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## Types, pattern and morphology of enteritis prevalent in pigs (*Sus scrofa domestica*) of Rajasthan

**Poonam Gupta, Shesh Asopa, Hemant Dadhich and Deepak Kumar Pankaj**

### Abstract

For the present study, 380 tissue samples of intestine were examined from carcasses of pigs of either sex, irrespective of age groups and breeds subjected to Post-mortem examination during January, 2020 to December, 2020. All these samples were examined grossly and microscopically to study the various inflammatory conditions of intestine with reference to type, pattern and morphology. Out of these, 142 samples representative of gross lesions were processed for subsequent histopathological examination. An overall incidence of inflammatory conditions of intestine of pig was observed as 35.21 per cent (50 out of 142). The occurrence of different types of enteritis such as acute catarrhal enteritis, chronic catarrhal enteritis, haemorrhagic enteritis, necrotic enteritis, necro-haemorrhagic enteritis, fibrinous enteritis and eosinophilic enteritis were reported as 14.08, 4.93, 7.04, 4.23, 3.52, 0.70 and 0.70 per cent respectively. Acute catarrhal enteritis (14.08 per cent) and fibrinous and eosinophilic enteritis (0.70 per cent) were reported as the most prevalent and least prevalent inflammatory conditions, respectively, affecting intestine of pigs during the study period.

**Keywords:** Enteritis, pig, gross, histopathology

### Introduction

The present goal of pig industry is to produce high quality lean meat at low cost which will play important role in socio-economic status of pig rearing farmers (Anubrata and Bujarbaruah, 2005) [2]. Enteritis is most common manifestation in which intestine are inflamed. Different type of enteritis such as catarrhal enteritis (Dutta *et al.*, 2007 and Sreevidya, 2017) [8, 32], haemorrhagic enteritis (Dutta *et al.*, 2007 and Sreevidya, 2017) [8, 32], necrotic enteritis (Dutta *et al.*, 2007 and Posthaus *et al.*, 2020) [8, 26] were reported previously. A high prevalence of gastrointestinal helminthic infections has been found in pig farms (Carstensen *et al.*, 2002) [7].

### Materials and Methods

For the present study, 380 tissue samples of intestine were examined from carcasses of pigs of either sex, irrespective of age groups and breeds during post-mortem examination from January, 2020 to December, 2020. Out of these, 142 samples of intestine 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) [18]. The tissue sections of 4-5 microns or micrometer thickness were cut and stained with haematoxylin and eosin staining method as a routine. Masson's Trichrome special staining method was used for demonstration of collagen fibers (Luna, 1968) [20]. The detailed histopathological observations were recorded.

### Results and Discussion

Different types of enteritis recorded in present study are placed in Table 1. An overall incidence of inflammatory conditions of intestine was observed as 35.21 per cent (50 out of 142) which corresponded well with the findings of Dutta *et al.* (2007) [8] as 31.05 percent in piglets.

**Table 1:** Different types of enteritis recorded

	Types of condition	Percentage
1	Acute catarrhal enteritis	14.08
2	Chronic catarrhal enteritis	4.93
3	Haemorrhagic enteritis	7.04
4	Necrotic enteritis	4.23
5	Necro-haemorrhagic enteritis	3.52
6	Fibrinous enteritis	0.70
7	Eosinophilic enteritis	0.70
	Total	35.21

### Acute catarrhal enteritis

This condition was recorded in 14.08 per cent cases in present study. Almost similar incidence was reported by Aljameel *et al.* (2014) <sup>[1]</sup> as 13.5 per cent. Grossly, there was yellowish mucinous exudate along with moderate hyperemia. In some cases, intestine was swollen and oedematous with yellowish mucinous exudate in lumen. These observations corresponded well with the findings of Jensen *et al.* (2010) <sup>[13]</sup> and Sreevidya (2017) <sup>[32]</sup>. Microscopically, there was hyperplasia of goblet cells along with severe cellular infiltration mainly of neutrophils and few lymphocytes (Fig.1). This condition was in accordance with the earlier reports of Dutta *et al.* (2007) <sup>[8]</sup>, Jensen *et al.* (2010) <sup>[13]</sup> and Sreevidya (2017) <sup>[32]</sup>.

