Ass. Univ. Bull. Environ. Res. Vol. 6 No. 1, March 2003

AUCES

APPLIED STUDY ON PHYSICAL RESTRAINT DURING ULTRASONOGRAPHY AS STRESS ON HEALTH STATUS AND SOME BLOOD PARAMETERS OF ONE HUMPED CAMELS (*Camelus dromedarius*) IN UPPER EGYPT

Moataz. A. Abdel-Rahman*; Moustafa. M. Ahmed and Derar. I. Derar*****

* Department of Animal hygien (Animal behaviour and management); **Department of Animal hygiene and ***Department of Theriogenology, Faculty of Veterinary Medicine, Assiut University.

ABSTRACT :

Two healthy male and three healthy female one humped camels aged between 4-5 years with average weight between 400-500 kg were used in this investigation. Allover the experiment, animals were adlibitum fed on barseem and commercial concentrate mixture. In the same time, water was freely available. The experiment was carried out for twelve successive weeks from the beginning of October to the end of December, 2002. During the experimental period, camels were secured and restrained for ultrasonographic examination each second day and for two hours where both forelimbs were tied together by a rope passing over the neck and both hind limbs were tied together by a rope passing over the back. Experimented male and female camels were examined clinically before and after restraint to determine their average pulse rate, respiratory rate and their body temperature. At the start of restraint period (control) as well as by the end of restraint period, three blood samples were drawn from the jugular vein of each animal for determination of leucocytic count, serum glucose and cortisol concentrations. The obtained data indicated that, physical restraint is considered as a stressful factor affecting the camel and reflected prominently on its health status and serum level of both cortisol and glucose. So, stress due to physical restraint must put in consideration during interpretation and explaining the obtained scientific results.

INTRODUCTION :

Commercial livestock are frequently confronted to restraint of movement when they held briefly during routine husbandry practices or when they are housed for long periods in restrictive places. This physical restraint may annoy the animals and a brief period of it may cause a variety of physiological effects. So, it is considered as a managemental strerss.

Stress Is defined by many scientists and physiologists as an external body forces that tend to displace the homeostatic state of the animal (Scott, 1981). Certain hormones show response patterns to stress and cause obvious physiological changes in the animal body. It was

found a strong correlation between the severity of the stressor and the detectable increase in the animal blood cortisol concentration (Leshner, 1978 and Friend, 1991). Cortisol is the principle glucocorticoids secreted by the adrenal cortex and it affects a wide range of activities in the body including metabolism of carbohydrates, proteins and fats and its increase is accompanied by a significant increase in the blood glucose level (McDonald, 1969). So, any stressful situation is reflected on the physiological state of the body which intern affects its homeostatic state and so its health status and behaviour.

Therefore, the aim of the present study is to determine the effect of physical restraint as stress factor on health status, serum cortisol and glucose concentrations as well as the differential leucocytic count of camels.

MATERIALS AND METHODS :

I- Animals used:

Two healthy male and three healthy female one humped camels aged between 4-5 years with average weight between 400-500 kg were used in this investigation. Camels were housed under the prevalent environmental conditions in a wide opened yard belonging to the experimental farm of faculty of veterinary medicine, Assiut University. Allover the experiment, animals were adlibitum fed on barseem and commercial concentrate mixture. In the same time, water was freely available.

II- Experimental design:

The experiment was carried out for twelve successive weeks from the beginning of October to the end of December, 2002. Camels were examined by the same person in the same time at the same place to avoid any extra factors. During the experimental period, camels were secured and restrained each second day for two hours for ultrasonographic gynacological examination (using Pie Medical Scanner 100 LC, Pie Medical Co., Netherland) where both forelimbs were tied together by a rope passing over the neck and both hind limbs were tied together by a rope passing over the back.

III- Health status measurements:

Experimented male and female camels were examined clinically before restraint (control) as well as after it according to Blood and Henderson (1974) & Blood and Radostits (1990) to determine their average pulse rate, respiratory rate and their body temperature.

IV- Blood parameters measurements:

At the start of restraint period (control) as well as by the end of restraind period, three blood samples, each of 5 ml were drawn from the jugular vein of each animal. The first one was drawn into glass test tubes contain EDTA for leucocytic count according to Franke and Reitman (1963). The second blood sample was drawn into centrifuge tubes and centrifuged for 30 minutes at 3000 r.p.m and the obtained sera were assayed within three hours for their glucose concentration according to Tinder (1969). The third blood sample was drawn into centrifuge tubes and centrifuged for 30 minutes at 3000 r.p.m and the obtained sera were freezed at –80 ºC and kept for further analysis to determine their cortisol level using TDx FLx system according to Dandliker and Sassure (1973).

