Anatomical Studies on the sperm storage organ of Pati and Chara-Chemballi Ducks


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ABSTRACT

The present investigation was conducted on the comparative anatomical study of vagina (sperm storage organ) of Pati and Chara-Chemballi ducks during laying periods. The vagina was collected immediately after death and anatomical studies were made on it. The vagina was a narrow muscular tube, sharply curved and was tightly bound by ligament. The length, width thickness and weight of vagina of Chara-Chemballi ducks were significantly (p<0.01) higher than Pati duck. The lining epithelium consisted of pseudostratified columnar epithelial cells with few goblet cells. The mean height of lamina epithelialis mucosae of vagina of the present study was significantly (p<0.01) higher in Chara-Chemballi duck (26.508±0.298 µm) than Pati duck (23.058±0.330 µm). A weak PAS positive reaction was noticed in the lining epithelium of vagina of Pati and Chara-Chemballi ducks.

Key words: Anatomical, Chara-Chemballi ducks, Comparative, Pati, Vagina.

INTRODUCTION

Rearing of duck is traditional household practices of the rural people of Assam, the North Eastern part of India. The Pati duck population constitutes a major indigenous non-descript duck variety in the state of Assam with an annual egg production per duck is 70-95 eggs (Kalita et al., 2009). However, Chara-Chemballi duck of Kerala which has been introduced in Assam is the indigenous varieties but their production performance differ significantly with an annual egg production per duck is 181.3 and average egg weight is 71.6±2.38g at 72 weeks of age under free range condition (Mahanta et al., 2009). The importance of the study of the vagina in poultry merges from economical point of view for obtaining the most products i.e. fertilized egg from the poultry. In the duck, the functional left oviduct consists of five segments viz., infundibulum, magnum, isthmus, uterus and vagina. Among all the glands, vagina plays a vital role in formation of bloom or cuticle and it provides the appropriate environment for sperm. In poultry, sperm transferred by natural mating or artificial insemination into the distal end of the vagina immediately begin their ascent to the uterovaginal junction at the anterior end of vagina. Mucosa of the vagina and uterus at uterovaginal junction is collectively referred to as the sperm –storage tubules where the egg is fertilized. 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), Adult indigenous chicken of Assam by Bharti and Talukdar (2016), but the information on the vagina of Pati and Chara-Chemballi ducks are still to be documented. Therefore, this investigation was aimed to describe the anatomical aspects of vagina of Pati and Chara-Chemballi ducks.

MATERIALS AND METHODS

In the present investigation, twelve each Pati and Chara-Chemballi ducks were utilized at 42 weeks of age. The Pati and Chara-Chemballi ducks were procured from Pathsala, Barpeta district and State Institute and Rural Development, Khanapara, respectively. Immediately after sacrifice, the topographic position was recorded and then the vaginas were collected as per the standard method of Gracy (1968) and gross studies were made on it. The gross anatomical characteristics of vaginas were studied and the different biometrical measurements viz, the length, width and thickness of vaginas were recorded with the help of electronic pan balance (McCance, 1974). For histological and histochemistry study, tissue samples of vagina were fixed in 10% neutral buffered formalin. Tissues were processed for Paraffin embedding method. Paraffin sections were cut in 5 micron thickness and stained with routine method for hematoxylin and eosin stained sections.
Fig-1: Photograph showing the position of Ovary (O) and Vagina (V) in Pati duck

Fig-2: Photograph showing the position of Ovary (O) and Vagina (V) in Chara-Chemballi duck

Fig-3: Photomicrograph showing the primary (A), secondary (B) and tertiary folds (C) in the vagina of Pati duck. H&E, 100X

Fig-4: Photomicrograph showing the primary (A), secondary (B), tertiary folds (C) and tunica muscularis (D) in the vagina of Chara-Chemballi duck. H & E, 100X

Fig-5: Photomicrograph showing the Sperm host gland (A) in Vagina of Chara-Chemballi duck. H & E, 400X

