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Occurrence and pathology of various parasitic conditions in cattle in Bikaner (*Bos indicus*)

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Abstract

The present study was conducted to evaluate the parasitic conditions of the cardiovascular system in cattle. A total number of 436 specimens of the cardiovascular system of cattle irrespective of age, sex, and breed were examined and out of these 122 samples, suspected abnormalities were further processed for histopathological examination. Parasitic condition like Sarcocystosis condition was recorded in 28 (23%) cases. Macroscopically, myocardium showed hemorrhages and necrotic area. Microscopically, the sarcocysts were seen with degenerative changes and myocarditis. It is concluded that the sarcocyst (23%) infection is the primary cardiovascular affection in cattle. The second parasitic condition Onchocerciasis was observed in 1 (0.82%) case. Grossly, parasitic granulomas, surrounded by hard connective tissue, were seen, extending outward the aorta serosa. Microscopically, numerous sections of the onchocerca parasite were found in the tunica intima of aorta.

Keywords: Sarcocyst, heart, histopathology, cattle, onchocerciasis

Introduction

Parasitic illnesses persist in cow herds, prevailing in both conventional and organic systems. A comprehensive understanding of these diseases is imperative for implementing effective control measures and fostering enhanced farm profitability.

Unraveling Sarcocystis Dynamics: The genus *Sarcocystis*, a realm of protozoan parasites, predominantly afflicts mammals in sarcocystosis. Microscopic scrutiny reveals lesions characterized by vasculitis, hemorrhage, and myocyte necrosis. The infiltration of myocytes by merozoites accentuates the severity. Sarcocysts, as observed by Lindsey *et al.* (1995)¹¹, may undergo degeneration, encircled by mononuclear cells, neutrophils, eosinophils, and occasionally giant cells.

Onchocerciasis Intricacies: onchocerciasis, a parasitic disease stemming from nematodes within the *Onchocerca* genus, affects both humans and animals. Predominantly impacting cattle, including buffaloes, *Onchocerca armillata*, *O. gutturosa*, and *O. gibsoni* manifest grossly as parasitic tunnels, nodules, roughening, and calcification, portraying the complex dynamics involved.

Strategic Control Paradigms: Understanding these parasitic intricacies calls for strategic control paradigms. Holistic approaches involve strategic deworming, vigilant veterinary surveillance, and the integration of organic farming practices. Systematically addressing these challenges not only optimizes cattle health but also bolsters the economic sustainability of farms.

In Conclusion: The battle against parasitic illnesses in cow herds necessitates a dual perspective rooted in knowledge and proactive measures. Heightened awareness and concerted efforts are paramount to ensuring the well-being of herds and fostering enduring success in farming enterprises.

Materials and Methods

Collection of Samples

The specimens of cardiovascular system of cattle (*Bos indicus*) for the proposed investigation

were collected from the carcasses of cattle irrespective of age, sex, and breed. The samples were collected from various municipal areas of Bikaner, Jaipur, Sikar. The samples were also collected from the carcasses and submitted to the Department of Veterinary Pathology, College of Veterinary and Animal Sciences, Bikaner for routine post-mortem examination. The samples received from the field veterinarians in the Department of Veterinary Pathology were also included in this study. During post-mortem examination, the samples were thoroughly examined visually and manually for various pathological abnormalities such as colour, consistency, shape and size, and presence of tumors and ulcers. The study was conducted from December 2017 to November 2018. During this period, 436 specimens of the cardiovascular system of cattle were examined, and out of these, 122 samples showing frank macroscopic lesions were used for further histopathological examination.

Histopathology

Following collection, all the samples were properly preserved in 10 percent formal saline after cutting the affected parts. The parts of affected tissue presenting the lesions with normal tissue were used for fixation and further histopathological examination. For histopathological examination, processing of tissue was done by paraffin embedding using the Acetone and Benzene technique (Lillie, 1965) [10]. The tissue sections of 4-6 micron thickness were cut and stained with routine. Hematoxylin and Eosin staining method as a routine. As far as possible, results were recorded by gross observation and microscopic lesions.

Statistical analysis

Data were statistically analyze using simple percentage calculation method.

