

Age related gross morphometrical observations of pancreas in Japanese quail (*Coturnix coturnix japonica*)

M S PALASKAR, J Y WAGHAYE and P N THAKUR✉

Maharashtra Animal and Fishery Sciences University, Nagpur 431 402, India

Received: 15 March 2023; Accepted: 11 February 2026

Keywords: Japanese quails, Meat and egg, Pancreas, Poultry

Although India has gradually advanced toward industrialization, its economy has historically been primarily agrarian. A large proportion of the population continues to rely on agriculture and allied activities, which provides significant scope for allied industries such as poultry farming to expand. This sector not only supports the livelihood of rural communities but also contributes to foreign exchange earnings through exports.

Quails are small game birds reared commercially for both meat and egg production. Because of their low initial investment and minimal maintenance requirements compared to other poultry species, quail farming is gaining popularity across India. Among quail species, Japanese quails are particularly advantageous due to their rapid growth, as they start laying eggs as early as 6–7 weeks of age. Their early sexual maturity, short reproductive cycle, and better resistance to diseases make them more suitable than conventional poultry for both commercial farming and research purposes.

For the present investigation, forty-eight Japanese quails (*coturnix japonica*) were procured from an authenticated source and maintained at the poultry farm of the College of Veterinary and Animal Sciences, Parbhani, under standard quail rearing practices. Twelve birds each were humanely sacrificed at the end of the first, second, third, and fourth week of age, by cranial subluxation, and the pancreas was exposed. The pancreas was examined *in situ* for gross anatomical features such as position, colour, shape, and lobation. Subsequently, the organ was carefully dissected to study its gross morphology and to record biometrical parameters including weight, length, and width. The weight of the pancreas was measured using a digital balance, while its length and width were determined with the help of a measuring scale.

In the present study, gross and biometrical observations were made on the pancreas of Japanese quail at different age groups. The gross observations of pancreas such as

location, colour, shape and lobulation were studied. The biometrical observations like weight, length and width were recorded.

Grossly pancreas appeared as whitish, elongated, ribbon shaped organ, located on right side of the abdominal cavity and extended from pylorus between descending and ascending segment of duodenal loop (Fig.1).

The present findings are consistent with earlier reports by Bock *et al.* (1997) in quail, Faris (2012) in pigeon, and Khadim *et al.* (2010) in red jungle fowl, who described the pancreas as a ribbon-shaped organ situated between the ascending and descending limbs of the duodenum. Similarly, Beheiry *et al.* (2018) observed that in goose, the pancreas was elongated and positioned on the right side of the abdominal cavity. Comparable results were documented by Agele and Mohammed (2012) in golden eagle and Sharoot (2016) in goose, where the pancreas was reported to lie on the right side of the abdominal cavity within the duodenal loop. Stornelli *et al.* (2006) also reported that in ostrich, the pancreas extended from pylorus to the duodenal loop. In agreement with the present observations, Simsek and Alabay (2008), Smith (1974) in quail, Gulmez *et al.* (2004) in goose, Saadatfar *et al.* (2011) in palm dove, Kara *et al.* (2014) in sparrowhawk, and Hamodi *et al.* (2013) in guinea fowl and common gull reported that the pancreas



Fig. 1 Photograph showing pancreas in duodenal loop in group - I. a. Descending limb of duodenum; b. Ascending limb of duodenum; c. Pancreas

Present address: Department of Veterinary Anatomy and Histology, College of Veterinary and Animal Sciences, Parbhani 431 402, India.*Corresponding author email: pravin_thakur75@rediffmail.com

in these avian species was enclosed within the duodenal loop.

In the present study, pancreas was observed as whitish in appearance. In contrast to, the present findings Khadim *et al.* (2010) in red jungle fowl, Faris (2012) in pigeon, Sharoot (2016) in goose, Agele and Mohammed (2012) in golden eagle, and Beheiry *et al.* (2018) in goose, described the pancreas as a pale pink organ. Such variation in colour may be attributed to interspecies differences.

