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RESEARCH ARTICLE

# Histomorphological and histochemical studies on magnum of oviduct in Japanese quails

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**Abstract :** The lamina epithelialis presented simple columnar ciliated epithelium in magnum, in both the groups of quail. Magnum, the second segment of oviduct, presented the tunica mucosa, tunica submucosa, tunica muscularis and tunica serosa from inside to outward in the present study.

**Key words :** Histomorphological , Histochemical, Magnum oviduct, Japanese quail

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## INTRODUCTION

Very mear information is available in literature on histology and histochemistery on magnum in Japanies quails, hence present investigation was made.

## RESEARCH METHODOLOGY

The present study was conducted on twenty Japanese quails. The birds were equally divided into two group's *viz.*, Group I (4-5 weeks of age) and Group II (7-8 weeks of age). Apparently healthy quails were used for this study.

For histological study, tissue pieces of 3 to 5 cm thick, were cur across the center of each segment of the oviduct and were fixed in 10 per cent neutral buffered formalin overnight at room temperature.These tissue pieces were then treated with routine methods of dehydration of ascending grades of alcohol (ethanol), cleared in xylene and embedded in paraffin wax. Each prepared paraffin blocks were sectioned serially at 3 to 5 µ thickness. The sections were stained with Mayer's haematoxyline and eosin stain for general histological and micrometrical observations (Singh and Sulochana, 1996). The following special staining techniques were also used for histomorphological study massons trichrome for collagen fibres (Luna, 1968) and Verhoeff's stains for elastic fibres (Luna, 1968).

McManus's PAS method (Singh and Sulochana, 1996), was implied to demonstrate the glycogen and

mucopolysaccharides in different segments of oviduct in both the groups.

The micrometrical observations of infundibulum of oviduct was recorded in microns (μ) as per the method of Culling (1969). The micrometrical observations were made by using ocular micrometer duly calibrated with stage micrometer. The measurements were recorded by calculating the average of 4 to 5 fields from each of stained slides.

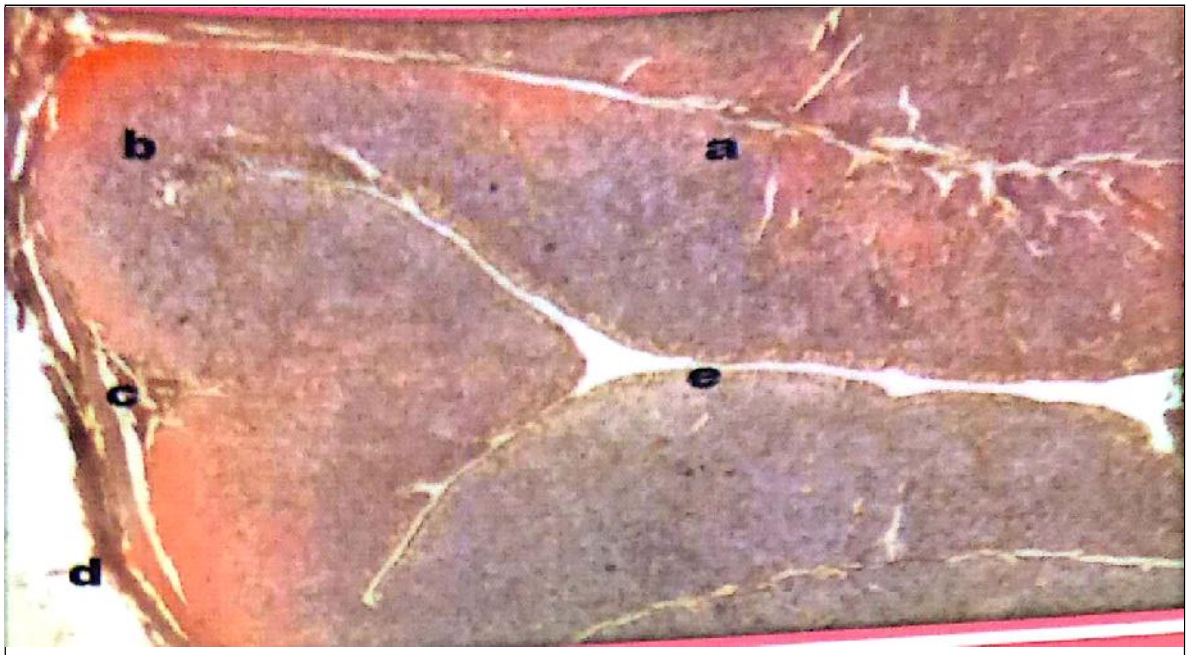
The data obtained was statistically analyzed and compared for micrometrical observations as per the method suggested by Snedecor and Cocharan (1994).

