GROSS AND HISTOMORPHOLOGICAL STUDIES OF SPERM STORAGE ORGAN IN ADULT INDIGENOUS CHICKEN (*Gallus domestics*) OF ASSAM, INDIA

S.K. Bharti and S.R. Talukdar

Department of Veterinary Anatomy and Histology

Bihar Veterinary College, Patna-800014

Received 10-11-2015 ***Accepted 22-2-2016***

Corresponding Author : drskbharti24@gmail.com; bharti24926@rediffmail.com

ABSTRACT

The present study was conducted on the gross and histomorphological structure of vagina (sperm storage organ) in indigenous chicken of Assam. Anterior part of the vagina forming a junction with uterus that is uterovaginal junction (UVJ) is referred as sperm storage tubule. The mucosa of vagina was lined by pseudostratified ciliated columnar epithelium with primary and secondary type folds and few goblet cells. The lamina propria-submucosa showed the presence of few tubular glands and it contained large amount of reticular fibres with scanty collagen and elastic fibres. Tunica muscularis consisted of thick inner circular and thin outer longitudinal layer. PAS positive reaction was intense in apical part of epithelium, moderate at central part of mucosal folds and lamina propria-submucosa was weak PAS positive.

KEY WORDS: Chicken, Vagina, Gross, Histomorphology, Histochemistry.

INTRODUCTION

The biological feature of the birds especially the reproductive tract has a great economical importance mirrored by the ever growing weight of aviculture as a branch of animal breeding. The importance of the study of the vagina in poultry merges from economical point of view for obtaining the most important product. i.e. fertilized egg from the poultry. In the domestic fowl, the functional left oviduct consists of five regions. i.e. infundibulum, magnum, isthmus, uterus and vagina. Among all, here glands of vagina play vital role in formation of bloom or cuticle and it provides the appropriate environment for sperm. In poultry, sperm transferred by natural matting or artificial insemination into the distal end of the vagina immediately begin their ascent to the uterovaginal junction (UVJ) at the anterior end of vagina (Basket, 2011). Mucosa of the vagina and uterus at UVJ collectively referred to as the sperm-storage tubules (SST), where the egg is fertilized and layers of albumen are deposited by its tubular glands. The structure and function of vagina has been documented in a variety of the birds, such as the domestic fowl, the Japanese quail, pigeon, turkey and hybrid chicken by Khan *et al.* (1999), but information on reproductive tract of indigenous chicken of Assam is still to be documented. Therefore this investigation was aimed to describe the gross, histological and histochemical aspects of vagina in indigenous chicken of Assam.

MATERIALS AND METHODS

The present study was conducted on twenty apparently healthy adult indigenous female chickens of Assam in Department of Anatomy and Histology of the Veterinary College at Khanapara, Guwahati. The birds were purchased locally and live weight of each bird was recorded at the time of procurement. The experimental birds were sacrificed as per the recommendation of Gracey (1986). The location and topographic position of the ovary and oviduct were located and vagina was separated from the reproductive tract. The biometrical measurements, viz. the length, breadth and thickness of vagina were recorded with the help of Vernier callipers. The tissue pieces were collected from vagina and fixed in 10 % neutral buffered formalin for 12 to 24 hours for the histological and histochemical study. Tissues were processed by routine methods and 5-6 μm thick paraffin sections were cut and stained with Mayer's Haematoxylin and Eosin stain for general tissue

reaction, Mallory's method for collagen fibers, Gomori's method for reticular fibers, Hart's method for elastic fibers and McManus method for glycogen (PAS) as described by Luna (1968). Epithelial length and thickness of lamina propria-submucosa, tunica muscularis and tunica serosa of vagina were recorded in Haematoxylin and Eosin (H & E) stained sections as per standard methods of micrometry (Culling, 1974). Data of the experiment were analyzed by standard statistical method as detailed by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The vagina studied was a muscular tube, thicker than that of other part of oviduct and showed the S-shaped curvature as has been reported by Mohammdpour *et al.* (2012) in adult laying hen and in domestic duck. The junction of the uterus with vagina (i.e. uterovaginal junction - UVJ) was marked by a sphincter that indicates the beginning of vagina was also reported by Basket (2011). The Vagina was finally terminated in the caudo-dorsal part of the cloaca. Similar findings were also reported by Strukie and Muller (1976) in adult laying hen and Mohammdpour *et al.* (2012) in domestic duck.