In the current study, the pancreas was consistently found to consist of four lobes—dorsal, third, ventral, and splenic—across all age groups. Among these, the dorsal lobe was the largest and was aligned along the descending limb of the duodenum (Fig. 2).

A smaller splenic lobe was observed extending towards the spleen from the pyloric end of dorsal lobe. The ventral lobe extended along the ventral aspect in between the ascending and descending duodenal loop (Fig. 3).

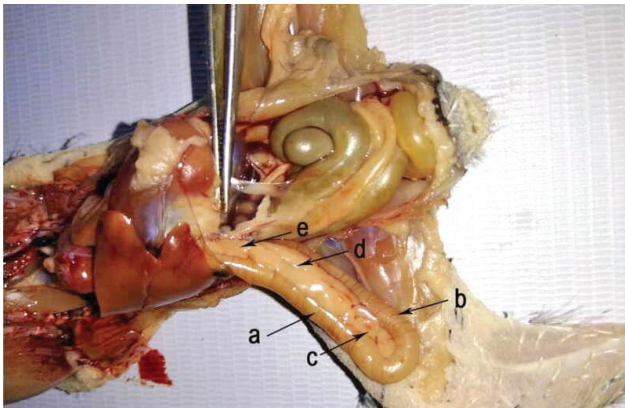


Fig. 2 Photograph showing Pancreas (Dorsal view)

- a. Descending limb of duodenum
- b. Ascending limb of duodenum
- c. Dorsal lobe of pancreas
- d. Third lobe of pancreas
- e. Splenic lobe of pancreas

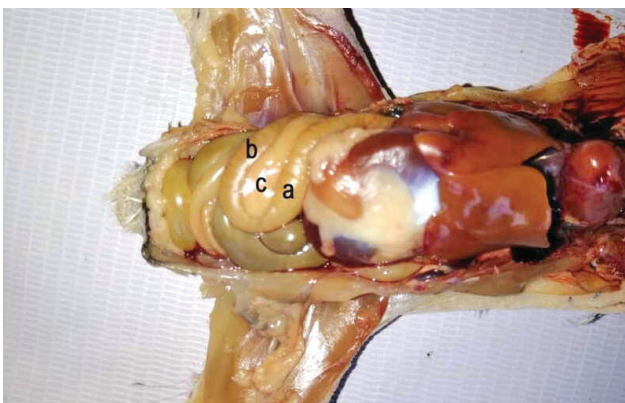


Fig. 3 Photograph showing pancreas in duodenal loop in group - I (Ventral view)

- a. Descending limb of duodenum
- b. Ascending limb of duodenum
- c. Ventral lobe of pancreas

In agreement with the present observations, Simsek and Alabay (2008) described the presence of four lobes—dorsal, ventral, third, and splenic—in the pancreas of quail. Similarly, Smith (1974) reported four lobes in *Coturnix* quail, noting that the dorsal and third lobes were situated on the dorsal side of the duodenal loop, while the ventral lobe laid along the ventral surface. The splenic lobe, being relatively small, was positioned dorsally to the liver and in continuity with the spleen. Bock *et al.* (1997) also confirmed these findings, observing that in quail, the dorsal lobe extended along the descending portion of the duodenum, with a narrow projection arising either from the dorsal or ventral lobe forming the splenic lobe. Comparable descriptions were given by Agele and Mohammed (2012) in golden eagle and Khadim *et al.* (2010) in red jungle fowl, both reporting a splenic lobe extending toward the spleen. Furthermore, Sharoot (2016), Deprem (2015), Gulmez *et al.* (2004), Beheiry *et al.* (2018) in goose, Saadatfar *et al.* (2011) in palm dove, and Faris (2012) in pigeon also documented the presence of dorsal, ventral, third, and splenic lobes.

Conversely, the present findings differed from those of Simsek *et al.* (2009) in falcons and Kara *et al.* (2014) in sparrowhawk, who identified only three lobes—dorsal, ventral, and splenic. Likewise, Stornelli *et al.* (2006) in ostrich and Hamodi *et al.* (2013) in guinea fowl and common gull reported only two lobes, dorsal and ventral. Interestingly, Bock *et al.* (1997) in quail and Stornelli *et al.* (2006) in ostrich noted that the ventral lobe was aligned along the descending limb of duodenum, which was in contrast with the present findings. The variation in the number of pancreatic lobes across studies appears to be species-dependent. Stornelli *et al.* (2006) specifically highlighted that the lobation of the pancreas varies among avian species.

