

Light Microscopic Structure of the Ureters of Rhode Island Red (RIR) and White Leghorn Chicken (WLH) During their Postnatal Stages of Growth and Development

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Abstract: The light microscopic structure of the ureter of RIR and WLH chicken of Bangladesh has been analyzed as histologically in the present study. Based on the histological architecture, the ureteral wall were clearly identified into three layers; mucosa, muscularis and adventitia. The lumen was roughly circular in cross section in both types of genetic groups. The histological features of the mucosa, muscularis and adventitia were remained same in different developmental stages. The epithelial wall of the ureter consists of a tall pseudo-stratified columnar epithelium in the cranial part through the middle part of the ureter which were transformed into transitional epithelium in the caudal part of the ureter in both Rhode Island Red (RIR) and White Leghorn (WLH) chicken. The presence of collagen and elastic fibers were observed in the lamina propria of the ureter. However, the population of lymphatic tissue in the lamina propria was greater in RIR rather than WLH chicken. The mucosal folds were very clear and more in RIR than WLH chicken. These differences did not depend on the developmental stages but depend on the genetic variation of the chicken.

Key words: Ureter, RIR, WLH, Postnatal stage

Introduction

The ureter is an important organ, which carries urine to the cloaca. The available literature revealed a few anatomical studies of the ureter of RIR and WLH chicken (Hodges, 1974). However, the research has not yet been conducted to study the histological features of the ureter of Rhode Island Red (RIR) and White Leghorn (WLH) chicken. In this regard, literatures were limited, moreover studies on the ureter of hybrid has not been carried out in climatic condition of Bangladesh. Therefore, with this idea keeping in mind, the different histological parameters of the ureter viz. the epithelial wall, composition of the lamina propria, distribution of collagen and elastic fibers within the lamina propria, the tunica muscularis and adventitia were investigated in the present study. This study will provide valuable information regarding the histological features of the ureter of Rhode Island Red and White Leghorn chicken to both poultry researchers and breeders.

Materials and Methods

The experiment was conducted in the Histology Laboratory, Department of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. Chicken from two varieties, RIR and WLH were assigned into five age groups viz. Day old, 30, 90, 180 and 360 days old birds. Each age group of both variety consisting of six chickens and they were obtained from the Poultry Farm of Bangladesh Agricultural University, Mymensingh. Chickens from each group was slaughtered at 10:30 a.m. Food and water was withheld two hours before slaughter and weight of each bird was recorded just prior to slaughter.

The cranial, middle and caudal parts of the ureters were obtained after slaughtering for histological studies. The tissues

from the different segments of the ureter were fixed in Bouin's solution for conventional hematoxylin and eosin staining. The hematoxylin and eosin stain (Gridley, 1960) was followed to study the histological structures of the ureter of both genetic groups of chicken in general with greater emphasis on (i) the number of mucosal folds, composition of the lamina propria and thickness of muscularis of the ureter (ii) the verhoeff's and Van Gieson stain (Gridley, 1960) were used to study the distribution of collagen and elastic fibers within the lamina propria of the ureter.

Results and Discussion

The ureteral segments of RIR and WLH chicken were consisted of three layers as mucosa, muscularis and adventitia. The lumen was roughly circular in cross section in both types of genetic groups. The histological features and morphometry of the mucosa, muscularis and adventitia were remained same in different developmental stages (Fig. 1a,b). The reports of the present findings were correspond to Hinman *et al.* (1993). In the present study, the lining epithelium was consisted of all tall pseudostratified columnar epithelium in which two types of cells were clearly visible. The majority of the cells were columnar and minority of the cells were cuboidal in cranial and middle part of the ureter (Fig. 2a, 2b), while the caudal part especially at the opening into the cloaca the lining epithelium of the ureter was transformed into transitional epithelium in RIR chicken (Fig. 2c). The epithelium was also columnar, bistratified or transitional or pseudostratified columnar (Goodchild, 1956). This transformation of pseudostratified columnar epithelium to transitional is natural and possibly found in all species of birds. In the present study, beneath the epithelium is a thick layer of sub-epithelial, areolar connective tissue, which contains variable amounts of diffuse lymphatic

