

Original Article

**Prevalence of *Linguatula serrata* Nymph in Goat in Tabriz, North-West of Iran**

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**Abstract**

*Linguatula serrata* is one of well-known members of Pentastomida which infects both humans and animals. The aim of this study was to evaluate the prevalence of *L. serrata* in mesenteric lymph nodes, livers and lungs of goats slaughtered in Tabriz area, Iran. Mesenteric lymph nodes (MLNs), livers and lungs of 280 goats slaughtered in Tabriz, North-west of Iran were investigated for nymphs of *L. serrata* from September 2009 to September 2010. The organs were examined macroscopically and then a tissue digestion method was also done for investigation of liver and lung of the goats that were infected MLN. The liver and lung samples were mostly taken from the condemned and rejected part of organs. The infection rate of *L. serrata* nymphs in MLNs, livers and lungs was 27.1 %, 2.8 % and 2.8 % respectively. The number of isolated nymph in infected lymph nodes varied from 1 to 22 with a mean of 7. Only one nymph was isolated from each infected livers and lungs. The infection rate increased with age ( $P < 0.05$ ). No significant difference in different sex groups and seasons was observed ( $P > 0.05$ ). *Linguatula* infection occurs as an endemic zoonosis in the study area and has an active transmission life cycle.

**Key words:** *Linguatula serrata*, Nymph, Goat, Iran

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## Introduction

*Linguatula serrata* (Frohlich, 1789) commonly known as 'tongue worm' is an aberrant worm-like parasite of occasional zoonotic importance in humans. The Phylum Pentastomida consists of about 100 identified species of linguatulids, all of which are endoparasites of the respiratory tract and other organs/body cavities of tetrapod vertebrates, particularly reptiles. The evolutionary affinities of this unusual group of organisms have continued to confound biologists because of morphological similarities to both annelids and arthropods, and suggestive phylogenetic relationships to Crustacea in the subclass Branchiura.<sup>1</sup> Because pentastomes appear to have a generally stronger affinity to arthropods some authors regard this group of organisms as a taxonomic class (Pentastomida) in the Phylum Arthropoda.<sup>2</sup> Regardless of its true taxonomic position within the invertebrate realm, there is no mistaking this highly peculiar parasite when recovered from a parasitized host.

The adult parasites typically inhabit the respiratory passages and body passages of birds, reptiles and mammals, wherein females lay eggs that are discharged from the respiratory tract in sputum and mucus. Of mammalian hosts, carnivores commonly serve as definitive hosts for pentastomes that commonly inhabit nasal sinuses and nasopharynx.<sup>3</sup> *Linguatula serrata* in canines (dogs) and humans can lead to nasopharyngeal linguatulosis (pentastomiasis) producing a condition called as *halzoun* or *marrara syndrome*.<sup>4</sup> This parasite has also been implicated in visceral organ involvement causing hepatic granuloma in humans<sup>5</sup> and other organs. A wide variety of domesticated and wild herbivores can act as intermediate hosts following ingestion of eggs via contaminated food and water. The eggs hatch and larvae emerge in the alimentary canal eventually migrating to various

internal organs and tissues (*eg*, mesenteric lymph nodes) transforming into nymphs that become encapsulated.<sup>6</sup> The occurrence of the parasites in domestic and wild animals used as a food source by humans including cattle, buffaloes, sheep, goats, pigs, has been well documented<sup>7</sup>. Humans and other carnivores acquire the parasites by ingestion of raw or undercooked viscera of infected animals.

The aim of this study was to evaluate the prevalence of *L. serrata* in MLNs, livers and lungs of goats slaughtered in Tabriz, Iran.

## Materials and Methods

From September 2009 till September 2010, MLN, liver and lung of 280 goats slaughtered in the Tabriz slaughterhouse and rural areas near to Tabriz, (East Azerbaijan province- Iran) were examined. The approximate age of goats was determined on the basis of butcher information. The liver and lung samples were mostly taken from condemned and rejected part of organs.

In the laboratory, each lymph node was cut longitudinally in a Petri dish containing normal saline and examined under stereomicroscope, recording the numbers of nymphs per lymph node.

The examination of livers and lungs of the goats that had infected MLN were done in two steps. First, the 50-100g samples (with a mean of 60g) were sliced in small pieces and observed precisely under stereomicroscope in order to find the nymphs. In the second step, the minced tissues were put in 200 ml of digestion solution containing 5g pepsin enzyme (7178, Merck) and 25 ml hydrochloric acid (374, Merck) in 1 liter water, incubating at 37° C for 24 h. After that, the suspensions were transferred to petri dishes and examined for *L. serrata* nymph.

The data were analyzed using chisquared and Fisher's exact tests (SPSS 11.5, Standard version, Copyright SPSS Inc.,

1982– 2002). The *P* value less than 0.05 was considered as significant.

