THE SCIENCE WORLD
A Monthly e Magazine
ISSN: 2583-2212
June 2022; 2(6), 675-678

Popular Article

Paratuberculosis in cattle

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DOI: https://doi.org/10.5281/zenodo.6659666

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Introduction

In India, paratuberculosis, also known as Johne's disease (JD), is endemic in domestic livestock and was first reported in Hisar, India, in 1913. National estimates of the prevalence of MAP in India are still unavailable (Kumar *et al*, 2007, Sharma *et al*., 2008). John's disease causes enormous economic losses and has a significant impact on the livestock industry due to premature culling of animals, reduced weight gain, reduced feed efficiency, and high morbidity (Kaur et al., 2011); reduced carcass value, reduced milk production, increased susceptibility to mastitis and reproductive disorders, resulting in increased calving intervals, decreased fertility, and additional veterinary costs (Hasonova & Pavlik, 2006). Paratuberculosis causes significant economic losses in the dairy industry in the United States, estimated at more than $200 million per year (Groenendaal et al., 2015), and thus has a significant impact in both developing and developed countries. No country claims to be free on MAP (Yue et al., 2016). Paratuberculosis, often known as Johne's disease, a chronic intestinal disease that mostly affects ruminants and camelids. In animals, paratuberculosis causes intermittent or chronic diarrhoea, chronic weight loss, and generalized stinginess (Whitlock and Buergelt, 1996).

Etiology

The disease is caused by Mycobacterium avium subspecies paratuberculosis (MAP). The organism is acid-fast, aerobic, and slow-growing, and its in-vitro growth requires exogenous mycobactin (Merkal and Curran 1974, Chiodini *et al* 1984).

Epidemiology

The disease occurs in most parts of the world and the prevalence seems to be increasing in some countries. Paratuberculosis is predominant in cattle and sheep in temperate climates with adequate rainfall and ground waters and in some humid, tropical areas. The incidence of paratuberculosis is high in animals kept intensively under environmental and husbandry conditions which are conducive to the spread of the infection (Chiodini et al., 1984a).

Mode of transmission

The important route of MAP transmission is the fecal-oral route between infectious cows and susceptible young calves via ingestion of contaminated milk, water, or uptake from the environment (Lombard 2011). Recent studies on the risk of faecal shedding in calves born to faecal culture positive dams or fed MAP-containing colostrum failed to confirm these proposed risk factors (Pithua *et al* 2012). In cows in the subclinical and clinical stages of the infection, intra-uterine transmission of MAP has been described (McQueen and Russell 1979, Sweeney *et al* 1996). The respiratory tract of cattle was proposed as an additional route of infection for MAP (Eisenberg et al 2012).

Clinical signs

In cattle the disease is characterized by chronic and intermittent diarrhoea that is not responsive to treatment, oedema of the throat and abdomen, loss of coat colour, emaciation and eventual death. Due to the chronic nature of the disease, clinical manifestations of paratuberculosis can appear as late as 3 to 5 years after infection (Riemann and Abbas, 1983; Chiodini et al., 1984a).

Post mortem findings.

The ileum often has a severely thickened and corrugated appearance due to the granulomatous infiltrate. Histologically, *M. paratuberculosis* is found in macrophages which infiltrate into the lamina propria of the intestine (Kubo *et al*., 1983). In cattle, there is no caseation, calcification, or fibrosis associated with paratuberculosis lesions (Hines et al., 1995).

Diagnosis.

Primary diagnosis can be made based on clinical signs, postmortem lesion, and histopathology, and it can be confirmed by a battery of diagnostic tests such as faecal culture, acid-fast staining, agar gel immunodiffusion (AGID), complement fixation test (CFT), delayed type hypersensitivity (DTH), interferon gamma assay, and enzyme linked immune-sorbent assay (ELISA). Culture-based methods are the "gold standard" for MAP infection diagnosis. These methods, however, are time-consuming and have a low sensitivity. Recently, molecular biological methods such as polymerase chain reaction (PCR) have been developed to detect MAP infection in animals (Fang et al., 2002).

Prevention and control

The prevention and management of John's disease in humans and animals, particularly dairy animals, is critical, and requires a robust control mechanism to prevent disease spread within species and between people and animals. One of the most limiting issues is the lack of a reliable, cost-effective, and quick diagnostic test (s).

Vaccination

Vaccination of cattle against paratuberculosis is not routinely recommended. Although it may have served a purpose in the past, recent information indicates it is of limited value in controlling *M. paratuberculosis* infections, causes a false sense of security in owners, is a serious health risk for veterinarians and prevents use of serologic tests in a herd (Collins, 1994).

Treatment

Currently, no antimicrobials are approved for the treatment of Johne's disease. M. paratuberculosis is more resistant to chemotherapeutic agents in vitro than M. tuberculosis so that prospects for suitable treatment are poor. Because of this lack of efficacy and the failure of any of the antimicrobials to provide a bacteriological cure, treatment is not recommended. (Radostits and Blood,1994)

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