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RESEARCH ARTICLE

Histomorphological and histochemical studies on isthumus of oviduct in Japanese quails

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Abstract : The mucosa of each segment presented lamina epithelialis, lamina propria and lamina mucosae. The mucosa was thrown into folds *viz.*, primary and secondary folds. The lamina epithelialis presented pseudostratified columnar ciliated epithelium was observed in isthmus, in both the groups of quail.

Key words : Histomorphological, Histochemical, Isthumus, Oviduct of Japanese quail

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INTRODUCTION

Very mear information is available in literature on histology and histochemistery of isthumus 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 or 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 (m) 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.

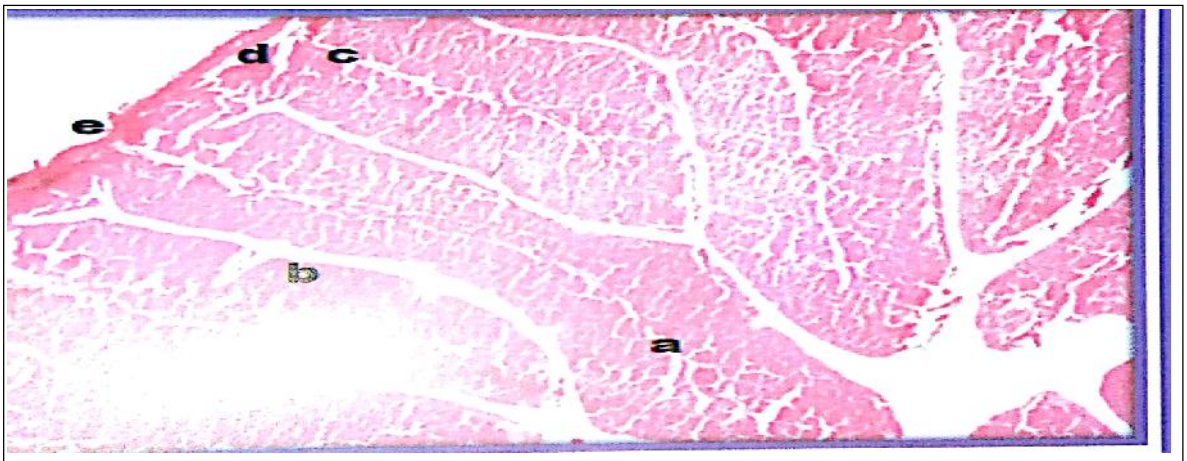
The data obtained was statistically analyzed and compared for micrometrical observations as per the method suggested by Snedecor and Cocharan (1994).

RESULTS AND DISCUSSION

The histological structure of isthmus, the third segement of oviduct, presented the tunica mucosa, tunica submucosa, tunica musculris and tunica serosa from outside to inward in the present study (Plate 1). This finding was in agreement with the earlier 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.

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

Plate 1 : Microscopic photograph if isthumus of 4-5 weeks aged Japanese Quail (H and E 80)



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

Plate 2 : Microscopic photograph of isthumus 7-8 week age Japanese quail showing (PAS x 80)

The tunica mucosa of isthmus consisted of lamina epithelialis, lamina propria and lamina muscularis mucosea) in the present study, the thickness of the tunica mucosa of the isthmus was 1.16 ± 0.16 mm in group I and 1.44 ± 0.17 mm in group II, respectively (Table 4). the thickness was significantly increased with the advancement of age.

The mucosa of the isthmus presented numerous folds. These folds were classified as primary and secondary. The primary folds were angular and the secondary folds were broad in appearance in the present study The findings are in consonance with the reports of Bacha and Bacha (1990) in hen, Bansal *et al.* (2010) in Punjab white quails and Ghule *et al*. (2010) in Japanese quails however, Bakst and Howarth (1975) reported that the mucosal folds broaden and become dimpled with glandular apertures in gallus domesticus.

The average number of primary and secondary folds per field in the isthmus of quails before laying were 3.83 ± 0.16 and 4.66 ± 0.21 in group I and during laying 6.22 0.22 and 7.01 ± 0.14 in group II, respectively (Table 1). the number of folds were increased with the advancement of age. This finding has similarity with the reports of Berg *et al.* (2001) in Japanese quail.

