86 b	77 ± 0.45 b

Group1 (Control), Group2 (10% ethanol at 5g/kg), Group3 (Silymarin at 50 mg/kg + 10% ethanol at 5g/kg), Group4 (camel urine at "1ml/100gm rats' B.W."), Group5 (camel urine at "1ml/100gm rats' B.W." + 10% ethanol at 5g/kg).
Means in the same column with the same letters are not significantly different.

Table 2
Changes in serum metabolites concentration of rats treated with camel urine and ethanol

Groups	Total Protein g/dl (Means ± S.E)		
	Day Zero	Day 15	Day 29
Group1	5.38 ± 0.21 a	5.42 ± 0.12 a	5.32 ± 0.22 a
Group2	5.54 ± 0.12 a	5.66 ±0.09 a	5.7 ± 0.07 a
Group3	5.58 ± 0.09 a	5.66 ± 0.09 a	5.6 ±0.05 a
Group4	5.7 ± 0.07 a	5.68 ± 0.11 a	5.6 ± 0.15 a
Group5	5.52 ± 0.09 a	5.52 ± 0.09 a	5.48 ± 0.04 a
Groups	**Albumin g/dl (Means ± S.E)**		
	Day Zero	**Day 15**	**Day 29**
Group1	2.78 ± 0.097 a	2.42 ± 0.12 b	2.46 ± 0.14 b
Group2	2.62 ±0.07 a	2.74 ± 0.07 a	2.76 ±0.05 a
Group3	2.6 ±0.07 a	2.72 ±0.07 a	2.7 ± 0.05 ab
Group4	2.7 ± 0.045 a	2.76 ± 0.09 a	2.56 ± 0.09ab
Group5	2.62 ± 0.09 a	2.58 ±0.07 ab	2.60 ± 0.03 ab
Groups	**Billirubin mg/dl (Means ± S.E)**		
	Day Zero	**Day 15**	**Day 29**
Group1	0.52 ± 0.14 a	0.3 ± 0.07 c	0.22 ± 0.04 c
Group2	0.42 ± 0.14 a	0.54 ± 0.05ab	0.56 ± 0.05 a
Group3	0.28 ±0.13 a	0.38 ±0.04 bc	0.46 ±0.05 ab
Group4	0.16 ± 0.02 a	0.6 ± 0.07 a	0.58 ± 0.04 a
Group5	0.48 ± 0.18 a	0.40 ± 0.04 bc	0.38 ± 0.04 b

Group1 (Control), Group2 (10% ethanol at 5g/kg), Group3 (Silymarin at 50 mg/kg + 10% ethanol at 5g/kg), Group4 (camel urine at "1ml/100gm rats' B.W."), Group5 (camel urine at "1ml/100gm rats' B.W." + 10% ethanol at 5g/kg).
Means in the same column with the same letters are not significantly different.

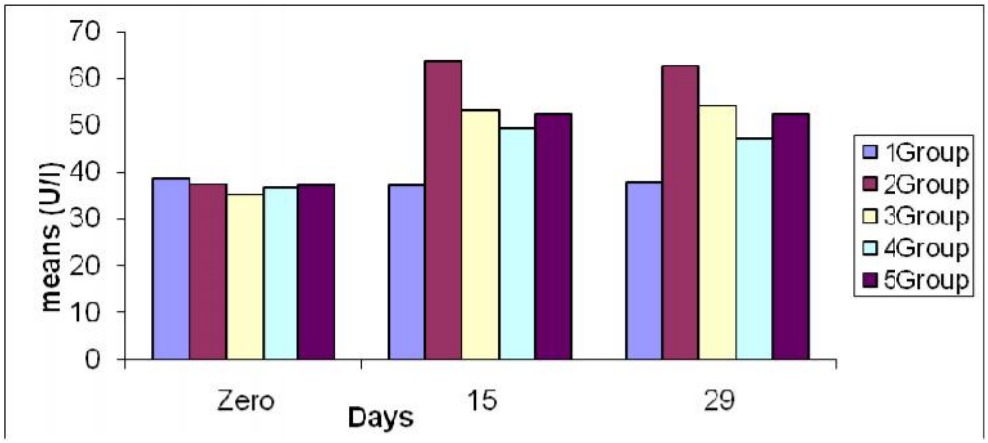


Figure 1
Changes in serum (AST) levels of rats treated with camel urine and ethanol