In the present study, there may be many causes responsible for acute catarrhal enteritis. It may be caused by bacteria like salmonella spp. (Wilcock, 1979) <sup>[33]</sup>, *Clostridium perfringens* (Yaeger *et al.*, 2007) <sup>[34]</sup> and *Brachyspira murdochii* (Jensen *et al.*, 2010) <sup>[13]</sup>. Sometimes, it may occur due to natural gastrointestinal helminth infestation (Karanja *et al.*, 2011) <sup>[15]</sup>.

### Chronic catarrhal enteritis

Grossly, the intestine was hard and thickened. The thickening of the intestine was eccentric and more severe on one side suggesting focal nature of lesions. These findings were almost similar to the findings of Sarma and Gogoi (1986) <sup>[29]</sup>, Mapother *et al.* (1987) <sup>[21]</sup>, Kumar *et al.* (2015) <sup>[17]</sup> and Sreevidya (2017) <sup>[32]</sup>. Microscopically, there were strands of fibrin with severe infiltration of lymphocytes and few neutrophils in mucosa (Fig.2). Almost similar findings were reported by Sarma and Gogoi (1986) <sup>[29]</sup>, Segales *et al.* (2001) <sup>[30]</sup>, Dutta *et al.* (2007) <sup>[8]</sup> and Sreevidya (2017) <sup>[32]</sup>.

Chronic catarrhal enteritis, in the present study might be caused by chronic bacterial infection such as *Campylobacter* spp. (Mapother *et al.*, 1987) <sup>[21]</sup>, *Lawsonia* spp. (Segales *et al.*, 2001) <sup>[30]</sup> or virus such as porcine circo virus 2 (Saikumar and Das, 2019) <sup>[27]</sup>.

### Haemorrhagic enteritis

This condition was recorded in 7.04 per cent cases in present study. A lower incidence was reported by Sreevidya (2017) <sup>[32]</sup> as 2.25 per cent. Grossly, the intestine showed dark brownish red haemorrhagic areas on mucosal surface. The haemorrhages varied in different cases from punctiform to ecchymotic types. These findings corresponded well with the findings reported by Love and Love (1979) <sup>[19]</sup>, Niilo (1988) <sup>[24]</sup>, Bolfa *et al.* (2013) <sup>[5]</sup> and Sreevidya (2017) <sup>[32]</sup>. Microscopically, there was marked haemorrhage along with infiltration of lymphocytes and few neutrophils in mucosa (Fig.3). Almost similar findings were reported by Niilo (1988) <sup>[24]</sup>, Bolfa *et al.* (2013) <sup>[5]</sup> and Sreevidya (2017) <sup>[32]</sup>.

Haemorrhagic enteritis in the present study may be caused by many etiological factors. It may be due to bacteria such as *Clostridium perfringens* (Niilo, 1988) <sup>[24]</sup>, *Lawsonia*

*intracellularis* (Bolfa *et al.*, 2013) <sup>[5]</sup>, *Escherichia coli* (Asopa *et al.*, 2015) <sup>[4]</sup>. Sometimes, it may be due to *Schistosoma japonicum* infection (Carmencita *et al.*, 1984) <sup>[6]</sup>.

### Necrotic enteritis

This condition was recorded in 4.23 per cent cases in present study. A lower incidence was reported by Dutta *et al.* (2007) <sup>[8]</sup> as 2.1 per cent. The gross findings such as greyish-white necrotic foci were present in intestine was in close approximation to the observation reported by Rajan *et al.* (1975) and Narita *et al.* (1984) <sup>[23]</sup>. Microscopically, there was necrosed villi and severe lymphocytic infiltration with mild fibrosis in submucosa (Fig.4) was in agreement with the observation of Zlotowski *et al.* (2008) <sup>[35]</sup>, Zlotowski *et al.* (2009) <sup>[36]</sup> and Posthaus *et al.* (2020) <sup>[26]</sup>.

