



Parasitological and Pathological Investigations on *Linguatula serrata* nymphs in Mesenteric Lymph Nodes in Sheep In Konya Region in Turkey

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ABSTRACT

In this study was aimed to investigate spread and pathological findings of *Linguatula serrata* nymphs in mesenteric lymph nodes (MLNs) in sheep. A total of 1000 MLNs from 140 sheep (125 male and 15 female) were collected from a commercial (Konet) abattoir. Fourteen of 140 sheep (10%) were infested with nymph stages of *L. serrata*. Infested lymph nodes were swollen, firm, edematous, many yellowish-white pinpoint and with congestion. In histopathological examinations, these nodules were consist of one or more nymphal stages of *L. serrata* and these were surrounded by infiltration mononuclear cells and neutrophyl leucocyte. Lymphoid follicles were hyperplastic and sinus catarrh was also observed in medulla.

Introduction

Linguatula serrata, well known as tongue worm, is a cosmopolitan parasite and occurs in the nasal and respiratory passages of the dogs, fox and wolf, more rarely in man, the horse, goat and sheep (Aldemir, 2004a; Aldemir, 2004b). Eggs of *L. serrata* are infective to a range of mammal intermediate hosts, particularly large grazing herbivores (Doğanay, 1983; Khalil, 1970; Pandey et al., 1987; Taşan, 1987). Nymphs of parasite occur in the mesenteric lymph nodes of herbivores including sheep. Canids become infected by eating the infected visceral organs of the herbivorous hosts (Dinçer, 1982; Guçlu and Aydenizoz, 1995; Tavassoli et al., 2000; Nourollahi et al., 2010). *L. serrata* infection has been reported in most domestic and wild animals including cattle, sheep, goats, pigs, camels, lion, leopard, giraffe and kudu, and rodents (Güçlü and Aydenizoz 1995; Tavassoli et al., 2000; Aydenizoz and Guçlu, 1997).

Human beings may also be infested by both the nymph stage, a condition called nasopharyngeal Linguatulosis or Halzoun syndrome and the egg, a condition called visceral Linguatulosis (Buslau et al., 1990; Riley et al., 1987). Human infection may occur via consumption of raw or under-cooked liver and lymph nodes. Human pentastomosis has been reported in certain

parts of the world, particularly in countries of the Middle East, America, Africa and in South-East Asia including the Indian subcontinent Barring two reports, each one from Pakistan and Egypt (Tavassoli et al., 2000; EL-Hassan et al., 1991; Gardiner et al., 1984; İşler and Tınar, 1993).

Although there are some surveys with the prevalence of infection with nymphs of *L. serrata* in sheep in Turkey, there is a parasitological and pathological investigation on *L. serrata* nymphs in MLNs in sheep (Aydenizöz et al., 2012). Therefore the aims of this study were to detect prevalence of infestation with nymphs of *L. serrata* and pathological changes in MLNs in sheep in Konya, Turkey.

Material and Methods

In this study, a total of 1000 MLNs from 140 sheep were collected in Konya (In the middle of Turkey) abattoir between June 1998 and May 1999.

Parasitological examination

For parasitological examination, the sampled lymph nodes were placed in polyethylene bags and were categorized based on their color (normal, red or hemorrhagic and black). After, per lymph nodes were longitudinally dissected and placed in the petri dishes and

massage in warm water for 15 minutes. Samples were examined under a stereomicroscope for *L. serrata* nymphs. The total number of nymph in per lymph nodes were recorded.

Histopathological examination

For histopathological examination, fresh tissue samples from MLNs were fixed in 10% buffered formalin solution. After the routine histopathology process tissue samples were embedded in paraffin wax, sectioned at 5 µ and stained with Hematoxylin and Eosin (H&E).

Results and Discussion

It was collected 1000 MLNs from 140 sheep (125 male and 15 female). Fourteen of 140 sheep (10%) were infested with nymph stages of *L. serrata*. Of 1000 examined lymph nodes 220 (22%) had parasite's nymphs (Fig. 1). According to gender, 3% of infested animals were male and 7% were female. In terms of gender to prevalence of infestations by statistical analyses (X² test), no significant difference was observed between female and male groups (P>0.05).

