

PARASITES OF ONE-HUMPED CAMEL (*Camelus dromedarius*) IN IRAN: AN ABATTOIR STUDY

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ABSTRACT

This study was conducted in Tehran and Najaf Abad abattoirs to determine the parasitic infection in *Camelus dromedarius* in Iran. A total of 286 camels from abattoirs of Tehran and Najaf Abad were examined during July 2011 until August 2012 from which 100 camels were evaluated for protozoa and external parasitic infection, and 186 camels were evaluated for internal parasites. A total 9 nematodes species, 4 cestodes species and 7 species of external parasites were identified as follows: Nematodes: *Haemonchus longistipes* (36%), *Parabronema skrjabini* (2.1%), *Camelostrongylus mentulatus* (5.3%), *Trichostrongylus mentulatus* (0.5%), *Physocephalus sexualatus* (0.5%), *Nematodirella longissimespiculata* (0.5%), *Nematodirus oiratianus* (0.5%), *Nematodirella cameli* (1.6%), *Onchocerca fasciata* (15%). Cestodes: *Moniezia expansa* (5.9%), *Moniezia benedeni* (2.6%), *Stilesia globipunctata* (23.6%), Hydatid cyst (in lung 16.6%, in liver 5.9% and in spleen 1.6%) *Arthropoda*: *Hyalomma dromedarii* (63.8%), *Hyalomma anatolicum. anatolicum* (4.6%) *Hyalomma schulzei* (0.4%), *Hyalomma detritum* (0.4%), *Rhipicephalus turanicus* (0.9%), *Cephalopina titillator* (48/3%), *Linguatula serrate* (64/7%). According the results of this study *Haemonchus longistipes* and *Hyalomma dromedarii* were more prevalent in camel. The results of this study showed that strategic control, including external and internal parasites of camel should be considered. This is the first report of *Hyalomma detritum* and *Rhipicephalus turanicus* from camel in Iran.

Key words: Abattoirs, *Camelus dromedarius*, Iran Najaf Abad, parasites

Various infectious diseases including parasitic infection may restrict growth and productivity of camel (Bekele, 2001). Different types of endo-ectoparasites affect health of camels. Parasitic disease and poor nutrition condition of this animal lower their viability to work or productivity (Bekele, 2002). Helminths are common parasites of gastro-intestinal tract (El-Bihari, 1985; Dakkak and Ouhelli, 1987; Borji *et al*, 2010). In blood feeding species like *Haemonchus* that inhabit the abomasum, feeding behaviour may lead to anaemia. Adult cestodes could be cause of mechanical obstruction or malabsorption. Hydatid cyst in camel is the most important metacestode, because the camel strain (G6) serves an important role in epidemiology of this disease (Motakef *et al*, 1976; Abdul-Salam and Farah, 1988; Moghaddar *et al*, 1992; Ahmadi, 2005). On the other hand, many important ecto-parasites can infect camels among which sarcoptic mange, blood sucking ticks and flies are important. Para-arthropod parasite *Linguatula serrata*, usually found in mesenteric lymphatic node, spleen and liver (Hussein *et al*, 1982; Bekele, 2001; Oryan *et al*, 2008).

Few studies have been done on parasitic infection in camels in Iran. This study was conducted to determine the prevalence of external and internal

parasitic infections in camel in Tehran and Najaf Abad abattoirs in Iran.

Materials and Methods

This study was carried out on 286 camels from the slaughter houses of Tehran and Najaf-Abad (Isfahan province) during July 2011 until August 2012. The slaughtered camels were imported from Sistan and Blochestan province. Each organ was examined separately for endo-parasites and ecto-parasites. Collected samples were sent to Iranian Parasitology Museum, Faculty of Veterinary Medicine, University of Tehran.