## RESULTS AND DISCUSSION

Magnum, the second segment of oviduct, presented the tunica mucosa, tunica submucosa, tunica muscularis and tunica serosa from inside to outward in the present study (Plate 1 and 2). This finding has similarity with the reports of Dellmann and Eurell (1998) in domestic fowl, Bansal *et al*. (2010) in Punjab white quails and Ghule *et al.* (2010) in Japanese quails.

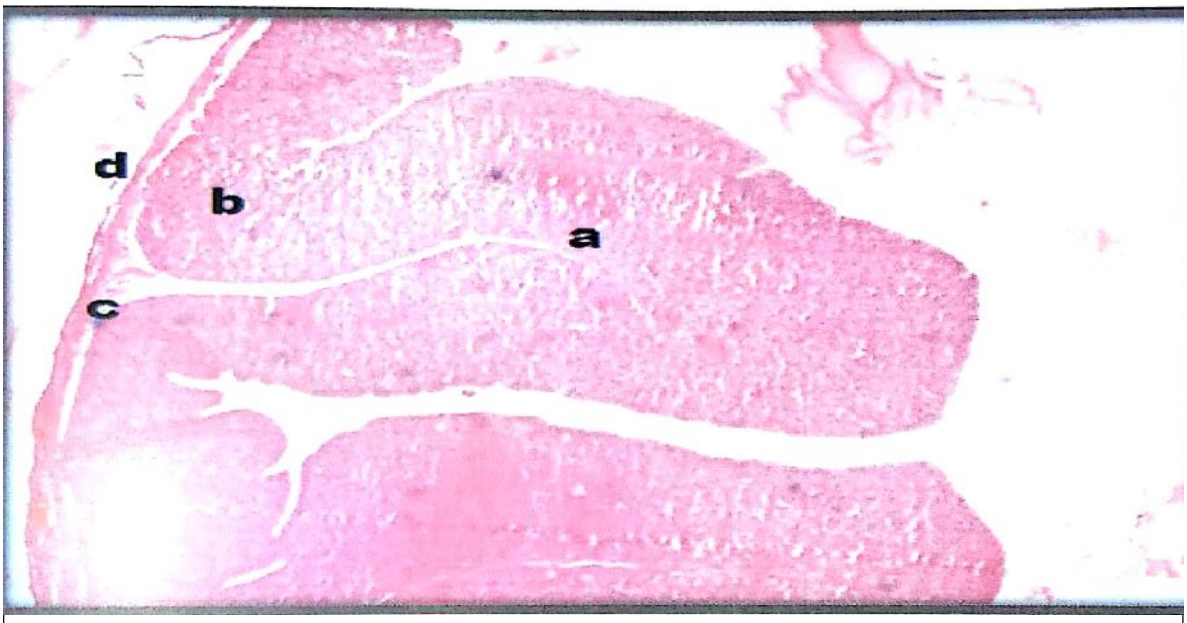
The tunica mucosa consisted of lamina epithelialis, lamina propria and lamina muscularis mucosea. In the present study, the thickness of the tunica mucosa of the magnum was 2.83 $\pm$ 0.30 μm in group I and 3.44 $\pm$ 0.24 μm in group II, respectively (Table 7). The proprial glands were highly developed and due to which the thickness of tunica mucosa has increased with the advancement of age. The glands were observed on the surface of epithelium either along the sides or near the bottom of the fold. This finding has supported by the earlier reports of Bansal *et al.* (2010) in Punjab white quails.

The mucosa with only the primary folds observed in the present study (Plate 1 and 2). This finding is in consonance with the reports of Davidson *et al.* (1968) in hen and Ghule *et al*. (2010) in Japanese quails. However, Berg *et al.* (2001) reported that the mucosal folds were packed with glands showing intensely stained granules in Japanese quail and Mohammadpour (2007) recorded well developed secondary folds forming many large duct like structures in the lamina propria of the guinea fowls.




