

HISTOMORPHOLOGICAL STUDIES ON GUT ASSOCIATED LYMPHOID TISSUE OF KHAKI CAMPBELL BREED OF DUCK (*Anas platyrhynchos*)

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Abstract: The lymphoid tissue was scattered throughout the intestine in the diffuse and aggregated form in all the groups under present study. The aggregated solitary lymphatic nodules were present in the caeco-colic junction called as caecal tonsils which corresponds to the mammalian Peyer's patches. The intraepithelial lymphocytes were also occurred in all parts of small intestinal epithelium. The epithelium covering the lymphoid nodules was different from that of the villus epithelium and was devoid of goblet cells. The characteristic M cells were found in the epithelium covering the nodules. The encapsulated and non-encapsulated lymphatic nodules were observed. The encapsulated nodules were adherent to the lamina muscularis. The germinal centers were well market in middle groups of birds.

Keywords: gut associated, duck, lymphoid organ.

INTRODUCTION

Ducks are reared in most parts of our country in small and large scales for egg and meat. The total duck population in India is 27643 thousands producing 1.49 billion eggs annually Anon (2011). Due to the rising costs of the poultry meat and goat meat, the duck meat has served the purpose as per requirement by of the people. It is relatively cheaper and has highly nutritious value as like other traditionally consumed meats. Meat and eggs of waterfowl have high nutritional value as human food. People eat meat of ducks not only because they like the taste, but also for its high nutritional value in terms of optimal composition of essential amino acids as well as favorable composition of fatty acids, with a high percentage of polyunsaturated fatty acids and a favorable ratio of omega 6- to omega 3- fatty acids.

The production of egg and meat depends on the health and normal growth of the bird, which is directly related with the lymphoid system of the body. The lymphoid system protects the body from foreign antigens and is comprised of primary and secondary lymphoid organs. The primary ones are thymus and bone marrow and the secondary ones constitute the spleen, bursa, mucosa associated lymphoid tissue, gut associated lymphoid tissue and lymph nodes

(Samuelson, 2007). The cells of body defense mechanism either neutralize the foreign body by producing antibodies or phagocytes with the help of macrophages. Concerning this immunological point of view, the histology of the lymphoid tissues of the duck is very important.

MATERIALS AND METHODS

The present work of histomorphological studies was carried out on the lymphoid tissues of the gut in the Khaki Campbell breed of duck of various age groups in 30 birds of either sex. The samples were collected immediately after the decapitation of birds. These samples were divided in to 5 age groups as GI (0-2 weeks), GII (2-4 weeks), GIII (4-6 weeks), GIV (6-12 weeks) and GV (12-18 weeks).

The tissue samples from the different part of gut viz. mouth cavity, pharynx, oesophagus, proventriculus, gizzard, duodenum, jejunum, ileum, caecum and colon were fixed in 10% Neutral buffered formalin and treated with routine method of dehydration, clearing and embedding in paraffin wax as per the method of Drury and Wallington (1980). The paraffin sections of 3 to 5 micrometer were obtained. These sections were studied with different staining methods as below.

1) The Haematoxylin and Eosin staining for general histomorphological study [Singh and Sulochana, 1996] 2) The Masson's trichrome staining method for studying the differentiation of collagen and smooth muscles fibers. [Singh and Sulochana, 1996]. 3) Gomori's stain for reticular fibers [Bancroft & Stevens, 1982].

4) Verhoeff's stain for elastic fibers [Bancroft & Stevens, 1982].

The slides were observed under light microscope to study the histomorphology of gut associated lymphoid tissue of different age groups in Duck.

RESULT AND DISCUSSION

The general histomorphological observations were made from the sections stained with Haematoxylin and Eosin. The special stains were employed to study the presence of connective tissue, i.e. Masson's trichrome to differentiate the collagen and muscle fibers, Gomoris stain for reticular fibers and Verhoeff's stain for elastic fibers.

Peyers patches and Solitary Lymphoid Nodules are distributed in the important strategic areas of the gut in ducks. Generally avian Gut Associated Lymphoid Tissues are not visible macroscopically from the serosal surface but it is interesting that the small intestinal Peyers Patches of the duck could be identified from the serosal surface. Identical histotopographic of the lymphoid follicles were present in the small intestine and in the large

intestine of the ducks. In the follicles of the small intestine, Peyers Patches remained in a cluster within the muscularis mucosae layer and separated from each other by a narrow inter-follicular area. Each Cluster of the continuous phase of the follicles comprised 4 -5 in numbers. The germinal centers are prominent. The tall domes covered the lamina propria but the follicle associated epithelia were not uniformly present. Villi were almost absent and the glandular tissues were distributed between the domes. In the Meckel's diverticle the follicles were present continuously as in the small intestine Payers patches. The domes were covered with follicle associated epithelia. The villi were scanty and the glandular tissues were present between the domes. The duodenum and jejunum showed no much remarkable differences. The lamina propria was blended with muscularis externa with very thin submucosa. The villi were long and slender in duodenum and jejunum. Their tips were more slender in ileum with thicker base. The diffuse lymphatic tissues was scattered in the lamina propria, submucosa in all parts of small intestine. At few places the solitary lymphatic nodules were observed. The intra epithelial lymphocytes were occurred in the epithelial lining independently and also in the form of clusters in all parts of small intestine.