For helminths which are in gastrointestinal system of each camel were opened and the content of each part were washed in sieve (Mesh 100). Lungs were inspected for hydatid cyst and also trachea were opened longitudinal and checked for the presence of helminths. Testes and spermatic cords of male camels were carefully examined for the presence of *Dipetalonema evansi*. Vein cords in both male and female camels were also examined for presence of *Schistosoma*. Subcutis of the head and neck regions, fascia of nuchal ligament and other fascial sheath of the body were also examined after slaughter to determine the occurrence

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of *Onchocerca* nodules. The nodules were stored in 10% formalin. Eyes of each camel were examined for presence of *Thelazia*. Collected samples were put separately into plastic containers and were taken to laboratory within a few hours.

Blood samples were taken from the jugular vein. 1cc of blood added to 5cc Alsever solution and sent to laboratory. Thin and thick smear of blood were taken and stained by Gemsa® (Merkco) and examined for blood parasites.

Five mesenteric lymphatic nodes were collected from each camel, cut into small pieces and massaged in tepid water for about 15 min. The samples were then examined using microscope and nymphs were collected.

Nasal cavity, nasopharyngeal area, frontal sinuses and turbinate bones were carefully inspected for the presence of *Cephalopina titillator*.

Before slaughter, all over the body skin specially perianal region, tail and ears were inspected for external parasites. Ticks were collected and placed in tubes contained 70% ethanol and sent to laboratory. Nomenclature and identification were based upon Walker (2003).

Results

Examination of gastrointestinal tract of 73 camels in Tehran slaughter house revealed that 69 of the camels were infested with 4 species of nematodes (*Haemonchus longistipes*, *Parabronema skrjabini*, *Nematodirus oiratianus*, *Nematodirella cameli*), 3 species of cestodes (*Moniezia expansa*, *M. benedeni*, *Stilesia*

globipunctata) and one larval stage of cestode (hydatid cyst). In Najaf-Abad, 113 camels were examined for gastrointestinal parasites revealed that 92 camels were infected with 7 species of nematodes (*Haemonchus longistipes*, *Parabronema skrjabini*, *Camelostrongylus mentulatus*, *Physocephalus sexalatus*, *Trichostrongylus probulurus*, *Nematodirella longissimespiculata*) 3 species of cestodes (*Moniezia expansa*, *Moniezia benedeni*, *Stilesia globipunctata*) and one larval stage (hydatid cyst) (Tables 1 and 2). There were heavy infections of *Haemonchus longistipes* in abomasum in both slaughter houses. *Onchocerca* nodules were detected in 25 out of 73 camels (34.2%) in Tehran and 3 out of 113 camels (2.6%) in Najaf-Abad slaughter house. Data of helminth infection from both slaughter houses are summarised in table 1.

In blood samples and smears no blood parasite were seen.

Sixty five out of 100 camels (65%) that examined for *Linguatula serrata* were found to be positive in Tehran slaughter house and 73 out of 113 camels (64.6%) were found positive in Najaf-Abad slaughter house.

Examination of the nasal cavity, pharynx, larynx, turbinate and sinuses of revealed that 83 out of 100 (83%) of the camels in Tehran slaughter house and 20 out of 113 (17.6%) of the camels in Najaf-Abad slaughter house were infested with instars of *C. titillator*. Hydatid cysts were found in 22 out of 73 camels (30.1%) in Tehran slaughter house and 9 out of 113 camels (7.9%) in Najaf-Abad slaughter house (Table 2).

Table 1. The prevalence of helminthes in 186 camels from Tehran and Najaf-Abad slaughter house.

