

Prevalence of Different Types of Enteritis in Camels of Rajasthan

Shesh Asopa^{1*}, Indu Vyas¹, Ashish Joshi², Rajni Arora³, Hemant Dadhich¹

ABSTRACT

For the present study, a total 80 tissue specimens of intestinal tract were examined from carcasses of camel, irrespective of sex, age and breeds, from July 2017 to June 2018. Out of these, 32 samples representative of gross lesions were processed for subsequent histopathological examination. An overall incidence of enteritis in camel was recorded as 40 % (32/80). The occurrence of various types of enteritis, *i.e.*, catarrhal enteritis, necrotic enteritis, necro-haemorrhagic enteritis, eosinophilic enteritis and haemorrhagic enteritis were 15.00, 6.25, 6.25, 5.00 and 7.50 %, respectively. Catarrhal enteritis was the most prevalent and eosinophilic enteritis least prevalent conditions affecting intestines of camels in Rajasthan during the study period.

Key words: Camel, Enteritis, Intestine, Rajasthan

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INTRODUCTION

One-humped camels (*Camelus dromedarius*) endure extreme environmental conditions like deprivation of water and scarcity of food, which explains the difference in the anatomical characteristics of camels from other animals to face ecological conditions that are not suitable for healthy living for different animals (Moselhy *et al.*, 2023). Multiple causes lead to unexplain mortalities in camels, including endoparasite infection, either blood or intestinal parasites, which causes catarrhal and haemorrhagic enteritis. There are many predisposing factors, particularly modified risk factors, including sudden changes in diet with overfeeding of green fodder rich in proteins or carbohydrates, deworming, overcrowding, and handling of animals. On the other hand, the non-modified risk factors, including seasonality deviations and age, alter the intestinal environment (Mubarak *et al.*, 2024). Like other animals, camel can be infected by many infectious diseases caused by different species of bacteria, viruses, parasites and fungi. These diseases can be categorized by the infected body system or organ, e.g. digestive system diseases (Alhendi, 2000). Mehta *et al.* (2012) reported maximum mortality (41.39 %) in camel due to involvement of digestive system.

Despite improvement in managerial practices and prevention and treatment strategies, enteritis is still the most common and costly disease. The frequent pathological findings in various diseases of camel comprise of the involvement of intestines. In many instances, such lesions in intestine are of great value in diagnosis of camel diseases and are very important aspects that envisage challenge to the veterinarian to arrive at a definite diagnosis of a particular problem. There is paucity of research on prevalence of different types of enteritis in camel in Rajasthan. Hence,

¹Department of Veterinary Pathology, College of Veterinary and Animal Science, Rajasthan University of Veterinary and Animal Sciences (RAJUVAS), Bikaner-334 001, India

²Veterinary Officer, Animal Husbandry Department, Bikaner-334001, Rajasthan, India

³Department of Livestock Production Management, College of Veterinary and Animal Science, RAJUVAS, Bikaner-334 001, India

Corresponding Author: Dr. Shesh Asopa, Assistant Professor, Department of Veterinary Pathology, College of Veterinary and Animal Science, RAJUVAS, Bikaner-334001, India. e-mail: asopa.shesh27@gmail.com

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the present study was designed to provide preliminary information on the prevalence along with gross and histopathology of various types of enteritis prevalent in camels of Rajasthan.

MATERIALS AND METHODS

For the present study, 80 tissue samples of intestines were examined from carcasses of camels of either sex, irrespective of age groups and breeds, during post-mortem examination from July 2017 to June 2018. Out of these, 32 samples of intestines showing gross lesions were further processed for histopathological examination. All the representative tissue samples were collected in 10% buffered formalin for histopathological examination. The tissues were processed mechanically for paraffin embedding by acetone and

benzene technique (Lillie, 1965). The tissue sections of 4-5 μm thickness were cut and stained with haematoxylin and eosin staining method as a routine. The detailed histopathological observations were recorded.

RESULTS AND DISCUSSION

Various types of enteritis recorded in present study are placed in Table 1. An overall incidence of various types of enteritis affecting intestine was recorded as 40 % (32/80).

