PART -3

Study of Histopathology
HISTOPATHOLOGY

INTRODUCTION:-

Domestic poultry has gained a much greater importance in animal production and constitutes a major factor in overall economy. It is realized that sum total of ravages occasioned by various parasitic infections in poultry can in no way be considered less significant than other ethiological agents. Amongst these, coccidiosis is believed to be a commonest depreciator or even a potential killer of our poultry.

Although many workers have commented on invasive powers of the sporozoites of coccidia, no formal studies have been made on this subject. Fantham (1910) discussed the penetration of the sporozoites of Eimeria avium in the young grouse, while Hadley (1911) commented upon the rapidity of the penetration of epithelial cells by the sporozoites of E. avium (=tenella). He noted that free sporozoites penetrated the epithelial cells at once. Tyzzer Theiler and Jones (1932) indicated that the sporozoites of Eimeria necatrix invaded the epithelium immediately after being freed from the oocysts, while the sporozoites of Eimeria tenella probably took longer; for they found live sporozoites free in caecal content 24 hours after the chicken was infected.
Tyzzer et al as well as Edger (1949) reported that sporozoites of both species invaded the epithelium of the gland fundi. These workers, like Hadley (1917) stated that the sporozoites occasionally passed through the epithelium and parasitized the cell of the underlying tissue. The sporozoites of *Eimeria praecox* were observed in the Tunica propria by Tyzzer et al, but there was no evidence of further development. The recognition of the early schizonts of *E. bovis* in the endothelial cell living the lacteals suggested that these sporozoites passed through the epithelium of the intestinal wall (Hammond et al 1946). The sporozoites of *E. brunetti* were observed by Boles and Becker (1954) in the cores of the villi 3 hours after the chicken was infected.

**Histopathology of chicken intestine (caeca):**

Coccidiosis due to Eimerian species is most serious infectious disease problem for poultry industry, the poultry meat (broiler) industry in particular is severally affected with losses greater than $100 million per year, because intensive husbandry encourages transmission of infectious oocyst between chickens, there are several species of Eimeria which parasitized the intestine of the chicken and several infections with any of there causes, weight loss poor feeding, conversion and death.

The species of coccidia involved in the infection undoubtedly play a major role in the pathogenicity observed. Species such as *Eimeria tenella* and
*Eimeria necatrix* may produces extensive tissue damage from infection. The infection of the cells of the intestinal mucous with coccidian brings dramatic changes in the structure and appearance of the villi.

During routine observation the caeca are to be seen shortened and thickened. The lesions in the caecal wall consist of thick mucoid material with blood clots which is discharged with the faces. *Eimeria tenella* is the common in caeca, colon and lower part of the small intestine of chicken cause acute coccidiosis characterized by haemorrhage.

The material for the study of coccidia and its infection to intestine was obtained from different chicken shops of Aurangabad region. The different parts of the intestine of slaughtered chicken were examined for coccidial infection. For positive samples oocysts were separated by centrifugation method (3000rpm) and oocyst kept for sporulation and preserved in 2.5% potassium dichromate solution at room temperature.

We have examined the caecal part of the infected chicken, which is infected by *Eimeria tenella* and *Eimeria necatrix*. For the histopathological study, we take infected and non infected intestinal caecal part. First we observed infection to the caecal part by above mentioned method. Then is taken for histopathological examination, first we observed external appearance of the
caecal portion of the both. Then remove all the fecal material from caeca by washing with tap water and preserved it in bovin’s fluid.

Histopathology of both the infected and non infected caecal parts is done by paraffin wax ($58-60^\circ$) embedding method. With the help of microtomy machine section were taken of 7-10 um thickness on slides. These slides of tissue are stained with Harries haematoxylene and Eosin method.

**Histology of normal intestinal caeca:-**

The caecum of the chicken is roughly divided in to two portions according to the diameter, the basal portion being of small size and containing little or no fecal material, while the distal portion is two to three times the size of proximal and normally filled with the brownish pasty fecal material characteristics of the caecum.

The normal histology of the caecum differs in no particular detail from the general structure of digestive tract of vertebrates. It consists of typical columnar epithelium, tunica propria, submucosa, muscular layers, and serous coat. (Lewis and Stohr, 1913). Numerous tubular glands, the glands of Liberkuhn are present throughout the entire length of the organ (Calhoun 1933). fig. no. 1
Histology of infected intestinal caeca:

When the sporulated oocysts are swallowed by the chicken it seems probable that the resistant wall of the oocyst is digested in to duodenum has been reported by Fantham (1910) in the Grouse and for coccidia of various kinds in the intestine of the rat by Andrews (1930). After the sporozoites enter the epithelial cells they can be found in the basal portion usually of the cell lining the inner or fundus portion of the glands. It was observed that there is apparently considerable variation in the degree of development among the different organisms; the first generation merozoites being almost completely developed in some instance.

In infected caecal parts first generation schizogony occurs in the crypts of liberkuhn so, in this area plenty of first generation schizonts are seen (fig no.2). Second generation schizogony occurs in area of tunica propria, so here so many second generation schizonts are seen in colonies (fig no.3&4). Severe haemorrhage is associated with the development of large second generation schizonts, which occurs in colonies in the intraglandular tissue. In heavy infections not only the tunica propria but lymphoid tissue, submucosa, and in a number of instances the muscular layers have been involved. The organism in the process of development increase in size to such an extent that by the surround tissues, small blood vessels, and
capillaries are so disrupted, probably by pressure that hemorrhage begins. During this time the identity of the epithelial cells, tunica propria, and muscle cells of the muscularis mucosa is lost, this condition is illustrated in fig. no. 5. The stages of development of the organisms up to the times of hemorrhage have been traced by Tyzzer (1929), and Tyzzer, Theiler and Jones (1932), Walter H. Pattillo (1958), B.S. Gill and H.N. Ray (1957) in Calcutta. Bhatia and Pande (1968) in Mathura, H. David Chapman (2002) from Fayetteville AR.
Fig no.1:- Transverse section of caecum shows the normal condition of the epithelium and other layers of wall.

Fig. no. 2:- Transverse section of caecum shows first generation schizonts develop in the base of epithelial cell toward the lumen of gland.
Fig. no 3: Transverse section of caecum shows second generation large sized schizonts in Broiler chicken.

Fig. no 4: Transverse section of caecum shows colonies of schizonts in Broiler chicken.
Fig. no. 5:- Transverse section of caecum shows complete disorganization of the epithelium and tunica propria and the large hemorrhagic areas near the surface.