Results and Discussion

Sarcocystosis condition was recorded in 23% of cases. Higher incidences were recorded by Hornok *et al.* (2015) [7] as 66% cysts of *S. cruzi*. Macroscopically, myocardium showed hemorrhages and necrotic area. Microscopically, a sarcocyst demonstrating the internal mass separated into many compartments along with myocarditis was present (Fig. A). Released crescentic shapes having bradyzoites from ruptured sarcocyst in myocardium (Fig. B). These findings were in close approximation to the findings recorded by Nourollahi-Fard *et al.* (2015) [12]. Some of the cysts were found ruptured and their bradyzoites were found released between the myocardial cells and the adjacent muscle parenchyma showed degenerative changes, necrosis, and focal myocarditis and myositis are in accordance with Lindsey *et al.* (1995) [11], Dubey *et al.* (1988) [5]. In the current study sarcocysts with different morphological characters were found. The high frequency of microscopic sarcocyst infection in cattle is associated with the fact that the cattle are in close association with dog sarcocysts (Fardet *et al.* 2009) [6].

Onchocerciasis in Aorta

This condition was observed in 1 (0.82%) case. Grossly, parasitic granulomas, surrounded by hard connective tissue, were seen, extending outward the aorta serosa (Fig. C). 34 Microscopically, numerous sections of the onchocerca parasite were found in the tunica intima of aorta (Fig. D). This condition was observed in 0.82% of cases. A higher incidence was recorded by SY, IA (2013) [14] as 10.7%. Macroscopic findings such as parasitic granulomas, surrounded by tough connective tissue, were seen, extending outward the serosa of

aorta. These findings are in accordance with SY, IA (2013) [14], Asaduzzaman *et al.* (2015) [1], Ladds *et al.* (1979) [8], Patnaik (1962) [13] and Cheema, Ivoghli (1978) [4]. Microscopic findings such as numerous sections of the onchocerca parasite were found in the tunica intima of aorta. These findings were in close approximation to the findings recorded by SY, IA (2013) [14]. The causes of onchocerciasis may be because the availability of vector flies. The age of the host and season of the year is the leading determinants that greatly influence the occurrence of the disease as reported by (Asaduzzaman *et al.* 2015) [1].

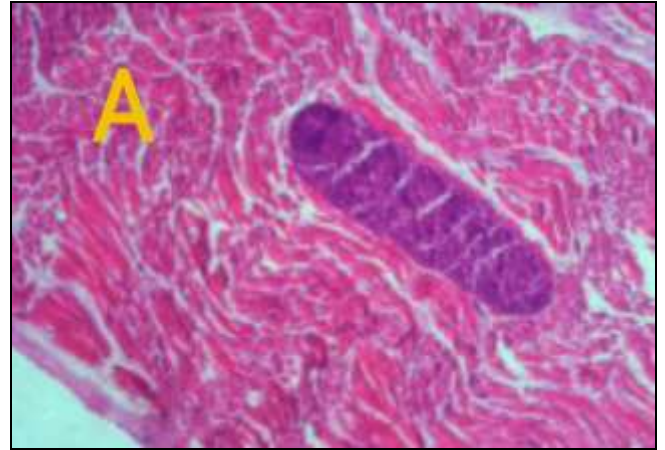


Fig A: Microphotograph of a sarcocyst demonstrating the internal mass separated into many compartments along with myocarditis. H&E, 100x

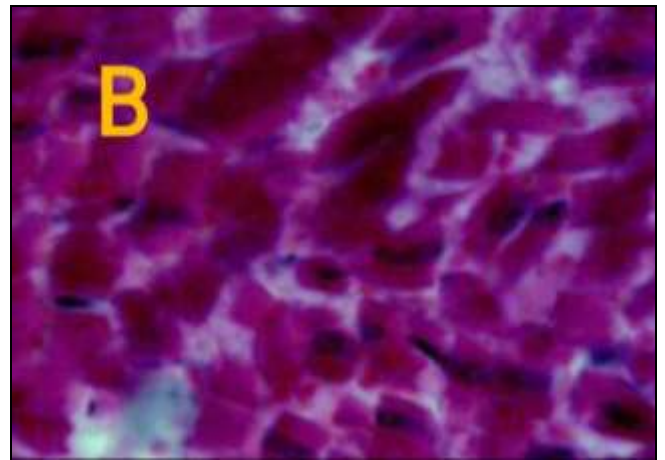


Fig B: showing released bradyzoites from ruptured sarcocyst in myocardium. H&E, 1000x.



Fig C: showing parasitic granulomas, surrounded by tough connective tissue on wall of aorta.



Fig D: Microphotograph of sections of the onchocerca parasite in the tunica intima of aorta. H&E, 100X

Conclusion

The present study indicates a higher occurrence (23%) of sarcocystosis and a significant occurrence of onchocerciasis in the cardiovascular system in cattle. Based on these results further study is warranted to elucidate the causes and occurrence of pathological conditions related to sarcocystosis in the cardiovascular system of cattle.

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