THE EFFECT OF PARASITOSIS ON SOME HAEMATOLOGICAL INDICES OF CAMELUS DROMEDARIES

R.M. AL-KHATIB [1,2], H.M. AL NAKHLI [3] and K.S. MAZLOUM [3]

[1] Veterinary Serum and Vaccine Research Institute, Abbasia, Cairo, Egypt
[2] Central Veterinary Diagnostic Lab., Ministry of Agriculture, Riyadh. KSA.
[3] National Agriculture and Animal Resources Research Center, Ministry of Agriculture, Riyadh. KSA.

ABSTRACT

Received at: 26/2/2012

Accepted: 13/3/2012

A total of five hundred and sextey two (246 male and 316 female) blood and Faecal samples were collected from camels (Camelus dromedaries, 3-6 years) started at Fab. to Sep. 2011, from middle regions of KSA (Al-Riyadh, Snam and Ramah). A total of 445 (79.18%) camels were positive for infection with parasites (nematods and blood parasite); 284 (50.55%) infected with nematods (nematodirus and trichuris eggs), 161 (28, 64%) infected with blood parasites (*Anaplasma marginale*). Thin smears of blood samples showed *Anaplasma marginale*, in females camel (30.06%) more than males (26.83%). Packed cell volume (PCV), haemoglobin concentration (Hbc), and red blood cell counts (RBCs) were affected in the infected camels compared to the non-infected ones. Parasite infection in camels leads to macrocytic anaemia, which will negatively affect camel production and leading to death. Further studies on the prevalence of parasitosis in camel in KSA were recommended.

Key words: Nematodes, Haematological indices, Anaplasma marginale, Camel.

تأثير الإصابة بالطفيليات على بعض المؤشرات الدموية فى الجمال

رجب محمد الخطيب ، حبيب مقبول النخلى ، كمال صابر مظلوم

هدفت هذه الدراسة إلى إجراء فحص لعينات روث ودم واجراء بعض المؤشرات الدموية على عينات دم غير متجلط تم جمعها من ٥٦٢ جمل من الذكور والإناث عمر ٣-٦ سنوات وذلك ابتدءا من شهر فبراير حتى شهر سبتمبر ٢٠١١م من المنطقة الوسطى بالمملكة العربية السعودية (الرياض ، سنام ، رماح) لبيان مدى تأثير إصابة الجمال بالطفيليات على بعض المؤشرات الدموية. تم تسجيل عدد ٤٤٥ جمل بنسبة (٧٩,١٨%) ايجابية العدوى للإصابة بالطفيليات(ببويضات النيماتودا وطفيليات الدم). ومن مجموع الإصابات ٢٨٤ جمل مصابة ببويضات النيماتودا (النيماتدريس والتريكيوريس) بنسبة (50.53%) وعدد١٦١ جمل مصابة بطفيليات الدم بنسبة (28.64%) وأظهر فحص مسحات رقيقة من عينات الدم إن الإناث بها نسبة إصابة بطفيل الانابلازما مارجينال (30.06%) اعلي منها في الذكور (26.82%). وقد تأثرت المؤشرات الدموية (قياس نسبة الهيماتوكريت وقياس تركيز الهيموجلوبين وعدد كريات الدم الحمراء) في الجمال المصابة عنها في الجمال غير المصابة. ووجد إن عدوى الطفيليات في الجمال تؤدى إلى حدوث الأنيميا مما ينعكس بالسلب على الإنتاج وبالتالي نفوق هذه الجمال وهذا يتطلب مزيد من الدراسة.

INTRODUCTION

Camels play an important socio-economic role in the arid and semi arid areas, where most of the resource poor farmers in Africa live (Guliye *et al.*, 2007). The role of camels in traditional areas has been highlighted (Wilson, 1984; 1998; Mehari *et al.*, 2007). The camel has been considered an aid to man for thousands of years in many different respects and has a high economic value by providing meat, milk and wool as well as transportation and labor. Gastrointestinal helminthes injure their hosts by a wide variety of mechanisms, mainly reduction in voluntary food intake, loss of productivity and diarrhea. Gastrointestinal nematodes (GIN) are one of the most important widely spread parasites of camels and other animals. Internal parasites are considered to be the most important causes of economic losses in camels. These parasites not only reduce the productivity and performance of camels but also predispose them to other infections and leads to death (Urquhart *et al.*, 1988). They cause significant economic losses worldwide due to its feeding behavior in the host (Soulsby, 1986). The GIN parasites adversely affect the nutritional status of the animals and lower the resistance against other diseases (Irfan, 1984).

