



Original Research

Outbreak of Intestinal Coccidiosis Due to *Eimeria Necatrix* in Rajasree Birds: Patho-Morphological and Electron Microscopic Study

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Abstract

Intestinal coccidiosis (*Eimeria necatrix*) was diagnosed in Rajasree birds of 16 week age presented for routine postmortem examination at Department of Pathology, C. V. Sc., Hyderabad. Clinically, birds showed soiling of feather with faeces around vent, mucoid bloody dropping and mortality of 51 birds out of 448 birds (11.38%) over three weeks period. Gross examination of birds showed pale muscle and severe dehydrated carcass. Intestine, particularly jejunum and ileum was ballooned and dull in colour with petechiae on serosa. Upon opening the intestine, mucosa was thickened and reddish in colour and the lumen was filled with blood tinged exudate. Microscopically, mucosa and sub mucosa of ileum and jejunum showed numerous schizonts along with infiltration of eosinophils and lymphocytes. Direct smear examination of caecal contents from dead birds revealed 2-3 oocyst per high power field with an average length and width around 24.45 μ m and 18.41, respectively.

Key words: *E. necatrix*, Histopathology, Intestinal Coccidiosis, SEM & TEM, Rajasree Birds

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Introduction

Avian coccidiosis has been considered as one of the economically important diseases in chicken caused by the intracellular protozoan parasite of *Eimeria species* (Taylor *et al.*, 2007). Although nine species of *Eimeria* have been identified in chickens, only seven of them have been reported to be pathogenic (Kahn, 2008; McDougald & Fitz-Coy, 2008). *Eimeria tenella* (*E. tenella*) and *Eimeria necatrix* (*E. necatrix*) are considered as the most pathogenic species (Soulsby, 1982). Despite of advances made in the field of



diagnosis in prevention, treatment and control through managerial and nutritional practices, avian coccidiosis remains one of the major diseases in chicken (Graat *et al.*, 1996).

Johnson (1930) first described intestinal coccidiosis due to *E. necatrix* species but only gave information on site of infection and some measurements for the asexual stages. Tyzzer *et al.* (1932) were the first to provide measurements as well as detail description on clinical sign, gross and histopathology lesions due to *E. necatrix*. In recent study, Soomro *et al.* (2001) and Patra *et al.* (2009) studied gross and histopathological features of intestinal coccidiosis due to *E. necatrix* and reported ballooning of intestine, petechiae on serosal surface and severe diffuse haemorrhages to petechiae on mucosal surface. Intestinal lumen was filled exudate mixed with blood on gross examination. Histopathological examination revealed odema, thickening of intestine with necrosis and sloughing of mucosa. In addition, Patra *et al.* (2009) reported depression, anorexia and bloody mucoid diarrhea with 20 sick birds out of 100 birds due to *E. necatrix* and 10 birds died out of 20 ailing birds during outbreak.

In view of these facts, present paper discusses an outbreak of intestinal coccidiosis due to *E. necatrix* in 16 weeks old flock. A detailed gross, microscopic and electron microscopic pathology of intestinal coccidiosis was discussed.

Material and Methods

Case History and Pathological Examination

A sudden increase in mortality in a flock of 16 week old of Rajasree birds were recorded in Poultry Research Station of the College and presented for post-mortem examination at Department of Pathology, C. V. Sc., Rajendranagar, Hyderabad. History reveals that the birds were kept in deep litter system of management. Clinically birds showed pale comb/ loss of skin pigmentation of shank, soiling of feather around vent and mucoid bloody dropping which were noticed on litter. The totals of 51 birds out of 448 birds (11.38%) were died over three week period. Gross lesions were recorded during routine examination and representative tissue samples (intestine, liver and kidneys) were collected in 10 % formalin for histopathological examination and in 2.5% Glutalaldehyde for Transmission Electron Microscopy and performed as per the standard protocol.

Parasitic Examination

The contents from caeca and cloaca were collected separately for parasitological examination and examined by direct smear method. The oocyst were separated by floatation technique. Morphometric analyses of oocyst were carried out. Species of *Eimeria* were identified by combination of microscopic features of oocyst morphology (shape and size), location of parasite in tissue and the nature of gross and histopathological lesions (Soulsby, 1982; McDougald & Fitz-Coy, 2008).

Result and Discussion

Intestinal coccidiosis due to *Eimeria necatrix* was diagnosed in Rajasree birds of 16 week age based on morphometry of oocyst, location of lesion, gross, histopathological and electron microscopic study. Clinically birds showed mucoid bloody dropping, pale comb/ loss of skin pigmentation of shank and mortality of 51 birds out of 448 birds (11.38%) over three week period. Gross examination revealed soiling of feather with blood tinged faeces around vent, pale muscle and severely dehydrated carcass. Intestine, particularly jejunum and ileum was severely ballooned and dull in colour with petechiae on serosa (Fig.1). Upon opening the intestine, mucosa was thickened, reddish in colour and the lumen was filled with blood tinged exudate (Fig. 2).



