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# EFFECT OF DELPHININE ALKALOID ISOLATED FROM *DELPHINIUM AJACIS* ON LIVER AND KIDNEY FUNCTIONS OF ADULT MALE RATS

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**ABSTRACT**

The effect of delphinine an alkaloid isolated from the Egyptian *Delphinium ajacis* on liver function reflected by serum glutamic pyrovic transferase (SGPT), glutamic oxaloacetic transferase (SGOT), alkaline phosphates activity, total and direct bilirubin as well as total protein and albumin was studied. The effect of delphinine was also studied on the kidney function represented by serum creatinine and blood urea levels after 1.5 hr and one week from administration. Intraperitoneal administration of delphinine (0.01 mg/kg) in adult male rats induced significant increase in serum GPT, GOT and alkaline phosphatase activity. Serum level of total bilirubin was significantly elevated after one week and direct bilirubin serum level was significantly elevated after 1.5 hr and one week. Serum albumin level was significantly elevated after one week Blood urea and serum creatinine levels were significantly elevated after 1.5 hr and one week from administration of delphinine. It could be concluded that alkaloid delphinine has the ability to deteriorate both liver and kidney functions even in such small dose in adult male rats.

## INTRODUCTION

The genus *Delphinium* belongs to the plant family Ranunculaceae which is one of the alkaloid rich families[1-5]. Among the plants of this genus *Delphinium ajacis*. The dried ripe seeds of the plant containing about 1% of alkaloids. The most important of which is delphinine. The general separation methods[6-10] for these alkaloids have been described by several authors. The liquid extracts of seeds have shown an insecticide activity especially to destroy pedicure. An emulsion or Saab solution of the delphenium alkaloids are toxic as contact and stomach poisons to certain varieties of insects[11].

Delphinine, the subject of this study, showed molecular formula $C_{33}H_{45}NO_9$ has been subject of intensive chemical studies[8].

The present work was undertaken to uncover the biochemical changes after the sounding danger of accidental feeding of livestock and cattles in the Egyptian farms and deserts specially Sinai and western part of the Delta.

In addition, the present work was suggested to estimate the effect of delphinium alkaloid on the liver and kidney functions, by determining of the serum GPT and GOT, alkaline phosphates activity, as well as total and direct bilirubin, total protein, albumin, serum creatinine and blood urea levels.

## MATERIALS AND METHODS

Adult male albino rats weighing 170 ± 20 g were used in the present study. Animals were kept at constant environmental and nutritional conditions and fed on a basal diet[14,15] for two weeks (adoption period) before the experiments. Diet and water were supplied *ad libitum*.

**Experimental design:**

The animals were divided into three groups each of 10 rats.

- The first group was used as normal control .
- The second group was given delphinine i.p. in a dose of 0.01 mg/kg and used for estimation of the biochemical parameters after 1.5 hrs from delphinine administration.
- The third group was given delphinine i.p in a dose of 0.01 mg/kg and used for estimation of the biochemical parameters after one week from administration.

Blood samples were taken 60 min. after ajaconine administration and centrifuged. Serum was stored at-20°C and used for the estimation of the chosen biochemical parameters.

**Estimation of SGOT and SGPT activities:**

This was carried out by using Randox-Kit (Ireland) according to the method described by Reitman and Frankel, Frankel[16,17].

**Estimation of serum alkaline phosphatase activity:**

This was carried out by using Bio-Analytics Kit (Florida,USA) according to the method described by Roy (1970) [18].

**Estimation of serum total and direct bilirubin levels:**

This was carried out according to the method described by Jendrassik (1938)[19] using Randox-Kit (Ireland).

**Estimation of serum total protein and albumin levels:**

Total protein was estimated by a colorimetric method (Gornall *et al* 1968)[20] using protein kit bioMerieus (France).

Albumin was estimated by a colorimetric method according to previous method[20].

**Estimation of blood urea and serum creatinine levels:**

Enzymatic determination of urea was done according to the method of Patton & Crouch (1977)[21] using urea-Kit (bioMerieux, France). Creatinine was determined by a colorimetric method.