However, the clinical manifestation of helminthes infection is subclinical or asymptomatic in which animals appear normal but are performing poor (Borji *et al.*, 2010). Few studies have been conducted on GIN and haematological indices of Camels (El Bihari, 1985; Abdul-Salam and Farah, 1988; Haroun *et al.*, 1996; Abdul-Mogod, 2001, Bekele, 2002 and Khan *et al.*, 2010).

Anaplasma is one of the most important parasites transmitted by many species of ticks (Marchette and Stiller, 1982), but mostly *Boophilus microplus* causing anaplasmosis (TFRC, 1996). When parasites infected red blood cells rupture, the parasite's membrane also ruptures, releasing the initial bodies into the blood stream to invade other RBCs. As the infection progresses, more and more RBCs contain parasites and are destroyed (Stewart *et al.*, 1981). The disease is characterized by fever, severe anemia, jaundice, brownish urine, loss of appetite, dullness or depression, rapid deterioration of physical condition, muscular tremors, constipation, yellowing of mucous membrane and labored breathing (Bram, 1983). This study was conducted to determine the prevalence and effects of parasitosis on some erythrocyte indices of camels from middle regions of KSA (Al-Riyadh, Snam and Ramah).

MATERIALS and METHODS

Study provances:- The study was conducted in middle regions of KSA (Al-Riyadh, Snam and Ramah).

Animals:- Fifty handerd and sexety two adult one humped dromedary camels (Camelus dromedarius) were randomly sampled over a period of one year for this work 2011.

Blood sampling

I- For the haematological analysis:- Five milliliters of blood was obtained directly from the jugular vein into vacutainers containing di-sodium ethylenediamine-tetra-acetic acid (EDTA) as an anticoagulant. The anticoagulated blood was used immediately for the determination of erythrocyte count, packed cell volume (PCV), and hemoglobin (Hbc) concentration.

a)- Erythrocyte count: The erythrocyte number (RBC) was counted in a hemocytometer. Mix the blood sample thoroughly; fill blood into red pipette at 0.5 mark. Fill reagent add up into the pipette to 101 mark. Shake the pipette on the vibrator for 1 min. Discarded the first 3-4 drops. Fill in the hemacytometer nicely, allows RBC to set down for 2-3 min. Count 5 red squares under microscope (x400). Calculate the RBC concentration. Red cell count = N x10,000 (Ferrer, 1929).

b) Packed cell volume (PCV): Packed cell volume (PCV) was determined by microhaematocrit method, by centrifuging the blood in a micro-hematocrit centrifuge (APEL Co., LTD. JAPAN. MODEL HC-702) for 6 minutes at 11500 rpm. (Palomeque *et al.*, 1991).

c) Hemoglobin (Hbc) concentration: Mix the blood sample thoroughly. Fill blood into Sahli pipette at the mark 20. Clean outside the pipette nicely. Blow out the blood into a tube containing 5 ml of Drabkin's solution wash inside the pipette thoroughly. Allow all Hb to convert to Cyanmet-Hb for 10 min. Read the percent transmittance at 540 nm using pure Drabkin's solution as a blank. Calculate the Hb concentration from standard curve (Drabkin and Austin, 1935).

II- Thin smears were prepared from anticoagulated blood:- A small drop of fresh blood was put in the middle of one end of the slide, and spread right across the slide and then air dried. The slide was labeled using a pencil. Blood films were fixed in absolute methyl alcohol for 5 minutes, stained in 10% diluted Giemsa's stain for 45 minutes, and washed with distilled water and then dried. Blood films were examined microscopically under oil immersion lens at x100 magnification (Nikon Microscope). The parasite identification was done with the help of keys mentioned in the book titled "Helminthes, Arthropods and Protozoa of Domestic Animals" (Soulsby, 1982 and Adam *et al.*, 1977)

Faecal sampling: Ten grams of faeces were collected from camels into an air tight container. The samples were analysed by flotation in saturated sodium chloride solution and sedimentation methods (Soulsby, 1982). Processed samples were examined microscopically; identification was done according to the keys of Soulsby. (Soulsby, 1982).