Fig-6: Photomicrograph showing the collagen fibers (Arrow) in the Vagina of Chara-Chemballi duck. Van Gieson’s, 400X

Fig-7: Photomicrograph showing the Elastic fibers (Arrow) in the Vagina of Chara-Chemballi duck. Hart’s method, 400X

Fig-8: Photomicrograph showing the Reticular fibers (Arrow) in the Vagina of Chara-Chemballi duck. Gomori’s Method, 400X
RESULTS AND DISCUSSION

Grossly, the vagina was a sharply curved narrow muscular tube tightly bounded by ligament. (Fig-1, Fig-2) It was connected to the uterus cranially and opened on the urodaeum of the cloaca caudally in accordance with Kings and McClelland (1975), Dyce et al. (2010) in ostrich and Mohammad Pour et al. (2012) in laying duck. The average biometrical measurement of length, width, thickness and weight of vagina were found to be significantly (p<0.01) higher in Chara-Chemballi duck (5.81±0.12 cm, 2.84±0.01 cm, 0.15±0.00 cm and 9.70±0.07 gm, respectively) than Pati duck (3.52±0.07 cm, 1.64±0.05 cm, 0.58±0.09 cm and 5.81±0.12 gm, respectively) (Table1). Mohammad Pour et al. (2012) reported the length, width, thickness and weight of vagina of laying duck were 6.62±1.13 cm, 14.85±2.78 mm, 3.31±1.11 mm and 8.41±1.38 gm, respectively. The length of vagina was about 3 cm in domestic duck (Das et al., 1965). These might be due to environmental condition of birds.

Histologically, the wall of vagina was thick and contained less primary folds and numerous secondary folds in both Pati and Chara-Chemballi ducks (Fig-3,4). The lining epithelium consisted of pseudostratified columnar cells with few goblet cells. The lamina propria-submucosa exhibited the presence of loose connective tissue where as tubular glands were not found in this layer but sperm host glands were present (Fig-5). These findings were supported by Das et al. (1965) in domestic duck. The lamina propria-submucosa contained more amount of collagen, reticular, elastic and nerves fibers than the other portion of oviduct in Chara-Chemballi duck than Pati duck. However, these could not be compared due to non-availability of literature.

Tunica muscularis of vagina was highly developed than other portion of oviduct and consisted of two layers i.e. inner circular layer and outer longitudinal layer in both the varieties of duck. Out of these two layers, inner circular layer was very thick than outer longitudinal layer in Chara-Chemballi duck as compared to Pati duck. Both these layers contained more amounts of collagen, reticular, elastic and nerves fibers in Chara-Chemballi than in the Pati ducks (Fig-6,7,8). The tunica serosa was formed by loose connective tissue and mesothelium. These findings were similar with the findings of Ghule et al. (2011) in Japanese quail.

The mean height of lamina epithelialis mucosae of vagina of the present study was significantly (p<0.01) higher in Chara-Chemballi duck (26.508±0.298 µm) than Pati duck (23.058±0.330 µm) (Table2). However, Khokhlov and Kuznetcov (2007) recorded that the epithelial height of vagina was 17.3±0.6 µm in hen at 540 day of age. These might be due to different breed varieties of birds.

Histochemically, both the varieties of Pati and Chara-Chemballi ducks revealed PAS weak reaction in the lining epithelium in contrast to Evencio-Neto et al. (1997) who reported that the epithelium of vagina showed negative reaction for PAS reaction in Muscovy duck.

CONCLUSION

Grossly, the length, width, thickness and weight of vagina of Chara-Chemballi duck were significantly (p<0.01) higher than Pati duck. Histologically, there was non-significant difference between the vagina of Pati and Chara-Chemballi ducks. However, the height of lamina epithelialis mucosae of vagina was significantly (p<0.01) higher in Chara-Chemballi duck than in Pati duck. Histochemically, both the varieties of ducks revealed PAS weak reaction in the lining epithelium. The study will be useful for the poultry scientists as well as farmers to device out the effective production and disease control regimes.

REFERENCES


