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Short Communication

Infection rates of *Linguatula serrata* nymphs in mesenteric lymph nodes from water buffaloes in North India

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ABSTRACT

The literature pertaining to prevalence of *Linguatula serrata* in large ruminants is limited. In abattoir survey, the infection rate of *L. serrata* in 1440 mesenteric lymph nodes collected from 480 buffaloes from North India was investigated. Results revealed 88 (18.3%) buffaloes and 288 (20.0%) mesenteric lymph nodes having parasite's nymphs. Nonsignificant difference ($P > 0.05$), between 1 and 3 years age (51.5%) and above three years of age (48.5%) groups was observed. Nonsignificant difference ($P > 0.05$) between the infection rate of male (51.5%) and female (48.5%) was also observed. Infection in haemorrhagic (57.2%) and black-coloured (67.5%) nymph nodes were significantly ($P < 0.05$) higher than normal-coloured nodes (8.8%). When compared based on consistency, the results showed soft lymph nodes (61.3%) were significantly ($P < 0.05$) more infected than normal (12.8%) and hard (30.0%) lymph nodes. The intensity of infection in normal, haemorrhagic and black lymph nodes were 1.81 ± 0.21, $4.23 \pm 0.0.62$ and 5.12 ± 0.73, nymphs respectively. The mean numbers of parasites in haemorrhagic and black-coloured lymph nodes were significantly ($P < 0.0005$) more than mean number of parasites in normal-coloured nodes. Again intensity of infection in normal, soft and hard lymph nodes was 2.31 ± 0.18, 5.84 ± 0.74 and 3.21 ± 0.68, respectively. When compared based on lymph nodes consistency, the soft lymph nodes were significantly ($P < 0.0005$) more severely infected than normal and hard ones. The study has generated some vital data about the prevalence of this underreported disease amongst the bubaline intermediate hosts along with important gross changes in the affected lymph nodes.

1. Introduction

Linguatula serrata, commonly known as tongue worm, is an abberant cosmopolitan zoonotic arthropod, belonging to the order Pentastomida (Shekarforoush et al., 2004). Adults inhabit the respiratory system (nasal sinuses and nasopharynx) of carnivorous especially dogs as definitive host (Alcala-Vanto et al., 2007) while ruminants like cattle, buffalo, goats, camels and sheep act as intermediate hosts harbour nymphal stages of the parasite in various organs, particularly mesenteric and mediastinal lymph nodes (Shakerian et al., 2008). Humans become infected either by ingesting of adult stages resulting into nasopharyngeal linguatulosis, commonly known as halzoun syndrome (Yagi et al., 1996), or by ingestion of eggs in contaminated food and water (Yao et al., 2008) resulting into visceral linguatulosis. Several studies have been carried out regarding the prevalence rate of *L. serrata* infection in dogs (Oryan et al., 2008), sheep (Ravindran et al., 2008), goats (Krishna et al., 1975), camels (Shakerian et al., 2008),

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Table 1
Age and sex wise prevalence of *Linguatula serrata* nymphs in buffaloes.[a,*]

Parameter	Infected number of animals	Uninfected number of animals	Total number of animals examined
Age			
<1 year	0 (0%)[a]	45 (11.5%)[a]	45 (9.4%)
Between 1 and 3 year	45 (51.1%)[b]	183 (46.7%)[b]	228 (47.5%)
>3 year	43 (48.9%)[b]	164 (41.8%)[b]	207 (43.1%)
Sex			
Male	45 (51.1%)[a]	205 (52.3%)[a]	250 (58.1%)
Female	43 (48.9%)[a]	187 (47.7%)[a]	230 (48.01%)
Total	88 (18 .3%)	392 (81 .4%)	480 (100%)

[a] Values with different letters (a–b) are statistically different ($P < 0.05$).
[*] Values in parenthesis depict relative percentage within the group.

cattle (Ravindran et al., 2008), buffaloes (Sivakumar et al., 2005) and humans (Yagi et al., 1996). Owing to religious constraints in countries like India, the literature pertaining to prevalence of *L. serrata*, particularly in large ruminants, is limited (Ravindran et al., 2008). The present communication deals with the prevalence of *L. serrata* in buffaloes from North India subsequent gross changes of the infected mesenteric lymph nodes.

