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DIAGNOSIS AND TREATMENT OF A TETANUS OUTBREAK IN A CAUVERY DELTA GOAT FARM

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Abstract

Outbreaks of tetanus, a sporadic disease caused by pathogenic C.tetani spores and toxins, have mostly been reported in sheep. This study, however, investigates a tetanus outbreak among goats at a private farm in Adhirampattinam block, Thanjavur district. The affected goats had recently undergone ear tagging for identification and insurance. Ten goats exhibited ear-region wounds, suggesting scab formation and potential C.tetani infection. Clinical examinations revealed symptoms indicative of C.tetani infection, while anerobic culture of ear swabs and scabs confirmed the presence of Gram-positive bacilli with terminal spores. Contaminated ear-tagging instruments were the likely cause. Strepto-penicillin treatment for 3-5 days at 2.5g/day effectively reduced fatalities. The study proposes that wound exudation could facilitate an anaerobic environment for C.tetani spore germination and toxin production. Vaccination and strict hygienic practices were advised, especially during kidding season before monsoon onset.

Keywords: Tetanus-goat-ear tagging-C.tetani.
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Introduction

Tetanus, a severe and often fatal disease, is caused by the anaerobic bacterium Clostridium tetani, which is found ubiquitously in the environment, particularly in soil, dust, and animal feces (Farrar et al., 2000). The bacterium produces a potent neurotoxin called tetanospasmin, which causes the clinical manifestations of the disease, including muscle rigidity, spasms, and autonomic nervous system dysfunction (Hawkins & Cohen, 2019). Livestock, particularly ruminants such as goats, are susceptible to tetanus due to their frequent exposure to the bacterium and their propensity for acquiring wounds, either from routine management practices or from accidental injuries (Nath et al., 2016). In this study, we report an outbreak of tetanus in an organized goat farm in the Cauvery Delta Zone of Tamilnadu, India, and discuss the diagnosis and therapeutic management of the affected animals.

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Tetanus in goats has been reported worldwide, with cases documented in countries such as India, Brazil, and the United States (Nath et al., 2016; Oliveira et al., 2018; Poppenga et al., 1991). In India, tetanus is a significant concern for goat farmers, as the country has a large goat population of approximately 135 million animals that contribute to the livelihood of millions of people (Basic Animal Husbandry Statistics, 2019). The Cauvery Delta Zone in Tamilnadu is a major goat-rearing area, with over one million goats raised for meat and milk production (Livestock Census, 2012). The region's tropical climate, characterized by high temperatures and humidity, provides favorable conditions for the proliferation of C. tetani and the development of tetanus in susceptible animals (Nath et al., 2016).

The diagnosis of tetanus in goats is primarily based on clinical signs, which can be categorized into three stages: the prodromal stage, characterized by restlessness and increased sensitivity to stimuli; the spasmodic stage, marked by muscle rigidity and spasms; and the paralytic stage, in which the animal exhibits progressive muscle paralysis and respiratory failure (Hawkins & Cohen, 2019). Laboratory confirmation of the disease can be achieved through the isolation of C. tetani from the wound site or the detection of tetanospasmin in the serum (Nath et al., 2016). However, these methods are often impractical in field settings due to the fastidious nature of the bacterium and the requirement for specialized equipment and expertise (Hawkins & Cohen, 2019).

The therapeutic management of tetanus in goats involves the administration of antitoxin, antibiotics, and supportive care to control the clinical signs and prevent complications (Hawkins & Cohen, 2019). Tetanus antitoxin, which neutralizes the circulating tetanospasmin, is the mainstay of treatment and should be administered as soon as the disease is suspected (Nath et al., 2016). The use of antibiotics, such as penicillin and metronidazole, is indicated to eliminate the C. tetani infection and halt the production of the neurotoxin (Hawkins & Cohen, 2019). Supportive care, including analgesics, sedatives, and muscle relaxants, is essential to manage pain and muscle spasms and improve the animal's comfort and chances of recovery (Nath et al., 2016).

In conclusion, tetanus is a serious and potentially fatal disease that can affect goats in the Cauvery Delta Zone of Tamilnadu, India. Early diagnosis and prompt therapeutic intervention are crucial to increase the likelihood of a favorable outcome for the affected animals. Further research is needed to better understand the epidemiology of the disease in this region and to develop effective prevention strategies, such as vaccination programs and improved management practices, to reduce the risk of tetanus outbreaks in goat farms.

