*Original Research*

# Lymphoid Leucosis and Marek's Disease in Chicken – Gross and Histopathological Studies

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**Abstract**

*Study of occurrence of Lymphoid leucosis (LL) and Marek's disease (MD) in chicken was taken up in Department of Veterinary Pathology, College of Veterinary Science Rajendranagar, Hyderabad. 2,157 birds were presented to post-mortem examination to the department; out of 2157 carcasses, 393 (18.22%) cases showed the lesions of neoplastic conditions; Out of these positive cases, 281 (13.08%) were diagnosed as MD and remaining 112 (5.20%) were LL. These conditions were diagnosed based on gross and histopathological changes. Grossly, diffused enlargement of liver, kidneys and spleen with white foci were noticed in LL; there was enlargement of liver, kidney, spleen, proventriculus and thickening of nerves in MD. Microscopically, diffuse proliferation and infiltration with uniform neoplastic lymphoblast cells were noticed in various visceral organs in LL and pleomorphic in MD.*

**Key words:** Chicken, Gross, Histopathological Studies, Lymphoid Leucosis, Marek's Disease

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## Introduction

Avian leucosis is a group of diseases of chicken comprises of lymphoid, erythroid, myeloid leucosis, Other tumours such as fibroma, haemangioma, nephroblastoma and Osteopetrosis. Avian leucosis is prevalent throughout the world. Lymphoid leucosis is the commonest neoplastic condition in chicken caused by avian leucosis virus (ALV) usually occurs between 14th to 30th week of age. Incidence is highest at about sexual maturity (Vegad and Katiyar, 2001) which induces lymphoma in chicken called Lymphoid leucosis (LL) (Pizer and Humpheries, 1989). Marek's disease (MD) is a lymphoproliferative disease of chicken caused by MD herpes virus (MDV) and is characterized by lymphoma formation in visceral organs, muscles, skin and lesions in peripheral nerves (Calnek and Witter, 1991). These two avian neoplastic diseases are responsible for economic loss due to both mortality and depressed performance (Panda, 1983). Hence, the

present study was designed to know the diagnosis and differential diagnosis of these two most important conditions based on impression smears, gross and histopathological examination.

**Materials and Methods**

A total of 2,157 chicken carcasses of various age groups were presented for post-mortem examination to Department of Veterinary Pathology, College of Veterinary Science, Rajendranagar. A detailed post-mortem examination of all dead birds was performed, the gross lesions were carefully recorded. Out of 2157 carcasses, 393 (18.22%) cases showed neoplastic growths on various visceral organs like liver, spleen, kidney, heart, proventriculus. These organs were collected in 10% neutral buffered formalin for histopathological examination. Formalin fixed tissues were washed under running tap water, dehydrated in ascending grades of alcohol, cleared in xylene and embedded in paraffin. Then 5µm thin sections were made and stained with Hematoxylin and Eosin (H&E) as per the standard procedures (Luna, 1968) and the prepared slides were examined under light microscope for histopathological studies.

**Results and Discussion**

In the present study, out of 2,157 birds presented for post-mortem examination, 393 (18.22%) cases showed the lesions of these neoplastic conditions; In these positive cases, 281 (13.08%) cases were diagnosed as Marek's disease and remaining 112 (5.20%) were lymphoid leucosis. These conditions were diagnosed based on characteristic pictures of impression smears, gross and histopathological changes.

