

GROSS ANATOMICAL AND BIOMETRICAL STUDIES ON OVIDUCT IN JAPANESE QUAIL

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Abstract: The gross study of the oviduct was conducted in twenty Japanese Quails (*Coturnix coturnix japonica*) before and during laying of egg. The birds were divided equally into two groups viz. Group I (4 to 5 weeks of age) and Group II (7 to 8 weeks of age). Apparently healthy quails were used for this study. The left oviduct was found functional and placed suspended by thin folded peritoneal membrane attached dorsally to inner surface of the abdominal cavity in the quails before (Group I) and during laying of egg (Group II). Total weight (gm), length (cm), average diameter (mm) and average thickness (mm) was significantly ($p < 0.01$) increased with the advancement of age in groups I and II respectively.

Keywords: Gross Anatomy, Biometry, Oviduct, Japanese quails.

Introduction

The right oviduct was under developed while the left oviduct was well developed and found functional. Similar were the findings of Raghavan (1964) in hen, Woodard and Mather (1964) in *Coturnix* quails and Dyce *et al.*, (1987) in birds. The left oviduct appeared segmented having five divisions viz. infundibulum, magnum, isthmus, uterus and vagina in Japanese quails (Plate 3). This finding goes well with the reports of Woodard and Mather (1964) in *Coturnix* quails, Fertuck and Newsted (1970) in quails, Sharma and Duda (1989) in Mallard, Berg *et al.*, (2001) in Japanese quail, Bansal *et al.*, (2010) in Punjab White quails and Ghule *et al.*, (2010) in Japanese quails.

Materials and Methods

The present study was conducted on twenty Japanese quails. The birds were equally divided into two groups viz. Group I (4-5 weeks of age) and Group II (7-8 weeks of age). The quails were sacrificed as per routine procedure by using halal method. After abdominal laparotomy and cranial displacement of sternum, the viscera was exercised carefully to approach the reproductive organs. The oviducts were identified and studied for its topographic relations. The organs *in situ* were photographed. The samples were collected in a small tray and then washed slowly under running tap water to remove tissue debris for correct gross anatomical observations.

The gross anatomical observations of oviduct were recorded with respect to its colour and location and the photographs of oviduct were taken to illustrate the gross anatomy.

Biometrical observations of different segments of oviduct viz. infundibulum, magnum, isthmus, uterus and vagina in both the groups were recorded as follows.

The total weight of oviduct was recorded in grams (gm) with the help of electronic scientific balance. The total length of oviduct from the anterior end of infundibulum to the terminal end of vagina was measured on centimeter scale with the help of non-stretchable thread and recorded. The length of each segment of oviduct viz. infundibulum, magnum, isthmus, uterus and vagina were measured in centimeter with the help of non-stretchable thread and centimeter scale and recorded. The diameter of each segment of the oviduct was measured with the help of digital vernier caliper and recorded in millimeters. After opening the oviduct, the thickness of wall of each segment of the oviduct was measured with the help of digital vernier calliper and recorded in millimeter.

Result and Discussion

The investigation was undertaken to study the Gross Anatomy, biometry and histomorphology of oviduct in each of 10 Japanese quails (*Coturnix coturnix japonica*) before and during laying of egg.

The right oviduct was under developed while the left oviduct was well developed and found functional. Similar were the findings of Raghavan (1964) in hen, Woodard and Mather (1964) in *Coturnix* quails and Dyce *et al.*, (1987) in birds. The left oviduct appeared segmented having five division's viz. infundibulum, magnum, isthmus, uterus and vagina in Japanese quails (Plate 3). This finding goes well with the reports of Woodard and Mather (1964) in *Coturnix* quails, Fertuck and Newsted (1970) in quails, Sharma and Duda (1989) in Mallard, Berg *et al.*, (2001) in Japanese quail, Bansal *et al.*, (2010) in Punjab White quails and Ghule *et al.*, (2010) in Japanese quails.

The left oviduct was suspended by thin folded peritoneal membrane, attached dorsally to inner surface of the abdominal cavity and caudally appears between the region of fourth thoracic rib to the region of cloacae. It is related to the left kidney, intestine and gizzard. This finding correlates with the reports of Raghavan (1964) in domestic hen and Dyce *et al.*, (1987) in birds.