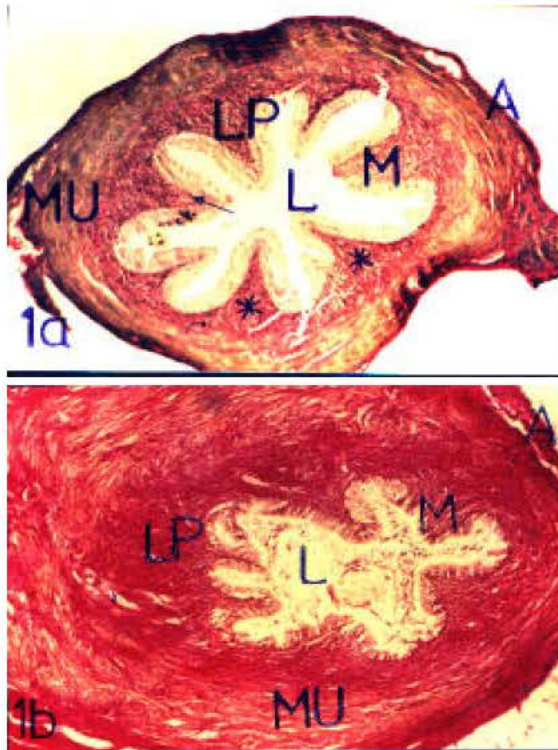


Fig. 1a-b: The ureter of RIR (1a) and WLH (1b) at 90 days of ages. The lumen (L) was roughly circular in cross section in both types of genetic groups. The ureter of both the strains was consisted of mucosa (M), muscularis (MU), and adventitia (A). The mucosal folds (arrow) were clear and more in RIR than WLH chicken. The population of lymphatic tissue in the lamina propria (LP) were greater in RIR (asterisks) than WLH chicken. The lamina propria (LP) of both the strains were Verhoeff's and Van Gieson positive. Both the tunica muscularis and adventitia were also Verhoeff's and Van Gieson positive. Verhoeff's and Van Gieson stain. X 83.25

tissue and occasional lymphatic nodules higher in RIR rather than WLH chicken (Fig. 1a).

Occasional lymphatic nodules was observed in different birds (Inoue, 1953). Well developed network of fine elastic fibers were also observed by different authors (Liu, 1962). From the present study it may be showed that the mucosal folds were very clear and more in RIR than WLH chicken (Fig. 1a). There was also the tunica muscularis which was consisted of a thick double layer of smooth muscle, an inner longitudinal and an outer circular layer. External to the muscularis was a thin adventitial layer of loose connective tissue (Fig. 1a-1b). The tunica muscularis consists of a thick double layer of smooth muscle, an inner longitudinal and an outer circular layer (Hodges, 1974). He also stated that external to the muscularis is a thin adventitial layer of loose connective tissue. The lamina epithelia were Verhoeff's stain positive at all the ages

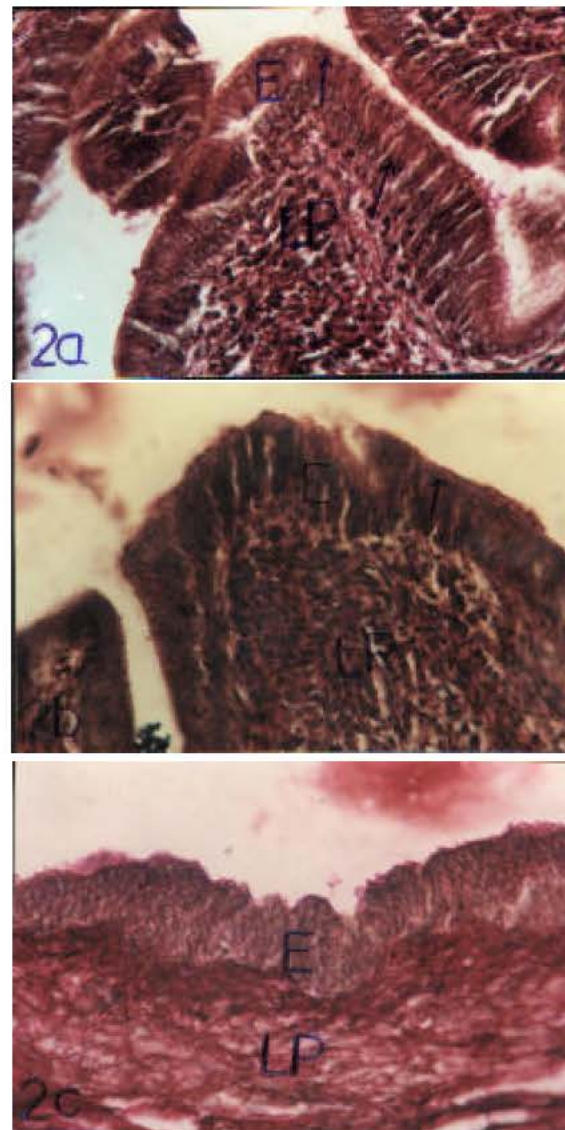


Fig. 2a-c: The ureter of RIR at 18 days of ages showing its cranial (2a), middle (2b) and caudal (2c) part. In the epithelia (E) two types of cells were clearly visible. The majority were columnar at the base (large arrows) and minority were cuboidal at the apex (small arrows) in cranial and middle part of the ureter. In the caudal part of the ureter, the pseudostratified columnar epithelium is transformed in to transitional epithelium (E). The lamina propria (LP) was Verhoeff's and Van Gieson positive. Verhoeff's and Van Gieson stain. X 33.

of both the strains of chicken. The lamina propria was positive to both Verhoeff's and Van Gieson's stain at all the ages of both genetic groups. Both the tunica mucosa and adventitia

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were also VanGieson's positive. In the present study, the lymphatic population within the lamina propria was greater in RIR than WLH chicken. The mucosal folds were very clear and more in RIR than WLH chicken. From the present research findings it may be concluded that these differences did not depend on the developmental stages but depend on the genetic variation of the chicken.

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