1) Gross examination of organs: Diffused enlargement of liver, kidneys and spleen with white foci were noticed in Lymphoid leucosis (Bhutia and Damodar Singh, 2017; Sneha *et al.*, 2017) (Fig.1, 2&3); there was enlargement of liver, kidney, spleen, proventriculus and thickening of nerves in Marek's disease (Fig.4) (Pejovic *et al., 2*006 and Kamaldeep *et al*., 2007).
2) Histopathological examination: Microscopic sections of liver revealed diffuse and focal aggregates of proliferating uniform sized immature lymphoid cells which displaced and compressed the hepatocytes. Fatty change with presence of clear vacuoles in the cytoplasm of hepatocytes was noticed (Fig. 6). Few degenerated hepatocytes and areas of necrosis were observed. Sinusoidal spaces were narrowed and infiltrated with lymphoblasts (Fig. 6). These findings in case of Lymphoid leucosis were in agreement with the previous reports (Balachandran *et al.*, 2009; Gopal *et al.*, Ravikumar *et al.*, 2016 and 2012; Soujanya *et al.*, 2019). Proliferating neoplastic lymphoid cells were found in spleen sections (Fig 10). Areas of congestion and haemorrhage was also noticed. Similar type of lesions were described in earlier reports (Sneha *et al.*, 2017; Bhutia and Damodar Singh, 2017). Diffuse infiltration of uniform lymphoid cells was noticed in interstitial spaces in sections of kidney (Fig. 8). Tubular epithelial cells were degenerated and glomeruli were shrunken.

These findings in case of Lymphoid leucosis supported the observations of Huang *et al.* (2013), Sneha *et al.* (2017), Bhutia and Damodar Singh (2017).





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Microscopic examinations of Marek's affected livers revealed diffuse proliferation of pleomorphic lymphocytes. Lymphocytic proliferation was so extensive that the normal architecture of hepatic lobules was largely distorted (Fig. 3). In the proventriculus extensive proliferation of lymphocytes was observed in the lamina propria, submucosa and in between and outside the muscular layers (Fig. 11). In the kidney, infiltrating and proliferating lymphocytic cells destroyed the normal architechture (Fig. 7). Unusual pleomorphism due to proliferation of neoplastic cells was observed in the spleen, pancreas and intestine (Fig. 9,12 & 13). These findings supported the observations of Pappenheimer *et al*. (1929); Furth, (1935); Campbell (1956); Payne and Biggs (1967), Balachandran *et al.* (2009), Swathy *et al.* (2012) and Soujanya *et al.* (2019).