**Results**

The prevalence of *L. serrata* nymphs in MLNs, livers and lungs of 280 goats slaughtered in the Tabriz slaughterhouse and rural areas near to Tabriz is shown in Table 1. The infection rate of MLNs, livers and lungs was 27.1 %, 2.8 % and 2.8 %, respectively. There was no infected goat in > 2 yr group. The infection rate increased with age (*P* = 0.009) (Table 1). No significant difference was observed between males and females (Table 1).

The prevalence of *L. serrata* infection in different seasons has been showed in Table 2, no significant difference was found. The

number of isolated nymph in infected lymph nodes varied from 1 to 22 with a mean of 7 (Fig. 1). From the infected livers and lungs, only one nymph was isolated. The results showed a higher infection rate of MLNs compared with that of livers and lungs (*P* = 0.0005).



**Fig 1.** A *linguatula serrata* nymph under stereomicroscope (40×)

**Table 1.** The prevalence of *Linguatula serrata* nymphs in MLNs, livers and lungs of 280 slaughtered goats in Tabriz

Age (year)	sex	No. of goats	Goats with infected MLNs No. (%)	Goats with infected livers No. (%)	Goats with infected lungs No. (%)
2<	Male	26	0 (0)	0 (0)	0 (0)
	Female	6	0 (0)	0 (0)	0 (0)
	Total	32	0 (0)	0 (0)	0 (0)
2-4	Male	30	8 (26.6)	0 (0)	0 (0)
	Female	42	4 (9.5)	0 (0)	0 (0)
	Total	72	12 (16.6)	0 (0)	0 (0)
4>	Male	58	16 (27.5)	4 (6.8)	4 (6.8)
	Female	118	48 (40.6)	4 (3.3)	4 (3.3)
	Total	176	64 (36.3)	8 (4.5)	8 (4.5)
Total	Male	114	24 (21.8)	4 (3.5)	4 (3.5)
	Female	166	52 (31.3)	4 (2.4)	4 (2.4)
	Total	280	76 (27.1)	8 (2.8)	8 (2.8)

**Table 2.** The seasonal variance of *Linguatula serrata* prevalence in MLNs, livers and lungs 280 slaughtered goats in Tabriz

season	No. of goats	Goats with infected MLNs No. (%)	Goats with infected livers No. (%)	Goats with infected lungs No. (%)	Total infected goats No. (%)
Spring	54	16 29.6	0 0	0 0	16 29.6
Summer	42	12 28.5	4 9.5	4 9.5	20 47.6
Autumn	78	24 30.7	0 0	0 0	24 30.76
Winter	106	24 22.6	4 3.7	4 3.7	32 30.1
Total	280	76 27.1	8 2.8	8 2.8	92 32.8

## Discussion

Without any specific clinical symptoms, *L. serrata* infection in ruminants leads to the reduction of animal products and hidden economic loss, as well as public health risks<sup>8</sup>. This study was done in East Azerbaijan Province, north-west of Iran. The slaughtered goats were mostly from the same area.

Previously, Oryan et al. (1993) reported *L. serrata* infection in 12.5 % of examined goats in Shiraz, Iran. Shakerian et al. (2008) reported the infection rate of MLNs and livers of the goats slaughtered at a slaughterhouse in Najaf-Abad, central part of Iran, as 21 % and 4.5 %, respectively and the maximum and minimum numbers of parasites was reported as 30 and 1 in MLNs and 10 and 1 in livers. This rate of infection is about 2 times higher than our result. It should be mentioned that Najaf-Abad is located in central arid region of Iran with a different climate compared with East Azerbaijan province famous for cold winters and heavy snowfall and subfreezing temperatures during December and January. It seems that the difference in climate can be the cause of the different rate of infection. On the other hands, in

our study because of economic limitations, the amount of liver and lung samples were too low (with a mean of 60g) and the samples were mostly taken from condemned and rejected parts of organs.

Different studies regarding the infection rate of *L. serrata* carried out in different seasonal condition have resulted in the varied results.<sup>9</sup> In our survey no significant difference between prevalence rates of infection in different seasons of the year was observed.

The results of our study showed a significant correlation of age and infection rate of goats slaughtered in the Tabriz slaughterhouse and rural areas near to Tabriz that was compatible with other studies done on sheep and camel in Iran<sup>10</sup>. In our study, no goat in the >2 yr group was infected. Also in our studies no significant difference was observed in the infection rate in both males and females that were compatible with another study<sup>11</sup>.

*Linguatula serrate* infests first MLNs, and then migrates to other organs such as the liver and lung<sup>12</sup>. In this study, the prevalence of *L. serrata* nymph in liver and lung were lower than MLNs, which is

in accordance with the findings of other investigation<sup>13</sup>.

Given the fact that consumption of undercooked goat liver is common in the studied area, the zoonotic importance of this infection should be taken into account accordingly.

Therefore, it is necessary to emphasize on a thorough examination of mesenteric lymph nodes by veterinary professionals in slaughterhouses.

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