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# Linguatulosis: A Widely Prevalent Parasitic Zoonosis

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## ABSTRACT

Linguatulosis is a cosmopolitan parasitic disease that poses a concern to human and animal health in endemic countries. The aim of the review was to assess the impact of linguatulosis on human and animal health. The etiological agent *Linguatula serrata* is a zoonotic parasite, which lives in the nasopharyngeal region of mammals. Several animals, such as dogs, cats, foxes and other carnivores acted as final hosts, whereas herbivorous animals served as intermediate hosts. Transmission of infection in humans occurs via ingestion. Visceral and nasopharyngeal form of disease is observed in humans. Educational program of public about the importance of personal hygiene, environmental sanitation and consumption of cooked meat, are imperative in the control of this foodborne parasitic disease.

**Key words:** Ingestion, *Linguatula serrata*, parasite, transmission, zoonosis

## INTRODUCTION

Zoonosis is defined as the disease or infection, which is naturally transmitted between vertebrate animal and man with or without an arthropod intermediate. Presently, over 300 zoonotic diseases of varied etiologies are reported from developing and developed nations. These diseases occur in sporadic as well as in epidemic form resulting into high morbidity and mortality<sup>1</sup>. Parasitic zoonoses posed a threat to human and animal health in many countries of the world including India. The economic and public health importance of parasitic diseases are not well studied particularly in non-industrialized countries due to several factors<sup>2</sup>.

Linguatulosis (Linguatuliasis) is a globally prevalent parasitic disease of veterinary and medical concern in endemic countries. In the Middle East, the disease is referred as Halzoun Syndrome, after the traditional dish of kibbe (raw beef or lamb), which may result in the ingestion of infected lymph nodes<sup>3</sup>. Likewise, in Sudan, linguatulosis is termed as Marrara Syndrome because of the traditional marrara dish that consists of uncooked goat or sheep liver that is commonly linked with the disease<sup>4</sup>. Epidemiological studies indicated that disease is worldwide in distribution, as human infections have been reported from Africa, Asia, Canada, Europe, Middle East, South America and USA<sup>1,4-8</sup>. Linguatulosis is described in immunocompetent as well as immunocompromised individuals<sup>9</sup>. The persons who have close contact with dogs and their secretions are at a higher risk to infection with *L. serrata*<sup>2</sup>.

Disease is caused by *Linguatula serrata* (tongue worm), which is a food-borne zoonotic pentastomid that affects humans and a wide variety of animals. The parasite belongs

to genus *Linguatula*, family *Linguatulidae*, order *Porocephalida* and phylum *Pentastomida*. The body of adult *Linguatula serrata* parasite is flat, elongated, annulated and tongue like and the anterior end have two pairs of hooks. The posterior extremity is somewhat narrow and cylindrical<sup>2</sup>.

The eggs, containing embryos are expelled in the nasal secretions or in the feces of final hosts. When these are ingested by an intermediate host, such as ruminants (camel, cattle, goat and sheep), rodents and accidentally by humans<sup>10</sup>, the embryos reaches the intestine and develops into a primary larval form that crosses the intestinal wall and migrate to different organs, such as mesenteric lymph nodes, liver, lungs, prostate gland and brain, where they feed on blood and fluids and molt to become mature nymphal stage. The nymph may retain alive in the intermediate host for at least two to three years, where they become encapsulated<sup>10</sup>. Humans can be infected either as an intermediate host (visceral linguatulosi) or as an accidental final host (nasopharyngeal linguatulosi)<sup>2,11</sup>. The present communication is an attempt to delineate the zoonotic significance of *Linguatula serrata*.

#### HOST

Natural infection are recorded in humans and in a variety of animals, such as buffalo, camel, cat, cattle, dog, fox, goat, pig, rabbit, sheep, snake and wolf<sup>1,2,12-15</sup>.

#### TRANSMISSION

Humans can get infection by eating raw or undercooked offal's mainly liver or lymph node from goat or sheep containing infective nymphs, ingesting vegetables and water contaminated with eggs excreted in the nasal discharge, saliva and faecal matter of animals<sup>2</sup>. Herbivorous animals, such as cattle, camel, sheep and goat acquire infection by grazing on the pasture contaminated with faeces or secretion of the canids, the definite host. Canids and felids, which acted as definite (final) hosts, contracted the infection by consuming viscera and tissues of the intermediate hosts like goat and sheep<sup>1</sup>.

#### CLINICAL SPECTRUM

**Humans:** In humans, clinical manifestations included pain, irritations and discomfort in upper respiratory tract, severe catarrh, bleeding, sneezing, coughing, difficulty in breathing, oedema of conjunctiva, lips, nose and larynx, lachrymation, photophobia, exophthalmia, vomiting, fever, headache and prostatitis<sup>1,8,10</sup>.

**Animals:** Sneezing, mucopurulent nasal catarrh and rarely epistaxis are observed<sup>1</sup>. Grossly, the affected lymphnodes are enlarged, soft and edematous. The cut surface of the lymph nodes shows spongy appearance and sometimes nymphs are found to crawl out<sup>2</sup>.

#### DIAGNOSIS

Due to the lack of specific clinical symptoms, diagnosis of linguatulosi is often difficult. Radiographs may help to reveal calcified cysts in tissues. Identification of nymph in biopsied or autopsied tissues can be made by histopathological technique<sup>1</sup>. Researchers have reported that diagnosis of visceral linguatulosi is made at autopsy<sup>9,16</sup>. The parasites are mostly located in the liver<sup>16</sup> and rarely in the lungs<sup>9</sup>. During the time of examination, the nymphs in human granulomas are usually found degenerated<sup>9</sup>. The disease should be differentiated from gnathostomiasis, filariosis, tuberculosis and malignancies. In dogs, the diagnosis can be made by demonstration of eggs in the feces<sup>1</sup>. It seems imperative to develop rapid, sensitive and cheap test to confirm the diagnosis of linguatulosi in humans and animals.

#### TREATMENT

Currently, no effective therapy is available for *Linguatula serrata* infection. However, symptomatic treatment may be attempted to give relief to the patient.

#### CONTROL

In the absence of chemotherapeutic agent and potent vaccine, certain preventive measures, such as avoiding ingestion of raw offal or uncooked meat, provision of clean water for drinking and food preparation, protection of water supply from faeces and other discharges of animals, fencing of pasture to prevent entry of carnivores, avoiding contact with canine saliva and drinking water used by dogs or wild canids, prohibition to provide raw viscera or offal of food animals to dogs and health education of the public on the mode of transmission, hazards of consuming raw meat and importance of food hygienic practices will certainly reduce the prevalence and incidence of linguatulosi<sup>1</sup>.

#### CONCLUSION

Linguatulosi is a widely prevalent foodborne parasitic zoonosis of public health concern. It is advised that patients with nasopharyngeal symptoms following history of ingestion of raw liver should be investigated for linguatulosi. Further research on the development of simple, low cost diagnostic

tool and safe, effective and cheap chemotherapeutic agent will be rewarding. It seems imperative to study the risk factors and public health implications of linguatulosis.

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