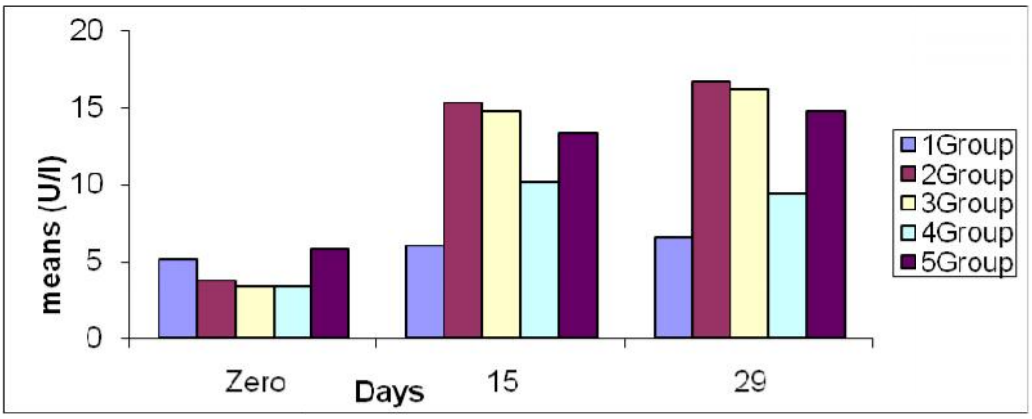


Figure 2
Changes in serum (ALT) levels of rats treated with camel urine and ethanol

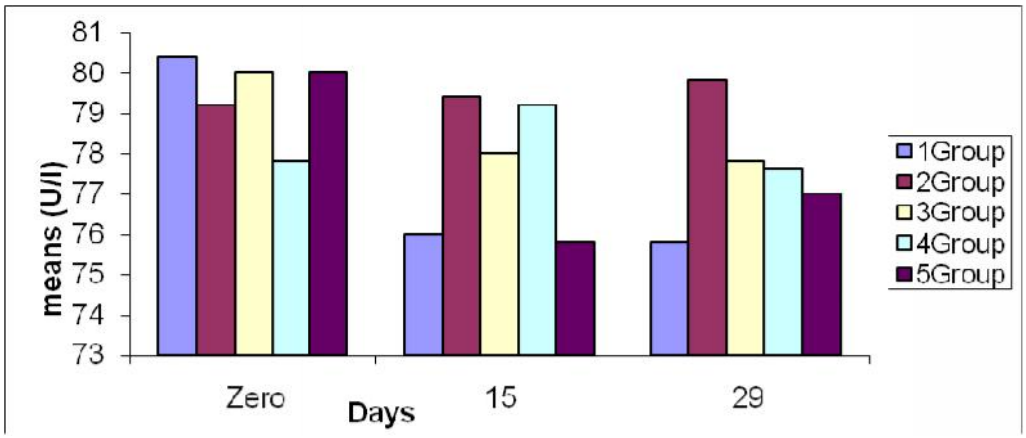


Figure 3
Changes in serum ALP levels of rats treated with camel urine and ethanol