RESULTS

Four hundred and forty five (79.18 %) out of 562 camels were infected nematodes and blood parasites; 284 (50.53%) of the camels examined were harbouring different nematodes eggs (trichuris and nematoderus, Fig. 1&2). One hundred and sixty one (28.64%) of camels was positive to infection with blood parasites (*Anaplasma marginale*, Fig. 3). parasitic infections *(Anaplasma marginale)* in female camels were higher than male 30.06, 26.83% respectively as shown in Tab. (1). The haematological analysis was within the normal range reported in the negative camels. Packed cell volume (PCV), haemoglobin concentration (HbC), and red blood cell counts severely affected in camels infected by both GIN and blood parasites (Tab. 2).

Fig. 1: Trichuris infection X40.

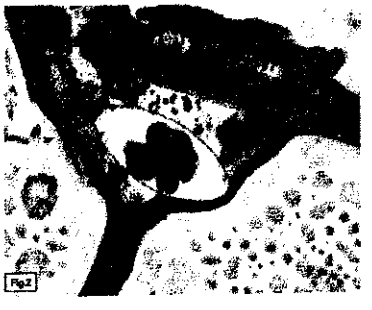

Fig. 2: Nematoderus infection X40.

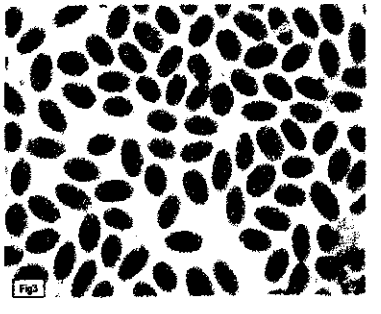

Fig. 3: *Analpasma marginale* infection X100.

Table 1: Prevalence of parasitic infection

No. of Animals		Negative sample	Positive samples				Total positives	
			Nematoda		Blood parasites			
			No.	%	No.	%	No.	%
562	246 ♂	42	128	52.03	66	26.82	194	78.86
	316 ♀	75	156	49.36	95	30.06	251	79.43
Total	562	117	284	50.53	161	28.64	445	79.18

Table 2: Hematological analysis of infected and Non-infected

	Negative samples	Positive samples	
		Nematode	Blood parasites
Pcv %	35.1	21.7	18.2
Hbc (gm)	11.9	8.5	8.1
RBCs ($x10^6$)	8.4	6.1	4.6

DISCUSSION

Helminthosis was considered as one of the main important problems in camels worldwide (Bekele, 2002). Out of 562 camels, 284 (50.53%) were found positive for the gastrointestinal nematodes (GIN) infection. This finding is in agreement with the results of (Borji *et al.*, 2010 and Mahfooz *et al.*, 2006) that found nematode infection in faecal samples in Iran and Pakistan respectively, but lower than that reported in Jordan (Sharrif *et al.*, 1997). In Ethiopian dromedaries, the country to country variation can be adequately attributed to variation between agro climatic conditions, levels of hygiene and husbandry practices (Allport *et al.*, 2005). Observed helminthes in this study were also reported from other regions (El Bihari, 1985; Abdul- Salam and Farah, 1988; Sharrif *et al.*, 1997; Bekele, 2002). The prevalence of nematods for males and females were 52.03% and 49.36%, respectively. This finding is in agreement with the result of Bekele (2002). Camels can acquire helminth infection by grazing on infected pastures or by ingesting infective larvae with drinking water (Blood *et al.*, 1979)

The blood parasites infection in femals (30.06%) was more than in males (26.82%) this result agreed with Barakat and Abdel-Fatth (1971) and Majeed *et al.* (1980); that reported variation in the blood constituents due to sex.

