

Pathomorphology of Coccidiosis (*Eimeria dunsingi*) in a Chatter of Budgerigars

Saahithya, R.*, B. Prakash Krishna, S. Jaisree, G. Balakrishnan, C. Soundararajan and A. Shanmugasundaram

Central University Laboratory, Centre for Animal Health Studies, TANUVAS, Chennai – 51, Tamil Nadu, India

*Email: saahithya.r@gmail.com

Received: March 2024

62/24

Accepted: November 2024

ABSTRACT

Six budgerigars (*Melopsittacus undulatus*) from an organised farm were presented for postmortem examination with a history of sudden mortality. Postmortem examination revealed poor carcass condition with brown, pasty contents adhering around the vent. Visible mucous membranes were pale. Internal examination revealed diffuse congestion of the heart, lungs, liver, kidney and spleen. The crop was empty. The entire length of the intestine revealed mild ballooning with the presence of brown coloured contents in the lumen. The mucosa was highly congested. The intestinal contents were scraped, and wet mount examination was performed. Microscopically, numerous unsporulated ovoid colourless oocysts without a micropyle were observed, which were suggestive of *Eimeria dunsingi* (*E. dunsingi*). Histopathological examination of the intestine confirmed the presence of various stages of *E. dunsingi* within the villi and adjacent to the crypts. There were multifocal haemorrhages in the lamina propria with desquamation of villi and the presence of numerous mononuclear inflammatory cells. The case was confirmed as Coccidiosis, and relevant treatment was advised to the farm.

Keywords: Budgerigars, Coccidiosis, *Eimeria dunsingi*, Pathomorphology

INTRODUCTION

Coccidiosis primarily affects the intestinal system of mammal and bird species. It is caused by the parasites of the genus *Eimeria* and *Isospora*, which belong to the phylum

Apicomplexa and have a complex life cycle (Peek and Landman, 2011). Haemorrhagic diarrhoea, depression, emaciation, weight loss and sometimes death are the sequelae of this disease (Hiepe and Jungman, 1983; Levine, 1985; Mimioglu *et al.*, 1969). All bird species are susceptible to the protozoan illness coccidiosis (Levine, 1985). Coccidiosis in pet birds is caused by various species *viz.*, *E. dunsingi*, *E. haematodi*, *I. psittaculae*, *I. serini* and *I. lacazei* have been identified in pet birds (Black *et al.*, 1997; Inci, 2001; Ritchie *et al.*, 1994), of which *E. dunsingi* is the only known pathogenic species affecting budgerigars (Greve, 1996).

To determine the cause, oocysts observed in faeces taken from living birds or during necropsy are observed microscopically. Also, oocysts can be initially concentrated by flotation using Sheather's sugar or ordinary zinc sulphate (Yabsley, 2008). Histopathological examination is done for further confirmation of this disease. This report aims to document the pathomorphology of coccidiosis due to *E. dunsingi* in a group of budgerigars and its histopathological confirmation.

MATERIALS AND METHODS

Six budgerigars (*Melopsittacus undulatus*) of about 6 months of age, among which 4 were males, and 2 were females (Fig. 1), from an organized farm with a total stock of 45 birds, were presented for postmortem examination to the Central University Laboratory, Centre for Animal Health Studies, TANUVAS, Chennai. The owner reported that the birds were dull, depressed, with watery diarrhoea

for the past 3 days. The birds collapsed suddenly. External examination revealed the presence of brown, pasty contents adhering around the vent (Fig. 2). The post-mortem examination was carried out, and the intestinal contents were scraped out. Faecal examination using wet mount and routine saturated salt floatation was performed. Identification and measurement of the oocyst were made according to morphological characteristics (Inci, 2001; Levine and Ivens, 1986). For histopathological examination, the intestinal tissue samples were collected, fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned stained with Haematoxylin and Eosin (H&E) (Suvarna *et al.*, 2018), and the tissue stages were identified (Zachary and McGavin, 2012).

