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Postnatal Development of Proventriculus associated Lymphatic Tissue in Kadaknath Fowl

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ABSTRACT
The present was conducted in Kadaknath fowl with an objective to identify the development ,distribution and pattern proventricular associated lymphatic tissue (PALT). From the present study it is clarified that the aggregations of lymphocytes were mainly in three different regions of the proventricular mucosa, viz, lamina propria, connective tissue core and close to the superficial proventricular glands . but during the day old and 7 days old bird the lymphatic tissue distribution was not distinct and noticeable. The distinct organized lymphocytic aggregations were notice during 28 days and 112 days old bird particularly in the lamina propria underneath the epithelium, and close to the superficial proventricular glands. In 112 days old bird there was distinct increase in size and cluster formation of lymphoid tissue , well marked lymphatic aggregation, and occasional presence of germinal was well established. These lymphatic tissues were demarcated by muscles and connective tissue.
Key words: *Kadaknath Fowl, Proventriculus, Lymphoid tissue, PALT*

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INTRODUCTION

In birds the digestive system, lined by mucosa, act natural barrier against the external environments. The mucosa contains the diffuse lymphatic tissues (Mucosal Associated lymphoid tissue) plays a vital role and act as a source of lymphocytes, polymorphonuclear leukocytes, plasma cells and macrophages. The mucosaassociated lymphoid tissue (MALT) of most birds is well developed [8, 5]. This tissue plays an important role in to induce immunity after oral immunization [1, 2]. Lymphocytes are distributed homogenously in lymphatic nodules in the mucosa associated lymphoid tissues. Proventriculus is the glandular stomach and a vital part of GUT. A solid knowledge of the avian GALT could contribute to the development of vaccines to be administered orally. Additionally, immune stimulation via pre- and probiotics is based on the presence of a well-developed intestinal immune system.

MATERIALS AND METHODS

The present study was conducted in 24 numbers of Kadaknath breed of fowl in the Department of Veterinary Anatomy, College of Veterinary & Animal Sciences, G. B. Pant University of Agriculture &Technology, Pantnagar. The birds were divided in four age groups viz, day old , 7 days, 28 days and 112 days old. The birds were sacrificed by severing the carotid artery and jugular veins. Feathers were removed manually and the proventriculus was carefully dissected out. Soon after collecting the tissue samples were fixed in 10% neutral buffered formalin. Tissue samples were processed for paraffin embedding and tissue sections (5-7µ) were stained with H&E technique.

RESULTS AND DISCUSSION

In the present investigation in day old bird lymphocytes were found to be in scattered, in diffused form, restricted to the lamina propria underneath the mucosa, and few lymphocytes were also found within the connective tissue core of mucosal folds. (Fig.1,2) Matsumoto & Hashimoto, [7].In 1-day-old reported minute clusters of lymphocytes close to the duct orifice and few In the deep proventricular gland. but in the present study no cluster formation were recorded.

In seven days old bird the amount of lymphocytes aggregation in the lamina propria was much more than the day old bird, but without cluster formation and found to be mostly distributed in the lamina propria underneath the mucosa, as well as within the connective tissue core.(Fig.3)

In 28 days old birds the lymphatic aggregation is more distinct and profound particularly in the lamina propria underneath the epithelium, and close to the superficial proventricular glands. With increase in size and cluster formation was noticed. (Fig.4 a,b,c) . the lymphocytes were found to be in much organized form of aggregations in an nodular form. Lymphocytes were also found within the connective tissue core in scattered form Fig.5. findings cane be correlated with the observation recorded by Matsumoto & Hashimoto. [7]. In 3 weeks old chicken. Though they have reported the presence of deep proventricular lymphocyte aggregations but in the present study it was not observed.

