

STUDIES ON SEASONAL PREVALENCE AND CLINICO-PATHOLOGY OF GASTRO-INTESTINAL HELMINTHS OF CAMEL (*Camelus dromedarius*) IN IRAN WITH SPECIAL REFERENCE TO NEMATODIRINAE NEMATODES

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ABSTRACT

Total 210 camels including 108 males and 102 females of either sex in different age groups varying from six months to eight years and above, slaughtered at Shiraz Slaughter house, Southern Iran were examined during three years for various intestinal nematodes with special reference to members of *Nematodirinae* family. Sixty two animals (29.52%) were infected with *Nematodirinae* nematodes including *Nematodirella longispiculata* 54 (25.71%), *Nematodirus helvetianus* 32 (15.24%), *Nematodirus spathiger* 30 (14.29%) and *Nematodirella cameli* 12 (5.71%). The animals in age group of 6 months to 2 years showed significantly high ($p < 0.05$) prevalence rate (83.33%) while those above 8 years had the lowest (10.86%). The prevalence rate was highest in spring (56.14%) and lowest in autumn (5.12%). Macroscopical lesions including hyperaemia, haemorrhages, necrotic foci, erosions and ulcers were observed in 11.9 per cent of the infected animals. At histopathological level, the necrotic, erosive and ulcerative areas were infiltrated with lymphocytes, macrophages and eosinophils and some of the vessels were occluded with fibrin thrombi.

The studies indicated high prevalence rate of *Nematodirinae* nematodes in the camels of this area particularly in spring season in young animals.

Key words: Camel, clinico-pathology, Iran, nematodirinae, prevalence, seasonal variation

Earlier surveys conducted on the seasonal incidence of various species of helminths mainly concentrated on small ruminants and also in cattle but not much attention was given to ascertain these infections in camel. However, sporadic reports on the occurrence of gastro-intestinal helminths in camels from certain countries were available (Altaif, 1974; El-Bihari, 1980; El-Bihari and Kawasmeh, 1980; Dakkak and Ouhelli, 1987; Gahlot and Chhabra, 2009). Mixed infection with two or three species in the same animal was also diagnosed by Selim and Rahman (1972). Soulsby (1982) stated that worm burden in young ruminants were higher in late winter to early spring. The influence of weather on the bionomics of free living stage of nematodes of ruminants was earlier reported by Levine (1978). Bio-climatographs also indicated the influence of climatic and meteorological factors mainly the effect of temperature, humidity and rain fall on the incidence of helminth infections. The present investigations were therefore, undertaken to record the seasonal prevalence of nematodes

belonging to *Nematodirinae* families in camels and their consequent effect in the intestinal tracts of these animals.

Materials and Methods

Camels included in this study were those brought for slaughter from different areas around Shiraz, southern part of Iran. The animals did not receive any anti-parasitic treatment. The experiment was conducted in different seasons for three years during 2002-2004 and total 210 camels (108 males and 102 females) of either sex in different age groups from six months to eight years and above were studied. Faecal examination of the camels under study, was conducted by routine techniques. At postmortem examination, the intestines were first examined *in situ* for gross lesions, if any and then for the presence of worms. The intestine of each animal was opened, washed with normal saline solution and screened by graded sieves. The worms were collected in fresh state examined under stereoscopic microscope, fixed in

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70% ethanol, cleared in lactophenol, and their detailed morphology was studied under light microscope for definite identification. Sections from the infected intestines were fixed in 10% neutral buffered formalin, dehydrated in graded ethanol, embedded in paraffin, sectioned at 5 µm thickness, stained with hematoxylin and eosin and studied under light microscope. The data were analysed statistically by T-test using SPSS version 13 for windows (SPSS Inc. Chicago II, USA). The statistical level of significance for all tests was set at P<0.05.

