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**SOME HEMATOLOGICAL AND BIOCHEMICAL
PARAMETERS OF DEBILITATING CAMELS
AT ALEXANDIRA GOVERNORATE**
(With 3 Tables)

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بعض التغيرات الدموية والبيوكيميائية للجمال المصابة بالوهن
في محافظة الإسكندرية

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شملت الدراسة في هذا البحث ثلاثون جمالا - بمنطقة أبيس - محافظة الإسكندرية. عشرة منهم أصحاء إكلينيكيًا و خالين من طفيليات الدم و الطفيليات الداخلية و الخارجية حيث استخدموا كمجموعة ضابطة أما العشرون الباقون فكانوا يعانون إكلينيكيًا من وهن و ضعف عام و هزال شديد. أظهرت تحاليل الدم لهذه المجموعة أصابتها بالأنيميا و التي تمثلت فسي نقص معنوي في العدد الكلي لكرات الدم الحمراء و نسب هيموجلوبين الدم و الخلايا المصمتة هذا بالإضافة إلى نقص معنوي في نسب الحديد و النحاس في مصل الدم. كما أظهر تحليل الدم زيادة معنوية في العدد الكلي لكرات الدم البيضاء و نسبة الخلايا الحمضية. كما أوضحت التحاليل البيوكيميائية لمصل الدم نقص معنوي في نسب كلاً من الكالسيوم، الفسفور الغير عضوي و الماغنسيوم و الصوديوم و البوتاسيوم و الكلور بالإضافة إلى مع وجود نقص غير معنوي في عنصر الزنك. و قد أظهر الفحص الميكروسكوبي لمسحة الدم و تحاليل البراز أن سبب وهن الجمال في هذا القطيع يرجع إلى أصابتها بالديدان الأسطوانية بالقناة الهضمية و التي ربما تكون من أهم أسباب وهن الجمال و قد اتضح أنه عند علاج الحيوانات المصابة ضد الطفيليات المعدية المعوية لابد من إضافة العناصر التي تم انخفاضها تبعاً للإصابة بالطفيليات كعلاج مساعد وهذا يعتبر من أهم سبل الوقاية من الهزال و الوهن المصاحبين لمثل هذه الإصابات.

SUMMARY

Thirty camels were used in this investigation at the sixth village of Abes-Alexandria. Ten of them were clinically normal and free from internal, external and blood parasites and act as control group. Twenty of them were suffered from debilitation and emaciation. Blood samples were collected from each animal for determination of complete blood picture. The hematological examination revealed anemia in debilitating camels represented by significant decrease of R.B.Cs, Hb, PCV %, while total white blood cell count and its differentiation revealed significant leucocytosis with eosinophilia in debilitating camels. The biochemical analysis of blood serum showed significant decrease of calcium, phosphorus, magnesium, sodium, potassium, chloride, iron and copper levels with in-significant decrease of blood serum zinc level in debilitating camels. From the pervious results we can conclude that gastrointestinal nematode infestation was one of the important causes of camel debilitation. Further more, addition of different deficient elements as feeding supplement considers as a supportive therapy in such cases.

Key words: Hematolical and biochemical parameters, camels

INTRODUCTION

Camels are considered as one of the oldest fundamental constituent of animal breeding. In Egypt, the total number of camels was about 170.000 (UNSO, 1990). Camels as productive animals need healthy alimentary tract, which is responsible for prehension, digestion and absorption of food and water. The prevention of disease rather than treatment becomes the main aim in the veterinary medicine. Therefore, the clinical signs, blood and biochemical constituents were considered to be the most important diagnostic aids for maintaining health and disease conditions (Barakat and Abd El-Fattah, 1970).

Although camels are considered as environmental tolerant animals, can suffer from debilitating effect's connected with a bad and sudden changes in management that can upset camels with several debilitating diseases as trypanosomiasis, mange diarrhea and chronic parasitic infestation (Higgins, 1986 and Sayed, et al, 1997).

Chronic parasitic infestation is one of the dangerous disorders, which leads to debilitation among camels (Richard, 1979). This infestation may lead to maldigestion and/or malabsorption leading finally to malnutrition. Chronically infected camels exhibit lower hemoglobin content, total red blood cells count and packed cell volume) (El-Magawry, 1983; Omran *et al.*, 1984; Manaa, 1990; and Mohamed, 1996). Anemia, emaciation, decrease of hump size or even absences of it, atrophy of the thigh muscles, edema of the limbs, alopecia and diarrhea (Otify, 1981; Georgi, 1985; Nasser, 1992; Mohamed, 1996 and Sayed, 1998).