The minimum and maximum numbers of nymph stages of *L. serrata* in MLNs of infested animals were detected between 1 and 5, respectively. Although some *L. serrata* nymphs were alive in mesenteric lymph nodes, others were calcified and died in mesenteric lymph nodes (Fig. 2).

On histopathological sections of the mesenteric lymph nodes encysted with nymphs were revealed layer of fibroblastic reactions with a mild underlying inflammatory zone containing mononuclear cells and neutrophil leucosit infiltration. There was disruption of cavity lining, a focal area of haemorrhages and congestion

of blood vessels in the surroundings of the cystic area. In one case, chronic granulomatous changes were also observed (Fig. 3).

Lymphoid follicles were hyperplasic and sinus catarrh was also observed in medulla (Fig. 4). It was detected most numbers of neutrophyl leucosits and endothelial cells in sinus (Fig. 5).

Infested lymph nodes by *L. serrata* were found in 15 (6.82%) of normal-colored lymph nodes, 94 (42.75%) of hemorrhagic (red) lymph nodes and 111 (50.45%) of black-colored lymph nodes. Comparison of relative frequency of infection with *L. serrata* nymphs in MLNs categorizes based on their color were summarized Table 1.

The prevalence of *L. serrata* in dogs have been reported to be 8.3% in Erzurum (Aldemir, 2004a), 53% in Elaziğ (Taşan, 1987); 10 %in Konya (Aydenizoz and Guçlu, 1997), 8,7% in Ankara (Tınar, 1976) and 20% in Bursa (Akyo et al., 1995) from Turkey.

Previous studies (Razavi et al., 2004; Miclăus et al., 2008; Shakerian et al., 2008; Tajik et al., 2006; Taylor et al., 2007) reported that the prevalence of *L. serrata* have been ranged from 21.6-94% in sheep and 2-44% in cattle (Taşan, 1987). Also, the prevalence of *L. serrata* nymph was found to be 48.3% in Elazig (Dinçer, 1982) from Turkey.

In the current survey, the prevalence rate of 10% was observed in native sheep, which is lower than previously reported rate by other surveys (Razavi et al., 2004; Miclăus et al., 2008; Shakerian et al., 2008; Tajik et al., 2006; Taylor et al., 2007). This probably indicates environmental, climatic factors, breeding systems (Extensive or intensive) and regional difference in distribution of parasite.

Table 1 Comparison of relative frequency of infection to *Linguatula serrata* nymphs in mesenteric lymph nodes categorizes based on their color.

Lymph nodes appearance Color	Number of examined lymph nodes			Infestation rates (%)
	Total	Non-infested	Infested	
Normal	830	750	15	6.82
Black	94	12	111	50.45
Hemorrhagic	76	18	94	42.73
Total	1000	780	220	100.0



Figure 1 The nymphal stages of *Linguatula serrata* in a mesenteric lymph node.



Figure 2 Calcified and died *Linguatula serrata* nymph in mesenteric lymph nodes.

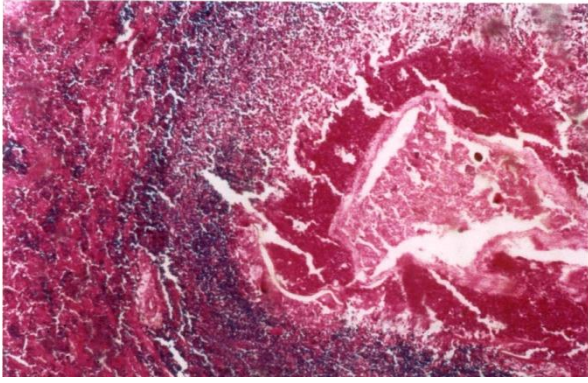


Figure 3 Mononuclear cells and neutrophil leucosit infiltration in mesenteric lymph nodes.