Results

Seasonwise variation in the prevalence of Nematodirinae nematodes in camels were summarised in tables 1 and 2. The prevalence of Nematodirinae nematodes in camels in Shiraz area was 29.52%, which was significantly high (p<0.05) in 6 months to 2 year old animals (83.33%), followed by 2 to 4 year old (47%), 4 to 6 year (32.2%), 6 to 8 year (18.8%) and above 8 year (10.86%) as presented in table 3. Table 2 indicated, 56.14% positive cases in spring, 36.66% in summer, 10.9% in winter and 5.12% in autumn. Species-wise prevalence revealed, 25.71% *Nematodirella longispiculata*, 15.23% *Nematodirus helvetianus*, 14.28% *Nematodirus spathiger* and 5.71% *Nematodirella cameli*. Mixed infection with two or three species was a routine finding. Clinical signs observed in 11.9% of the infected animals included diarrhoea, emaciation, weakness, dehydration and

acute enteritis. Grossly, mild to moderately infected intestines appeared almost normal, while the highly infected ones were hyperaemic and showed areas of haemorrhages and necrotic foci. Few intestines of highly infected animals showed multi-focal areas of erosions (Fig 1) and rarely ulceration. At histopathological level, the mucous membrane and submucosal areas of the intestine of the highly infected animals were infiltrated with lymphocytes, macrophages and eosinophils (Fig 2). The arterioles and capillaries were hyperaemic and fibrin thrombi were seen in some of the lymphatic vessels and venules (Fig 3). In few cases, focal detachment of mucous membrane and submucosa and ulceration of these areas were evident.

Discussion

The prevalence rate (29.52%) of Nematodirinae nematodes in camels in the present study was comparable to that of Tafti *et al* (2001) who recorded 21.0% nematode infections in camels in Iran. However, Selim and Rahman (1972) reported lower infection rate in camels (*Camelus dromedarius*) by coprological examination in Egypt by observing *Nematodirus* eggs in 12.18% animals. The prevalence rate of nematodirinae infection in camel of Shiraz area was significantly higher in the young animals compared to adults. In addition, the prevalence was higher in Spring and Summer as compared to other seasons. The present results corroborated with those

Table 1. Prevalence of Nematodirinae nematodes in camels in Shiraz area of Iran.

Years	No. examined	No. positive	No. showing clinical signs (%)	No. showing postmortem lesions	<i>Nematodirella longispiculata</i> (%)	<i>Nematodirella cameli</i>	<i>Nematodirus spathiger</i>	<i>Nematodirus helvetianus</i>	No. of animals died
2002	63	20	10	10	18	5	8	10	3
2003	79	23	8	8	19	3	12	9	4
2004	68	19	7	7	17	4	10	13	2
Total animals +ve %	210	62 (29.52%)	25 (11.90%)	25 (11.90%)	54 (25.71%)	12 (5.71%)	30 (14.28%)	32 (15.23%)	9 (4.28%)

Table 2. Yearwise seasonal variation numbers in winter, spring, summer and autumn of Nematodirinae nematodes in camels in shiraz, Iran.

Years	Seasons								Total	
	Winter		Spring		Summer		Autumn			
	No. examined	No. positive	No. examined	No. positive	No. examined	No. positive	No. examined	No. positive	No. examined	No. positive
2002	10	1	17	10	20	8	16	1	63	20
2003	22	2	20	12	25	9	12	0	79	23
2004	23	3	20	10	15	5	11	1	68	19
Total animals +ve %	55	6 (10.90%)	57	32 (56.14%)	60	22 (36.66%)	39	2 (5.12%)	210	62 (29.52%)

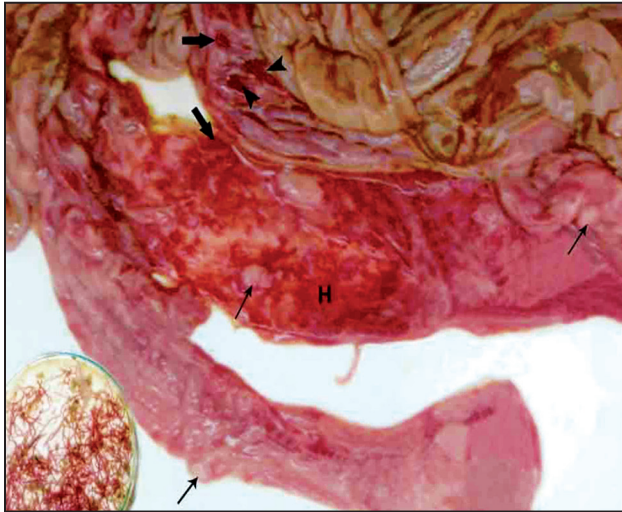


Fig 1. Gross photograph of section of duodenum of camel infected with nematodirinae nematodes. Severe haemorrhages (H), necrotic foci (thin arrow), erosions (thick arrow) and ulcers (arrow head) in the mucous membrane.