RESULTS AND DISCUSSION

Gross external examination of the carcass revealed poor bodily condition. Visible mucous membranes were blanched. Brown, pasty contents adhered to the vent. Internal examination revealed diffuse congestion of the heart, lungs, liver, kidney, and spleen. The crop was empty. The entire length of the intestine revealed mild ballooning with the presence of brown-colored contents in the lumen. The mucosa was highly congested. Examination of the faecal sample revealed numerous unsporulated ovoid oocysts with a zygote, and without a micropyle. The size of captured oocysts was measured by ocular micrometre. They measured about $33 \times 23 \mu\text{m}$ (Fig. 3). This was in accordance with the morphological characteristics (Shape, size, existence or non-existence of structural constituents like micropyle and polar granule) documented by Bowman (1995), Schmidt *et al.* (1989), Shirley (1992) and Patton (1993) and Greve (1996). The oocysts were suggestive of *E. dunsingi*.

Histopathological examination of the intestine revealed the presence of unsporulated oocysts within the villi and around the crypts (Fig. 4). There were

multifocal haemorrhages in the lamina propria with desquamation of villi and the presence of numerous mononuclear inflammatory cells (Fig. 5). These findings are in accordance with the findings of Ozmen *et al.* (2013). Based on the postmortem findings, examination of the faecal contents and histopathological examination, the case was confirmed as Coccidiosis due to *E. dunsingi*. The owner was advised to treat the remaining birds with amprolium at a dose of 30 grams in 50 litres of water in the drinking water. Vitamin and mineral supplementation with haematinics were also advised for supportive care. This was found to be effective in controlling further mortality. Advice was given to remove the bedding material and to clean the soiled contents. After one month, a follow-up was made, and the budgerigars were clinically examined for their bodily condition. The droppings were collected, and faecal wet mount examination was conducted to rule out the presence of any unsporulated oocysts or eggs. All the birds showed negative results, and no further morbidity or mortality was reported. Prevention by reducing crowding in the cages or stress may be a more effective approach to reduce or prevent outbreaks of coccidiosis in birds (Atkinson, 2009). Birds were given proper cage space, and stress was minimized by timely management and care.

SUMMARY

This paper describes the incidence, postmortem examination, parasitological and histopathological examination of *E. dunsingi* in a group of budgerigars and its subsequent treatment and prophylactic measures. The importance of coccidiosis in budgerigars stems from its potential to cause significant morbidity and mortality within aviaries or pet bird populations. Early detection and treatment are vital in managing coccidiosis in budgerigars. Improving the birds' overall health through a balanced diet and adequate hydration can help bolster their immune response against coccidiosis.

REFERENCES

- Atkinson, C.T., N.J. Thomas and D.B. Hunter (2009), *Edi. Parasitic diseases of wild birds*, John Wiley & Sons.
- Black, S.S., L.A. Steinohrt and L.B. Bertucci (1997), Encephalitozoon hellem in budgerigars (*Melopsittacus undulatus*), *Vet. Pathol.*, **34**: 189-198.
- Bowman, D.D. (1995), Protozoans, in Georgis, Parasitology for veterinarians (ed 6). Philadelphia, PA, Saunders, pp. 83-111.
- Greve, J. H. (1996), Gastrointestinal parasites, Roskopf, W.J. and R.W. Woerpel, ed. Diseases of cage and aviary birds, 3rd ed. Baltimore: William & Wilkins, pp.613-619.
- Hiepe, T. and R. Jungman (1983), Veterinärmedizinische Protozoologie. Lehrbuch der parasitologie band 2, Stuttgart, New York: Gustav Fischer Verlag.
- Inci, A. (2001), ördekvekuşlarda Coccidiosis. Dinçer S, ed. Coccidiosis. Izmir: Türkiye Parazitoloji Derneği Yayın No. 17: 177-199.
- Levine, N.D. and V. Ivens (1986), The Coccidian parasites (protozoa, apicomplexa) of artiodactyla. Illinois Bio. Monogr. 55. Urbana and Chicago: Illinois University Press
- Levine, N.D. (1985), Veterinary protozoology, 1st ed. Ames, Iowa: Iowa State Univ. Press, pp. 130-218.
- Mimioglu, M, K. Goksu and F. Sayın (1969), Veterinervetibbiprotozooloji II. Ankara: Ankara Universitesi Basimevi.
- Ozmen, O., A. H. M. E. T. Aydogan, M. E. H. M. E. T. Haligur, R. Adanir, O. Kose and S. Sahinduran, S. (2013), The pathology of *Macrorhabdus ornithogaster* and *E. dunsingi* (Farr, 1960) infections in budgerigars (*Melopsittacus undulatus*), *Israel Journal of Veterinary Medicine*, **68**(4): 218-224.
- Patton, S. (1993), An overview of avian coccidia, Scientific Proceedings of the Annual Conference of the Association of Avian Veterinarians, Nashville, TN, pp 47-51.
- Peek, H.W. and W.J.M. Landman (2011), Coccidiosis in poultry: anticoccidial products, vaccines and other prevention strategies, *Vet. Quart.*, **3**: 143-161.
- Ritchie, B.W., G.J. Harrison and L.R. Harrison (1994), Avian medicine: Principles and application. Lake Worth, FL: Wingers Publishing Inc, pp. 482-521.
- Schmidt, G.D., L.S. Roberts in Brake, D.K. (ed): Foundations of Parasitology (ed 4). St Louis, MO, Times Mirror/Mosby, 1989, pp 114-138
- Shirley, M.W. (1992), Research on avian coccidia: an update, *British Veterinary Journal*, **148**(6): 479-499.
- Suvarna, K. S., C. Layton and J.D. Bancroft (2018), Bancroft's theory and practice of histological techniques. Elsevier Health Sciences.
- Yabsley, M.J. (2008), Eimeria, in Atkinson, C.T., N.J. Thomas and D.B. Hunter, ed. Parasitic diseases of wild birds. Singapore: Wiley-Blackwell, pp. 162-180.
- Zachary, J. F. and M.D. McGavin (2012), Ed. Pathologic Basis of Veterinary Disease. Elsevier Health Sciences.