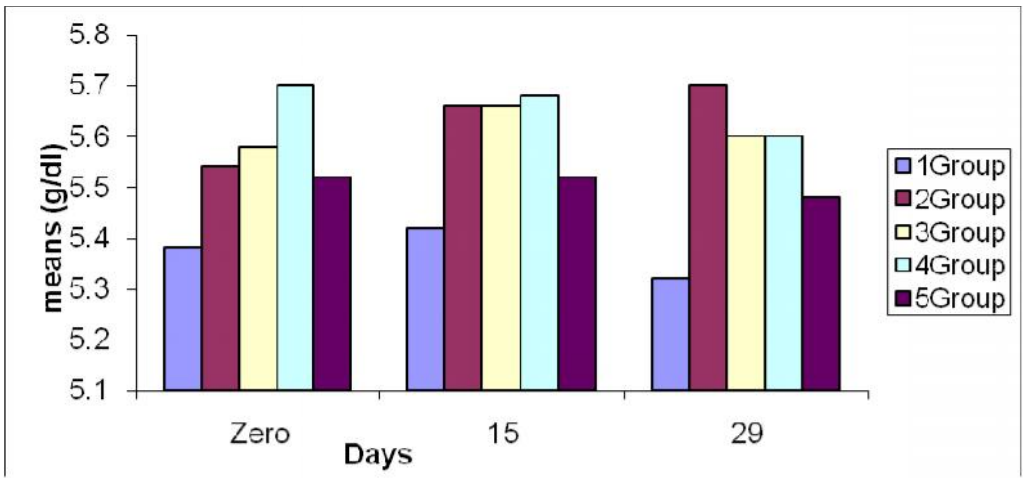


Figure 4
Changes in total protein concentration in rats treated with camel urine and ethanol

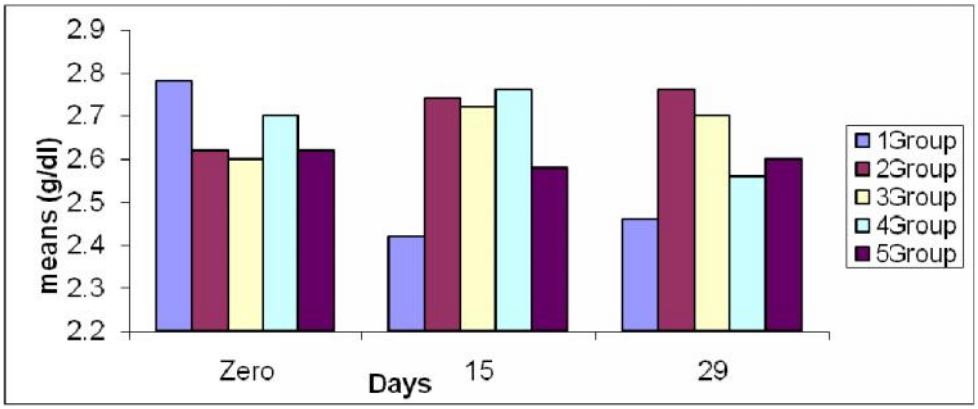


Figure 5
Changes in albumin concentration in rats treated with camel urine and ethanol