Hematological analysis of blood can often provide valuable information regarding the health and sickness of animals (Al-Busadah, 2007 and Mohammed *et al.*, 2008). The PCV in the infected animals was lower than in non-infected animals, which is usually the case in most parasitic infection. A similar observation was reported in one humped camels in Sudan (Mohammed *et al.*, 2007). The anemia was macrocytic, which could be attributed to large number of reticulocytes in circulation as a result of the active response from the red bone marrow. This is similar to an earlier report which showed that *Anapasma marginale* significantly affects the RBC indices of the camels (Mohammed *et al.*, 2007). Pathogenesis of anemia due to parasitism could be attributed to the direct effect of the parasite on the infected erythrocytes, which may be incriminated, or

the decreased life span of RBCs and also the suppression of the haemopoitic system (Mahran, 2004). Anemia in infected camels could also be due to extensive erythrophagocytosis in the reticulo-endothelial system initiated by parasitic damage to erythrocytes. The haematological indices of negative camels in this study were within the normal range reported by Abdelgadir *et al.* (1984); Mehrotra and Gupta (1989).

The relatively high incidence of parasites observed in this study could be due to the favourable environmental conditions for the survival and proliferation of the arthropod vectors responsible for the transmission of the parasites. Thus, there is need for an appropriate treatment against these parasites in infected camels. This study reveals the significant parasitic infection on the erythrocyte indices of camels in KSA.

REFERENCES

Abdelgadir, S.E.; Wahbi, A.G.A. and Idris, O.F. (1984): Some blood and plasma constituents of the camel. In: W.R. Cockrill (ed.), The Camelid–An All Purpose Animal, Scandinavian Institute of African studies, Uppsala, Sweden, 438-443.

Abdul-Mogod, S.Z. (2001): Studies on helminth parasites of gastrointestinal tract of camels. MSc Thesis, Cairo University, Egypt.

Abdul-Salam, J.M. and Farah, M.A. (1988): Seasonal fluctuations of gastrointestinal helminths of camels in Kuwait. Vet. Parasitol., 28: 93-102.

Adams, K.M.G.; Paul, J. and Zaman, V. (1977): Medical and Veterinary protozoology, an Illustrated guide. Revised edition published by Churchill Livingstone Edinburgh and London pp. 32–49.

AL-Busadah, K.A. (2007): Some Biochemical and Haematological Indices in Different Breeds of Camels in Saudi Arabia. Scientific Journal of King Faisal University (Basic and Applied Sciences); 8 (1): 1428H.

Allport, R.; Mosha, R.; Bahari, M.; Swai, E.S. and Catley, A. (2005): The use of community-based animal health workers to strengthen disease surveillance system in Tanzania, Revue scientifique et technique International Office of Epizootics 24(3): 921-932.

Barakat, M.Z. and Abdel-Fatth, M. (1971): Seasonal andsexual variations of certain constituents of normal camel blood. Zentralblatt for Veterinarmedizin A 18: 174-178.

Bekele, T. (2002): Epidemiological studies on gastrointestinal helminths of dromedary (Camelus dromedarius) in semi-arid lands of eastern Ethiopia. Vet. Parasitol., 105: 139-152.

Blood, D.C.; Henderson, J.A. and Radostits, O.M. (1979): Strongylosis in Horses. Veterinary Medicine. 5th Ed., Bailliere Tindall, London, UK.

Borji, H.; Razmi, G.H.; Movassaghi, A.R.; Naghibi, A.G.H. and Maleki, M. (2010): A study on gastrointestinal helminths of camels in Mashhad abattoir, Iran. Iranian Journal of Veterinary Research, Shiraz University, Vol. 11, No. 2, Ser. No. 31, 2010.

Bram, R.A. (1983): Tick-borne livestock diseases and their vectors: the global problem. Ticks and tick-born diseases, FAO Animal Production and Health Paper. World Anim. Rev., Rome, 36: 7-11.

Drabkin, D.L. and Austin, J.H. (1935): Spectrophotometric studies. V. A technique for the analysis of undiluted blood and concentrated hemoglobin solution. Journal of Biological Chemistry 112: 105-115.

El Bihari, S. (1985): Helminths of the camel: a review. Br. Vet. J., 141: 315-326.

Ferrer, D. (1929): Manual de tecnica histologica. Libreria Castells, Ronda Universidad, Barcelona, Spain, 369 pp.

Guliye, A.Y.; Noor, I.M.; Bebe, B.O. and Kosgey, I.S. (2007): Role of camels (Camelus dromedarius) in the traditional lifestyle of Somali pastoralists in northern Kenya, Outlook on Agriculture 36(1): 29-34.