Table 1 : Mean (± SE) values of number of primary and secondary mucosal fold per microscopic field in isthmus 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.	Isthmus of oviduct (mm)	3.83± 0.16	4.66 ± 0.21	6.22 ± 0.22	7.22 ± 0.14**

** 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 length («m) of primary and secondary mucosal folds in isthmus 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.	Isthmus of oviduct (mm)	82.83 ± 1.30	19.50 ± 0.22	107.11 ± 0.77**	20.66 ± 0.57^{NS}

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 3 : Mean (± SE) values of height of epithelium («m) in ishumus of oviduct in Japanese quail at different groups

Sr. No.	Segment of oviduct	Group I Mean ± SE	Group II Mean ± SE
1.	Isthmus of oviduct (µm)	1.16 ± 0.16	1.88 ± 0.11**

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

Table 4 : Mean (± SE) values thickness («m) of tunica mucosa, tunica submuosa, tunica muscularis in isthmus 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.	Isthmus of oviduct (µm)	1.16 ± 0.16	1.16± 0.16	3.66 ± 0.33	1.44±0.17^{NS}	1.77 ± 0.14*	4.88± 0.11**

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 5 : McManus's PAS activity for glycogen in isthmus of oviduct in Japanese quail at different groups

Sr.No.	Segment of oviduct	Group I		Group II	
		Regional showing PAS		Regional showing PAS	
		Lining epithelium	Proprial gland	Lining epithelium	Proprial gland
1.	Isthmus 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 average length of primary and secondary folds was increased from group I 82.83 ± 1.30 and 19.50 ± 0.22 μm to group II 107.11 ± 0.77 and 20.66 ±0.57 μm with the advancement of age (Table 2). But the average length was found th be decreased gradually in isthmus as compared to the mucosal folds of magnum. This finding goes well with the reports of Bansal *et al*. (2010) in Punjab white quails. 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 isthmus was pseudostratified columnar ciliated type in both group I and II. Similar were the findings of Bacha and Bacha (1990) in hen, Dellmann and Eurell (1998) in domestic fowl, Bansal *et al.* (2010) in Punjab white quails and Ghule *et al*. (2010) in Japanese quails. However, Bakst and Howarth (1975) opined that ciliated epithelial cells predominate throughout the oviduct with non-ciliated cells approaching an equal proportion in isthmus of gallus domesticus, Fujii (1981) reported the predominance of ciliated cells in the isthmus of chicken Ozen *et al.* (2009) recorded simple columnar ciliated to pseudostratified columnar ciliated type in the isthmus of Pekin duck.

The average height of the epithelium was 1.16 ± 0.16 μm and 1.88 ± 0.11 μm, respectively in the quails before and during the laying period in the present study (Table 7). The epithelial height was slightly increased with the advancement of age.This finding goes well with the reports of Bansal *et al.* (2010) in Punjab white quails.

The mucosal glands in the isthmus were less in number as compared to magnum but structurally these were similar to the proprial glands of magnum This finding has similarity with the reports of Bansal *et al.* (2010) in Punjab white quails. However, Fujii (1981) in chicken reported that the lamina propria consisted of loosely arranged simple branced tubular glands. The cells of the gland had basal nuclei and secretory granules towards the apex. Further, Berg *et al.* (2001) reported few proprial glands having less densely packed granules in the isthmus of Japanese quail.

The average thickness of the tunica submucosa of the isthmus (Plate 2) was 1.16 ± 0.16 μm in group I and 1.77 ± 0.14 μm in group II, respectively (Table 4). The propria submucosa showed well developed tubular glands and the connective tissue fibres *viz.*, Collagen, reticular and elastic fibres Similar were the reports of Ghule *et al.* (2010) in panese quails.

The average thickness of the tunica muscularis of the isthmus was 3.66 ± 0.33 μm in groups I and 4.88 ± 0.11μm in group II, respectively (Table 4). The muscularis layer consisted of inner circular and outer longitudinal smooth muscle fibres. The collagen fibres were interspersed between the two muscle layers. The results find similarly with the reports of Fujii (1981) in chicken, Bansal *et al.* (2010) in Punjab white quails and Ghule *et al.* (2010) in Japanese quails.The tunica serosa presented loose connective tissue fibres and lamina epitherlialis serosa covered by mesothelium in group I and group II.

The lining epithelium and the proprial glands of the isthmus showed weak reaction for PAS activity in the immature quails. However, with the advancement of age, the reaction was observed to be moderate in the lining epithelium and strong activity in the proprial glands of the isthmus for glycogen in the quails during laying of egg, Similar were the reports of Ozen and Kurum (2009) in Pekin duck and Bansal *et al.* (2010) in Punjab white quails.

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