Table 1: Incidence of various types of enteritis recorded in present study

Type of condition	No. of samples	%
Catarrhal enteritis	12	15.0
Necrotic enteritis	5	6.25
Necro-haemorrhagic enteritis	5	6.25
Eosinophilic enteritis	4	5.00
Haemorrhagic enteritis	6	7.50

Catarrhal enteritis was recorded in 15.00 % cases in present study. A higher incidence was reported by Kumar *et al.* (2015) as 20.38 %. Grossly, the surface of intestine showed moderate hyperaemia and contained increased amount of mucinous exudate in the lumen. Microscopically, desquamation, necrosis and hyperplasia of goblet cells along with severe infiltration of neutrophils and lymphocytes in mucosa (Fig. 1) was present. Similar findings were observed by Sastry and Rao (2005) and Kumar *et al.* (2015). The development of catarrhal enteritis has been attributed to many factors such as copper sulphate administration (Damir *et al.*, 1993), copper and molybdenum deficiencies (Sastry and Rao, 2005), or due to endoparasites infections (Mubarak *et al.*, 2024).

Necrotic enteritis was recorded in 6.25 % cases. A relatively lower incidence was reported by Kumar *et al.* (2015) as 1.94 % in camel. The gross findings such as patchy grayish white necrotic areas along with congestion were in close approximation to the observations reported by Moghaddar *et al.* (2010) and Kumar *et al.* (2015). The microscopic findings such as desquamation and necrosis of villi along with severe lymphocytic infiltration in mucosa (Fig. 2) were in close conformity with the earlier reports of Khan *et al.* (2018). This condition presumably may be due to many etiological factors such as bacteria like *E. coli* (Asopa *et al.*, 2015), viruses like PPR (Khan *et al.*, 2018). Also, niacin deficiency might be responsible for necrotic enteritis (Sastry and Rao, 2005).

Necro-haemorrhagic enteritis was recorded in 6.25 % cases. A lower incidence was reported by Kumar *et al.* (2015) as 2.91 % in camel. Grossly, congestion and haemorrhages along with depressed necrotic areas were seen on intestine. Microscopically, severe infiltration of mononuclear cells mainly lymphocytes in mucosa along with necrosis and haemorrhages at the tip of villi (Fig. 3) seen were in agreement with earlier observations of Hammad *et al.* (2007) and Kumar *et al.* (2015). It might be caused by bacterial or viral infections or organophosphate and carbamate insecticides poisoning (Hammad *et al.*, 2007).

Eosinophilic enteritis was recorded in 5.00 % cases in present study. A lower incidence was reported by Kumar *et al.* (2015) as 0.97 % in camel. Gross findings included swollen and edematous wall of intestine, which was in close approximation to the earlier findings reported by Zheng *et al.* (2008) and Kumar *et al.* (2015). In some cases, the lumen of small intestine, particularly the duodenum containing dark coloured clotted blood and mucus admixed with the ingesta was noticed. The microscopic findings included desquamation along with infiltration of eosinophils and lymphocytes in villi (Fig. 4) in close conformity with the observation of Tafti *et al.* (2001) and Kheirandish *et al.* (2012). Some sections showed eosinophilic enteritis along with completely damaged mucosa of intestine with presence of various developmental stages of parasite *Eimeria* (Fig. 5). Similar observations were reported by Tafti *et al.* (2001) and Kheirandish *et al.* (2012). Eosinophilic enteritis might be associated with specific etiology, e.g. Mycoplasma infection (Jubb *et al.*, 2007) or parasitic infection such as coccidiosis (Kheirandish *et al.*, 2012; Boukert *et al.*, 2024) or idiopathic origin.

Haemorrhagic enteritis was recorded in 7.50 % cases in present study. A lower incidence of this condition as 5.83 % was reported by Kumar *et al.* (2015). The gross findings such as congestion, haemorrhages and oedema of the intestinal wall noted were in agreement with the earlier report of Kumar *et al.* (2015). The microscopic findings such as severe haemorrhages along with leucocytic infiltration and degenerated mucosa (Fig. 6) correspond well with the earlier findings of Kumar *et al.* (2015). It might be due to bacterial infections such as Salmonella (Nour-Mohammadzadeh *et al.*, 2010) and *Clostridium perfringens* (Ahmed, 2004) or due to endoparasites infestations (Mubarak *et al.*, 2024).