In 112 days old bird the lymphoid mass were maximum developed in form of nodular structure occasional surrounded by connective tissue and muscle. Heave diffused lymphocyte population were seen particularly lamina propria, connective tissue core and in the form of nodules, occasionally may have germinal centre , were also located in this layer. Lymphoid masses were increased in size. These findings were in agreement with though Matsumoto & Hashimoto, [7] in chicken they have reported the presence of deep proventricular lymphocyte aggregations with germinal centre but no lymphocyte masses at the deep proventricular gland were noticed which may be due to not exposing to the invading antigenic substance [6]. Lymphocytic aggregations in the deep proventricular glands were also reported by Jeurissen *et al*., [4]; Ogunkoya & Cook, [9], Casteleyn [3] in 3 month old chicken

The present study first clarified that the aggregations of lymphocytes were found in mainly three different regions of the proventricular mucosa, viz, lamina propria, connective tissue core and close to the superficial proventricular glands . the distinct organized lymphocytic aggregations were notice in 28 days old bird, so it can be said that mucosal immune mechanism through the proventricular associated lymphatic tissue begins from 4th week onwards. Matsumoto & Hashimoto [7] in chicken reported the mucosal immunity function begins from 3rd week onwards.. Additionally, the epithelium of the glandular ducts is often infiltrated by many T lymphocytes [10, 7]. Casteleyn [3] reported the aggregation of lymphocytes in the lamina propria, Aggregations of T lymphocytes were also reported at the junctions of the glandular ducts with the proventricular lumen and deep proventricular gland. So immediately after the hatch the birds were dependant on the maternal immunity so the mucosal immunity was not fully developed but with the advancement of age following the exposure of the foreign antigen there was establishment of mucosal immunity lead by Proventriculus Associated lymphatic tissue which is in agreement with the Matsumoto, & Hashimoto [7] in chicken, Casteleyn [3], Fisinin [11]. But a detail investigation , identification , distribution of B-cell, T-cell for this kadaknath breed of fowl is required as being a much adopted, disease resistance local bird, in particular to GUT immunity is concern.

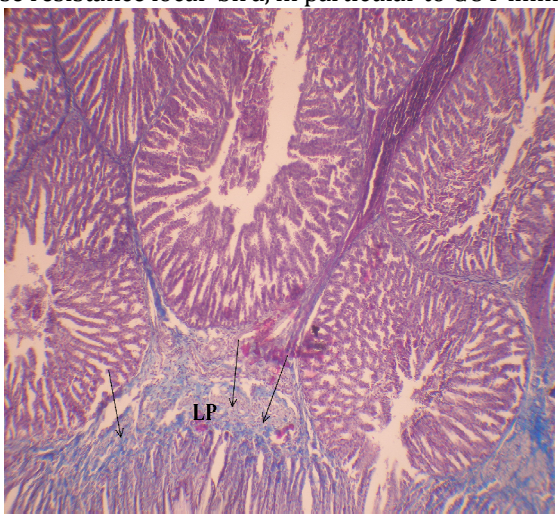

Fig:1 Showing the scattered lymphoid tissue(arrow) in lamina propria day old kadaknath bird (magnification 400X)

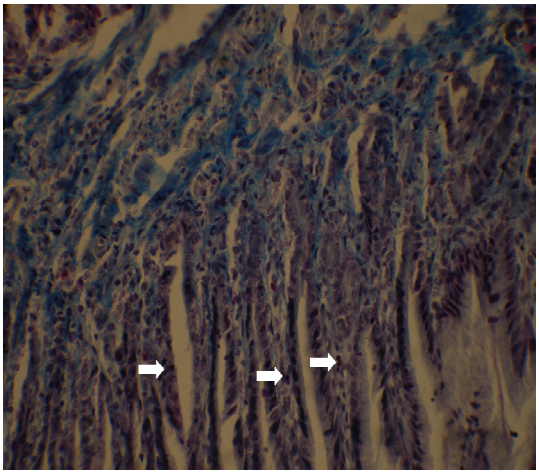

Fig:2 Showing few lymphocytes (arrow) in connective tissue core of days old kadaknath bird (magnification400X)

