

## **Histopathological Lesions of Coccidiosis Natural Infestation in Chickens**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors VBO and IJB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DYG and TPPC managed the analyses of the study. Author UMA managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Coccidiosis is a disease that is caused by protozoan parasite belonging to the subclass coccidia and family Eimeridae, developing within the intestine of most domestic and wild animals and birds. Seven species of *Eimeria* (*E. acervulina*, *E. brunetti*, *E. maxima*, *E. mitis*, *E. necatrix*, *E. praecox* and *E. tenella*) are recognized as infecting chickens. This study is part of the diagnostic investigations carried out to record the incidence of coccidiosis in chickens from different poultry farms sent to Central Diagnostic Laboratory of National veterinary research institute Vom Nigeria for diagnosis. The clinical signs observed include greenish, yellowish, brown bloody stool, inactivity, off feed, weight lost, huddling, drop in feed intake, drop in production, emaciation, comb and wattles pale, anemia and sudden death. Gross lesions include ballooned and haemorrhagic intestine while histopathological lesions revealed loss of epithelial tissue, congestion of blood vessels which indicated disruption followed by leakage of blood, severe mucosal oedema, necrosis of submucosa, loss of villi and marked haemorrhages, presence oocyst within the intestinal villi and lymphoid cells showing hyperplasia. It can be concluded that clinical signs, gross and histopathological examination can be used as a tool for diagnosis of coccidiosis.

**Keywords:** Chickens; coccidiosis; histopathology.

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## 1. INTRODUCTION

Coccidiosis is a disease that is caused by protozoan parasite belonging to the subclass coccidia and family *Eimeridae*, developing within the intestine of most domestic and wild animals and birds. Seven species of *Eimeria* (*E. acervulina*, *E. brunetti*, *E. maxima*, *E. mitis*, *E. necatrix*, *E. praecox* and *E. tenella*) are recognized as infecting chickens. Although coccidiosis is a disease known for many years, it is still considered as the most economical important parasitic condition affecting poultry production worldwide [1]. Coccidia are one group of protozoa that affect many animal and avian species. Infection by these protozoa lead to severe intestinal disease known as coccidiosis causing weight loss, diarrhoea, ill-thrift and death [2,3]. Avian coccidiosis is classified into caecal and intestinal forms. Caecal coccidiosis is an acute disease characterized by diarrhoea and massive caecal haemorrhages. It is caused by *Eimeria tenella* [4,3]. Similarly, intestinal coccidiosis is caused by *E. necatrix* [5]. Coccidiosis presented an aggregate dispersion pattern and seasonal variations in infestation levels, influenced by the environmental conditions in the rainy season. Variation in the coccidiosis dynamics created overall changes in the bird flocks, characterized by greater diversity, species richness and evenness during the rainy season. There high prevalence of coccidiosis in the rainy seasons than in dry seasons due to wetness of bird pens in lackage roofs [6]. The agewise prevalence of coccidiosis was the highest (48%) in the 31-45 days age group and the least (6%) in 0-15 day's age group of layers. The coccidiosis was found highly prevalence in mud/ mud + brick type floor than in concrete type floor farms [7]. It has been reported as the most common pathogenic and chronic form occurring in the domestic poultry among all these species. In this form, lesions are distributed throughout the length of the intestine, but, most common in the middle portion of the small intestine. In acute form, severe unclotted blood may be observed. Flocks infected as a result of mild to severe exposure usually shows a marked decrease in food and water consumption and birds become depressed and tend to huddle and weight loss may noticed [8]. The weight loss may occur as a result of the disruption of the intestinal mucosa where minimal absorption is taking place. The lesion of coccidiosis depends on the degree of inflammation and damage to the intestinal tract resulting in diarrhea and consequently dehydration. Lesions of the intestinal mucosa

and loss of pigmentation may also become apparent during the latter stages of infection [9,10,11,2,3]. Major pathological manifestations of coccidiosis clinically can be observed as haemorrhage, malabsorption, diarrhoea and reduction in body weight gain [12,3].