Organ	Parasites		Infection rate		Min and max number of helminths
			No	Percent	
Abomasum	Nematode	<i>Haemonchus longistipes</i>	67	36	5-7700
		<i>Parabronema skrjabini</i>	4	2.1	2-10
		<i>Camelostrongylus mentulatus</i>	10	5.3	3-19
		<i>Trichostrongylus probulurus</i>	1	0.5	1
		<i>Physocephalus sexalatus</i>	1	0.5	1
Small intestine	Nematode	<i>Nematodirella longissimespiculata</i>	1	0.5	7
		<i>Nematodirus oiratianus</i>	1	0.5	11
		<i>Nematodirella cameli</i>	3	1.6	6-14
	Cestode	<i>Moniezia expansa</i>	11	5.9	100-400cc
		<i>Moniezia benedeni</i>	5	2.6	30-100cc
		<i>Stilesia globipunctata</i>	44	23.6	10-400cc
Lung	Meta Cestode	Hydatid cyst	31	16.6	1-4
Liver	Meta Cestode	Hydatid cyst	11	5.9	1-2
Spleen	Meta Cestode	Hydatid cyst	3	1.6	1-2
Connective tissue and ligament	Nematode	<i>Onchocerca fasciata</i>	28	15	1-15

Table 2. The Infection rate of arthropodes derived from in 213 camels from Tehran and Najaf-Abad slaughter house.

Organ	Parasites		Infection rate		Min and max of infection
			No	Per	
Skin	Tick	<i>Hyalomma dromedarii</i>	136	63.8	1-294
		<i>Hyalomma an. anatolicum</i>	10	4.6	6-15
		<i>Hyalomma schulzei</i>	1	0.4	12
		<i>Hyalomma detritum</i>	1	0.4	3
		<i>Rhipicephalus turanicus</i>	1	0.4	8
Nasopharyngeal	Larvae	<i>Cephalopina titillator</i>	103	48.3	1-147
MLNs	Nymph	<i>Linguatula serrata</i>	138	64.7	2-162

Five species of ticks (*Hyalomma dromedarii*, *Hyalomma schulzei*, *Hyalomma anatolicum anatolicum*, *Hyalomma detritum*, *Rhipicephalus turanicus*) infested 213 camels in both slaughter houses (Table 2).

Reproductive system of camels were not infested with any parasite.

Discussion

One-humped camel (*Camelus dromedarius*) is the most common species in Iran. Upon the annual report of Iranian Veterinary Organisation (IVO) in 2009, the estimated camel population of Iran is about 154,000. Parasitic diseases cause substantial economic losses in terms of decrease in working capacity, growth and productivity (Parsani *et al*, 2008). Few studies have been conducted on parasites (especially ectoparasite) of one humped camels in Iran.

In this study, 286 camels were examined for parasitic infection and studied animals were found infected. In the examination of gastrointestinal tract and fascial sheath of the body, 9 species of nematodes (*Haemonchus longistipes*, *Parabronema skrjabini*, *Camelostrongylus mentulatus*, *Physocephalus sexalatus*, *Trichostrongylus probulurus*, *Nematodirella longissimespiculata*, *Nematodirella cameli*, *Nematodirus oiratianus*, *Onchocerca* spp). Three species of cestodes (*Moniezia expansa*, *Moniezia benedeni*, *Stilesia globipunctata*) and one larval stage of cestode (hydatid cyst) were identified. Maximum and minimum of infection rates in this study belong to *Haemonchus longistipes* (36%), *Nematodirella longissimespiculata* and *Physocephalus sexalatus* (0.53%), respectively. There were heavy worm burden of *Haemonchus longistipes* in abomasum, the average of worm count were 379 worms in each infected camels and maximum of worm detected were 7700. In the previous study was the prevalence of this infection reported 30% in Tehran (Mirzayans and Halim, 1980) and 18% in Mashhad (Borji *et al*, 2010). The prevalence of *Haemonchus longistipes* in Saudi Arabia were reported 32.8% and

68% as predominant worm in abomasum (EL-Bahy *et al*, 2008; Banaja and Ghandour, 1994). Mirzayans and Halim (1980) reported *Haemonchus longistipes*, *Parabronema skrjabini*, *Camelostrongylus mentulatus*, *Physocephalus sexalatus*, *Trichostrongylus probulurus*, *Nematodirella cameli* and *Nematodirus oiratianus* in Tehran. The prevalence of *Haemonchus longistipes*, *Parabronema skrjabini*, *Camelostrongylus mentulatus*, *Trichostrongylus probulurus*, *Nematodirella cameli*, *Nematodirus oiratianus* were 18%, 10%, 38%, 64%, 10%, 16%, respectively in Mashhad (Borji *et al*, 2010).