Etiological agents of enteritis might include corrosives and toxic substances, poor nutrition, foreign bodies, pathogenic infections and toxins formed in the intestine itself as a result of bacterial growth or decomposition of stagnating contents. In-addition, other factors, *viz.*, poor management practices, adverse climatic conditions, indiscriminate use of antibiotics leading to drug resistance etc. might have also contributed to the increased occurrence of enteritis leading to considerable economic losses.

Based on the evidence presented, it can be concluded that enteritis is associated with various degenerative processes and necrosis along with leucocytic infiltrations in intestine, affecting overall health and productivity of camels. The different types, pattern and morphology of various types of enteritis are of great value in diagnosis of camel diseases. Based on the above conclusions, appropriate feeding methods and strict hygienic measures are recommended for controlling these conditions. Awareness creation should be made for camel owners about treatment, and control and prevention mechanisms, proper management and vaccination of animals should be done to improve the productivity of camels.

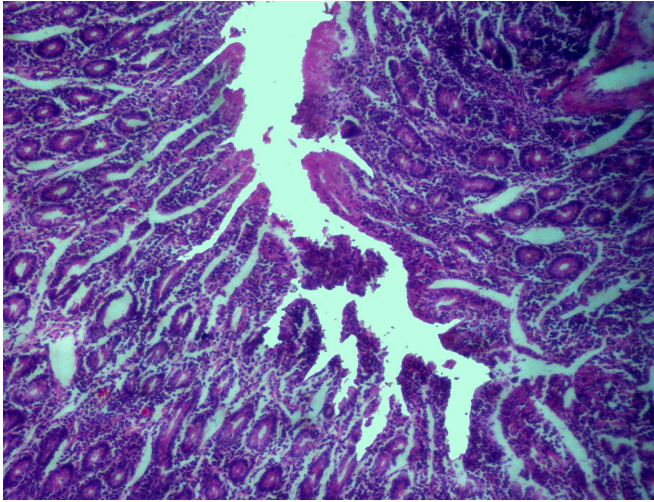


Fig. 1: Microphotograph of intestine showing desquamation, necrosis and hyperplasia of goblet cells along with marked leucocytic infiltration in mucosa. H&E. 100X.

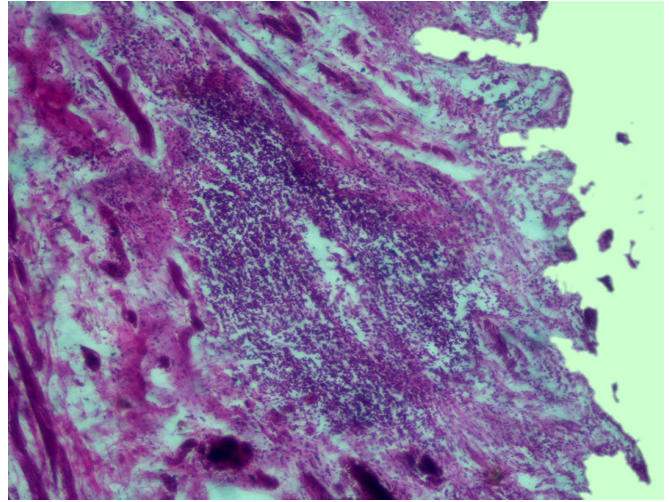


Fig. 2: Microphotograph of intestine showing desquamation and necrosis of villi along with severe lymphocytic infiltration in mucosa. H&E. 100X.

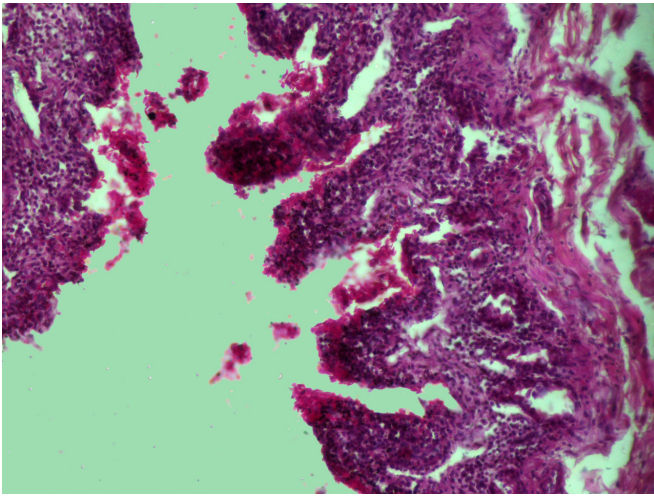


Fig. 3: Microphotograph of intestine showing severe infiltration of lymphocytes in mucosa along with necrosis and haemorrhages at the tip of villi. H&E. 400X.

