



INCIDENCE OF *LINGUATULA SERRATA* NYMPHS AND PATHOLOGICAL LESIONS OF MESENTERIC LYMPH NODES IN CATTLE FROM URMIA, IRAN

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Summary

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This study was aimed to determine the infection rates of mesenteric lymph nodes (MLNs) with *Linguatula serrata* nymphs and their pathological lesions. From November 2012 to June 2013, the MLNs of 104 cattle were randomly sampled in Urmia slaughterhouse, northwestern Iran. They were examined macroscopically and histopathologically. The infected and non-infected lymph nodes were processed for histopathology. They were examined under light microscope and observations were recorded. The results indicated that out of 104 sampled cattle, 63 (60.57%) were infected. Macroscopic examination revealed that the infected lymph nodes were swollen and dark, with rubbery consistency, some with subcapsular haemorrhages on cutting. The mean number of counted lymph node follicles in the nodes from healthy cattle at random microscopic levels was 18 ± 2.8 (range 15–23), compared to 48.9 ± 3.7 (range 44–57) in the infected nodes. Because *L. serrata* is a zoonotic parasite, preventive measures should be adopted to break the parasite's cycle and minimise the risk of infection in both humans and other animals.

Key words: cattle, Iran, *Linguatula serrata*, pathology, Urmia

INTRODUCTION

Linguatula serrata (also called *Pentastomum denticulatum*), is a cosmopolitan zoonotic parasite owing its name to its resemblance to a vertebrate tongue (Symmers & Valteris, 1950; Charles & Hendrix, 1998). *L. serrata* parasites play an important role in veterinary and human medicine (Schmidt & Roberts, 1981). Dogs and other carnivores are the primary

final hosts and parasites live in the nasopharyngeal region of the final hosts. Various herbivores serve as the best intermediate hosts for the immature stages of the parasite (Alcala-Canto *et al.*, 2007; Ghorashi *et al.*, 2016). Tavassoli *et al.* (2007b) reported that *L. serrata* in infected lymph node induce gross and morphological changes. Previously, patholo-

gical changes in infected animals were described in sheep (Yakhchali & Tehrani, 2011; Azizi *et al.*, 2015) and goats (Yakhchali & Tehrani, 2013).

The main reported gross changes were hyperaemia, haemorrhage, focal necrosis, calcification, oedema and swelling of the infected lymph nodes. Microscopic evaluation showed mild fibrosis with haemosiderin deposition (Azizi *et al.*, 2015).

The current investigation was aimed to determine the infection rates of mesenteric lymph nodes and pathological lesions caused due to infection with *L. serrata* nymphs in cattle in Urmia, Northwest of Iran.

MATERIALS AND METHODS

Parasitological examination

A total of 104 cattle were randomly selected from a slaughterhouse in Urmia during November 2012 to June 2013. The presence or absence of *L. serrata* nymphs in the MLNs of animals was examined, individual each lymph node was cut longitudinally, put in petri dishes containing normal saline and examined under a dissecting microscope for *L. serrata* nymphs (Tavassoli *et al.*, 2007a).

Histopathology

The normal and infected lymph nodes were collected in 10% buffered formal saline and processed for histopathology. Paraffin blocks were made; 4–5 µm sections were cut and stained with haematoxylin and eosin. They were examined under light microscope and observations were recorded.

Data analysis

The Chi-Square test (SPSS version 17.0) was used to compare the relative frequency of infection lymph nodes based on their colour and consistency.

RESULTS

The results indicated that 63 (60.57%) out of 104 cattle were infected. From 484 collected MLNs 146 samples (30.16%) were infected with *L. serrata* nymphs. The mean number of parasitic nymphs in the lymph nodes was 2.27, with a range of 1–66 nymphs, and 1878 parasites were collected.

Macroscopic findings

Macroscopic examination revealed that the infected lymph nodes were swollen

Table 1. Relative frequency of *L. serrata* infection in lymph nodes categorised on the basis of their colour and consistency

Lymph nodes appearance	Number of examined lymph nodes			Relative frequency of infection (%)
	Total	Non-infected	Infected	
<i>Colour</i>				
Normal	371	302	69	18.5
Haemorrhagic	65	29	36	55.3
Black	48	7	41	85.4
<i>Consistency</i>				
Normal	397	319	78	19.6
Soft	59	3	56	94.9
Hard	22	12	10	45.4

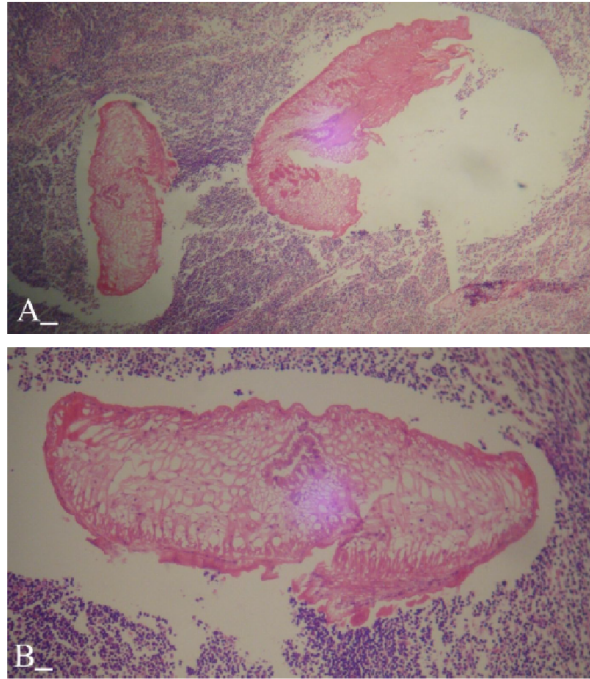


Fig. 1. Parasitic nymphs in the cortex of the node. Note the inflammatory cells around the parasite. H&E staining (A: 40×; B: 100×).