IV- Statistical analysis:

Statistical analyses of the collected data were carried out according to procedures of completely random design, SAS (1995).

RESULTS :

The results of this study were illustrated in tables 1,2and 3 as well as figure 1.

Table (1): Health status measurements of the examined camels .

Item		Control	Restrained	"p" value
Pulse rate (No. / min.)	Male	32±2	48±3	<0.01
	Female	34±1	52±2	<0.01
Respiratory rate (No. / min.)	Male	10±1	21±1	<0.01
	Female	12±1	22±1	<0.01
Temperature (ºC)	Male	36.8±0.1	36.9±0.1	NS
	Female	36.7±0.1	37.1±0.1	NS

NS = Non-significant

Table (2): Serum cortisol (µg / L) and glucose (Mmol / L) concentrations of the examined camels.

Item		Control	Restrained	"p" value
Cortisol	Male	0.91±0.02	1.58±0.01	<0.01
	Female	0.88±0.021	1.61±0.02	<0.01
Glucose	Male	5.67±0.2	7.92±0.2	<0.01
	Female	5.49±0.1	7.96±0.2	<0.01

Table (3): Differential leucocytic count (10^3/µl) of the examined camels

Item		Control	Restrained	"p" value
Total WBCs	Male	12.07±0.22	12.12±0.21	NS
	Female	11.87±0.18	11.89±0.20	NS
Neutrophils	Male	6.76±0.10	6.67±0.10	NS
	Female	6.71±0.10	6.60±0.10	NS
Lymphocytes	Male	3.35±0.10	3.63±0.10	NS
	Female	3.30±0.10	3.55±0.10	NS
Monocytes	Male	1.42±0.06	1.32±0.04	NS
	Female	1.37±0.04	1.27±0.03	NS
Eosinophils	Male	0.42±0.05	0.39±0.03	NS
	Female	0.37±0.05	0.35±0.04	NS
Basophils	Male	0.120±0.01	0.110±0.01	NS
	Female	0.120±0.01	0.120±0.01	NS

NS = Non-significant

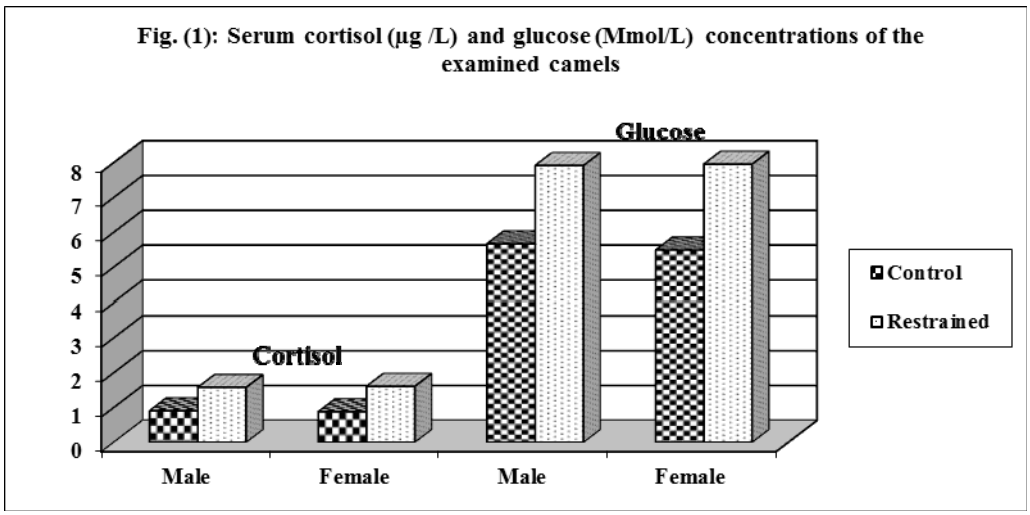

Fig. (1): Serum cortisol (µg /L) and glucose (Mmol/L) concentrations of the examined camels

DISCUSSION :

I-Physical restraint and health status of camels:

The data represented in table (1) showed the average pulse rate, respiratory rate (No. / min.) and body temperature (ºC) of the experimented male and female camels before and after restraint. It was 32, 10, 36.8 and 34, 12, 36.7 for male and female camels before physical restraint while it was 48, 21, 36.9 and 52, 22, 37.1 for male and female camels after physical restraint, respectively. These results indicated that, physical restraint had a significant effect ($p<0.01$) on health status of both male and female camels which reflected in the form of a significant increase in their pulse and respiratory rates, however, their body temperature did not so affected. This finding may be related to the physiological and biological adjustments and changes in the animal body to meet that new stressful situation (Hafez, 1975; Banerjee, 1982 and Radostits et al., 1994).

