

Effects of transportation stress on packed cell volume, total serum protein, potassium, and thyroxine concentrations, in dromedary camels

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ABSTRACT

Packed cell volume (PCV), total serum protein, sodium (Na), potassium (K), and thyroxine (T₄) concentrations were measured in 4 female camels before and after their trucking for a distance of 180 km west of Tripoli. Transportation caused an increase in PCV, total serum protein, and caused no significant effects on Na, K, and T₄ concentrations.

INTRODUCTION

Stress effects may include several alterations in various blood constituents namely electrolytes and hormones. Transportation is a category of environmental stress which may imply a stressfull effect on several body functions. It has been shown that calves subjected to transportation for a long distance showed a reduction in body weight, elevation in cortisone levels and no apparent effects on blood Na and K levels (1). Trucking of ewes for one hour on the road resulted in remarkable adrenal responses (2). The increase in corticotropin (ACTH) release which induces the release of adrenal corticoids is the direct indicator of the animal response to stress. Injection of ACTH caused an increase in the retention of Na and excretion of K from kidney tubules (3). The response of Na and K was very rapid within the first 30 min. after ACTH administration in dairy heifers (4). Camels can tolerate heat stress by excreting a concentrated urine (5), though the physiological and endocrinological aspects for such mechanisms remain debatable. Since transportation is considered a primary physical stress, the present study was undertaken to investigate the effects of transportation stress on packed cell volume (PCV), total serum protein, electrolytes, and thyroxine (T₄) concentration in dromedary camels.

MATERIALS AND METHODS

Four female camels were trucked for a distance of 180 km west of Tripoli from El-Fateh University Farm to the Assa Camel Project. Two blood samples were collected from each camel shortly before and after transportation in heparinized and a non-heparinized tubes via jugular vein puncture using vacutainer needles. Heparinized blood samples were used for PCV determinations and serum from non-heparinized samples were used for total protein, Na, K, and thyroxine determinations.

Total serum protein was measured instantly using a refractometer. Na and K were measured in at the Medical Analysis Laboratory in Tripoli using Kline flame «Beck-

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man, USA». Thyroxine concentrations were determined in all samples using Amerlex-T₄-Radioimmunoassay kit, supplied by Secretariat of Energy. Data were exposed to paired t-test analysis as described by Snedecor and Cochran (6).

RESULTS AND DISCUSION

Means standard errors of packed cell volume (PCV), serum total protein, Na, K, and T₄ concentrations prior to and following transportation are presented in Table 1. The mean values of PCV and total serum protein are similar to other reported values (7). Upon exposure to transportation, both values were significantly elevated ($P < 0.05$). This increase in PCV and total serum protein may suggest hemoconcentration of the blood probably due to an increase in cellular requirements which are accompanied by an increase in the number of red blood cells.

Table 1 — Mean and standard errors of PCV, total serum protein, Na, K, and thyroxine levels in camels before and after transportation

Character	Before transportation	After transportation
Packed cell volume (%)	29.50 ± 1.94 ^A	32.25 ± 2.4 ^B
Total plasma protein (g/100ml)	5.90 ± 0.09 ^A	6.11 ± 0.10 ^B
Na (meq/L)	108.50 ± 6.81	112.75 ± 7.85
K (meq/L)	3.90 ± 0.19	3.75 ± 0.41
Thyroxine (ng/ml)	140 ± 9.00	124.50 ± 9.18

Superscripts with different letters on the same line are statistically different ($P < 0.05$)

Extracellular fluid concentrations of Na are slightly lower while these of K are quite similar to values reported for the same species (5). Transportation showed no noticeable effects on serum concentrations of Na and K ($P > 0.05$). It has been shown that dehydration in camels resulted in an increase in plasma Na, K, and blood osmolality (5). This was explained by the reduction in water excretion which may be achieved by reduction of the glomerular filtration rate and the increase of tubular reabsorption (5).

Mean plasma concentration of T₄ is slightly higher than the previously reported values (9), however, there was no differences in plasma T₄ levels prior to and after transportation. It has been shown that other stressors, such as heat caused a remarkable reduction in thyroid activity in Camelidae species, *Llama glama* (10) and in cattle (8).

Regardless of the effects of transportation on thyroid function which requires detailed investigations, the changes of PCV and total serum protein suggest the important role of transportation as a physical management stressor in causing some physiological alterations in animal hemostasis. This opens an area of research to find the proper method of handling animals between locations especially those used for slaughtering, since it has been stated that transportation caused a significant reduction in body weight in cattle (4) and in sheep (2).

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تأثير النقل على نسبة كرات الدم الحمراء ((PCV))، بروتين الدم، الصوديوم، البوتاسيوم وتركيز هرمون الثايروكسين في الابل

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المستخلص

تمَّ تعيين كل من نسبة كرات الدم الحمراء، البروتين، الصوديوم، البوتاسيوم وهرمون الثايروكسين في دم أربعة نياق نقلت لمسافة 180 كم من جامعة الفاتح الى مشروع العسة الزراعى.

أدت عملية النقل الى زيادة في عدد كرات الدم الحمراء وزيادة في نسبة البروتين في الدم ولكن لم تحدث أثراً معنوياً على تركيز الصوديوم والبوتاسيوم. تشير هذه الدراسة إلى أن عملية النقل قد تعتبر عملية هامة في تغيير بعض الوظائف الحيوية في الحيوانات التي تنقل من مكان الى آخر حيث أن البحوث أثبتت بأن نقل الأغنام والأبقار الى المجازر تسببت في نقص معنوى في وزن الجسم، لهذا ينصح باجراء المزيد من البحوث في هذا المجال لتحديد أفضل الطرق لنقل الحيوانات من مكان الى آخر بحيث لا تتعرض الى نقص في وزن الجسم.