Haroun, E.M.; Mahmoud, O.M.; Magzoub, M.; Abdel Hamid, Y. and Omer, O.H. (1996): The haematological and biochemical effects of the gastrointestinal nematodes prevalent in camels (Camelus dromedarius) in central Saudi Arabia. Vet Res Commun. 20(3): 255-64.

Irfan, M. (1984): Keynote address on effects of parasitism on livestock production. Pakistan Vet. J., 4: 25-27.

Khan, M.N.; Sajid, M.S.; Khan, M.K.; Iqbal, Z. and Hussain, A. (2010): Gastrointestinal helminthiasis: prevalence and associated determinants in domestic ruminants of district Toba Tek Singh, Punjab, Pakistan, Parasitology Research 107(4): 787-94.

Mahfooz, A.; Abubakar, M.; Bilal, M.Q. and Ahmad, T. (2006): prevalence and chemotherapy of gastrointestinal parasites in camels in and around faisalabad, Pakistan. 26 (4): 209-210.

Mahran, O.M. (2004): Some studies on blood parasite in camels (Camelus dromedaries) at Shalatin city, Red Sea Governorate. Assiut Vet. J. 50: 172-183.

Majeed, M.; Hur, G.; Rahman, Z. and Ahmed, A. (1980): Effect of sex and season on 10 haematological values of normal adult humped camels. Rev. Elev. Med. Vet. Pays. Trop. 33: 135-141.

Marchette, N. and Stiller, D. (1982): The *Anaplasmataceae, Bartonellaceae,* and *Rochalimaea quintana. In*: Marchette, N.J. (Ed.), Ecological Relationships and Evolution in the Rickettsiae. CRC Press, Boca Raton, Florida, USA, p.98-106.

Mehari, Y.; Mekuriaw, Z. and Gebru, G. (2007): Camel and camel product marketing in Babilie and Kebribeyah woredas of the Jijiga Zone, Somali Region, Ethiopia. Livestock Research for Rural Development. Volume 19, Article (49). http://www.lrrd.org/lrrd19/4/meha19049.htm, accessed 31/10/2010.

Mehrotra, V. and Gupta, M.L. (1989): Seasonal variations in certain bloodc onstituents in camel. Indian Journal of Animal Science 59: 1559-1561.

Mohammed, A.K.; Sackey, Z.A. and Tekdek, B.K. (2007): Common health problems of the one humped camel (*Camelus dromedaries*) introduced into Sub-humid climate in Zaria, Nigeria. Res. J. Anim. Sci; 1: 1-5. Pakistan Vet. J., 26(4): 209-210.

Mohammed, A.K.; Sackey, A.K.B. and Tekdek, L.B. (2008): Mean haematological characteristics of healthy adult one humped camel *(Camelus dromedaries)* introduced into a semi-humid climate of Nigeria. Journal of camel Practise; 15 (2): 187-190.

Palomeque, J.; Pinto, 0. and Viscor, G. (1991): Hematologic and blood chemistry values of the masai ostrich (struthio camel us). Journal of Wildlife Diseases, 27(1), pp. 34-40.

Sharrif, L.; Al-qudah, K.M. and Al-Ani, F.K. (1997): Prevalence of gastrointestinal helminths in one-humped camel (*Camelus dromedaries*) in Jordan. J. Dromed. Pract. Res., 41: 67-69.

Soulsby, E.J. (1982): Helminths Arthropods and Protozoa of domesticated animals, 7th end. Bailliere Tindall, London.

Soulsby, E.J. (1986): Helminths, Arthropods and Protozoa of Domesticated Animals. 7th Edn., Williams and Wilkins Company, Baltimore, London, pp: 212-242.

Stewart, N.P.; Dalgliesh, R.J. and Tratt, T. (1981): Life-cycle of tick and tick fever parasites. *Queensl and Agriculture Journal,* 107(6): 305-308.

TFRC "Tick Fever Research Center" (1996): Tick Fever and Disease Diagnosis. Department of Primary Industries, Queensland, Australia.

Urquhart, G.M.; Dunn, A.M.; Jennings, F.W.; Duncan, J.L. and Armour, J. (1988): Veterinary Parasitology ELBS, Bath Press Avon Great Britain pp. 200–253.

Wilson, R.T. (1984): The Camel. 1st edn, Longman Group Ltd, Longman House Mill, Harlow Essex, UK, Pp. 223.