II-Physical restraint and serum cortisol and glucose concentrations of camels:

The data illustrated in table (2) showed the effect of physical restraint on the blood levels of cortisol and glucose of male and female camels. With regard to blood cortisol level, these data indicated that, physical restraint had a significant effect on serum cortisol level of both male and female camels ($p<0.01$). Serum cortisol level was 0.91 and 0.88 µg/L for male and female camels at the start of restraint while it was 1.58 and 1.61 µg/L by the end of restraint period, respectively. This significant increase in the blood cortisol level indicated an occurrence of stress due to physical restraint where acute stress causes an outpouring of ACTH which intern causes the adrenal cortex to increase its secretion of glucocorticoids including cortisol (McDonald, 1969; Burchfield et al., 1980 and Stephens, 1981).

With regard to blood glucose level, table (2) revealed that, serum glucose level was 5.67 and 5.49 Mmol/L for male and female camels at the start of restraint period while it was 7.92 and 7.96 Mmol/L by the end of restraint period, respectively. These data indicated that, restraint had a significant effect ($p<0.01$) on blood glucose level of camel, a finding which may related to the fact that glucocorticoids, including cortisol, act mainly on the hepatocytes which induced to produce gluconegenic enzymes which increase the rate of gluconeogenesis and enhance the conversion of protein to glucose. Moreover, cortisol causes a moderate reduction in the rate of glucose utilization by the cells, which leads to a rise in blood glucose (Guyton and Hall, 1996).

III-Physical restraint and interpretation of leucocytic series of camels:

The data represented in table (3) showed the effect of physical restraint on the differential leucocytic count of the blood of both male and female camels. These data showed that, the count (10^3/µl) of total WBCs, Neutrophils, Lymphocytes, Monocytes, Eosinophils and Basophils before restraint (control) was 12.07, 6.76, 3.35, 1.42, 0.42, 0.120 and 11.87, 6.71, 3.30, 1.37, 0.37, 0.120 for male and female camels,

respectively. However, it was 12.12, 6.67, 3.63, 1.32, 0.39, 0.110 and 11.89, 6.60, 3.55, 1.27, 0.35, 0.120 for male and female camels after restraint respectively. This result indicated that, leucocytic series of the experimented male and female camels was not significantly affected by the physical restraint, although it is known that, increased glucocorticoids level in the blood is followed by a significant depression in the number of circulating eosinophils and basophils (Ruckebusch et al., 1991). This may be related to the restraint period itself in the present investigation (two hours) which may be not enough to do significant changes in the leucocytic series.

CONCLUSION :

In conclusion, physical restraint is considered as a stressful factor affecting the camel and reflected prominently on its health status and serum level of both cortisol and glucose which are likely to upset its body homeostasis and so, its behaviour. Therefore, a successful management program should be established within our camel farms to avoid any harmful stressors and provide the animal with a comfortable situation. At the same time, the effect of physical restraint must put in consideration during evaluation and explaining the obtained scientific results particularly the ultrasonographic gynecological investigation.

REFERENCES :

1-Banerjee (1982): A textbook of animal husbandry. 5th Ed., Oxford and publishing company.

2-Blood, D.C. and Henderson, J.A. (1974): Veterinary medicine. 4th Ed., Bailliere-Tindall-London.

3-Blood, D.C. and Radostits, O.M. (1990): Veterinary medicine. 7th Ed., Great Britian.

4-Burchfield, S.R.; Wood, S.C. and Elich, M.S. (1980): Pituitary adrenocortical response to chronic intermittent stress. Physiol. And Behav., 24; 297-302.

5-Dandliker, W.B. and Saussure, D.V. (1973): Review article: fluorescent polarization immunoassay. Theory and experimental method. Immunochemistry, 10: 219-227.

6-Franke, S. and Reitman, S. (1963): Clinical laboratory methods and diagnosis. 6th Ed., C.V. Mosby Company, USA.

7-Friend, T.H. (1991): Response of animals to stress. J. Dairy Sci., 74: 292-303.