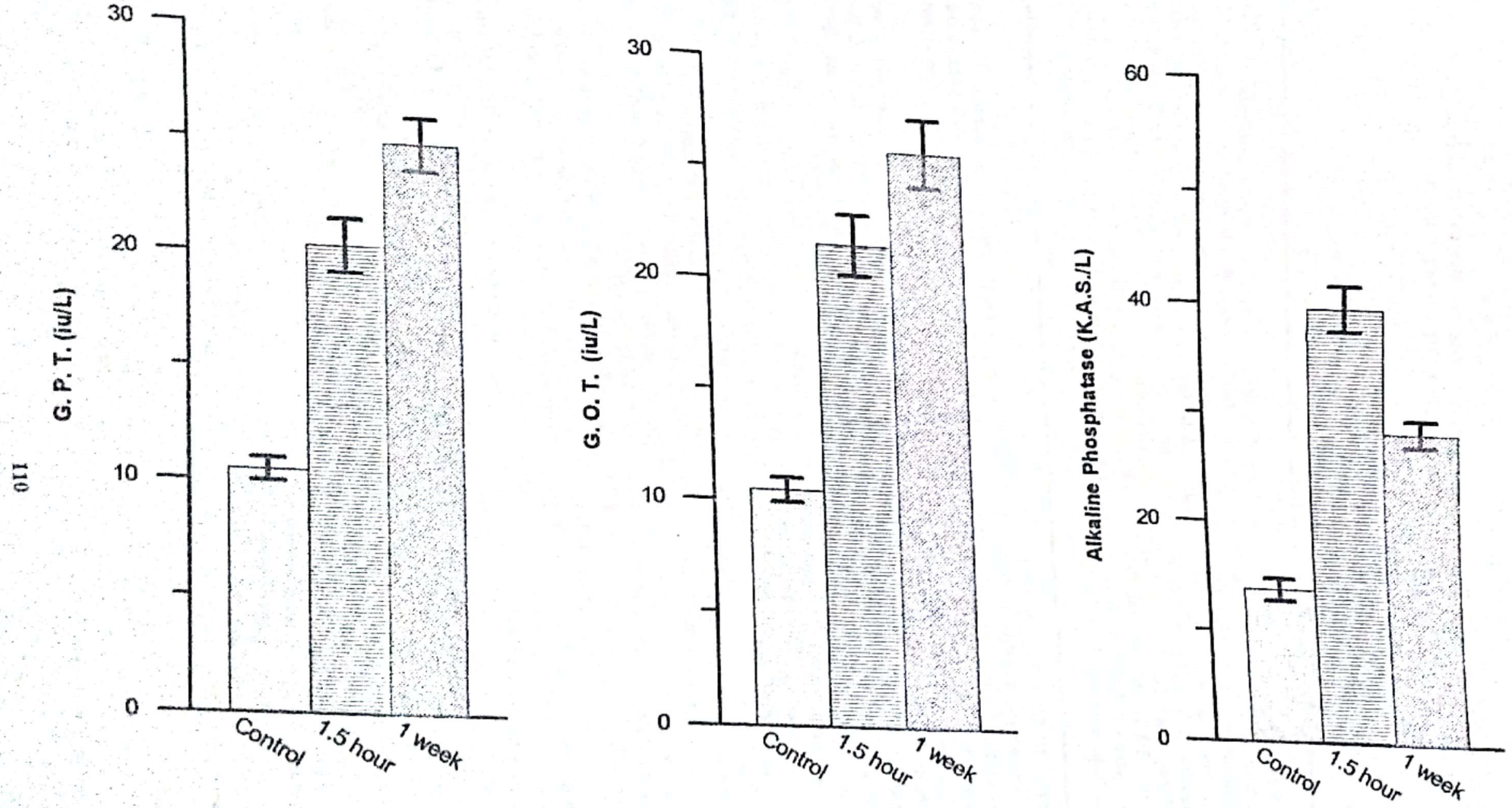


**Fig. (1) : Effect of delphinine (0.01 mg/kg) on serum GPT, GOT and alkaline phosphatose activity of adult male rats.**

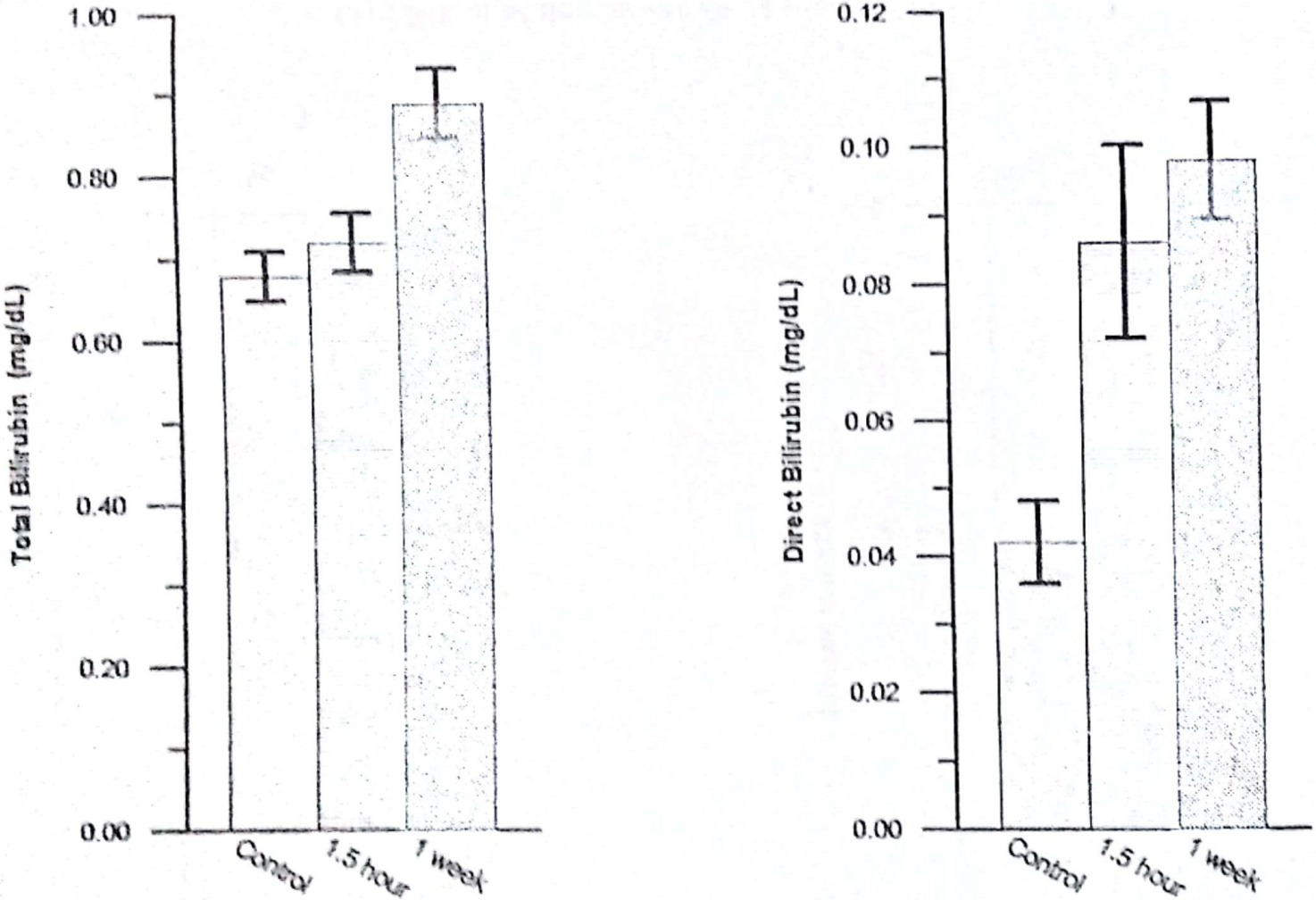


**Fig. (2) : Effect of delphinine (0.01 mg/kg) on serum total and direct bilirubin of adult male rats.**

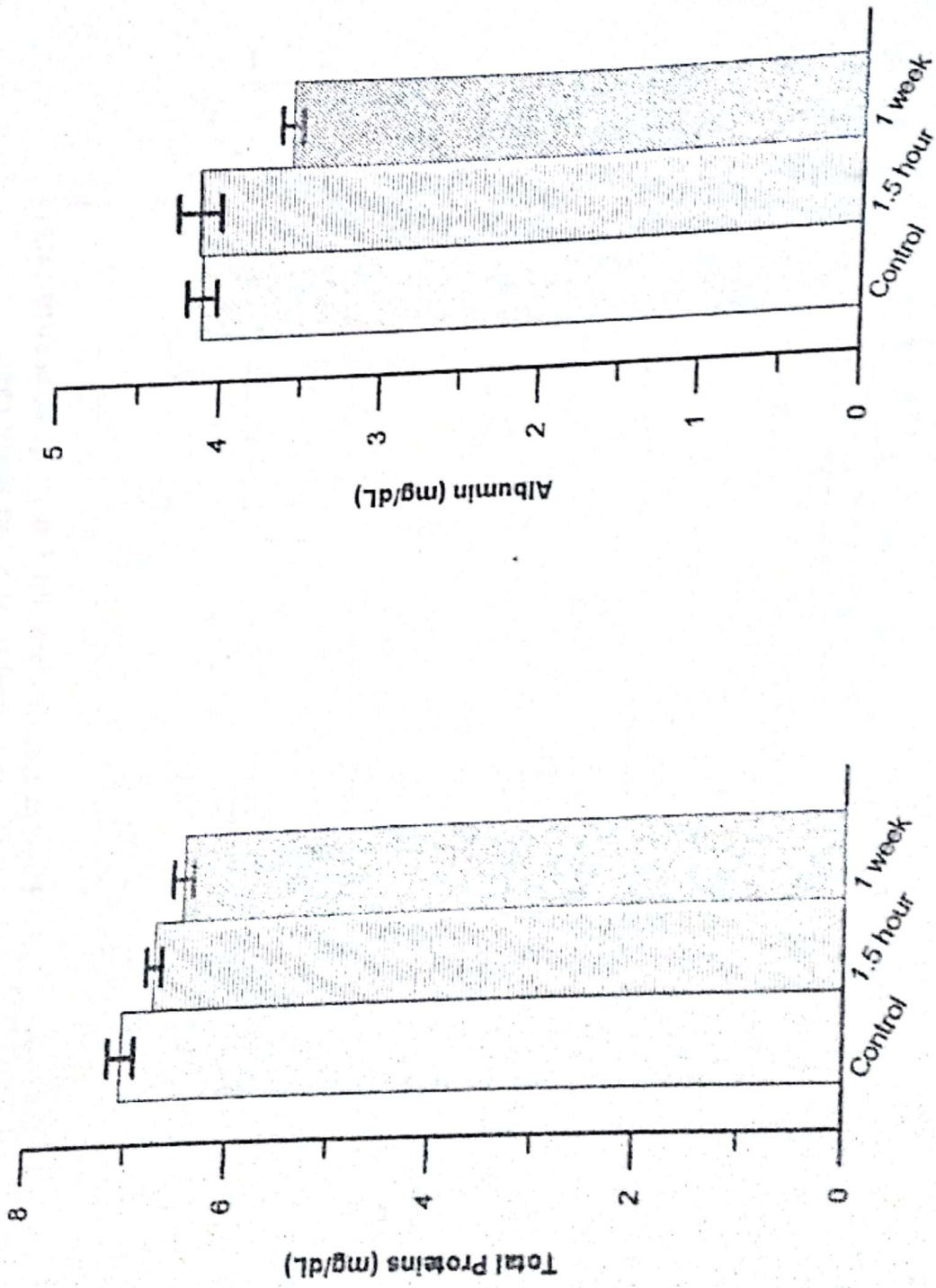