This condition may occur by many etiological agents such as bacteria like *Clostridium perfringens* (Posthaus *et al.*, 2020) <sup>[26]</sup>. Viruses like Herpes virus (Narita *et al.*, 1984) <sup>[23]</sup>, classical swine fever virus (Kumar *et al.*, 2007) <sup>[16]</sup> and Porcine circo virus 2 (Zlotowski *et al.*, 2009) <sup>[36]</sup>.

### Necro-haemorrhagic enteritis

This condition was recorded in 3.52 per cent cases in present study. Grossly, the affected part of intestine showed patchy necrotic areas along with haemorrhage. Almost similar findings were reported by Perez *et al.* (1999) <sup>[25]</sup> and Bolfa *et al.* (2013) <sup>[5]</sup>. Microscopically, the affected part of intestine showed necrosed tip of villi with mild haemorrhages and lymphocytic infiltration in mucosa (Fig.5) were in close conformity with the observation of Segales *et al.* (2001) <sup>[30]</sup>, Zlotowski *et al.* (2009) <sup>[36]</sup> and Posthaus *et al.* (2020) <sup>[26]</sup>.

We can conclude that in present study necro-haemorrhagic enteritis may be due to bacterial infection such as *Salmonella chlorerasuis* (Perez *et al.*, 1999) <sup>[25]</sup>, *Lawsonia intracellularis* (Segales *et al.*, 2001) <sup>[30]</sup>, *Clostridium perfringens* (Posthaus *et al.*, 2020) <sup>[26]</sup> and virus like porcine circo virus 2 (Zlotowski *et al.*, 2009) <sup>[35]</sup>.

### Fibrinous enteritis

This condition was recorded in 0.70 per cent cases in present study. Grossly, there was a thick, grey or whitish grey membrane covering the intestinal mucosa was observed. These findings corresponded well with the earlier reports of Songer and Uzal (2005) <sup>[31]</sup>, Sanz *et al.* (2007) <sup>[28]</sup> and Irimie *et al.* (2010) <sup>[11]</sup>. Microscopically, there was deposition of fibres along with leukocytic infiltration in submucosa. Intestine revealed greenish coloured fibrous tissue bands with Masson's Trichrome stain (Fig.6). Almost similar finding was observed by Songer and Uzal (2005) <sup>[31]</sup>.

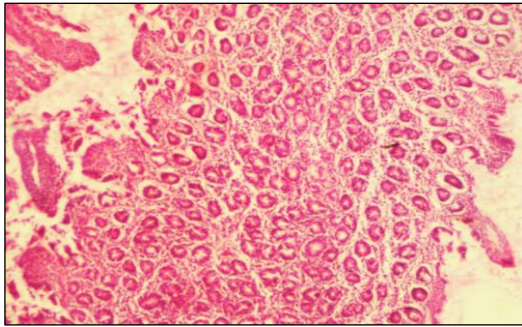
Fibrinous enteritis, in the present study might be caused by chronic bacterial infection such as *Clostridium perfringens* type-C (Songer and Uzal, 2005) <sup>[31]</sup> salmonella spp. (Irimie *et al.*, 2010) <sup>[11]</sup>.

### Eosinophilic enteritis

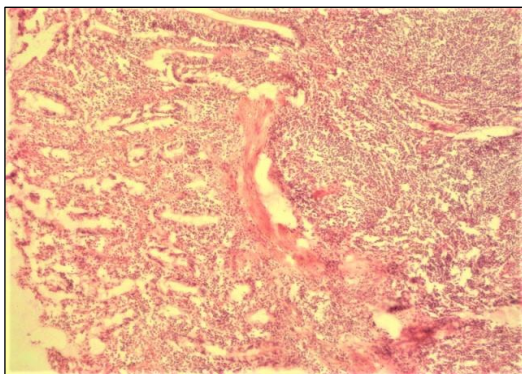
This condition was recorded in 0.70 per cent cases in present study. Grossly, intestinal wall becomes swollen, edematous and thick as compared to normal was in agreement with the earlier observations of Sarma and Gogoi (1986) <sup>[29]</sup>, Meena (2010) <sup>[22]</sup>, Kumar *et al.* (2015) <sup>[17]</sup> and Asopa (2019) <sup>[3]</sup>. Microscopically, eosinophilic infiltration along with hyperplastic goblet cells was in close conformity with the observation of Gaurat and Gatne (2009) <sup>[10]</sup>.