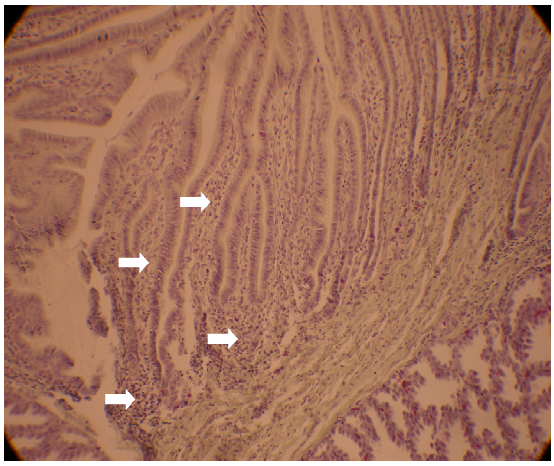

Fig:3 Showing the diffused lymphatic tissue (arrow) in the lamina propria and in connective tissue core of 7 days old kadaknath bird (magnification400X)

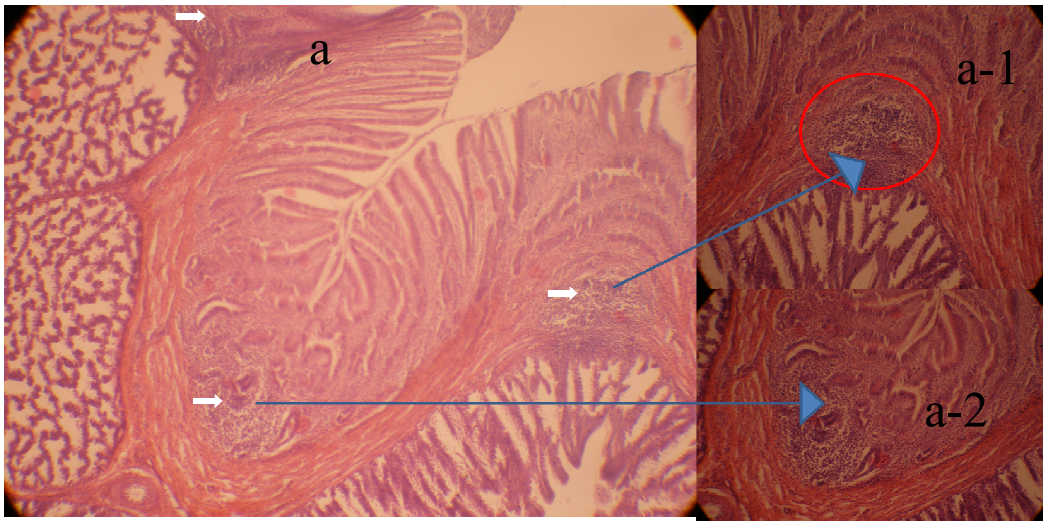

Fig:4 showing the distribution of lymphatic tissue (arrow) during 28 days old kadaknath fowl ; a (400X), a-1 and a-2 at higher magnified view

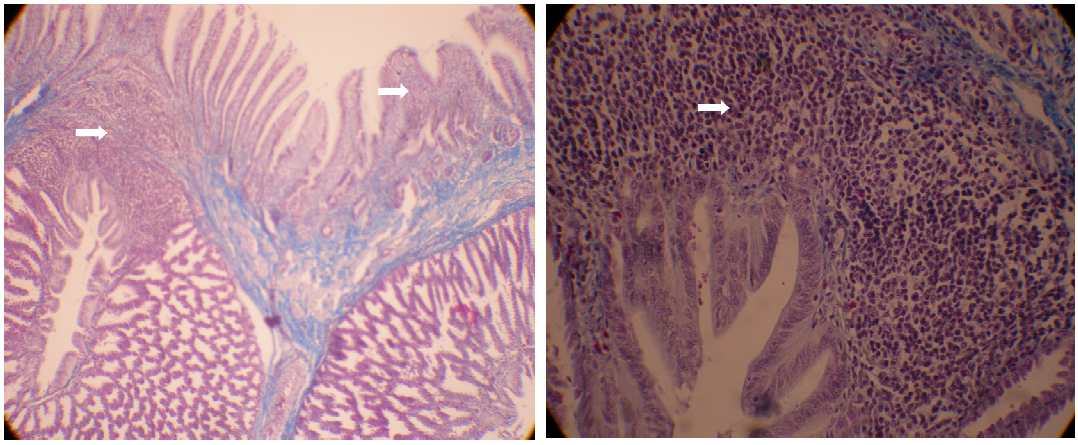

Fig:5 showing the distribution of lymphatic tissue during 28 days old kadaknath fowl (arrow)