Materials and Methods

As per the history received, under the insurance coverage a total of 120 kids (2 weeks of age) were ear tagged. After 11 days, death of 10 animals were reported in goats of Nondescript breed with symptoms of tetanus in Adhirampattinam block of Thanjavur dist., Tamilnadu. After 2 days, another 20 animals died with the same symptoms. The history details that ailing animals were also reported with stiffness of fore and hindlimbs, dullness, anxious expressions for sound and light, mild bloat, salivation, prolonged third eyelid and the case fatality was more than 85% .On thorough disease investigation, the affected goat revealed signs of mild fever, teeth grinding with rigidity of cervical muscles and recumbency (Fig 1 and 2). The presence of plastic tag on the ear with a wound was the most common feature in all ailing animals. The wound lesions and parts of it were collected and inoculated in Robertson's cooked meat media at 37 ^{0}C for 48 hours in Anerobic box (Himedia, Mumbai).Blood

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smears from the wound with ear were collected from ailing and healing animals for testing at the laboratory for staining and admission of biochemical tests for confirmation of *C.tetani*.

Results and Discussion

After 48 hrs anerobic incubation, the stained smears by Gram's method showed G +ve bacilli with terminal spores suggestive of *C.tetani* which was earlier reported by Chandranaik et *et al.* 2009). The discrete colonies (2–5 mm) on blood agar with slightly raised colonies of semi-translucent gray with irregular rough margins and surrounded by a zone of hemolysis. As reported by Smith 1975. *C. tetani* spores were round and terminal, giving a characteristicshape usually termed "drumstick." The same tissues from healthy sheep were found negative for Clostridium tetani. The present study suggest that contaminated wound with soil and due to spores, the *C.tetani* would have invaded and caused the tetanus with is in accordance with Smith and Sherman (2009) .

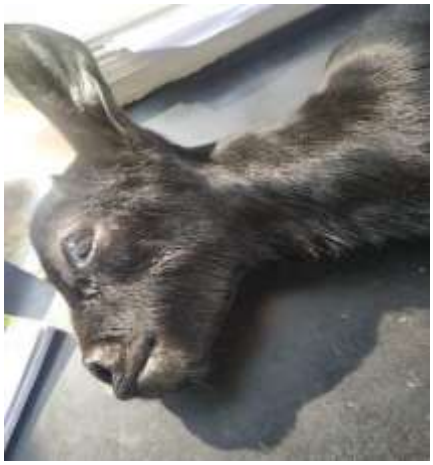

Fig 1 Erected pinnae with prolapse of third eyelid

Fig 2 Lock jaw with muscle rigidity of fore and hindlimbs

The plastic tag when punched for ear tagging created air tightness in the ear wound predisposing anaerobic condition for Clostridium group of organism. (Chandranaik *et al.* 2009). The exudation of fluid due to rubbing allowed the production of toxins inturn increasing the severity of the disease. A similar report by Valgarean *et al*. (2011) revealed that tetanus in male goat after a week of ear tagging due to unhygienic wear tag placement as there were no history of tetanus toxoid vaccination. Hence the animal were subsequently treated with Streptopenicillin injection being the choice for 4-6 days as described by Radostits *et al*. (1994) and with anti-inflammatory Meloxicam injection showed good response for the remaining ailing animals. A treatment protocol of Procaine penicillin injection @20000IU /kg bw for 5 days was advocated successful treatment of tetanus by Lotfollazaheb et al (2019) but in our study, another substitute of Strepto-penicillin was administered which was found effective as the mortality reduced in a week and came down to 5% after the treatment as described by Radostatis *et al.*(1994). Earlier reports of successful treatment of tetanus with antimicrobials in livestock (Bhikane *et al* 2005; Harish *et al*. 2006) supported this study as earlier intervention in kids with administration of tetanus toxoid will reduce the mortality in organised farms. Strict hygiene was advised with change of bedding materials

and shed cleaning was implemented and goats were shifted to another shed for prevented the spread. Moreover surgical operations / managemental procedures involving Animal Husbandry practices in goat farm should be performed with sterile hygiene in neonates and proper disinfection of umbilicus will prevent tetanus.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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