The average weight, length, breadth and thickness of vagina were 2.1350 ± 0.1005 g, 7.1680 ± 0.2709 cm, 0.9150 ± 0.0544 cm and 0.7660 ± 0.0294 cm, respectively, however the wall thickness in laying hen and duck reported by Mohammdpour *et al* (2012) was 2.01 ± 0.78 mm and 3.31 ± 1.11 mm, respectively. However, King and McLelland (1975) reported length in domestic fowl as 7 to 8 cm.

The vaginal wall was thick and had primary and secondary folds (Fig. 1), which were lined by pseudostratified ciliated columnar cells and goblet cells (Fig. 2). Similar findings were also reported earlier by Dellmann and Carithers (1996) and Mohammdpour *et al.* (2012) in adult laying hen and in domestic duck, respectively. However, Nickel *et al.* (1977) reported that the lining epithelium of vagina was ciliated columnar type and the mucosa was raised into numerous narrow ridges. The average epithelial thickness was found as 31.9445 ± 0.1089 mm. However, Richardson (1935) reported that the thickness of lining epithelium was 35.00 mm in domestic fowl**.**

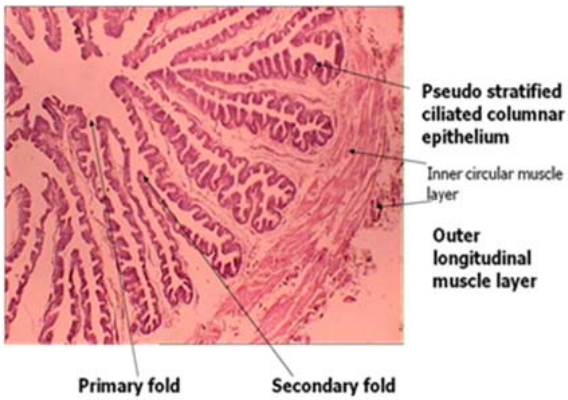

FIG. 1. PHOTOMICROGRAPH OF VAGINA SHOWING PRIMARY AND SECONDARY FOLDS AND INNER CIRCULAR, OUTER LONGITUDINAL MUSCLE LAYER

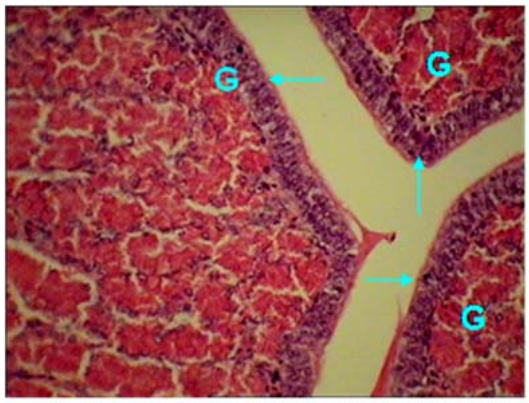

FIG. 2. PHOTOMICROGRAPH OF VAGINA OF CHICKEN SHOWING PSEUDOSTRATIFIED CILIATED COLUMNAR EPITHELIUM (⟶) AND BRANCHED TUBULAR GLANDS (G). H & E X40.

The lamina propria-submucosa showed the presence of loose connective tissue with few tubular glands; whereas Mohammdpour *et al.* (2012) reported that the vagina in laying duck has little or less glands in this region. These layers show the abundance of reticular fibres and little amount of elastic and collagen fibers (Fig. 3). Tunica muscularis mucosae consisted of a thick well developed inner circular and outer longitudinal smooth muscle fibers (Fig. 2) with more amount of reticular

and elastic fibers and less amount of collagen fibers. Similar findings were reported by Mohammdpour *et al.* (2012) in laying duck and Mishra *et al.* (2014) in native chicken of Bangaladesh. The tunica serosa consisted of loose connective tissue along with blood vessels and nerve fibers and concurred with the reports of Banks (1987) in fowl and Dellmann and Carithers (1996) in chicken. The mean thickness of lamina propria-submucosa, tunica muscularis and tunica serosa were 1281.0.0400 ± 10.0981mm, 421.0800 4.4898 mm, and 14.9686 ± 0.0981mm, respectively. However, Mohammdpour *et al.* (2012) reported that in laying hen and laying duck thickness of tunica muscularis was 471.11 ± 204.96 mm, and 323.88 ± 67.57 mm, respectively.

