

# A NOTE ON PLASMA ANTIOXIDANT STATUS IN SUDANESE CAMELS (*Camelus dromedarius*) AFFECTED BY MUSCULOSKELETAL DISORDERS

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There is a growing increase in musculo-skeletal conditions of unknown aetiology in the Butana area. Agab and Abbas (1999) firstly described Haboub's and bent neck syndromes without determining the specific causes. The objective of this study was to determine antioxidant status in two diseases of unknown aetiology.

A field survey was conducted in Butana area of Central Sudan during January-December 2000 in Pack-Arabi camels of both sexes. For treatment protocols, 2,800 IU  $\alpha$ -tocopherol were given s/c and 400 ml calcium borogluconate (14 mg/ml), intravenously.

Blood samples were collected from the jugular vein and centrifuged in a refrigerated centrifuge. Immediately after centrifugation, a 2.55% (v/v) solution of metaphosphoric acid was added to the plasma samples (plasma: acid solution = 2:1) and the mixtures were frozen until thawed prior to analysis. Vitamin C concentrations in plasma were determined according to Lykkesfeldt (2000). Vitamin E and A were measured by isocratic high-performance liquid chromatography with fluorescent detection as previously described (Miller *et al*, 1984).

Data were analysed by ANOVA and were presented as means  $\pm$  SE. Significance level was detected at  $p < 0.05$ .

## Results

The prevalence of Haboub's and bent-neck syndromes was evident in animals of present study. Out of 2120 camels examined, 314 had Haboub syndrome and 65 had bent neck. The prevalence of Haboub's syndrome and bent neck in present study was 18.8% and 3%, respectively. The plasma antioxidant levels in relation to these conditions

are presented in table 1. The levels of retinol and ascorbate were not found significantly lower in disease conditions whereas  $\alpha$ -tocopherol and calcium levels were found significantly lower in affected animals (Table 1). However, supplementation of  $\alpha$ -tocopherol and calcium increased its level on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> day of supplementation (Table 2).

**Table 1.** Plasma calcium, retinol, ascorbate, and  $\alpha$ -tocopherol levels\* in camel affected with Haboub and bent-neck conditions.

Condition	Retinol	$\alpha$ -tocopherol	Ascorbate	Calcium
Healthy	490.3 $\pm$ 78.4 <sup>a</sup>	2.5 $\pm$ 0.3 <sup>a</sup>	4.91 $\pm$ 0.9 <sup>a</sup>	9.8 $\pm$ 1.2 <sup>a</sup>
Haboub	487.2 $\pm$ 70.4 <sup>a</sup>	0.8 $\pm$ 0.04 <sup>b</sup>	4.33 $\pm$ 0.8 <sup>a</sup>	6.5 $\pm$ 0.9 <sup>b</sup>
Bent-neck	474.4 $\pm$ 62.4 <sup>a</sup>	0.7 $\pm$ 0.05 <sup>c</sup>	4.72 $\pm$ 0.7 <sup>a</sup>	5.8 $\pm$ 0.8 <sup>c</sup>

<sup>a,b,c</sup> Means on the same column having different superscripts are significantly different at  $P < 0.05$ .

\*Values are expressed as Mean  $\pm$  SE.

## Discussion

Trypanosomiasis, mange and helminthiasis constitute a great hazard to camel productivity in the tropical zone; particularly Sudan. Mohamed and Beynen (2002) determined the prevalence of camel's diseases and their influence on vitamin C status. However, new conditions affecting the musculo-skeletal system are increasing in number.

Mineral and vitamin requirements in camels kept under natural grazing conditions are not ascertained with precision but during dry season, their requirements are increased. The bent neck syndrome and haboub's syndrome were firstly described by Agab and Abbas (1999). Musculo-

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**Table 2.** Effects of vitamin mineral supplement on  $\alpha$ -tocopherol and calcium plasma levels in camels affected with Haboub and bent-neck conditions.

Analyte	Pre-treatment		1 day post treatment		2 day post treatment		3 day post treatment	
	$\alpha$ -tocopherol	Calcium	$\alpha$ -tocopherol	Calcium	$\alpha$ -tocopherol	Calcium	$\alpha$ -tocopherol	Calcium
<b>Bent-neck</b>	0.7±0.04	5.9+0.9	1.0±0.08	6.4+0.92	1.6±0.2	8.2+0.8	2.2±0.2	9.9+1.4
<b>Haboub</b>	0.8±0.003	6.7+1.1	1.1±0.09	7.2+1.0	1.8±0.1	8.9+0.9	2.0±0.3	9.5+1.1

\*Values are expressed as mean  $\pm$  SE.

skeletal stiffness and pain particularly in the head and neck region characterise Haboub's syndrome.

The prevalence of Haboub's syndrome and bent neck in this study was higher than those reported by Agab and Abbas (1999) who found it to be 5.7 and 0.6%, respectively. High temperature, heavy tick infestation and poor pastures are predisposing factor to Haboub's syndrome (Agab and Abbas, 1999). Poisoning by the shrub *Capparis tomentosa* was incriminated as the primary cause of bent-neck syndrome (Idris *et al*, 1979). Trypanosomiasis, mange, helminthiasis infection reduced vitamin C status. However,  $\alpha$  - tocopherol and calcium showed significant reduction in plasma level. Two cases of the two conditions were treated with  $\alpha$ -tocopherol and calcium borogluconate. The conditions were relieved four days post injection.

In summary, Haboub's syndrome and bent neck condition are attributed to decreased levels of calcium and  $\alpha$ -tocopherol in Sudanese camels.

## References

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