In the current study, significant age-related differences were observed in the biometrical parameters of the pancreas. The mean pancreatic weight was recorded as 0.124 ± 0.009 g, 0.202 ± 0.019 g, 0.408 ± 0.030 g, and 0.459 ± 0.012 g in birds of group I, group II, group III, and group IV, respectively (Table 1; Fig. 4).

The average length of pancreas in group I, group II, group III and group IV age groups of birds was recorded as 3.25 ± 0.19 cm, 3.73 ± 0.15 cm, 4.27 ± 0.16 cm and 4.67 ± 0.11 cm, respectively (Table 2 and Fig. 5).

The average width of pancreas at proximal aspect (towards pylorus) was recorded as 2.42 ± 0.21 cm, 3.50 ± 0.25 cm, 4.25 ± 0.19 cm and 5.50 ± 0.28 cm in group I, group II, group III and group IV age groups of birds respectively (Table 3 and Fig. 6).

In group I, group II, group III and group IV age groups of birds, the average width of pancreas at middle aspect was recorded as 3.33 ± 0.20 cm, 4.50 ± 0.36 cm, 5.83 ± 0.32 cm and 7.00 ± 0.23 cm, respectively (Table 4 and Fig. 7), whereas at distal aspect (towards duodenal loop/duodenal flexure) it was recorded 2.00 ± 0.19 cm, 2.92 ± 0.25 cm, 3.83 ± 0.29 cm and 4.27 ± 0.24 cm, respectively

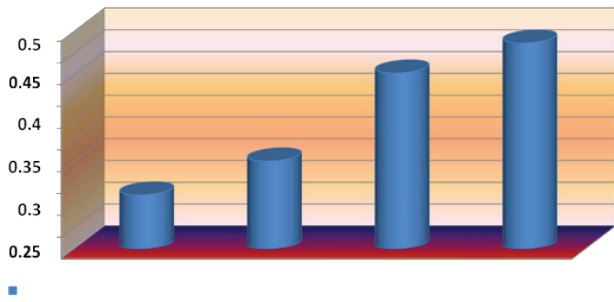


Fig. 4 Mean and SE of weight of Pancreas (gm) in Group-I, Group-II, Group-III and Group- IV age group of birds

Table 1. Mean and SE of weight of Pancreas in Group-I, Group-II, Group-III and Group- IV age group of birds

Sr no	Groups	Range (gm)	Mean (gm)	SE ±
1	I	0.082-0.152	0.124	0.009
2	II	0.065-0.281	0.202	0.019
3	III	0.269-0.544	0.404	0.03
4	IV	0.426-0.547	0.473	0.01

(Table 5 and Fig. 8).

The present investigation was carried out to study age related changes in pancreases of Japanese quails ranging from one to four weeks of age. Gross anatomical features, including the location, colour, shape, and lobation, along with biometrical parameters such as weight, length, and width, were studied. Grossly, the pancreas of Japanese quail was observed as a whitish, elongated, ribbon-like organ, extending from the pylorus and enclosed between

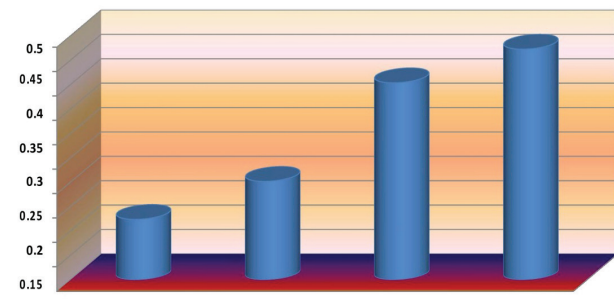


Fig. 5 Mean and SE of length of Pancreas in Group-I, Group-II, Group-III and Group- IV age group of birds