2. Materials and methods

The study was conducted on the local abattoirs of Mathura district, India. The animals from the adjoining states of Punjab, Haryana, Rajasthan and Uttar Pradesh were brought for slaughter purpose. A total of 480 carcasses were examined in the study period and three mesenteric lymph nodes per animal were brought to the Departmental Laboratory for detailed examination in properly labelled, sealed polythene bags at 4 °C. Lymph nodes were immediately examined so as to avoid putrefactive changes. Lymph nodes were categorized based on their colour (normal, red or haemorrhagic and black) and consistency (normal, soft and hard). After recording the gross appearance and other details about sex of the animal and its age, examination of the lymph nodes was performed in two steps. Firstly, individual lymph nodes were sliced in small pieces and observed under stereomicroscope for the nymphal stage. In the second step, the minced lymph nodes were treated in 200 ml of digestion solution containing 5 g pepsin enzyme (Merck) and 25 ml hydrochloric acid (Merck) in 1 L water and incubated at 37 °C for 24 h. Then, the suspensions were transferred to petri dishes and examined for *L. serrata* nymphs (Shakerian et al., 2008). The total number of nymph per lymph node was recorded as an indication of intensity of infection.

The computer software, SPSS Version 9.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for analysis. To compare relative frequency of infection between different groups of lymph nodes, along with age and sex variations, Chi-square tests was used. The one-way analysis of variance followed by pairwise comparisons using the Bonferroni tests were used to test the difference between mean numbers of parasites (intensity of infection) in lymph nodes with different colours and consistency. Differences were considered significant when $P < 0.05$.

3. Results

A total of 88 buffaloes (18.33%) were found to be infected with one or more nymphal stages of *L. serrata*. So far as number of infected individual lymph node is concerned, out of 1440 lymph nodes 288 (20.0%) had parasite's nymphs. So far as age wise prevalence is concerned, the animal were divided into three groups viz., below 1 years of age, between 1 and 3 years age and above three years of age. None of the animal <1 year group were found to be positive. However, nonsignificant difference ($P > 0.05$) between the infection rate of 11animals, between 1 and 3 years age (51.5%) and above three years of age (48.5) was observed. Sex does not seem to be an important factor contributing to prevalence rates. Nonsignificant difference ($P > 0.05$) between the infection rate of male (51.5%) and female (48.5%) both at general as well as in age group levels was observed. The results are summarized in Table 1.

So far as colour of lymph nodes is concerned, 8.8, 57.2 and 67.5% of normal-coloured, haemorrhagic (red) nodes and black-coloured lymph nodes had infections, respectively. Statistical analysis revealed the rate of infection in haemorrhagic and black-coloured lymph nodes was significantly more than infection rate in normal-coloured ones ($P < 0.05$). However, nonsignificant difference ($P > 0.05$) between the infection rate of haemorrhagic and black-coloured lymph nodes was observed (Table 2). On the basis of their consistency, 12.8, 61.3 and 30.0% of the normal, soft and hard lymph nodes were found infected, respectively. Analysis revealed that the relative frequency of infection in soft lymph nodes was significantly ($P < 0.05$) more than those in normal and hard lymph nodes and hard lymph nodes were in turn more frequently infected than normal ones ($P < 0.05$). On the basis of intensity of infection (number of nymphs per lymph node), the mean numbers of parasites in haemorrhagic ($4.23 \pm 0.0.62$) and black-coloured (5.12 ± 0.73) lymph nodes were significantly ($P < 0.0005$) more than in normal-coloured (1.81 ± 0.21) lymph nodes (Table 3). However, the intensity of infection in haemorrhagic and black-coloured lymph nodes was non-significant. When compared based on consistency of lymph nodes, the soft (5.84 ± 0.74) lymph nodes had significantly ($P < 0.0005$) more parasites than normal (3.21 ± 0.68) and hard ones (2.31 ± 0.18) and the later two showed non significant differences in mean number of nymphs ($P > 0.05$).