The oviduct appeared cream in colour in group I as well as in group II except the uterus, which showed brown colour in the present study. Woodard and Mather (1964) reported cream to brown colour of the left oviduct in *Coturnix* birds.

In the present study, the total weight of oviduct was 2.57 ± 0.46 and 8.58 ± 0.63 gm in group I and group II respectively (Table 1). The weight was increased due to advancement of age (53 weeks) in laying turkey hens 265.00 to 279.50 gms as reported by Dalrymple *et al.*, (1968) and Khokhlov (2008) in sexually mature hens, however, Mohammadpour (2007) observed the weight of oviduct as 56.19 ± 9.64 gm in hen and 35.68 ± 9.91 gm in each of twenty hens and ducks of 1 to 1.5 years of age respectively. But Kanchana (2006) reported the lower values of mean weight of the left oviduct to be 3.48 gm with a range of 2.29 to 3.96 gms in non-laying guinea fowls of 10 months of age.

The total length of oviduct, in the present study, was 15.28 ± 2.066 and 29.77 ± 0.433 cm in group I and group II, respectively (Table 1). However, higher values of length measurements were observed by Dalrymple *et al.*, (1968) in hens of 53 weeks age 80.90-84.50 cms; Kelany *et al.*, (1992) reported 75.00 and 70.00 cms, in Hy-line and Dandrawi breeds of egg producing fowls at 24 weeks of age respectively, Garg *et al.*, (2006) in adult Kadaknath birds of 26 weeks of age reported 58.70 cm, and Mohammadpour (2007) found 71.85 ± 5.47 cm and 60.27 ± 10.19 cm in hen and duck of 1 to 1.5 years of age respectively. Further, Kanchana (2006) reported lower values 9.00 to 12.70 cm of oviductal length in non-laying guinea fowls at 6 months of age.

The average length of various regions of oviduct viz. infundibulum, magnum, isthmus, uterus and vagina measured in Group I (1.75 ± 0.09 , 7.08 ± 0.67 , 4.28 ± 0.34 , 2.56 ± 0.23 and 0.88 ± 0.15 cms) and group II (3.34 ± 0.15 , 12.34 ± 0.20 , 6.94 ± 0.41 , 4.55 ± 0.27 and 1.75 ± 0.11 cms) respectively. The values of length were found increased with the advancement of age in the present study. Similar were the reports of Woodard and Mather (1964) in 18 to 30 weeks old Japanese quails 18.20, 46.90, 20.10, 9.90 and 4.90 cms respectively. Dalrymple *et al.*, (1968) in laying turkey hens of 53 weeks of age 10.90-11.70, 44.50-45.20, 12.60-14.50, 9.60-10.80 and 2.60-3.50 cms respectively and Kanchana (2006) in non-laying guinea fowls of 10 months age 11.75, 18.25, 8.75, 4.50 and 3.25 cms respectively. The magnum was the longest segment of the functional oviduct appeared in the present study, was in collaboration with the findings of Woodard and Mather (1964) in Japanese quails, Dalrymple *et al.*, (1968) in laying turkey hens, Garg *et al.*, (1968) in adult Kadaknath birds and Kanchana (2006) in non-laying guinea fowls.

The average diameter of oviduct in the present study was 4.07 ± 0.96 mm and 5.13 ± 0.84 , mm in group I and group II respectively (Table 1). The measurements were increased with the advancement of age. The average diameter of various regions of oviduct viz.

infundibulum magnum, isthmus, uterus and vagina measured in Group I (0.56 ± 0.02 , 5.83 ± 0.16 , 5.33 ± 0.21 , 5.16 ± 0.16 and 3.50 ± 0.22) mm and groups II (1.75 ± 0.14 , 6.22 ± 0.14 , 5.88 ± 0.26 , 6.16 ± 0.30 and 5.66 ± 0.16) mm respectively. However, Kanchana (2006) reported lower values of oviductal diameter 0.45, 1.35, 0.70, 3.65 and 0.65 mm respectively in non-laying guinea fowls.