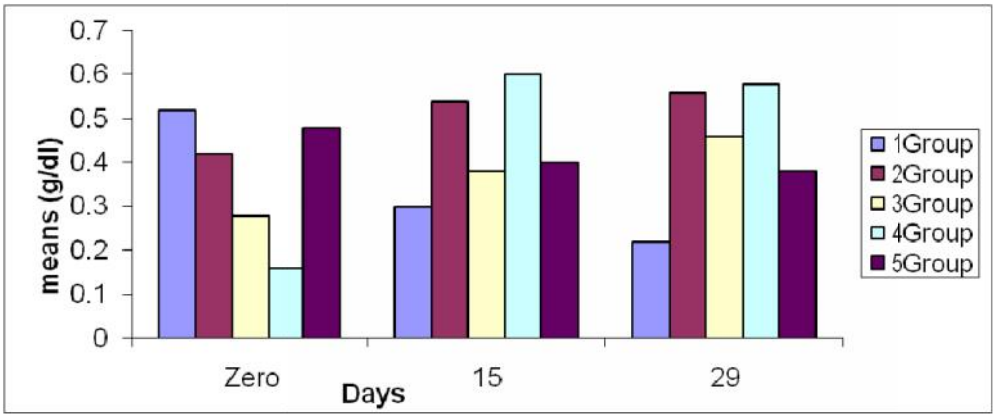
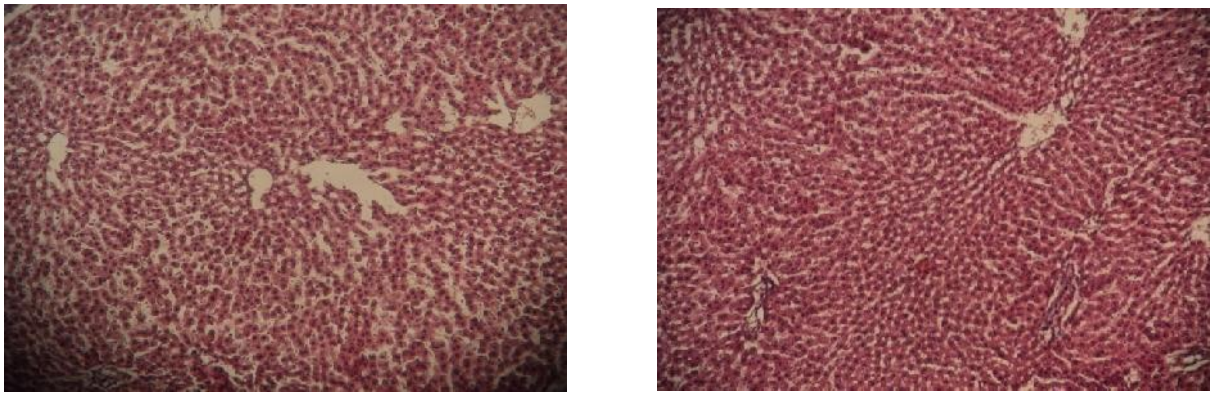


Figure 6
Changes in billirubin concentration in rats treated with camel urine and ethanol

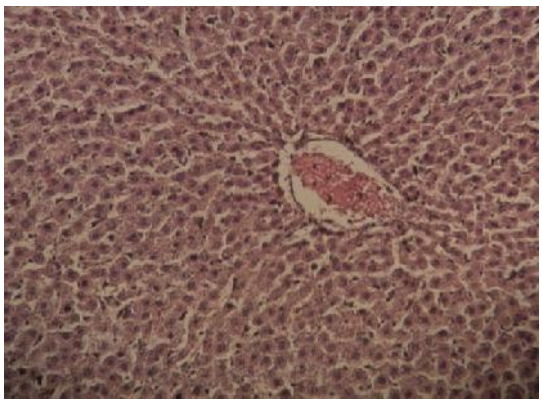


a b

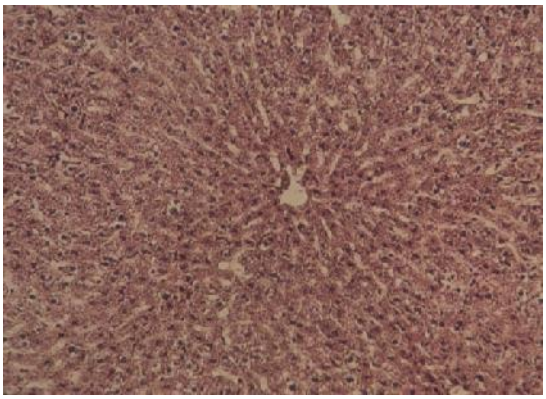
Figure7(a & b)
Histopathological changes in livers of rats treated with ethanol, camel urine and Silymarin

(a) Section of liver cells of group 2 (10% ethanol at 5g/kg), showing liver damage in a form of generalized necrosis, fatty change and congestion.

(b) Section of liver cells of group 4 treated with camel urine at "1ml/100gm B. W.", showing generalized fatty changes and slight necrosis.



c



d

Figure7 (c & d)

Histopathological changes in livers of rats treated with ethanol, camel urine and Silymarin

(c) Section of liver cells of group 5 which treated with camel urine at "1ml/100gm B.W." + 10% ethanol at 5g/kg, showing generalized fatty change.

(d) Section of liver cells of group 3 which treated with Silymarin at 50 mg/kg + 10% ethanol at 5g/kg), showing slight fatty change.

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