Figure 1: Budgerigars – Debilitated and dehydrated carcass



Figure 2 : Budgerigars – Diarrhoeic droppings adhered around the vent

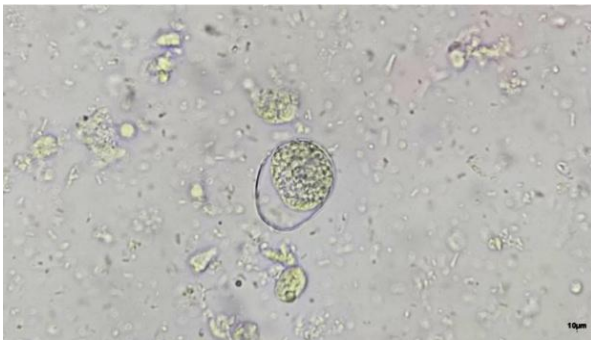


Figure 3: Microscopic examination of faecal contents - An unsporulated ovoid oocyst without micropyle of Eimeria dunsingi

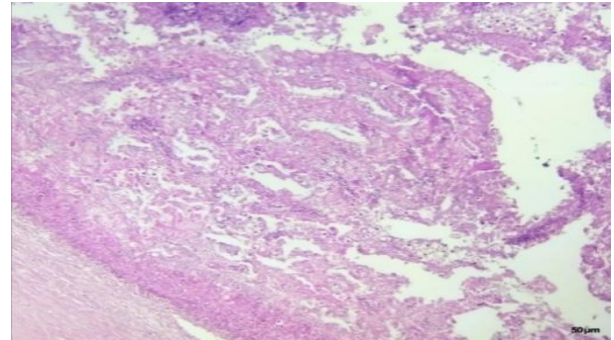


Figure 4: Histopathology - Diffuse necrosis of epithelial cells, multifocal haemorrhages with numerous oocysts of Eimeria sp. (H&E 20x)

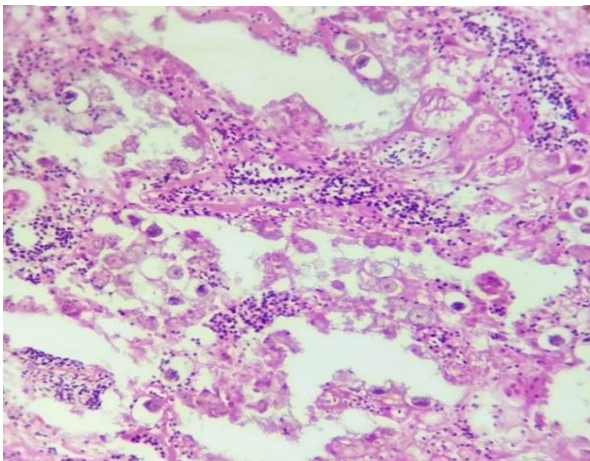


Figure 5: Budgerigar – Intestine - Histopathology – Diffuse hemorrhages in the lamina propria and mucosa, necrosis and sloughed off epithelial cells with presence of numerous oocysts of Eimeria sp. (H&E 40x)