The caeco-colic junction showed the aggregation of lymphatic nodules. These were referred as the caecal tonsils which correspond to mammalian Peyer's patches.(Fig.1) These nodules were covered with epithelium, forming dome and were devoid of goblet cells. Some lighter colored cells with large nucleus were also observed in epitheliums which were designated as M cell suggesting their associations with intra epithelial lymphocytes. The lymphatic nodules were encapsulated and non-encapsulated. The lymphoid compartments of caecal Peyers Patches were comparable with the small intestine Peyers Patches and lymphoid tissues of the Meckel's Divertible. Series of lymphoid follicles remained together in the proximal caecum. But isolated follicular cluster was found in the middle and distal caeca. In the terminal rectum segregated lymphoid nodules were present in the sub mucosae. Each nodule contained 2-3 follicles. The domes were comparatively short.

The lymphoid compartment of the gut associated lymphoid Tissues in ducks include a follicular structure, dome, follicle associated epithelia, inter-follicular area. Histomorphologically identical lymphoid structures prevailed throughout the gastrointestinal tract in the duck. In ducks 3-4 follicular structures found in a cluster with very narrow inter-follicular area. This study shows that the sub epithelial zone of the lymphoid tissues is densely populated with lymphocytes and the domes were prominent irrespective of the anatomical location. But towards the end of the gut domes were comparatively short. The

Epithelia covering the domes were not uniformly present in the villi of the lymphoid aggregates and even indistinct in the small intestine Peyer's Patches.

The terminal part of the thoracic oesophagus contains an aggregated lymphoid nodule which is commonly referred to as the 'oesophageal tonsil' [Fig.2]. The aggregated lymphoid nodules in the small intestine of the duck were arranged in the form of annular bands [Fig.3]. Numerous diffuse lymphocytes and small lymphocytic aggregates in the lamina propria of small intestine of duck. Lymphocytes in the central core of the villi of caecum. The lamina propria contained diffuse lymphatic tissue and small aggregates. In the colon, the solitary lymphatic aggregates were observed between the muscularis mucosa and tunica muscularis [Fig.4]. It is apparent from this study that the aggregated lymphoid tissues of the small intestine Meckel's diverticle, caecum and rectum are integral parts of gut associated lymphoid tissues of the ducks.

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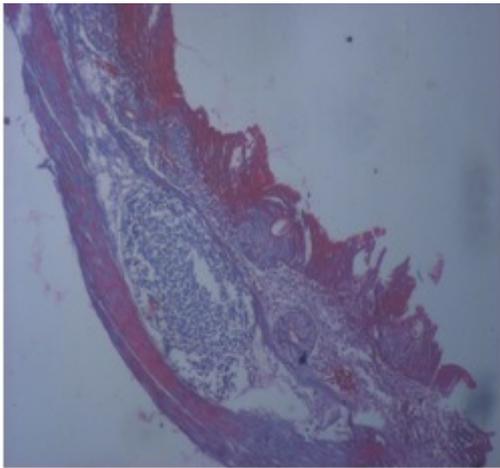


Fig.1. Photomicrograph of Caecum showing lymphatic nodule.

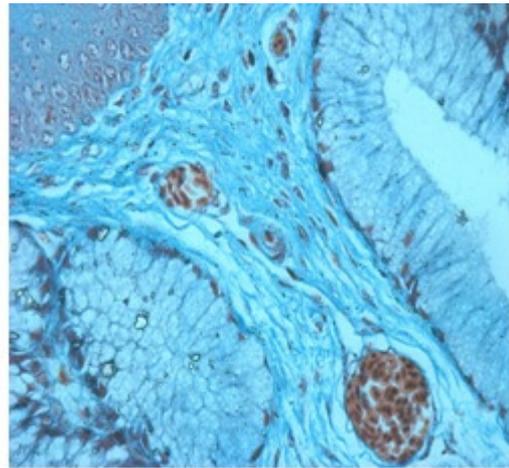


Fig.2. Photomicrograph of Oesophagus showing oesophageal tonsil.

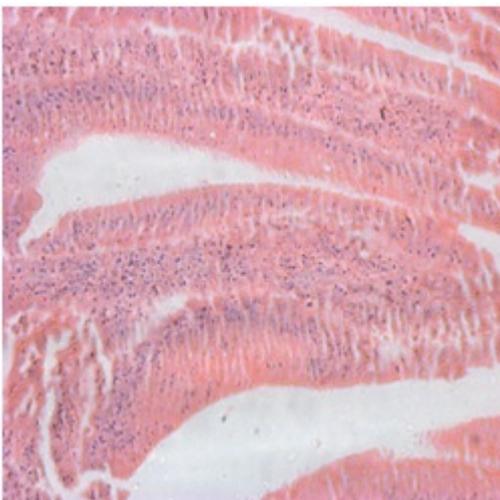


Fig. 3. Photomicrograph of Jejunum showing lymphocytes in annular bands

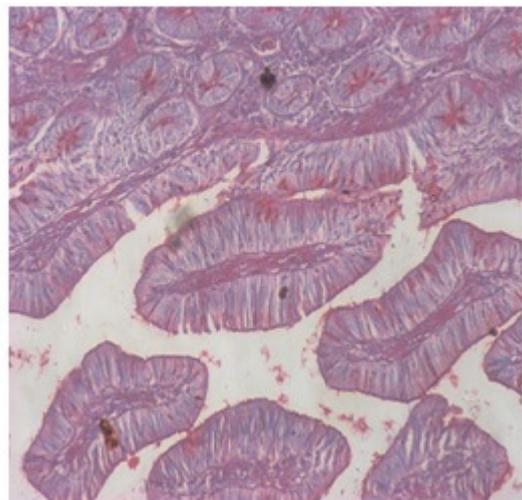


Fig 4. Photomicrograph of colon showing solitary lymphatic aggregation.