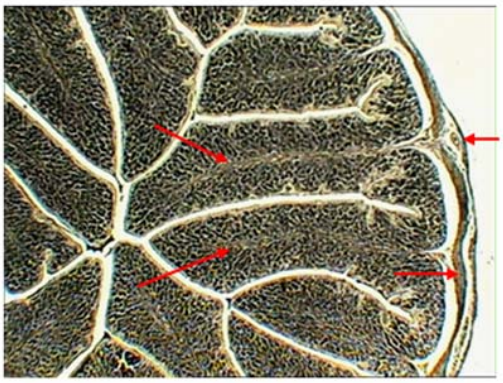

FIG. 3. PHOTOMICROGRAPH OF VAGINA SHOWING THE PRESENCE OF RETICULAR FIBRES (⟶) IN CENTER OF THE FOLDS, LAMINA PROPRIA-SUBMUCOSA, TUNICA MUSCULARIS AND TUNICA SEROSA LAYER.

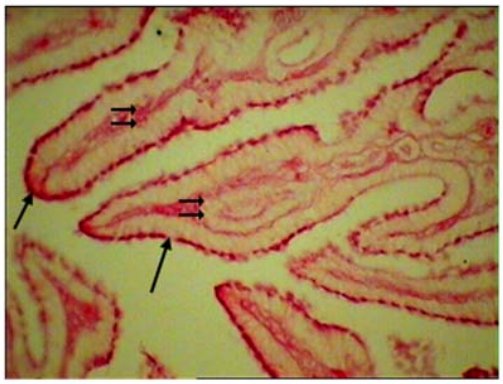

FIG. 4. PHOTOMICROGRAPH OF VAGINA PAS POSITIVE REACTION (⟶) IN APICAL PART OF LINING EPITHELIUM (⇉) CENTER OF THE FOLD. PAS X40.

The most significance of intense PAS positive reaction was appreciated in the apical part of the cytoplasm of the lining epithelium and in the centre of the fold (Fig. 4).

REFERENCES :

Basket, M.R. (2011). J. Anim. Sci., 89: 1323-1329.

Banks. W.J. (1987). Applied Veterinary Histology. 2nd edn. Williams and Wilkins, Los Angeles, p. 511-516.

Culling, C.F.A. (1974). Handbook of Histomorphological and Histochemical Techniques. 3rdedn, Butterworth and Co., London.

Dellmann, H.D. and Carithers, J.R. (1996). Cytology and Microscopic Anatomy. 5thedn, Lea and Febiger, Box 3024, USA. P. 275-277.

Gracey, J.F. (1986). Bleeding method of slaughtering-slaughter. Meat Hygiene. 8thedn, p. 144-145.

Khan, M.Z.L., Asaduzzamman, M., Rahman, A. and Islam, K.N. (1999). Bangladesh J. Anim. Sci., **28(12**): 47-51.

King, A.S. and McLelland, J. (1975). Outline of Avian Anatomy. Baillere Tindall, London. p. 65.

Luna, L.G. (1968). Manuals of Histologic Staining Methods of Armed Forces Institute of Pathology, 3rdedn, McGraw Hill Book Co., London.

Mishra, D., Sultana, N., Masum, M.A. and Rahman, S. (2014).. Bangladesh J. Vet. Med., **12**: 9-15.

Mohammadpour, A.A., Zamanimoghadam, A. and Heidari, M. (2012). Vet. Res. Forum, Winter, **3(1):**

27-30.

Nickel, R., Schummer, A. and Seiferle, E. (1977). Anatomy of domestic birds. Verlag Paul Parey, Berlin, Humburg, p.75-81.

Richardson, K.C. (1935). Female Genital System. In: The Histology of the Fowl. (1974), Academic Press, Inc. Ltd., Oval Road, Landon.

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods. 8th edn. Iowa State Univ. Press, Ames, Iowa, USA.

Strukie, P.D. and Muller, W.J. (1976). Avian Physiology. 4th edn, Springer Verlag, New York, Berlin, Heideberg, Tokio. p. 303-306.

❑