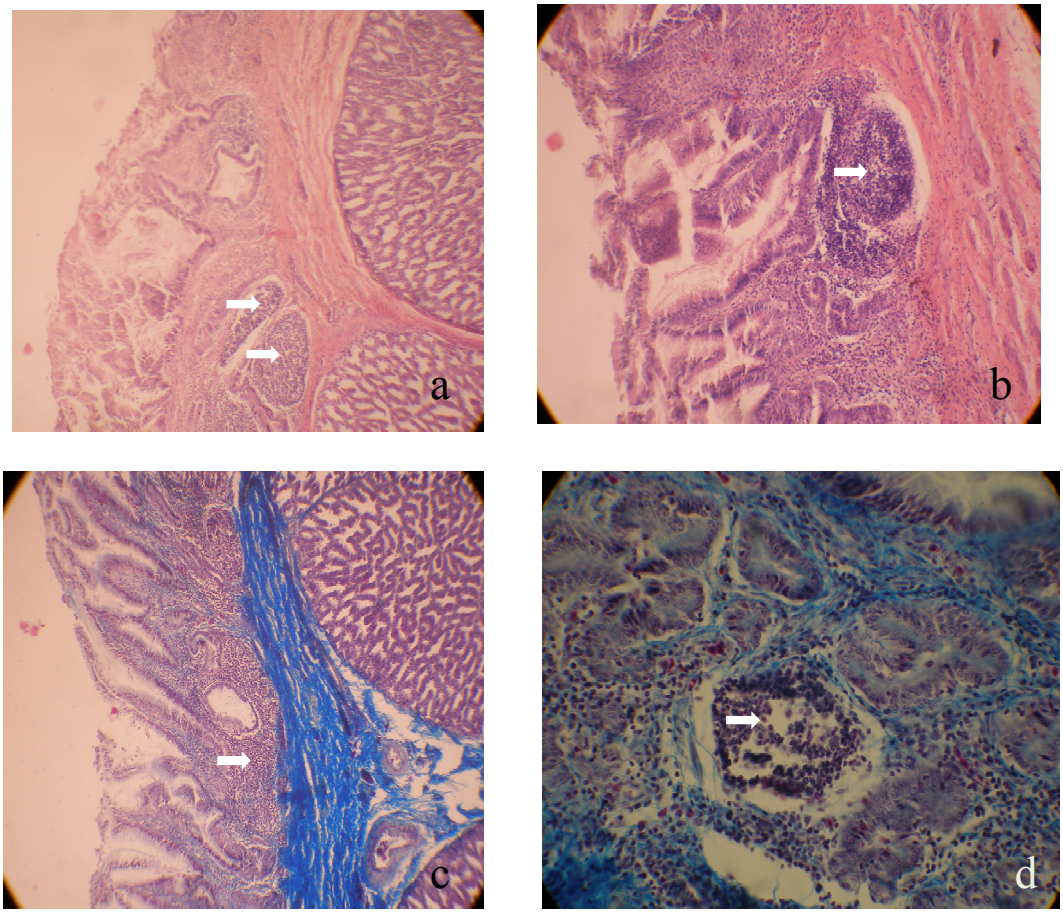

Fig:6 showing the most distinct and well organized lymphoid tissue in the lamina, propria in nodular form surrounded by muscle (a),b. diffused lymphatic tissue in lamina propria just beneath the mucosa(c), lymphatic aggregation in nodular form in between the mucosal glands(d)

CONCLUSION

In the proventriculus of kadaknath fowl the aggregations of lymphocytes were found in mainly three different regions of the proventricular mucosa, viz, lamina propria, connective tissue core and close to the superficial proventricular glands . The distinct organized lymphocytic aggregations were notice in 28 days old bird and maxmum developed in the 112 days old birds. The mucosal immunity was not fully developed in the earlier postnatal days but with the advancement of age following the exposure of the foreign antigen there was establishment of mucosal immunity lead by Proventriculus Associated lymphatic tissue. But a detail investigation , identification , distribution of B-cell, T-cell for this kadaknath

breed of fowl is required as being a much adopted, disease resistance local bird, in particular to GUT immunity is concern.

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