Due to the difficulties encountered during diagnosis, Coccidiosis is still a major problem worldwide. To; identify different species by the morphology of the oocysts can be challenging and it requires trained personnel [13]. However, the diagnosis of coccidiosis can be achieved based on clinical signs, coprology and pathomorphological and pathohistological analysis [14,15]. The significance of the pathological findings is very relevant which is based on the macroscopic and histopathological damages to the intestines. So the aim of this study is to diagnose Coccidiosis using clinical and histopathological approaches.

## 2. MATERIALS AND METHODS

The findings reported in this study are part of the diagnostic investigations carried out to record the incidence of coccidiosis in poultry chicken from different poultry farms sent to Central Diagnostic Laboratory for diagnosis. Clinical histories and signs were recorded. Postmortem was then conducted and the lesions were recorded and fresh faecal analysis from the intestinal contents were carried out to examine for oocysts and sporozoites using the method described by Adams et al. [16].

### 2.1 Histopathological Procedure

Tissues from intestine and caeca were harvested with the aid of scalpel blade and forceps. Then fixed in 10% neutral buffered formalin solution. They were allowed to fix properly before processing with ascending grades of ethyl alcohol. Then cleared with two changes of xylene. The tissues were then infiltrated in molten paraffin wax and then embedded. Tissue blocks were sectioned at 5 microns thickness, stained with Haematoxylin and Eosin [17].

### 2.2 Heamatoxylin and Eosin Staining Technique Procedure

The sections were hydrated through descending grades of alcohol, stained in Harris Heamatoxylin for 2 min rinsed in H<sub>2</sub>O, differentiated in 1% acid alcohol briefly, blued in scott's top water for 2 min, Counter stained in 1% aqueous eosin for 1

min, rinsed in water. The sections were then dehydrated through ascending grades of alcohol, cleared with xylene and mounted in distrene polystyrene xylene (DPX). The slides were then examined with the light microscope and the photomicrographs recorded accordingly.

### 3. RESULTS AND DISCUSSION

#### 3.1 Clinical Findings

The clinical findings were observed and recorded for all the sick chickens and they include greenish, yellowish, brown bloody stool, inactivity, off feed, weight lost, huddling, drop in feed intake, drop in production emaciation, comb and wattles pale, anemia and sudden death; this is in agreement with previous reports [12,4].

#### 3.2 Post - Mortem Lesions (Gross Pathology)

Coccidiosis was determined through demonstration of postmortem lesions recorded in dead birds. The postmortem revealed the lesions of intestinal and caecal forms of coccidiosis.

In case of intestinal form, external ballooned intestine and petechial hemorrhages could be

seen while looking grossly without opening the gut which is similar to the findings of several authors [18,5,19].

In case of caecal coccidiosis, enlargement of caecum with clotted blood, haemorrhages were observed. On opening the caeca, the bloody mass, a characteristic of caecal coccidiosis was found, similar to the reports of several authors [20,21,18,22,3].

#### 3.3 Histopathological Lesions

Histopathological lesions in case of caecal form revealed loss of epithelial tissue, congestion of blood vessels which indicated disruption followed by leakage of blood, severe mucosal oedema, necrosis of submucosa, loss of villi and marked haemorrhages and lymphoid cells showing hyperplasia. Also, chicken caecum and intestine showing *Eimeria* oocyst (Fig. 1). In case of intestinal forms, lesions were found in the form of complete detachment of the mucosal layer from sub-mucosal layer. Also chicken intestine showing sloughing of the villi and *Eimeria* oocyst, decreased of villa height in addition to cancerous necropsy and fatty decomposition were observed (Figs. 2 and 3), this is similar with the reports of previous researchers [14,15].