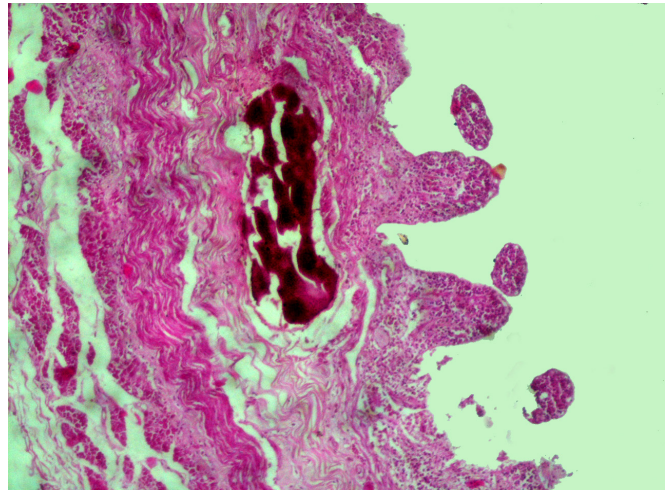


Fig. 4: Microphotograph of intestine showing desquamation along with infiltration of eosinophils and lymphocytes in villi and blood stained contents in submucosa. H&E. 100X.

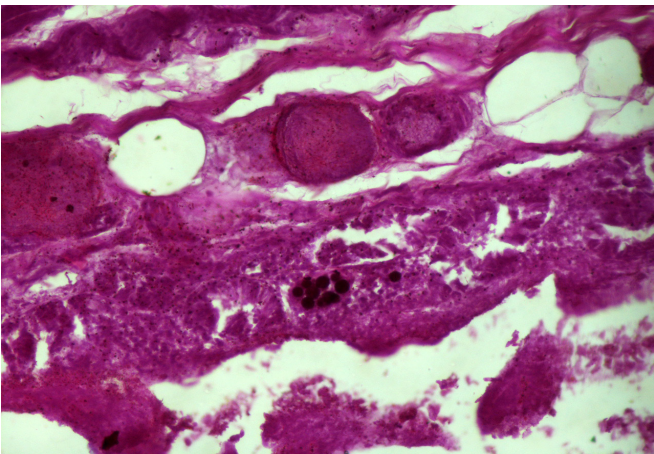


Fig. 5: Microphotograph of intestine showing damaged mucosa along with presence of various developmental stages of the parasite *Eimeria*. H&E. 400X.

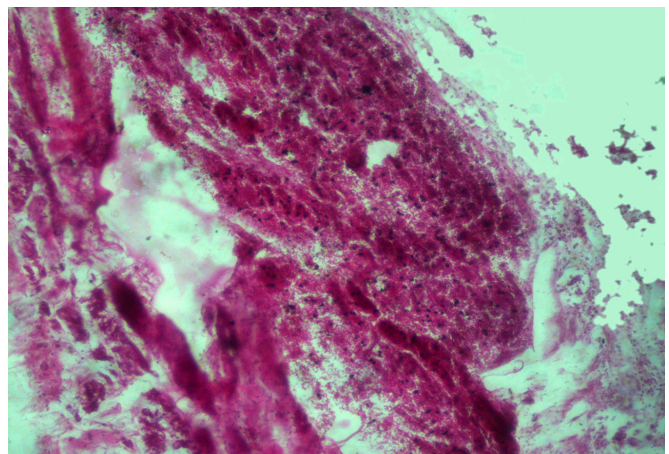


Fig. 6: Microphotograph of intestine showing severe haemorrhages along with leucocytic infiltration and desquamated mucosa. H&E. 100X.

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