Table 2. Mean and SE of length of Pancreas (cm) in Group-I, Group-II, Group-III and Group- IV age group of birds

Sr no	Groups	Range(cm)	Mean(cm)	SE ±
1	I	2.4-4.1	3.25	0.19
2	II	2.8-4.7	3.73	0.15
3	III	3.1-4.9	4.27	0.16
4	IV	4.2-5.4	4.67	0.11s

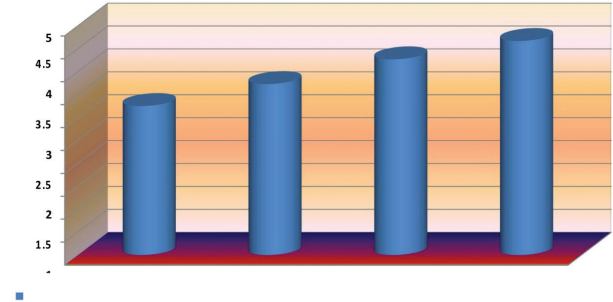


Fig. 6 Mean and SE of width of Pancreas at Proximal aspect in Group-I, Group-II, Group-III and Group- IV age group of birds

Table 3. Mean and SE of Width of Pancreas (mm) at Proximal aspect in Group-I, Group-II, Group-III and Group- IV age group of birds

Sr no	Groups	Range(mm)	Mean(mm)	SE ±
1	I	2.0-4.0	2.42	0.21
2	II	2.0-4.0	3.5	0.25
3	III	3.0-5.0	4.25	0.19
4	IV	4.0-6.0	5.5	0.28

the ascending and descending limbs of the duodenum on the right side of the abdominal cavity. In all age groups, four distinct lobes dorsal, third, ventral, and splenic were consistently identified. Among them, the dorsal lobe was the largest, running along the descending duodenum, while the splenic lobe was the smallest, extending towards the spleen from the pyloric end of the dorsal lobe. The ventral lobe was positioned ventrally between the duodenal limbs. Biometrical analysis revealed a progressive and statistically

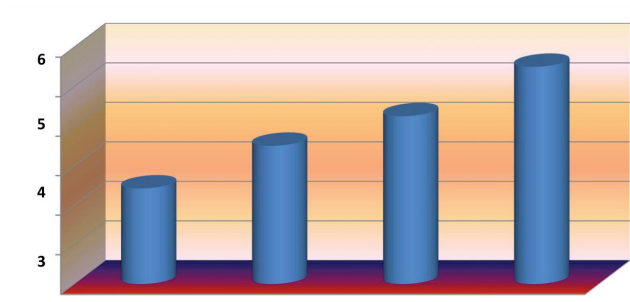


Fig. 7 Mean and SE of width of Pancreas at Middle aspect in Group-I, Group-II, Group-III and Group- IV age group of birds

Table 4. Mean and SE of Width of Pancreas at Middle aspect in Group-I, Group-II, Group-III and Group- IV age group of birds

Sr no	Groups	Range(mm)	Mean(mm)	SE ±
1	I	3.0-4.0	3.33	0.2
2	II	2.0-6.0	4.5	0.36
3	III	4.0-7.0	5.83	0.32
4	IV	6.0-8.0	7	0.23

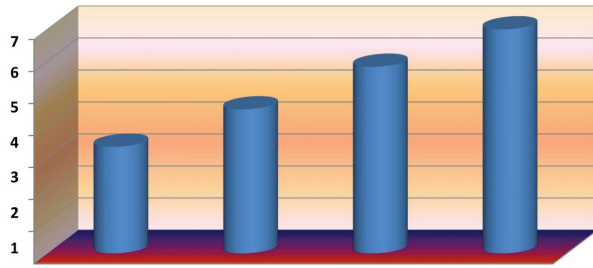


Fig. 8 Mean and SE of width of Pancreas at Distal aspect in Group-I, Group-II, Group-III and Group-IV age group of birds

Table 5. Mean and SE of Width of Pancreas (mm) at Distal aspect in Group-I, Group-II, Group-III and Group-IV age group of birds

Sr no	Groups	Range(mm)	Mean(mm)	SE ±
1	I	1.0-3.0	2.0	0.19
2	II	2.0-4.0	2.92	0.25
3	III	3.0-6.0	3.83	0.29
4	IV	3.0-6.0	4.67	0.24

significant increase in the weight, length, and width of the pancreas with advancing age.