Trace elements as copper, iron and zinc play an important role in general health condition to livestock (Manaa, 1990; Selim, 1992 and Mohamed, 1996). Parasitic infested camels showed additionally to anemia, chronic diarrhea that affect major blood serum levels such as calcium, inorganic phosphorus and magnesium (Manaa, 1990; and Mohamed, 1996). The aims of this study were: -

- 1- Description of clinical picture of the examined animals.
- 2- Diagnosis of the most probable causes of debilitation among camels.
- 3- Recording some hematological changes associated with camel's debilitation.
- 4- Determination of some major and minor blood serum constituents associated with camel's debilitation.

MATERIALS and METHODS

Animals:

Clinical examinations were conducted on thirty camels of both sex belonging to a private flock in Abes area, Alexandria. The owner's complain was emaciation and debility of some individuals while other did not show any abnormal clinical manifestation. These animals were accordingly classified into two groups according to their general health conditions, after complete clinical examination of the suspected animals (Higgins and Kock, 1984), and fecal and blood films examinations. The first group was proved both clinically and laboratory to be healthy. The second group showed emaciation, decrease of hump size, edema; alopecia and some animal's suffered from chronic diarrhea with some degree of dehydration.

Samples:

- 1- *Fecal samples*: - were collected individually in clean plastic bags for examination of gastrointestinal parasites according to Coles (1986).

- The detected parasitic eggs were diagnosed according to manual of veterinary laboratory parasitological techniques (1971).
- 2- *Skin scraping* - were collected from aleopic animals to exclude of external parasites after Coles, (1986).
 - 3- *Blood films*: - were examined against blood parasites and differential leucocytic count by Leshiman stain after Coles (1986).
 - 4- *Blood samples*: - Two blood samples were collected from each animal. The first was collected on (EDTA) for hematological examinations (RBCs, TWBCs, Hb, PCV, MCV, MCH, and MCHC) after Coles (1986). The second one was collected for serum separation to estimate blood serum calcium, inorganic phosphorus, magnesium and iron by special kits on a spectrophotometer according to Gitelman, (1967), Zollinger et al. (1965), Gindler (1971) and Peters (1956), respectively. Blood serum chloride, was estimated according to Freid (1972). Sodium and potassium were estimated by flame photometer as described by Oser (1965). Serum copper and zinc were estimated by using atomic absorption according to Makino and Takahara (1981).
 - 5- *Statistical analysis*: - Obtained data were statistically analyzed by using t test after Snedecor and Cochran, (1967).

RESULTS

Clinical evaluation:

The physical examination of investigated two groups of camels showed in significant changes in body temperature, pulse rate except shallow rapid respiration in debilitating camels group. Clinical examination of diseased debilitated camels revealed weakness and paleness of mucous membrane, some of them showed decrease of the hump size, obvious appearances of ribs and depletion of subcutaneous fat. Others showed alopecia and chronic pasty feces.

Laboratory examination:

The results of the fecal analysis among the debilitating camels showed eggs of *Trichuris* and *Trichostrongylidae* species. Blood films and skin scraping of diseased animals showed absence of blood parasites and ectoparasites. The results of blood picture and blood biochemical analysis were tabulated in Tables 1, 2 and 3, respectively.

Table 1: Erythrocytic picture in normal control and debilitating camels.

Parameters	Control group	Group of debilitating camels with chronic intestinal parasitic infestation
Hb g/ dl.	13.30 ± 0.45	10.77 ± 0.35 **
R.B.Cs X 10 ⁶ / mm ³	12.38 ± 0.44	9.20 ± 0.34 **
PCV%	32.50 ± 0.65	26.50 ± 0.95**
MCV (fl)	26.26 ± 0.50	28.80 ± 0.05**
MCH (Pg)	10.74 ± 0.19	11.70 ± 0.19*
MCHC%	40.90 ± 0.81	40.64 ± 0.80

** Highly significant at P < 0.001

*Significant at P < 0.01

Table 2: Total leukocytes and its differential count in normal control and debilitating camels.

Parameters	Control group	Group of debilitating camels with chronic intestinal parasitic infestation
T W.B.Cs x10 ³ mm ³	10.90 ± 0.52	14.11 ± 0.52 **
Neutrophils %	35.75 ± 2.08	35.38 ± 1.38
Eosinophils %	3.15 ± 0.25	8.8 ± 0.58**
Basophils %	0.19 ± 0.1	0.24 ± 0.09
Lymphocytes %	57.15 ± 2.10	52.33 ± 1.80
Monocytes %	3.76 ± 0.37	3.25 ± 0.70

** Highly significant at P < 0.001

* Significant at P < 0.01

Table 3: Biochemical serum contents of some major and minor elements in normal control and debilitating camels.