(a) Primary mucosal fold, (b) Tunica submucosa, (c) Tunica muscularis, (d) Tunica serosa,
(e) Pseudostratified ciliated columnaer epithelium

**Plate 1: Microscopic photograph of magnum 4-5 weeks aged Japanease quail showing masons trichrome (160x)**




(a) Primary mucosal fold, (b) Tunica submucosa, (c) Tunica muscularis, (d) Tunica serosa

**Plate 2: Microscopic photograph of magnum 7-8 weeks aged Japanease quail showing H and E (80x)**

**Table 1: Mean (± SE) values of length (cm) of magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | Group II Mean ± SE |
|---|---|---|---|
| 1. | Magnum of oviduct (cm) | 7.08 ± 0.67 | 12.34 ± 0.20** |

** indicate significance of value at P ≤ 0.01
Group I :- Japanese quail of 4-5 weeks of age; Group II :- Japanese quail of 7-8 weeks of age

**Table 2 : Mean (± SE) values of diameter (mm) of magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | Group II Mean ± SE |
|---|---|---|---|
| 1. | Magnum of oviduct (mm) | 5.83 ± 0.16 | 6.22 ± 0.14$^{NS}$ |

NS= Non-significant

**Table 3 : Mean (± SE) values of thickness (mm) of magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | Group II Mean ± SE |
|---|---|---|---|
| 1. | Magnum of oviduct (mm) | 0.29 ± 0.03 | 0.65 ± 0.016** |

* and ** indicate significance of values at P ≤ 0.05 and 0.01, respectively
Group I : Japanese quail of 4-5 weeks of age ; Group II : Japanese quail of 7-8 weeks of age

**Table 4 : Mean (± SE) values of number of primary and secondary mucosal fold per microscopic field in magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | | Group II Mean ± SE | |
|---|---|---|---|---|---|
| | | Primary folds | Secondary folds | Primary folds | Secondary folds |
| 1. | Magnum of oviduct (mm) | 2.33 ± 0.21 | -- | 3.66 ± 0.16** | |

** indicate significance of value at P ≤ 0.01
Group I : Japanese quail of 4-5 weeks of age ; Group II :- Japanese quail of 7-8 weeks of age

In the present study, the number of primary mucosal folds were 2.33 ± 0.21 and 3.66 ± 0.16 per field in group I and group II, respectively (Table 5). The average length of folds was increased from group I, 91.66 ± 3.07 µm to group II, 180.00 ± 1.66 µm with the advancement of age (Table 6). However, Davidson *et al.* (1968) and Bansal *et al.* (2010) reported higher values of length in hen and Punjab white quails, respectively. Further, Bakst (1978) suggested that the presence of an ovum in the magnum resulted in the flattening of the mucosal folds and occlusion of the oviductal lumen in hen.

The lining epithelium of the magnum was simple columnar ciliated and with more secretory cells in the quails before and during the laying of egg (Plate 1). Bakst and Howarth (1975) opined that ciliated epithelial cells predominate throughout the oviduct with non-ciliated cells approaching an equal proportion in isthemus of *Gallus domesticus*, Bacha and Bacha (1990) reported columnar ciliated type of epithelium with goblet cells in hen, Dellmann and Eurell (1998) found simple simple columnar with equal number of ciliated cells and goblet cells in domestic fowl, Berg *et al.* (2001) observed simple columnar and consisted of alternating ciliated cells and non-ciliated secretory cells in Japanese quail, Mohammadpour (2007) found ciliated and non-ciliated cells about equal in number in laying hens, Mohammadpour and Keshtmandi (2008) reported ciliated pseudostratified in turkey and ciliated pseudostratified columnar in pigeon and Ghule *et al.* (2010) observed pseudostratified columnar ciliated with goblet cells in Japanese quail. However, Gopinath and Haffezuddin (1980) reported cuboial epithelium with basal cells in the magnum of domestic fowl and Bansal *et al.* (2010) mentioned simple columnar having less ciliated and more secretory cells in Punjab white quails.

