

# Prevalence and Pathology of *Linguatula serrata* Infestation in Mesenteric Lymph Nodes of Sheep in Kirikkale, Turkey

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## ABSTRACT

The present study was undertaken to determine the prevalence and pathology of *Linguatula serrata* infestation in mesenteric lymph nodes (MLNs) of sheep slaughtered at the municipal abattoir in Kirikkale (in Central Anatolia, Turkey). For this purpose, 1729 MLNs were collected from 258 sheep (231 females and 27 males). On gross examination 14 sheep (5.4 %) were infested and nymphal stages of *L. serrata* were detected in 97 of 1729 MLNs (5.2%). In terms of gender, 1.6 % of infested animals were male and 3.9 % were female. Prevalence of *L. serrata* nymphs in MLNs, and relative frequency of *L. serrata* in MLNs in different age groups was not statistically significantly different. In histopathological examinations, parasitic granulomas with necrosis in lymph nodes was the major lesion. One or more nymphal stages of *L. serrata* were surrounded by infiltration of mononuclear (lymphocyte and histiocyte) and giant cells in some cases with fibrosis.

**Keywords:** *Linguatula serrata*, mesenteric lymph nodes, pathology, prevalence, sheep.

## INTRODUCTION

The adult stages of *Linguatula serrata* occur in the nasal passages and sinuses of dogs, cats, foxes and rarely in man, horses, goats and sheep. Male parasites are 1.8-2 cm and females are 8-13 cm in length. *L. serrata* is tongue-shaped, transversely striated, slightly convex on its dorsal surface and flattened ventrally. The eggs are about 90x70 µm. Expelled eggs from the respiratory passages of final host (by coughing or sneezing) are ingested by herbivorous, the intermediate host. The larval stages of the parasite develop in mesenteric lymph nodes (MLNs), liver and lung. Nymphs are 4-6 mm in size. Final host are infested by eating infected organs (1, 2).

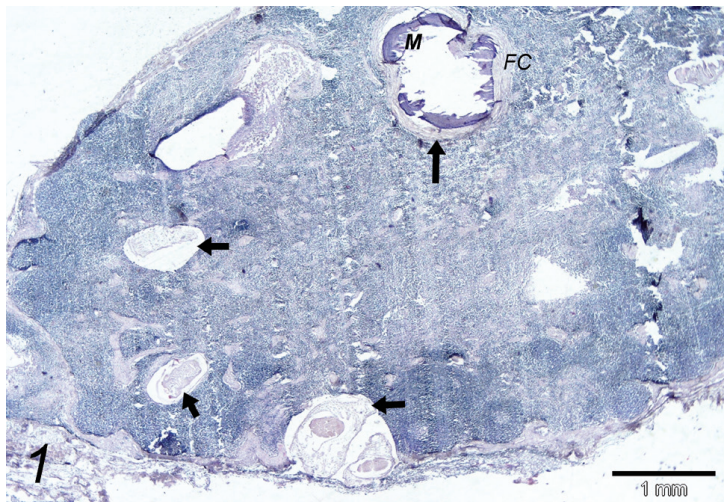
Humans may be infected by the ingestion of nymphs of *L. serrata* (nasopharyngeal linguatulosi-Halozoun syndrome) or by the consumption of infective eggs (Visceral linguatulosi). While the visceral form of infection usually remains asymptomatic, pharyngitis and coughing is seen in the nasopharyngeal form (1-4).

Although linguatulosi has no clinical and pathologic importance in domestic animals (16, 21) it is important for public health due to the potential for infecting human (3, 5-7). The present study was undertaken to determine the prevalence of the nymphal stages of *L. serrata* from the Kirikkale Abattoir and to investigate the lymph node pathology in sheep.

## MATERIALS AND METHODS

### Animals

Sheep mesenteric lymph nodes (MLNs) were obtained from the Kirikkale Municipality abattoir. Kirikkale is located in Central Anatolia (east of the capital Ankara); the climate is characterized by extremes of hot summers and cold winters with limited rainfall (8). Akkaraman sheep of different ages were examined for the infection for the nymph stage of *L. serrata*. The animals were classified into 3 different age



**Figure 1.** Many nymphal stages of *L. serrata* localised in mesenteric lymph node (arrows) and one of them is necrotic and mineralised and surrounded by fibrous capsulation (M: mineralisation, FC: Fibrous capsulation). Reducing the numbers of lymphoid follicles in cortex. **Bar= 1mm**, H&E.

groups (<2 years, 2-4 years and >4 years of age). A total of 1729 MLNs were randomly obtained. One to 14 MLNs collected from each sheep. All lymph nodes were transferred to the parasitology laboratory in separate polyethylene bags. For gross examination, lymph nodes were longitudinally dissected, placed in the petri dishes and massaged in warm water for 15 minutes. The samples were then examined under the stereomicroscope. The total numbers of nymphs in per lymph nodes were recorded.

