BIOCHEMICAL CHANGES DURING DRAFT LOADING IN DONKEYS

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ABSTRACT

The present investigation was carried out to study the effects of draft load on biochemical parameters glucose, cholesterol, urea and lactate in donkeys. Six male donkeys 4 to 5 years of age were subjected to loading exercise (i.e. 10 per cent draft load for 1st to 5th days and 20 per cent draft load from 6th to 10th day). A highly significant ($P \leq 0.01$) increase in serum lactate and urea and highly significant decrease in glucose level at 10 per cent and 20 per cent draft load was noted . Cholesterol showed non- significant ($P \leq 0.05$) effect at 10 per cent and 20 per cent draft load.

KEY WORDS : Draft load, Donkeys, Biochemical Parameters

INTRODUCTION

The donkey, *Equus africanus asinus*, is a domesticated member of the Equidae or horse family. Draught animals, the principal being donkeys, play an important role in agricultural production and transport. Donkeys are preferred as draught and transport animals because they are friendly, hardy, quiet and more economical, compared to horses and oxen. They can be maintained on local farm produce, and are easy to train, intelligent and patient while working . Donkeys as pack animals can carry a load that is up to 100 kg or that is 50% of their body weight (Pal et al., 2002). It has also been reported that donkeys can carry a heavy load twice the weight a person can carry for a longer distance (Martin and Smith, 2005). Equids particularly donkeys are being used by man for a long time, but very little efforts have been made to study on various physiological and biochemical aspects during different conditions . They are the most important draught animal playing key role in the agriculture sectors in the developing countries in the form of pack transportation, carting, threshing, farm cultivation, riding, milk and meat production for human (Simenew, *et al*., 2011) .The blood biochemical indices may be influenced by various factors including such as breeds, environmental factors, load carrying capacity and veterinary care availability etc (Sow *et al*., 2012).

MATERIALS AND METHODS

Six apparently healthy adult medium-size Donkeys of 4-5 years of age (120 to 150 kg BW) were selected for the present study. A loading car designed and obtained from Central Institute of Agricultural Engineering (CIAE) was used to set the desire draught load for the study. These animals were procured from National Research Centre on Equine, Jorbeer, Bikaner. The entire experiment was conducted in two phases. In the first phase from day1st to 5th the animals were subjected to exercise with 10 per cent draft weight load for 2 hours or till fatigue symptoms appear whichever is earlier. At this stage 5 ml blood was collected without anticoagulant from jugular vein in a sterile vacutainer and was kept in slanting position for 1 hr at 37^0C for separation of serum. The animals were allowed for 2 hrs rest and 5 ml blood was collected for obtaining serum. In the second phase from day 6th to 10 th the animals were subjected to exercise with 20 per cent draft weight load and blood samples were collected as earlier in the 1st phase. Blood clots were broken and tubes were centrifuged at 2,500 rpm for 30 min. The serum was pipette out in small pyrex tubes and was kept immediately in the deep freeze at -20°C till further analysis.

Table 1: Mean ± S.E. value of Lactate, Cholesterol, Glucose and Urea according to the effect of 10% draft load in Donkey. N=6

Phases	Lactate** (mmol/l)	Cholesterol^{NS} (mmol/l)	Glucose **(mmol/l)	Urea **(mmol/l)
	Mean ± S.E.	Mean ± S.E.	.Mean ± S.E.	Mean ± S.E.
Control or Pre Exercise Condition(C)	0.238±0.009^{a}	3.068±0.08^{a}	4.675±0.09^{b}	11.507±0.38^{a}
after 2 hrs. Exercise(T1)	0.439±0.055^{b} (+84.45)	3.004±0.07^{a} (-2.08)	4.004 ± 0.12^{a} (-14.34)	13.81±0.46^{b} (+20.68)
2 hour after rest (T2)	0.252±0.027^{a} (+5.88)	3.043 ± 0.12^{a} (-0.81)	4.654 ± 0.15^{b} (-0.42)	12.12±0.47^{a} (+5.39)

Table 2: Mean ± S.E. value of Lactate, Cholesterol, Glucose and Urea according to the effect of 20% load in Donkey. N=6

Phases	Lactate** (mmol/l)	Cholesterol^{NS} (mmol/l)	Glucose **(mmol/l)	Urea **(mmol/l)
	Mean ± S.E.	Mean ± S.E.	.Mean ± S.E.	Mean ± S.E.
Control or Pre Exercise Condition(C)	0.23±0.01^{a}	3.02±0.101^{a}	4.87±0.086^{b}	10.71 ±0.36^{a}
after 2 hrs. Exercise(T1)	0.45±0.04^{b} (+90.17)	2.78±0.081^{a} (- 7.94)	4.45±0.100^{b} (-8.62)	13.93 ±0.37^{b} (+30.06)
2 hour after rest (T2)	0.24±0.02^{a} (+5.98)	2.83±0.097^{a} (-6.29)	4.84±0.106^{b} (-0.61)	11.79 ±0.46^{a} (+10.08)

Note: Mean comparison have been made within different phases.

Mean superscripted with different letters differ significantly ($P \leq 0.05$) from each other.

Fig in parenthesis are representing per cent increase or decrease.

Biochemical analysis was carried out using spectrophotometer- systronics 169 following standard methods in use as : Lactate – (Enzymatic method ,practical clinical biochemistry 6th edition, Varley's, 1988 using Lactate Dehydrogenase at 340 nm.), Cholesterol (modified Roeschlau's method, 1974) as described in diagnostic reagent kit manufactured by Transasia Biomedicals, Ltd., Solan , Himachal Pradesh, at 505/670 nm. , Glucose (Glucose oxidase-Peroxidase, GOD-POD method as described in diagnostic reagent kit manufactured by Spinreact at 500-550nm and Urea –(Glutamate dehydrogenase (GLDH) -Urease method as described in diagnostic reagent manufactured by Transasia Biomedicals, Ltd., Solan , Himachal Pradesh at 340 nm.

RESULTS AND DISCUSSION

The data obtained in the present study are depicted in table 1 and 2 at 10 and 20 per cent draft load. The results revealed that, a highly significant ($P \leq 0.01$) increase was found in 10 and 20 per cent draft load in lactate concentration. Similar trend was reported by Judson *et al*., (1983) Lekeux *et al*., (1991); Perez *et al*., (1992) in horses after transport and exercise. Mazzeo and Marshall (1989) predicted a direct linear relationship between catecholamine concentrations and lactate production during exercise with increasing intensities. Simultaneously there a significant fall in glucose concentration at 10 and 20 per cent draft load in donkeys. This may be due to increased demand for energy by active muscles, during exercise when body remains stressful, the stress hormone cortisol play a vital role by enhancing glycolytic activities .

A highly significant ($P \leq 0.01$) increase in serum urea level at 10 and 20 per cent draft load and then after decreased after two hours rest (T2 level) Our observation corroborate with the findings of of Snow *et al*. (1982) and Judson *et al*., (1983) in horses following submaximal and maximal exercise.

In present study non-significant effect was observed on cholesterol concentration in response to the 10% and 20% draft load. The cholesterol concentrations may be decreased due to increased adrenals and thyroid activities. Thyroid hormones have negative correlation with cholesterol concentrations (Lehninger *et al*., 2000). The study also revealed at the end of two hours rest (T2 af level), the cholesterol values were more or less similar to the control level (Yadav *et al*., 2001). Further the levels of metabolites under study after 2 hours rest returned to normal.

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