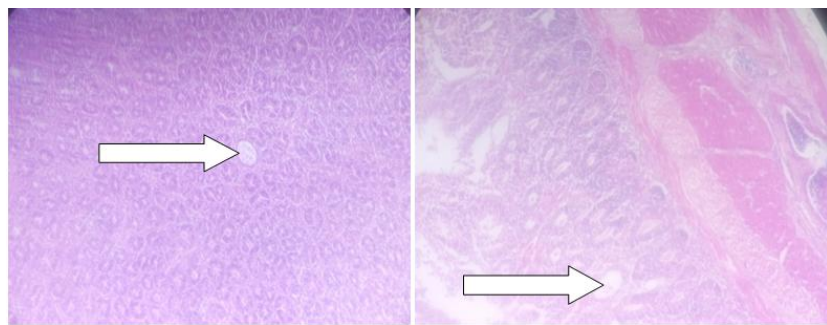


Fig. 1. Photomicrograph of chicken caecum and intestine showing *Eimeria* oocyst

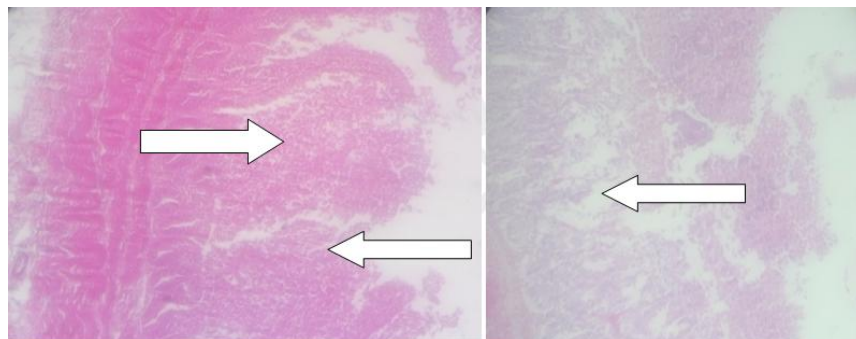
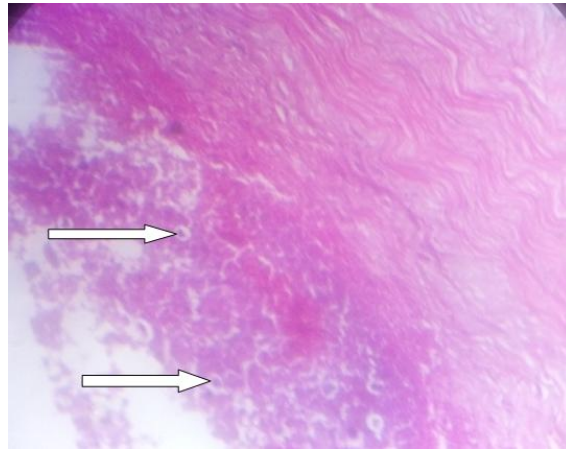


Fig. 2. Photomicrograph of chicken intestine showing sloughing of the villi



**Fig. 3. Photomicrograph of chicken intestine showing sloughing of the villi and Eimeria oocyst**

#### 4. CONCLUSION

The clinical signs observed include greenish, yellowish, brown bloody stool, inactivity, off feed, weight lost, huddling, drop in feed intake, drop in production, emaciation, comb and wattles pale, anemia and sudden death. Gross lesions include ballooned and haemorrhagic intestine while histopathological lesions revealed loss of epithelial tissue, congestion of blood vessels which indicated disruption followed by leakage of blood, severe mucosal oedema, necrosis of submucosa, loss of villi and marked haemorrhages, presence oocyst within the intestinal villi and lymphoid cells showing hyperplasia. It can be concluded that clinical signs, gross and histopathological examination can be used as a tool for diagnosis of coccidiosis.

#### ETHICAL APPROVAL

Animal Ethic committee approval has been taken to carry out this study.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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