### Histopathological examination

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

**Table 1:** The prevalence of *L. serrata* nymphs in MLNs by age and gender.

Age (year)	The number of infected sheep	The number of infected male (%)	The number of infected female (%)
<2	5	0 (0.0)	5 (100)
2-4	5	3 (60)	2 (40)
>4	4	1 (25)	3 (75)
Total	14	4 (28.57)	10 (71.42)

P>0.05



**Figure 2.** An early stage of parasitic lesion surrounded by mixed cellular infiltrations and a hyperemic vessel. **Bar= 100 $\mu$** , H&E.

### Statistical analysis

Statistical analyses were carried out using the  $\chi^2$  test. A value of P<0.05 was considered statistically significant.

## RESULTS

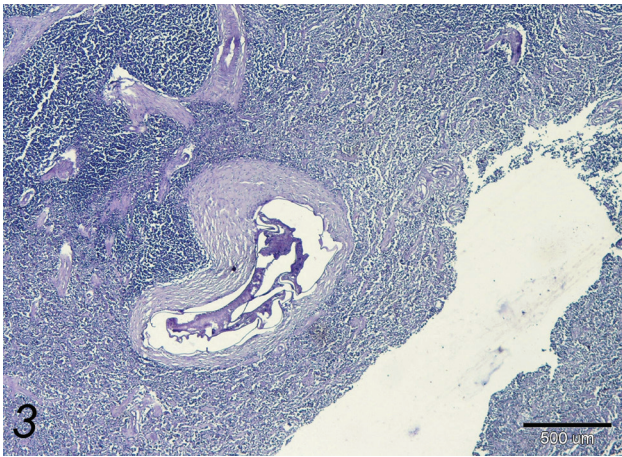
On gross examination, 14 sheep of 258 (5.4%) were found to be infested and nymph stages of *L. serrata* were detected in 97 of 1729 MLNs (5.6%). In terms of gender, 1.6% of infested animals were male and 3.9% were female. There was no significant difference was observed in the prevalence of *L. serrata* nymphs in MLNs between female and male groups (P>0.05) (Table 1). The number of nymphs in each lymph node was between 1 and 69. Prevalence of *L. serrata* nymphs in MLNs in the different age groups showed no statistically differences (P>0.05) (Table 2).

On histopathological examinations, chronic parasitic granulomas were the major finding in these infected MLNs. One or more nymph stages of *L. serrata* were found localized in MLNs (Fig. 1) and surrounded by infiltration of mono-

**Table 2:** The comparison of mean and median value number of *L. serrata* nymphs in different age groups.

Age (year)	Number of infected MLN	Mean value	Std error	Range	Median value
<2	29	5	2,16	4-69	5,80
2-4	42	3	2,96	1-19	8,40
>4	26	1,5	4,43	1-17	6,50
Total	97	3,5	18,06	1-69	10,64

P>0.05



**Figure 3.** A late stage of parasitic lesion. Nymphal stages of *L. serrata* is necrotic and mineralised and surrounded by severe fibrous capsulation. **Bar= 500μ, H&E.**

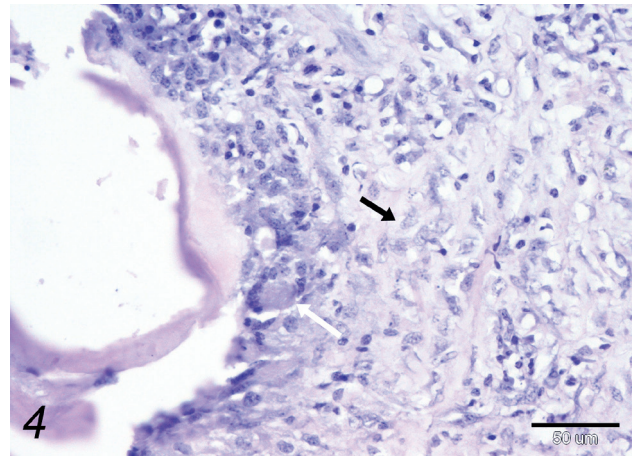
nuclear (lymphocytes and histiocytes) and giant cells in some cases with fibrosis (Fig. 2-4). Neutrophils and eosinophils were seen in limited number in the sections. Degenerative and necrotic changes and moderate mineralization were observed in parasitic structures (Fig. 3). Necrotic areas were also observed in lymphoid tissue with reduced cellularity in lymphoid follicles.