and dark, with rubbery consistency, some with subcapsular haemorrhages on cutting (Table 1).

The statistical analysis showed that the rate of infection in haemorrhagic and black-coloured lymph nodes was significantly higher compared to infection rate in normal-coloured ones ($P < 0.05$). The relative frequency of infection in soft lymph nodes was significantly ($P < 0.05$) higher than that in normal and hard lymph nodes and hard lymph nodes were more frequently infected than normal ones ($P < 0.05$).

Parasitic nymphs were evident in severely infected nodes; the infected nodes had distorted architecture with cystic changes and haemorrhages especially around parasites. Some calcified nodules were also observed.

Microscopic findings

The infected lymph nodes showed rather distorted architecture and follicular hyperplasia. The entrapped parasitic nymphs were present at cortical area. Severe infiltration of neutrophils with abscess formation and microcalcification were also present especially around parasitic nymphs. The medulla part showed oedematous changes (Fig. 1).

Table 2 shows the mean number and percentages of macrophages, plasma cells, lymphocytes, and neutrophils. The average number of lymph node follicles obtained from healthy cattle at random microscopic levels ranged from 15 to 23 (18 ± 2.8), compared to 44 to 57 (48.9 ± 3.7) follicles in infected nodes.

Table 2. Mean number and percentage of counted immune cells in mesenteric lymph nodes of cattle in 14 random microscopic fields of destroyed space around parasites

	Mean number	Mean percentage
Neutrophils	9	6.63
Plasma cells	19	13.79
Macrophages	22	16.05
Lymphocytes	88	63.51

DISCUSSION

Although the parasite *L. serrata* is prevalent worldwide, it is primarily seen in tropical and subtropical areas. Infections with *L. serrata* in humans have been reported from Africa, South America, Southeast Asia, and the Middle East (Beaver *et al.*, 1984; El-Hassan *et al.*, 1991; Lazo *et al.*, 1999; Siavashi *et al.*, 2002).

Previous studies in Iran have reported *L. serrata* infection prevalence rates of 27.8–76.5% in dogs (Meshgi & Asgarian, 2003; Rezaei *et al.*, 2011), 19–68% in goats (Rezaei *et al.*, 2012; Youssefi *et al.*, 2012; Dehkordi *et al.*, 2014), 10.2–52.5% in sheep (Tavassoli *et al.*, 2007b; Fard *et al.*, 2011; Youssefi *et al.*, 2012; Dehkordi *et al.*, 2014), and 14.8–69.1% in cattle (Tajik *et al.*, 2006; Youssefi & Hadizadeh-Moalem, 2010; Youssefi *et al.*, 2012; Alborzi *et al.*, 2013; Nematollahi *et al.*, 2015).

Data are limited regarding the pathological lesions of lymph nodes infected with *L. serrata* in cattle. In the present study, macroscopic examination of lesions in MLNs revealed hyperaemia, haemorrhages, severe oedema, swelling and softening of the lymph nodes, discolouration (dark green), focal necrosis, and calcification, indicating a severe infection. Infec-

tion severity and number of parasites in black and haemorrhagic lymph nodes were significantly higher than in normally coloured nodes ($P < 0.05$). Analysis revealed that the relative frequency of infection in soft lymph nodes was significantly ($P < 0.05$) higher than those in normal and hard lymph nodes and hard lymph nodes were more frequently infected than normal ones ($P < 0.05$). Previous studies on macroscopic appearance of lymph nodes infected with parasitic nymphs have reported enlarged lymph nodes and oedema, with loose consistency and dark colour as well as viscous fluid-filled cyst with haemorrhagic and necrotic areas containing cystic spaces in the path of parasite migration in cut sections of medulla (Sivakumar *et al.*, 2005; Tavassoli *et al.*, 2007b; Miclaus *et al.*, 2008). These findings are consistent with the results of the present study.

The infected lymph nodes were architecturally distorted with some entrapped nymphs mostly in the cortical area with severe acute inflammatory reaction and abscess formation.

Based on our knowledge, geographical limitations close contact between dogs and cattle, and regular migration of nomads and their livestock and dogs (fed on uncooked offal of the ruminants) to the study area might have contributed to the high infection rate in this area. In fact, such factors facilitate constant contact between the final host and cattle. Because *L. serrata* is a zoonotic parasite, preventive measures should be adopted to break the parasite's cycle and minimise the risk of infection in both humans and animals.

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