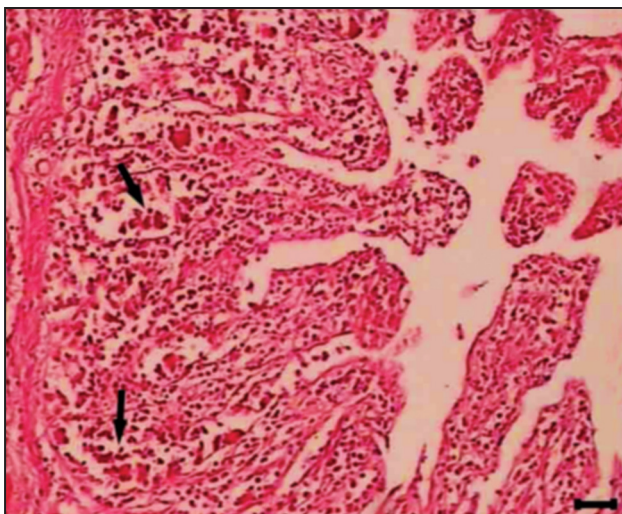


Fig 2. Microphotograph of section of duodenum of camel showing eosinophils, lymphocytes, plasma cells and macrophages infiltrated in the mucous and submucosal areas denoted with arrows. (H and E, scale bar=85 μ m).

of Moghaddar and Afrahi (2008) who observed higher incidence of gastro-intestinal nematodes in sheep in Summer and Spring. The feeding habit of young camels and their insufficient immune system might be responsible for the high prevalence. Young animals were usually kept close at home which might be more contaminated and also fed in the pasture forages close to the ground while the adults fed in less contaminated deserts and also on leaves of trees on the higher branches. In addition, the traditional animal husbandry system of mix farming of camels with sheep and goats could be another reason of higher prevalence rate in the young animals than the



Fig 3. Microphotograph of section of duodenum of an infected camel showing eosinophils, lymphocytes, plasma cells and macrophages infiltrated in the mucous and submucosal areas (arrow). A fibrinous thrombus seen in a venule of the subserosal area (arrow head). H and E, scale bar=210 μ m.

older ones. The present results were also in agreement with those of Vlassoff *et al* (2001) from New Zealand who reported similar trend in the occurrence of these nematodes in lambs, and with those of Moghaddar (2008) who stated that *Nematodirus* spp were more common in younger sheep. Mirzayans and Halim (1980) also noted more or less similar trend for *N. longisipiculata* and *N. oratianus* in camel in Iran and Steward (1950) for *Nematodirus* spp in camel in Sudan. Higher prevalence rate in Spring suggested that the ova of Nematodirinae nematodes were resistant to the extreme climatic conditions and could survive for long time during winter and might result into mass hatching and high infection in this season. Makovcova *et al* (2009) also observed survival of *Nematodirus felicollis* larvae in winter resulting into high outbreaks in spring. Since some species of Nematodirinae families were blood sucking and had direct effect on the health and production of the

Table 3. Nematodirinae nematode infection in different age groups of camels examined in Shiraz area.

Age groups	Number of animals examined	Sex		Number + ve (%)
		Male	Female	
6 months-2 year	12	8	4	10 (83.33%)
2-4 years	38	29	9	18 (47%)
4-6 years	59	25	34	19 (32.20%)
6-8 years	55	26	29	10 (18.18%)
8 years & above	46	20	26	5 (10.86%)
Total	210	108	102	62 (29.52)

animals, their high prevalence in camels of this area might effect meat and milk production. Effective control measures for these parasites in camels of this area and change in grazing, management practices and also periodic treatment with broad spectrum anthelmintics could be beneficial in lowering down the prevalence rate of infection.

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