

## EFFECT OF MUSCULAR EXERCISE ON SOME SERUM BIOCHEMICAL CONSTITUENTS IN CAMELS

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### SUMMARY

*Six mature healthy trained male one humped camels of Bahittcharry Breed aged from 8 to 10 years were exposed to muscular exercise, in form of running for 30 minutes. Blood samples were collected separately from each animal before and after running and sera were separated. Serum level of urea, creatinine, total proteins, albumins, cholesterol, triglycerides, total and direct bilirubin, AST, ALT as well as AP activities were determined.*

*The results of the present investigation revealed that muscular exercise in camel induced significant increase in serum levels of urea, creatinine, total proteins, albumins, triglycerides, total and direct bilirubin, AST as well as AP activities.*

### INTRODUCTION

Competitions of racing camels became popular in several arabian countries specially in the Gulf area. Moreover, camels are now widely used as working animal as well as for security purposes in desert regions. Therefore, studies concerning the physiological adaptation of camels for severe environmental conditions as well as their great ability for heavy muscular effort have attracted the attention of some investigators (Yagil 1985 and Inow et al., 1988).

Serum biochemical changes following exercise were determined in racing horses (Lucke and Hall 1980, and Judson et al., 1983) and in working mules (El-Anwar, 1989). However, there is no available literature describing the biochemical changes which muscular exercise imposes on blood constituents in camels. The purpose of the present study was to determine changes which may occur in the levels of some biochemical parameters in blood of camels following muscular exercise.

### MATERIALS AND METHODS

Six mature well trained healthy male camels of one humped Bahittcharry breed were used. Animals were of age ranged from 8 to 10 years. They were kept at Al-Khanka Haggana Center. Camels were exposed to muscular exercise, in the form of running, for 30 minutes.

Individual blood samples were collected, separately, via jugular vein puncture from each animal before and after running. Sera were separated and kept at -20°C till biochemical analysis.

Levels of urea (Patton and Crouch, 1977), creatinine (Henry, 1974), total proteins and albumins (Lowry, et al., 1951), cholesterol (Stein, 1986), triglycerides (Fossati and Prencipe, 1982), total and direct bilirubin (Broderon and Vind, 1963), alanine-aminotransferase (ALT) and aspartate-aminotransferase (AST) (Reitman and Frankel, 1957), as well as alkaline phosphatase (AP) activi-

ures (Bullent and Goldberg, 1971) were determined.

Statistical analysis of the obtained data, using t-test, was carried out according to Mead and Curaw, (1973).

**RESULTS AND DISCUSSION**

1989).

The levels of total proteins and albumins increased significantly ( $p < 0.01$ ) following exercise in camels table (1). These results were similar to those previously recorded in horses (Snow et al., 1983) and mules (El-Anwar, 1989). The increase in total proteins and albumins may indicate the in-

Table (1) Effect of muscular exercise on some serum biochemical constituents of camel (Mean  $\pm$  SE).

Item	Before exercise	After 30 exercise	Probability
urea $\mu$ mol/L.	6.33 $\pm$ 0.29	7.85 $\pm$ 0.32	<0.01
creatinine $\mu$ mol/L.	127.81 $\pm$ 11.35	185.64 $\pm$ 10.49	<0.01
T.protein g/dL.	6.15 $\pm$ 0.09	6.90 $\pm$ 0.21	<0.01
albumin g/dL.	3.42 $\pm$ 0.07	3.87 $\pm$ 0.05	<0.01
cholesterol $\mu$ g/dL	145.36 $\pm$ 4.87	158.21 $\pm$ 6.47	N.S.
triglycerid			
$\mu$ mol/L	0.63 $\pm$ 0.06	0.88 $\pm$ 0.05	<0.01
T.bilirubin $\mu$ g/dL	1.86 $\pm$ 0.15	5.37 $\pm$ 0.36	<0.01
D.bilirubin $\mu$ g/dL	0.81 $\pm$ 0.12	2.14 $\pm$ 0.18	<0.01
ALT U/ml	26.47 $\pm$ 2.37	32.38 $\pm$ 4.85	N.S.
AST U/ml	86.59 $\pm$ 3.79	150.32 $\pm$ 6.41	<0.01
AL.P. $\mu$ U/ml	3.86 $\pm$ 0.32	5.67 $\pm$ 0.25	<0.01

N.S. = non significant.

The highly significant increase ( $P < 0.01$ ) in Serum urea and creatine, table (1) following 30 minutes muscular exercise in camels may be probably due to the combined prerenal effects of reduced infusion with lower glomerular filtration and greatest load from increased metabolic activity (Snow et al., 1988). Similar finding was observed in horse (Rose et al., 1980). On the other hand, blood urea level did not influenced following three hours muscular exercises in horses (Keenan, 1979) of five hours working in mules (El-Anwar,

1988). It has been concluded that hemoconcentration in camels may be due to the loss of considerable amount of water content through sweating (Yagil, 1985).

In the present study a highly significant increase ( $P < 0.01$ ) in serum triglycerides level could be detected after muscular exercise in camels table (1). Such increase was similar to those reported in horses (Rose et al., 1980 and Poso et al., 1983).

Snow et al. (2000) mentioned that the increase in the concentration of triglycerides following muscular exercise may be due to an increase in the process of hepatic re-esterification of free fatty acids.

In the opinion of Lucke and Hall, (1980) muscular exercise, in horses, resulted in an increase in the rate of intramuscular hemolysis due to repeated trauma of the circulating red blood cells during exercise. This explanation can be accepted as the main cause of the significant increase ( $P < 0.01$ ) in the levels of total and direct bilirubin detected in blood of camels after running, table (I). Moreover, the decrease in plasma volume due to sweating is a contributing factor.

The present study revealed significant increase ( $P < 0.01$ ) in serum AST and AP activities, table (I). Similar results were obtained in racing horses (Rose et al., 1980). On the contrary, Keenan, (1979) did not notice any significant change between the levels of these enzymes before and after racing in horses. It is a fact that, in all species of animals, AST and AP are intracellular enzymes and that the increase in their circulating levels in plasma is indicative to cellular destructions (Varley et al., 1980). It is not logic that mild muscular exercise resulted in cellular destruction at that rate which led to such higher detected levels of AST and AP. Therefore, the only explanation of the detected significant increase in AST and AP activities might be a temporary state resulted from hemoconcentration due to considerable water loss in sweat.

In conclusion the present study revealed that muscular exercise in camel induced significant increase in serum levels of urea, creatinine, total protein, albumin, triglycerides, total and direct bilirubin, AST as well as AP activities.

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