SUMMARY

In the present investigation, forty-eight Japanese quails (*Coturnix coturnix japonica*) were maintained at the poultry farm of the College of Veterinary and Animal Sciences, Parbhani, following standard quail management practices. Pancreatic samples were collected from twelve birds each at the end of the first, second, third, and fourth week of age. The pancreas appeared whitish in color, elongated and ribbon-like in shape, situated on the right side of the abdominal cavity, and was composed of four distinct lobes dorsal, third, ventral, and splenic. With increasing age, a progressive rise in the weight, length, and width of the pancreas was observed in Japanese quails.

REFERENCES

Agele RAAA and Mohammed FS. 2012. Architecture morphology and histological investigation of pancreas in golden eagles

(*Aquila Chrysaetos*). *Al- Anbar Journal Veterinary Sciences* 5(2): 149–55.

Beheiry RR, Waheed A A A R, Ahmed M B, Salem H F and Karkit M W. 2018. Morphological, histological and ultrastructural studies on the exocrine pancreas of goose. *Journal of Basic and Applied Sciences* 7(3): 353–58.

Bock P, Moneim M A and Egerabacher M 1997. Development of Pancreas. *Microscopy Research and Techniques* 37: 374–83.

Deprem T, Tasci SK, Bingol S A, Sari E K, Aslan S and Ilhan S. 2015. Histological and Histochemical Studies on Structure of Pancreatic Ducts of the Goose (*Anser anser*). *Turkish Journal of Veterinary and Animal Sciences* 39: 62–68.

Faris S A. 2012. Anatomical and Histological study of the Pancreas of Pigeon. *Journal of College of Education for Pure Science* 2(4): 64–72.

Gulmez N, Kocamis H, Aslan S and M Nazil. 2004. Immunohistochemical Distribution of cells containing Insulin, Glucagon and Somatostatin in the Goose (*Anser anser*) pancreas. *Turkish Journal of Animal Sciences* 28: 403–7.

Hamodi H M, Abed A A and Taha AM. 2013. Comparative Anatomical, Histological and Histochemical Study of the Pancreas in Two Species of Birds. *Research and Reviews in Bio-Sciences* 8(1): 26–34.

Kara A, Tekiner D, Simsek N, Balkaya H and Ozudogru Z. 2014. Distribution and location of endocrine cells in the pancreas of the Sparrowhawk, *Accipiter nisus*. *Kafkas University Veterinary Fak Derg* 20(2): 307–12.

Khadim K K, Zuki A B Z, Noordin M M, Babjee S M A and Zamri-Saad M. 2010. Morphological Study of Pancreatic Duct in Red Jungle Fowl. *African Journal of Biotechnology* 9(42): 7209–15.

Saadatfar Z, Asadian M and Alishahi E. 2011. Structure of Pancreas in Palam dove (*Streptoplia Selegalensis*). *Iranian Journal of veterinary science and Technology* 3(2): 25–32.

Sharoot-Al H A. 2016. Anatomical, Histological and Histochemical Architecture of Pancreas in Early Hatched Goose (*Anser anser*). *Kufa Journal for Veterinary Medical Sciences* 7(1): 147–53.

Simsek N and Alabay B. 2008. Light and electron microscopic examinations of the pancreas in quails (*Coturnix coturnix japonica*). *Revue Medicine Veterinaire* 159(4): 198–206.

Smith P H. 1974. Pancreatic Islets of Coturnix Quail. A light and electron microscopic study with special reference to the Islets organ of the splenic lobe. *Anatomi Research* 178: 567–586.

Stornelli M R, Ricciardi M P, Miragliotta V, Coli A and Giannessi E. 2006. Morpho-structural study of the pancreas and pancreatic Duct in Ostrich (*Struthio camelus L*). *Acta Veterinaria Brno* 75: 157–60.