**Table 5 : Mean (± SE) values of length («m) of primary and secondary mucosal folds in magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | | Group II Mean ± SE | |
|---|---|---|---|---|---|
| | | Primary folds | Secondary folds | Primary folds | Secondary folds |
| 1. | Magnum of oviduct (mm) | 291.66 ± 3.07 | -- | 180 ± 1.66** | |

NS = Non-significant ** indicate significance of value at P ≤ 0.01
Group I : Japanese quail of 4-5 weeks of age; Group II : Japanese quail of 7-8 weeks of age

**Table 6 : Mean (± SE) values of height of epithelium («m) in magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | Group II Mean ± SE |
|---|---|---|---|
| 1. | Magnum of oviduct (µm) | 1.16 ± 0.16 | 1.66 ± 0.16** |

NS = Non - significant * and ** indicate significance of values at P ≤ 0.05 and 0.01, respectively

**Table 7: Mean (± SE) values thickness («m) of tunica mucosa, tunica submuosa, tunica muscularis in magnum of oviduct in Japanese quail at different groups**

| Sr. No. | Segment of oviduct | Group I Mean ± SE | | | Group II Mean ± SE | | |
|---|---|---|---|---|---|---|---|
| | | Tunica mucosa | Tunica submucosa | Tunica muscularis | Tunica mucosa | Tunica submucosa | Tunica muscularis |
| 1. | Magnum of oviduct (µm) | 2.83 ± 0.30 | 2.16 ± 0.16 | 3.16 ± 0.16 | 3.44 ± 0.24$^{NS}$ | 2.88 ± 0.11 | 4.33 ± 0.16** |

NS = Non - significant * and ** indicate significance of values at P ≤ 0.05 and 0.01, respectively
Group I : Japanese quail of 4-5 weeks of age ; Group II : Japanese quail of 7-8 weeks of age

**Table 8 : McManus's PAS activity for glycogen in magnum of oviduct in Japanese quail at different group**

| Sr. No. | Segment of oviduct | Group I Regional showing PAS | | Group II Regional showing PAS | |
|---|---|---|---|---|---|
| | | Lining epithelium | Proprial gland | Lining epithelium | Proprial gland |
| 1. | Magnum of oviduct | + | ++ | ++ | +++ |

\+ Weak PAS +ve reaction , ++ Moderate PAS +ve reaction , +++ strong PAS +ve reaction
Group I : Japanese quail of 4-5 weeks of age ; Group II : Japanese quail of 7-8 weeks of age

The nuclei of the secretory cells were round and located close to the base of the cell in the present study (Plate 2). However, Ghule *et al*. (2010) reported that the nuclei of the secretory cells were oval and located at the central to apical portion of the cells in Japanese quail.

The average height of the epithelium was 1.16 ± 0.16 μm and 1.66 ± 0.16 μm in group I and group II, respectively (Plate 2). The values of epithelial height were recorded lower in the present study than the reports of Bansal *et al*. (2010) in Japanese white quails. The mucosal epithelial height was somewhat reduced in magnum as compared to the height recorded in the infundibulum as also reported earlier in Japanese white quails by Bansal *et al*. (2010).

The thickness of the tunical submucosa of the magnum was 2.16 $\pm$ 0.16 μm in group I and 2.88 $\pm$ 0.11 μm in group II, respectively (Table 7). This layer has presented numerous tubular glands which were lined by cuboidal cells with secretory material in the lumen. Similar were the findings of Ghule *et al*. (2010) in Japanese quails.

The thickness of the tunica muscularis of the magnum was 3.16 $\pm$ 0.16 μm in group I and 4.33 $\pm$ 0.16 μm in group II, respectively. The muscular layer of magnum was thicker than that of infundibulum. This layer was made up of smooth muscle bundles having thicker circular layer and thinner longitudinal layer interspersed with blood vessels and connective tissue fibres (Plate 1). These observations are in concurrence with the reports of Gopinath and Hafeezuddin (1980) in domestic fowl, Fujii (1981) in chicken and Ghule *et al*. (2010) in Japanese quails.The tunica serosa was made up of a subserosa with loose connective tissue fibres and lamina epithelialis serosa with mesothelium in group I and group II.

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