The prevalence of the *Onchocerca fasciata* was 15%. The prevalence of *Onchocerca fasciata* was 2.7% in Egypt and 15.5%, 59%, 10.9% in Saudi Arabia (Cheema *et al*, 1984; Nasher, 1986; Ekl-Massry and Derbala, 2000; Ghandour *et al*, 1991).

The maximum and minimum rate of infection of cestodes belong to *Stilesia globipunctata* and *Moniezia benedeni*, respectively. This finding is in agreement with that of Borji *et al* (2010). *Stilesia globipunctata* also had high prevalence (30%), rather than other cestodes in Kerman (Radfar *et al*, 2006). The prevalence rate of *Stilesia globipunctata* had been lower than the report of Mirzayans and Halim (1980).

Hydatid cyst had a high prevalence rate in camel and lung is the predominant site (16%). Many studies have shown that camel is an important intermediate host of *Echinococcus granulosus* (Hosseini *et al*, 1998) and G6 isolate (camel isolate) was recorded from goats and sheep in Iran (Rajabloo *et al*, 2012).

Prevalence of hydatid cyst in lungs, liver and spleen were 16.6%, 5.9%, and 1.6%, respectively. Fertility and the viability of hydatid cyst in camel were 26.7% and 79.1% that it's next highest after sheep. On the other hand, the camel strain of *E. granulosus* exists in Iran (Hosseini and Eslami, 1998; Zhang *et al*, 1998; Ahmadi, 2005) and it could infect human (Fasihi Harandi *et al*, 2002; Dinkel *et al*, 2004). So hydatid cyst in camels and camel strain of *E. granulosus* should be regarded in control program.

In the present study, 5 species of ticks (*Hyalomma dromedarii*, *Hyalomma schulzei*, *Hyalomma anatolicum anatolicum*, *Hyalomma detritum*, *Rhipicephalus turanicus*), on species of para arthropoda (*Linguatula serrata*) and one fly larve (*Cephalopina titillator*) were seen. *Hyalomma dromedarii* (63.8%) and *Hyalomma schulzei* (0.4%) had maximum and minimum of infection rate. This is the 1st report of *Hyalomma detritum* and *Rhipicephalus turanicus* from camel in Iran. Prevalence of *Hyalomma dromedarii* and *Hyalomma schulzei* in centre of Iran and Sistan and Balochestan province were (9.7, 70.7%) and (8.6, 0.6%), respectively (Nabian *et al*, 2009). *Hyalomma dromedarii* were also reported from Burkina Faso (Dia, 2006).

Examination of mesenteric lymphatic nodes (MLNs) revealed that 64.7% of camels were infested with *Linguatula serrata*. The high prevalence showed that camels are the good intermediate host for *Linguatula serrata*. It was reported from Ouromia (75%), Shiraz (12.9%), Kerman (16.2%) and Isfahan (47%). (Oryan *et al*, 2011; Radfar *et al*, 2010; Shakerian *et al*, 2008; Tajik *et al*, 2007).

Camel nasal miyasis were seen in 48.3% of examined camels. Prevalence of *C. titillator* were 13.3% in Kerman (Radfar *et al*, 2006), and 58.1 in eastern areas of Iran (Oryan *et al*, 2008).

According to the results of this study, *Haemonchus longistipes* and *Hyalomma dromedarii* were more prevalent in camel. The results of this study showed that strategic control, including external and internal parasites of camel should be considered.

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