We can conclude that in present study necro-haemorrhagic

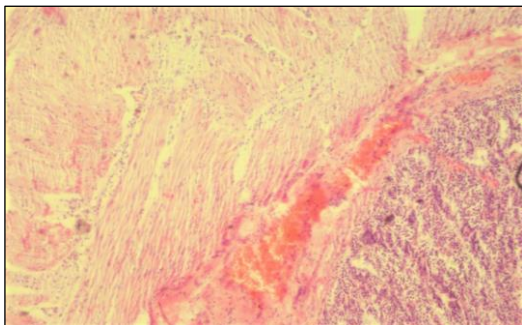
enteritis may be due to gastrointestinal helminth infestation such as *Ascaris suum* (Islam *et al.*, 2008) <sup>[12]</sup>, *Fasciola buski* and *Artyfechinostomum sufrartyfex* (Gaurat and Gatne, 2009) <sup>[10]</sup>.



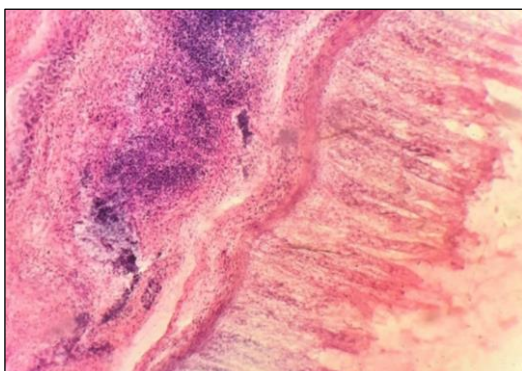
**Fig 1:** Microphotograph of intestine showing hyperplasia of goblet cells along with severe cellular infiltration mainly of neutrophils and few lymphocytes. H&E. 100X



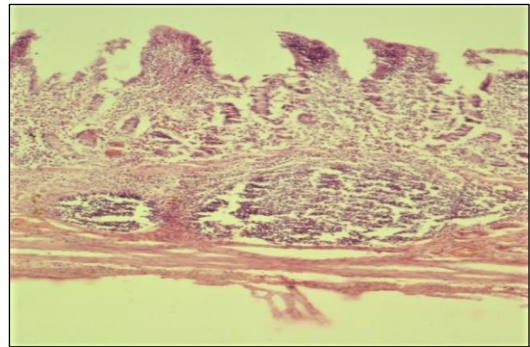
**Fig 2:** Microphotograph of intestine showing strands of fibrin with severe infiltration of lymphocytes and few neutrophils in mucosa. H&E. 100X



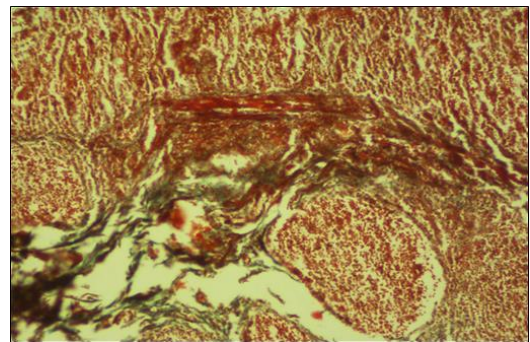
**Fig 3:** Microphotograph of intestine showing marked haemorrhage along with infiltration of lymphocytes and few neutrophils in mucosa. H&E.100X



**Fig 4:** Microphotograph of intestine showing necrosed villi and severe lymphocytic infiltration with mild fibrosis in submucosa. H&E.100X



**Fig 5:** Microphotograph of intestine showing necrosed tip of villi with mild haemorrhages and lymphocytic infiltration in mucosa. H&E.100X



**Fig 6:** Microphotograph of intestine showing deposition of fibres along with leukocytic infiltration in submucosa. Masson's Trichome stain.100X

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