## DISCUSSION

The prevalence of linguatulosis in dogs have been reported in many studies in different location of Turkey by Tinar (9) (8,7 % in Ankara); Dincer (10) (40.2 % in Elazig); Tasan (11) (53 % in Elazig); Akyol et al. (12) (20 % in Bursa); Aydenizoz and Guclu (13) (10 % in Konya) and Aldemir (14) (8.3% in Erzurum). In fecal examinations for linguatulosis 0.8 % of dogs in Konya (15) and 11.6% in Elazig has been found (11).

In some studies undertaken to investigate the prevalence of the intermediate hosts, the prevalence of *L. serrata* was found as 44% in cattle (16) and 52.5% in sheep (17). Larval stages of *L. serrata* were detected to a lesser extent in the liver. Razavi et al. (18) reported the localization of the nymphal stages of *L. serrata* as 29.9% in MLNs and 6.4% in the liver of goats. Similarly, Shakerian et al. (19) reported the rate in camels as 21 % in MLNs and 4.5% in the liver. In sheep, in Turkey, the prevalence of the infestation with *L. serrata* was found to be 48.3% in Elazig (10) and 3% in Konya (13).

In the current study, the rate of sheep infected with the nymphal stages of *L. serrata* was found as 5.4 %. While there



**Figure 4.** Chronic granulomatous lesions against nymphal stages of *L. serrata* by the infiltration of lymphocytes, histiocytes (black arrow) and giant cell (white arrow). **Bar= 50μ, H&E.**

is very little difference between Konya and Kirikkale, this parasitic infestation was more prevalent in Elazig (a city in East Anatolia) than that in Central Anatolian cities (Konya and Kirikkale). Breeding systems (intensive or extensive) or stray dog management may play a role in this regard.

Shakerian et al. (19) reported that the infection rate increased with the age of camels and they proposed that the absence of infection in young animals might due to the nature of the food or the frequency of contact with dogs. Razavi et al. (18) found no difference of prevalence between the age groups in goats. In our study, there was no significant difference among age groups as described by Razavi et al. (18). This may be due to the fact that sheep have much less contact with stray dogs than camels.

In the present study, no significant difference was observed in the prevalence of *L. serrata* nymphs in MLNs between female and male groups ( $P>0.05$ ). Similarly, Shakerian et al. (19) reported no significant difference between the male and female groups in camels. However, Razavi et al. (18) reported a statistical difference between male and female goats. This situation may have arisen due to the fact that sampling was not carried out equally for both sexes.

Histopathological findings such as parasitic granuloma formation, degenerative and necrotic changes in both lymphoid tissue and parasitic structure, and cellular infiltration were observed. These histopathological changes were similar to previous reports (20-23). Miclăuș et al. (21) reported acute and chronic lesions with the presence of bacterial colonies

and yeast cells. Acute lesions consisted of traumatic foci, with hemorrhage and/or necrosis and chronic lesions were represented by parasitic granulomas with variable fibrosis. In our study, chronic lesions were more prominent without bacterial colonies and yeast cells. The time lapse after infection may play a role in defining the characteristics of the histopathologic lesions. Similar to our findings, Gul and Ilhan (22) reported that cystic parasitic granulomas were surrounded by mononuclear cells and fibrous proliferation.

In conclusion, linguatulosis is an important zoonotic parasitic disease although it has no clinical or pathological importance for domestic animals. As infected animals do not show any clinical signs and due to the fact that the parasite is not easily noticed during post mortem examination, humans may inadvertently consume these offals. In present study, *L. serrata* infections in sheep were found to be relatively high in Kirikkale province of Turkey. In order to avoid infestation both humans and animals should be aware not to consume raw or undercooked offals of sheep and goats.

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