8-Guyton, A. and Hall, J.E. (1996): Textbook of medical physiology. 9th Ed., W.B. Saunders, Philadelphia, USA.

9-Hafez, E.S. (1975): The behaviour of domestic animals. 3rd Ed., Bailliere-Tindall-London.

10-Leshner, H.R. (1978): An introduction to behavioural endocrinology. Oxford University Press, New York.

11-McDonalds, L.E. (1969): Veterinary endocrinology and reproduction. 1st Ed., Lea and Febiger, Philadelphia, USA.

12-Radostits, O.M.; Leslie, K.E. and Fetrow, J. (1994): Herd health. 2dn Ed., Great Britian.

13-Ruckebusch, Y.; Phaneuf, L. and Dunlop, R. (1991): Physiology of small and large animals. B.C. Decker Inc., Philadelphia, Hamelton.

14-SAS (1995): Statistical analysis system. User's Guide : Statistics. Version 6, 2nd Ed., SAS Inst. Inc., Cary, NC.

15-Scott, G.H. (1981): What is animal stress and how is measured ?, J. Anim. Sci., 52: 150-153.

16-Stephens, D.B. (1981): Stress and its measurments in domestic animals. Adv. Vet. Comp. Msd., 24: 179-210.

17-Tinder, P. (1969): Determination of glucose in blood using glucose oxidase with an alternative oxygen acceptor. Annals. Clin. Biochem., 6: 24-27.

دراسة تطبيقية عن تقييد الحركة البدنية أثناء الفحص بالموجات فوق الصوتية كعامل مسبب للإجهاد على الحالة الصحية وبعض مكونات الدم فى الجمال وحيدة السنام فى صعيد مصر

معتز أحمد محمد عبد الرحمن* ، مصطفى محمد أحمد ، ضرار رفعت إبراهيم*****

* قسم صحة الحيوان (سلوكيات ومعاملة الحيوان)، ** قسم صحة الحيوان، *** قسم التوليد والتناسليات
كلية الطب البيطرى- جامعة أسيوط.

أجريت هذه الدراسة خلال الفترة من بداية أكتوبر حتى نهاية ديسمبر عام ٢٠٠٢ على عدد ٢ من الذكور و ٣ من الإناث للجمال وحيدة السنام، والتى تراوحت أعمارها من ٤ إلى ٥ سنوات وأوزانها من ٤٠٠-٥٠٠ كيلوجرام بغرض الوقوف على مدى تأثير تقييد الحركة البدنية على الحالة الصحية وبعض مكونات الدم لهذه الحيوانات وعلى الأخص أثناء إجراء الفحوص الفيزيقية، كما فى حالة الفحوص التناسلية باستخدام الموجات فوق الصوتية.

وتم تغذية هذه الحيوانات على مخلوط المركزات الجافة بالإضافة إلى البرسيم، وذلك بما يتناسب مع أوزانها، كما تم تقديم مياه الشرب النقية لها بحرية فى الأحواض المخصصة لذلك. ولقد أجريت هذه الدراسة لمدة ١٢ أسبوعاً متصلة، وذلك بتقييد الحركة البدنية للجمال المستخدمة فى التجربة كل ثانى يوم لمدة ساعتين عن طريق ربط القائمتين الأماميتين مع بعضهما باستخدام حبل مار فوق الرقبة وربط القائمتين الخلفيتين مع بعضهما باستخدام حبل مار فوق الظهر.

وفحصت الحالة الصحية للحيوانات المستخدمة قبل وبعد انتهاء فترة التقييد، وذلك بتعيين معدلات النبض والتنفس ودرجة حرارة جسم هذه الحيوانات. بالإضافة إلى ذلك أخذت عينات من دم هذه الحيوانات فى بداية وعند نهاية فترة التقييد وعوملت هذه العينات المعاملة الخاصة لتعيين نسبة كل من الكورتيزول والجلوكوز بدم الجمال، وكذلك الاختلاف فى عدد كريات الدم البيضاء بجميع أنواعها، وذلك قبل وبعد التقييد.

أثبتت النتائج التى تم الحصول عليها أن تقييد الحركة البدنية للجمال يعتبر من العوامل المسببة للإجهاد والتى أثرت تأثيرا معنويا على حالتها الصحية ومستوى هرمون الكورتيزول ونسبة الجلوكوز فى مصل دم هذه الحيوانات. وقد تم التوصية بمراعاة ذلك فى برنامج الرعاية والمعاملات اليومية للجمال وكذلك أثناء تقييم نتائج الأبحاث العلمية.