Parameters	Control group	Group of debilitating camels with chronic intestinal parasitic infestation
Calcium (mg / dl.)	9.90 ± 0.55	8.59 ± 0.53 **
Inorganic phosphorus (mg / dl.)	6.95 ± 0.18	5.38 ± 0.38**
Magnesium (mg / dl.)	2.60 ± 0.29	1.98 ± 0.59*
Sodium (m.mol / L)	145.26 ± 6.14	127.93 ± 2.74*
Potassium (m.mol / L)	5.62 ± 0.34	4.78 ± 0.33*
Chloride (m.mol / L)	134.29 ± 3.60	120.93 ± 3.39*
Iron (µg %)	126.13 ± 3.45*	109.39 ± 2.68*
Copper (µg %)	97.20 ± 2.1	83.20 ± 1.35*
Zinc (µg %)	133.32 ± 3.73	126.48 ± 1.72

** Highly significant at P < 0.001

* Significant at P < 0.01

DISCUSSION

Camels are exposed to a wide range of affections, which cause their debility. Of these, chronic parasitic intestinal infestation which is recognized to be one of the most serious and damaging disease affecting camels (Higgins, 1986). Various degrees of debility was observed on the examined camels, these are manifested by weakness, anemia, decrease of the hump size, atrophy of the thigh muscles and debility of subcutaneous fat, with chronic diarrhoea and dehydration. Hematological picture of camels suffering from chronic parasitic gastroenteritis (Table 1) showed significant decrease in hemoglobin, total erythrocytic count per mm^3 blood and in the packed cell volume percent, while there were significant increases in MCV and MCH. These irregular changes of the erythrocytic index were nearly similar to the results recorded by Manaa (1990) and Baraka (1995). The marked fluctuation of erythrocytic index may be attributed to the discrepancy in RBCs count and size, hemoglobin content, PCV% and consequently the erythrocytic indices with concomitant states of dehydration (Yagil *et al.*, 1974).

The total leucocytic count per mm^3 blood (Table 2) was significantly increased in diseased animals. This remarked leucocytosis was due to the significant increase in eosinophils percentage (Abd El-Sammec, 1990). Leucocytosis associated with chronic parasitic gastroenteritis was mainly attributed to the chronic inflammatory parasitism and harmful effect of toxins produced by parasites on the haemopoietic organs. This explanation was previously accepted by Coles (1986) and these findings agreed with El Magawary (1983); Higgins (1986) and Sayed (1998). Eosinophilia might be also due to antigen antibody reaction that might be produced by the presence of parasites (Dobson, 1967).

The biochemical analysis of the present study (Table 3) showed that serum calcium, inorganic phosphorus and magnesium values were significantly decreased in diseased camels by chronic parasitic infestation. These results agreed with the results obtained by El Magawry (1983) and Manaa, (1990). Radostitis *et al.* (1995) explained the decrease in both serum calcium and magnesium may be due to the decrease of the both intake and absorption of them which was caused either by anorexia or gastrointestinal atony associated with chronic

parasitic infestation. Serum inorganic phosphorus was regulated by multiple factors as phosphorus intake and absorption, in addition to the dietary level of calcium, magnesium and vitamin D (Parasad, 1977 and Mc-Dwell *et al.*, 1983). These factors were disturbed in case of parasitic infestation. The serum sodium, potassium and chloride levels were significantly decreased in chronic parasitism. Similar results were recorded by Melvin (1970), Parasad (1977), Omran *et al.* (1984) and Laila *et al.* (1986) who explained reduction in the serum sodium, potassium and chloride by usually losses from the body associated with parasitic infestation, and these serum electrolytes were influenced by the rate of electrolytes lost especially in diarrhea. This might explain the decrease of the electrolytes in such cases.

Regarding to serum trace elements, copper and iron levels were significantly lowered while the serum zinc level showed insignificant decreases. Reduction of blood serum trace element levels in parasitic infested camels, if compared with control clinically healthy ones, can be explained by the fact that the chronic infestation leads to loss of appetite with consequence great loss of blood. (Kaneko and Cornelius, 1971). Waggar (1980) attributed such decrease in blood serum trace element levels with chronic parasitic infested animals either through impaired in absorption or increased excretion of concerned elements.

From these results we can conclude that the main cause of camels debility in the examined camels is infestation by gastrointestinal nematodes. Routine and regular fecal examination is considered one of the most important easy methods for diagnosis of gastrointestinal parasites which will enables in the control of the gastrointestinal parasite infestation and to give the prophylactic suitable anthelmintics to overcome one of the most causes of the camel debility. Furthermore, adding of mineral salts during treatment of gastrointestinal nematodes is important to subside the deficiency of these minerals.

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