The average thickness of oviduct in the present study was 0.17 ± 0.04 mm and 0.22 ± 0.10 mm in group I and group II respectively (Table 1). The measurements were increased with the advancement of age. Similar were the reports of Mohammadpour (2007) in laying hen 2.07 mm and 2.09 mm in duck aged 1 to 1.5 years of age. The average thickness of various regions of oviduct viz. infundibulum, magnum, isthmus, uterus and vagina measured in Group I (0.09 ± 0.002 , 0.29 ± 0.03 , 0.14 ± 0.005 , 0.29 ± 0.009 and 0.07 ± 0.003 mm) and group II (0.18 ± 0.003 , 0.65 ± 0.016 , 0.20 ± 0.018 , 0.48 ± 0.005 and 0.10 ± 0.004 mm) respectively. These observations could not be compared for want of similar records in the literature.

Table 1: Mean (\pm SE) values of total weight (gm), length (cm), average diameter (mm) and average thickness (mm) of oviduct in Japanese quail at different groups

Sr. No	Parameter	Group I Mean \pm SE	Group II Mean \pm SE
1	Total weight (gm) of oviduct.	2.57 ± 0.46	$8.58 \pm 0.63^{**}$
2	Total length (cm) of oviduct.	15.28 ± 2.066	$29.77 \pm 0.433^{**}$
3	Average Diameter (mm) of oviduct	4.07 ± 0.96	$5.13 \pm 0.84^{**}$
4	Average thickness (mm) of oviduct.	0.17 ± 0.04	$0.32 \pm 0.10^{**}$

** - significant at $P \leq 0.01$

Table 2: Mean (\pm SE) values of length (cm) of each segment of oviduct in Japanese quail at different groups

Sr. No.	Segment of oviduct	Group I Mean \pm SE	Group II Mean \pm SE
1	Infundibulum of oviduct (cm)	1.75 ± 0.09	$3.34 \pm 0.15^{**}$
2	Magnum of oviduct (cm)	7.08 ± 0.67	$12.34 \pm 0.20^{**}$
3	Isthmus of oviduct(cm)	4.28 ± 0.34	$6.94 \pm 0.41^{**}$
4	Uterus of oviduct (cm)	2.56 ± 0.23	$4.55 \pm 0.27^{**}$
5	Vagina of oviduct (cm)	0.88 ± 0.15	$1.75 \pm 0.11^{**}$

** - significant at $P \leq 0.01$

Group I :- Japanese quail of 4-5 weeks of age.

Group II :- Japanese quail of 7-8 weeks of age.

Table 3: Mean (\pm SE) values of diameter (mm) of each segment of oviduct in Japanese quail at different groups

Sr. No.	Segment of oviduct	Group I Mean \pm SE	Group II Mean \pm SE
1	Infundibulum of oviduct (cm)	0.56 \pm 0.02	1.77 \pm 0.14**
2	Magnum of oviduct (mm)	5.83 \pm 0.16	6.22 \pm 0.14 ^{NS}
3	Isthmus of oviduct (mm)	5.33 \pm 0.21	5.88 \pm 0.26 ^{NS}
4	Uterus of oviduct (mm)	5.16 \pm 0.16	6.16 \pm 0.30**
5	Vagina of oviduct (cm)	3.50 \pm 0.22	5.66 \pm 0.16**

NS – Not significant ** - Significant at $P \leq 0.01$

Table 4: Mean (\pm SE) values of Thickness (mm) of each segment of oviduct in Japanese quail at different groups

Sr. No.	Segment of oviduct	Group I Mean \pm SE	Group II Mean \pm SE
1	Infundibulum of oviduct (mm)	0.09 \pm 0.002	0.18 \pm 0.003**
2	Magnum of oviduct (mm)	0.29 \pm 0.03	0.65 \pm 0.016**
3	Isthmus of oviduct (mm)	0.14 \pm 0.005	0.20 \pm 0.018*
4	Uterus of oviduct (mm)	0.29 \pm 0.009	0.48 \pm 0.005**
5	Vagina of oviduct (mm)	0.07 \pm 0.003	0.10 \pm 0.004**

* Significant at $P \leq 0.01$ ** - Significant at $P \leq 0.01$

Group I :- Japanese quail of 4-5 weeks of age.

Group II :- Japanese quail of 7-8 weeks of age.

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