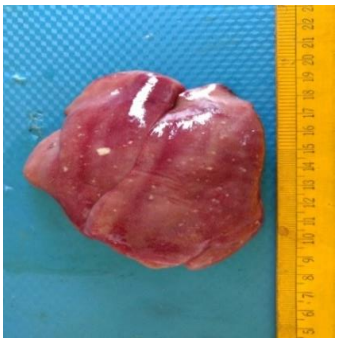

**Fig.1:** Diffused enlargement of liver with white foci were noticed in Lymphoid leucosis

**Fig. 2:** Diffused enlargement of spleen with white foci were noticed in Lymphoid leucosis

**Fig.3:** Diffused enlargement of kidneys with white foci were noticed in Lymphoid leucosis

**Fig. 4:** Enlargement of liver, kidney, spleen, proventriculus in Marek's disease

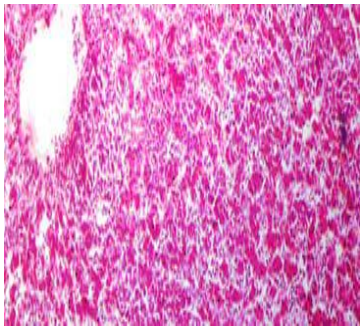

**Fig. 5:** Proliferation of pleomorphic lymphocytes in the liver in Mareks, H&E x10.

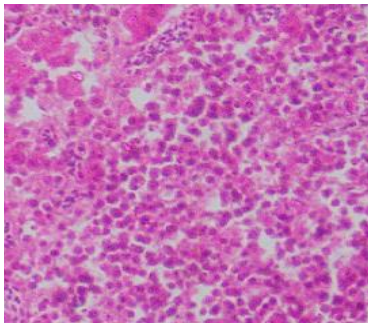

**Fig. 6:** Liver section showing uniform sized immature lymphoid cells in LL. H&E x40.

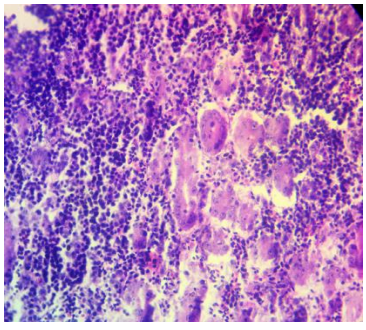

**Fig. 7:** Infiltration of pleomorphic lymphocytes and destruction of tubules in the kidney in Mareks, H&E x 10.







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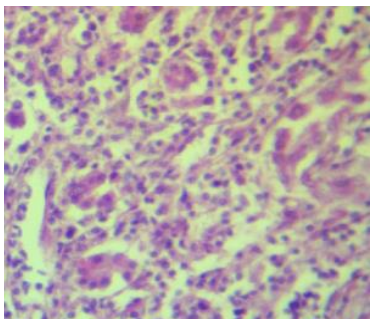

**Fig. 8:** Kidney section showing diffuse infiltration of uniform lymphoid cells in interstitial spaces. In LL. H&E x40

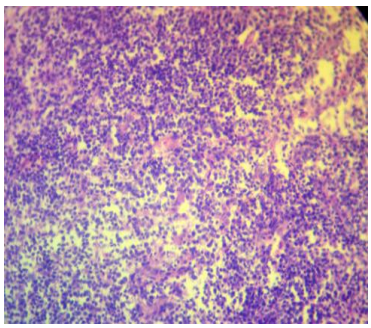

**Fig. 9:** Splenic parenchyma showing diffused infiltration of lymphoid cells in MD. H&E x 10.

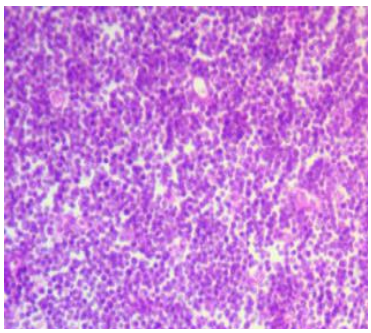

**Fig. 10:** Spleen section showing proliferating neoplastic lymphoid cells in LL. H&Ex10.

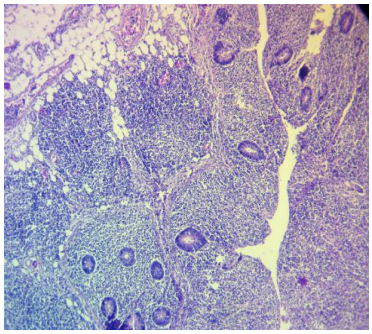

**Fig. 11:** Proventriculus section showing prominent lymphoid proliferation with degenerative changes in glandular epithelium in MD.HE x 10.

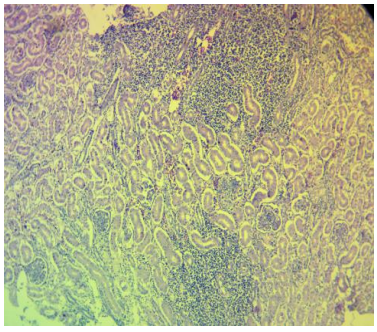

**Fig. 12:** Section of pancreas showing prominent lymphoid infitration into the interstitium with degenerative changes in the exocrine pancreatic acini and islets of langerhans in MD H&E x 10.

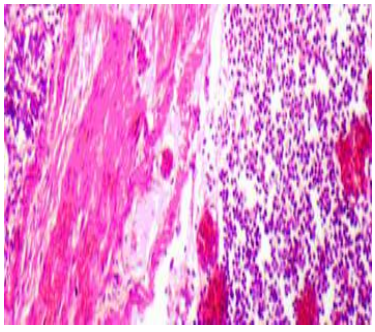

**Fig. 13:** Proliferation of lymphocytes in the mucosa and serosa of intestine in MD. H&E x10.

## Conclusion

LL and Marek's infections in chicken causes development of neoplasms in various organs also induces immunosuppression. ALV can damage organs by proliferation of neoplastic tissue. Such birds are more prone to secondary infections which can further weaken the immune system (Lutticken, 1997 and Nouri *et al.*, 2001). So, prevention and control of LL and Marek's infections is very important to avoid huge economical losses due to mortality and decreased performance of the birds.

## Acknowledgements

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