Fig. 1: Intestine showing extensive ballooning with petechiae on serosal surface **Fig. 2:** Intestine showing blood tinged content

The caeca did not show any gross lesions. However, direct smear examination of caecal content from dead birds revealed 3-5 oocyst per high power field (HPF). The morphometric analysis of oocyst showed average length of 24.45 μm and width of 18.41. Microscopically, section of intestine showed sloughing of epithelial cell, accumulation of large number of RBCs, exudate along with different coccidial stages in lumen. Mucosa and sub mucosa of ileum and jejunum showed infiltration of inflammatory cells viz. eosinophils and lymphocytes along with numerous schizonts (Fig. 3).

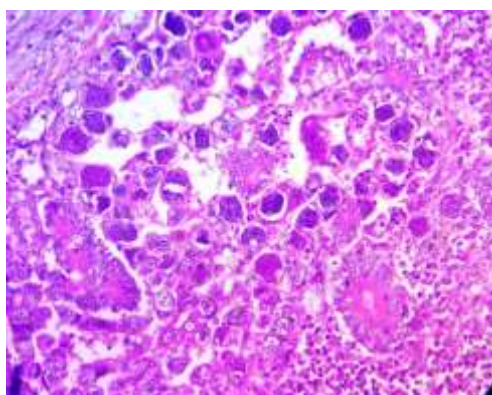


Fig. 3: Intestinal mucosa and sub mucosa showing Schizonts stages (HE X 400x)

The schizonts were round to oval in shape and were found in bunches. Due to extensive denudation and erosion of mucosa and sub mucosa at some part of intestine showed remaining epithelium to undergo proliferative changes. The morphometric analysis of schizonts in tissue section showed average length of 38.88 μm and width of 29 μm (Length range-36.91 to 41.17 μm and width range- 23.56 to 34.44 μm). Transmission Electron Microscopic study of section of intestine revealed numerous round to oval shaped schizont containing few to numerous round to elongated and varied size meronts (Fig. 4). Section also showed accumulation of red blood cells and inflammatory cells. Based on gross, light microscopic, morphometric analysis of oocyst and EM lesion of intestine, the disease was confirmed as intestinal coccidiosis due to *E. necatrix*.

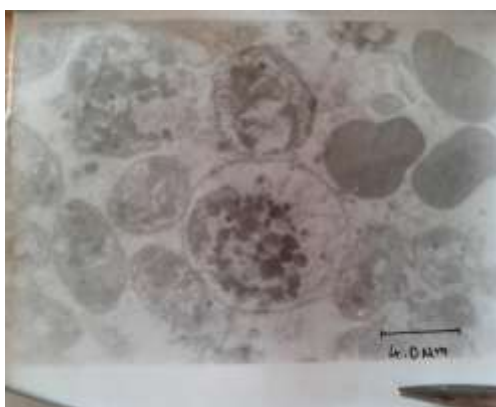


Fig. 4: TEM- Schizont containing few to numerous round to elongated and varied size meronts (Magnification-4825X)

In spite of revolutionary progress made in diagnosis and control of avian coccidiosis, it is still challenging disease and placed among important economic disease of poultry. The annual losses worldwide due to avian coccidiosis is estimated to be at around \$800 million (Williams, 1999). In the present investigation, the outbreak of coccidiosis was recorded at 16 week age. McDougald & Fitz-Coy (2008) also reported that coccidiosis due to *E. necatrix* mostly occur in older birds of 9-14 weeks possibly due to low reproductive capability of parasite, it fail to compete with other coccidian and hence diagnosed mostly in older birds. Mortality started due to accidental flooding of rain water into the shed which could have been the predisposing factor for occurrence of this outbreak. The clinical signs viz. bloody mucoid diarrhea, loss of skin pigmentation of shank and mortality observed in the investigation are akin to those earlier reports (Tyzzer *et al.*, 1932; McDougald & Fitz-Coy, 2008; Shiferaw, 2006).

The gross and histopathological changes observed in the present investigation are in agreement with observations recorded earlier in coccidiosis due to *E. necatrix* (Tyzzer *et al.* (1932); Soomro *et al.* (2001); Patra *et al.* (2009) McDougald & Fitz-Coy, 2008; Williams, 1999; Shiferaw, 2006). The similarity in the lesions caused by *E. maxima* and *E. necatrix* infections and part of intestine affected as well as lesions due



to necrotic enteritis pose a challenge in differential diagnosis of these diseases (McDougald & Fitz-Coy, 2008). Moreover, published literature suggest that, the gametogony of *E. necatrix* occur in caeca and oocyst shedding without any lesion in caeca which is characteristic feature of *E. necatrix* was also noticed in the present investigation. This characteristic feature is also used for identification of *E. necatrix* from other species of chicken coccidia (McDougald & Fitz-Coy, 2008).

Conclusion

In conclusion, present paper describe the outbreak intestinal coccidiosis due to *E. necatrix* in a 16 week old Rajasree birds and recorded 11.38% mortality over three week period. A detail gross, histopathology and electron microscopy study in intestinal coccidiosis due to *E. necatrix* has been described and discussed.

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