**Fig. (3) : Effect of delphinine (0.01 mg/kg) on serum total protein and albumin levels of adult male rats.**

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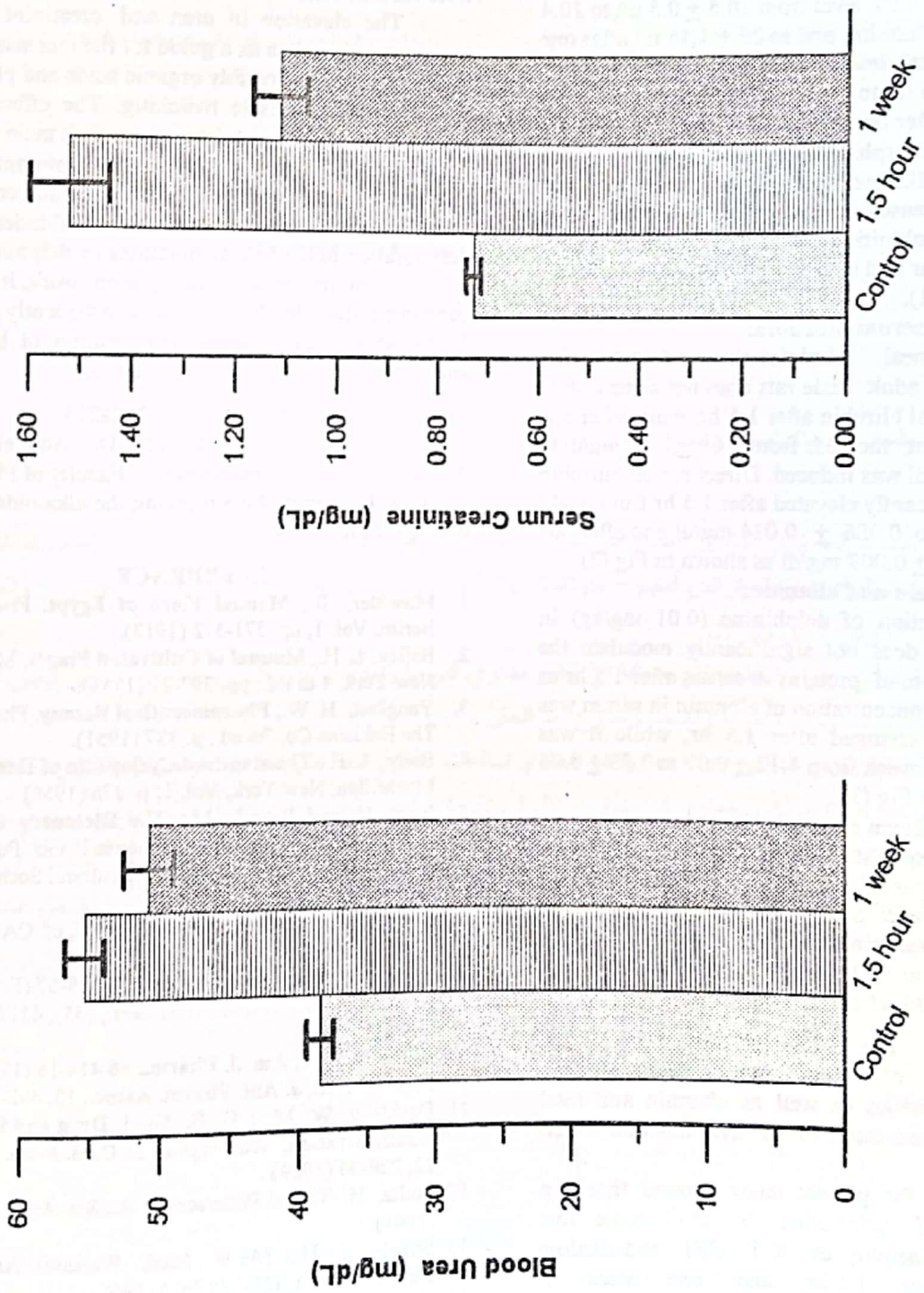


**Fig. (4) : Effect of delphinine (0.01 mg/kg) on blood urea and serum creatinine of adult male rats.**

## RESULTS

Effects of intraperitoneal administration of Delphinine 0.01 mg/kg in adult male rats after 1.5 hr and one week have shown the following results:

**Serum transaminases:**

Administration of delphinine induced significant increase in serum GPT level from 10.5 ± 0.5 u/l to 20.4 ± 1.18 u/l after 1.5 hr and to 25 ± 1.16 u/l after one week. GOT serum level was significantly increased from 10.5 ± 0.54 u/l to 21.7 ± 1.37 u/l after 1.5 hr and to 26 ± 1.53 u/l after one week as shown in Fig (1).

**Serum alkaline phosphatase activity:**

Serum alkaline phosphatase activity was significantly increased inserum after i.p administration of 0.01 mg/kg delphinine from 13.8 ± 1.03 u/l to 39.6 ± 2.0 u/l after 1.5 hr and to 28.4 ± 1.2 UL after one week as shown in Fig (1).