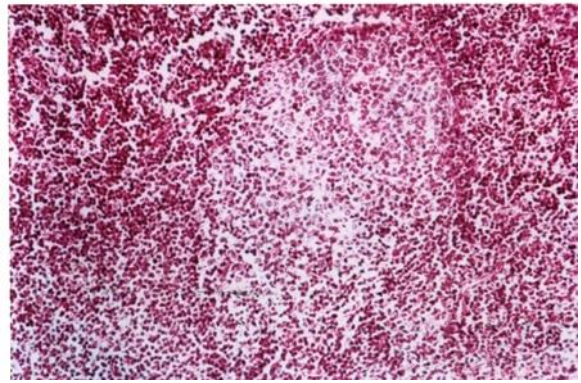


Figure 4 Hyperplastic lymphoid follicles and sinus catarrh in medulla.

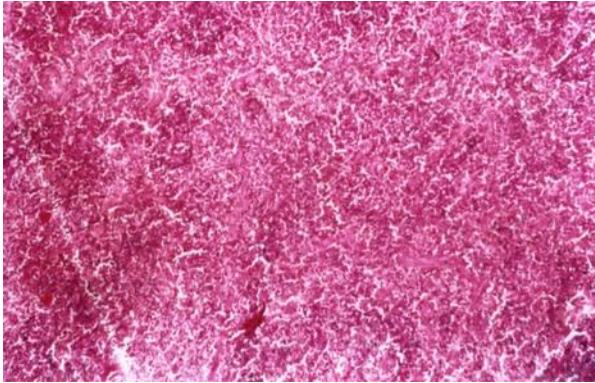


Figure 5 Neutrophil leucosits and endothelia cells in sinus.

In terms of gender to prevalence of infestations by statistical analyses (X^2 test), no significant difference was observed between female and male groups ($P>0.05$). In similar studies (Aydenizöz et al., 2012; Dinçer, 1982; Guçlu and Aydenizöz, 1995; Tavassoli et al., 2000) were obtained same results.

Previous studies with comparison of relative frequency of infection to *L. serrata* nymphs in MLNs (Nourollahi et al., 2010) reported that were found in 9.3% of normal-colored lymph nodes, 76.5% of hemorrhagic lymph nodes and 86.3% of black-colored lymph nodes.

In the present study, infested lymph nodes by *L. serrata* were found in 15 (6.82%) of normal-colored lymph nodes, 94 (42.75%) of hemorrhagic (red) lymph nodes and 111 (50.45%) of black-colored lymph nodes. These results agree with those of (Tavassoli et al 2007) in Iran.

The rate of infestation was different in lymph nodes with altered color. So that the black- or red-colored lymph nodes were significantly more frequently infested. Lower frequency of infestation and lower number of nymphs in the hard lymph nodes (calcified) in comparison with soft ones may suggest that as lesions become older some pathologic changes, e.g. calcification, occur in the infested nodes and these changes impair survival of nymphs in affected lymph nodes. The changes of the color of the lymph nodes could be considered as an indication of infestation with nymphs of *L. serrata* and condemnation of such lymph nodes is necessary to interrupt the life cycle of parasite.

As a conclusion the present work was conducted in

order to determine, parasitological and pathological investigations on *L. serrata* nymphs in MLNs in sheep in Konya, Turkey and 14 out of 140 (10%) sheep were infested with nymph. Of 1000 examined lymph nodes 220 (22%) had parasite's nymphs. The infestation of *L. serrata* in lymph nodes should be considered as an important risk marker for human being infections. People consuming sheep visceral organs as raw or semi-cooked meal could potentially acquired the parasite. It could be concluded that, the infection with *L. serrata* in sheep might have serious impact on public health. Therefore, it should be emphasized that a thorough inspection of MLNs of sheep needs to be taken into account in the slaughterhouses.

The prevention for *L. serrata* nymphs in MLNs in sheep has to be based on hygienic condition and eradication of parasites in the definite host.

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