**Total and direct serum bilirubin:**

Intraperitoneal administration of delphinine (0.01 mg/kg) in adult male rats does not significantly change serum total blirubin after 1.5 hr, white after one week a significant increase from 0.68 ± 0.03 mg/dl to 0.89 ± 0.04 mg/dl was induced. Direct serum bilirubin level was significantly elevated after 1.5 hr from 0.042 ± 0.006 mg/dl to 0.086 ± 0.014 mg/dl and after one week from 0.098 ± 0.009 mg/dl as shown in Fig (2).

**Serum total protein and albumin:**

Administration of delphinine (0.01 mg/kg) in adult male rats does not significantly modulate the concentration of total proteins in serum after 1.5 hr or one week. The concentration of albumin in serum was not significantly changed after 1.5 hr, while it was reduced after one week from 4.12 ± 0.09 to 3.58 ± 0.06 mg/dl as shown in Fig (3).

**Blood urea and serum creatinine:**

The concentration of blood urea was significantly increased from 38.5 ± 0.99 to 55.4 ± 1.7 mg/dl after one week. Serum creative was significantly elevated after delphinine administration from 0.73 ± 0.015 mg/dl and to 1.52 ± 0.077 mg/dl after 1.5 hr and to 1.11 ± 0.05 mg/dl after one week as shown in Fig(4).

## DISCUSSION

The use of serum transaminases alkaline phosphatase activities as well as albumin and total protein levels as indicators for the liver function is well accepted [23,24].

Results of the present study showed that i.p administration of delphinine in adult male rats increased serum activity of GOT, GPT and alkaline phosphatase after 1.5 hr and one week of administration. The se results indicates the incidence of liver cell deterioration. It was reported that the rapid rise in SGOT and SGPT activity may result from a sudden change in the tissue permeability, cell fragmentation or from specific phase of progressive cellular damage[25]. The increase in alkaline phosphatase activity may be due to its release by the canalicular membrane the effect which could be due to the action of delphinine on the liver cell membrane. On the after hand the ability of delphinine to inhibit the clearance of bilirubin and consequently increase its serum concentration as well as the decrease in serum albumin level could be taken as a good indicators for liver insufficiency [26].

The elevation in urea and creatinine levels in blood could be taken as a guide for the increase of other tocsin substances possibly organic acids and phenols[27] which produce muscle twitching. The effects which were seen in our experiments in adult male rats after administration of delphinine. The present results showed that an increase in blood urea and creatinine, the effect which could be taken as a good indesc for the deterioration of the kidney functions by delphinine.

From the data of the present work, it could be concluded that delphinine and consequently the herb *Delphinium ajacis*, induce deterioralion of both liver and kidney functions in adultmale rats.

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# تأثير الدلفنين المستخلص من نبات دلفنيام أجاكس علي وظائف الكبد والكلي في الجرذان البالغة

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في هذا البحث تمت دراسة تأثير الدلفنين المستخلص من نبات دلفنيام أجاكس علي وظائف الكبد متمثلة في قياس نشاط ناقلات الأمين في مصل الدم (جلوتاميك بيروفيك ترانس أمنياز - جلوتاميك أوكسالو أستيك ترانس أمينات) والفوسفاتا - القولي - والبيلوروبين الكلي والمباشر وكذلك البروتين الكلي والزلال .

كما تمت دراسة التأثير علي وظائف الكلي متمثلة في قياس مستوي اليوريا والكرياتين في الدم وذلك في ذكور الجرذان البالغة بجرعة مقدارها ٥,٠١ مجم/كجم. لمدة ساعة ونصف وأسبوع بعد الحقن .

وقد أحدث الحقن البيريتوني للدلفنين زيادة معنوية في مستوي ناقلات الأمين كلا علي حدة والفوسفاتاز القلوي وذلك في كلا الفترتين في مصل الدم كما حدث انخفاض معنوي في مستو الزلال في الفترة الثانية فقط .

بالنسبة لليوريا والكريانتين فقد حدثت زيادة معنوية في مستوي كلا منها في الدم في كلا الفترتين نتيجة لحقن الدلفنين .

من خلال نتائج البحث يمكن استنتاج أن الدلفينين وبالتبعية نبات الدلفنيام أجاكس يحدث إضطرابا في وظائف كلا من الكبد والكلي في ذكور الجرذان البالغة.