



Gross Anatomical Studies on the Thyroid Gland of Chabro Chicken Reared During Winter Season

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Abstract

Gross anatomical studies were conducted on thyroid gland of eight weeks old 12 apparently healthy Chabro chickens (six males and six females) reared in winter season. The thyroid glands appeared as light pink coloured oval bodies i.e. right and left glands located on the ventral surface of the base of the neck just caudal to the junction of subclavian and common carotid arteries. The left thyroid gland was situated more cranially than the right one. Average weight of the thyroid gland in males was equal to that of females. The average length in males was more than the females but the average thickness was slightly higher in females than males. The average width of the thyroid gland was more in females (6.80 ± 0.35 mm). The difference in biometrical parameters in male and female Chabro chicken in winter season might be due to effect of sex hormones and feeding behaviour.

Keywords: Chabro, Chicken, Thyroid, Winter Season



Introduction

The thyroid gland is a unique endocrine gland which plays an important role in controlling pre and post-natal growth and differentiation of many organ systems (Sturkie, 1976). It plays an important role in basal metabolic rate, reproduction and development and growth of muscles and bones (Sturkie, 1976). The present work has been conducted on the thyroid gland of Chabro birds of either sex reared in winter season to know the seasonal variation. Chabro chicken is more adoptive to climatic fluctuations and acclimatizes to the entire climatic zone (CPDO, 2017). There is scarcity of information on sexual differences in gross anatomy of thyroid gland in Chabro birds reared in winter season. This study would form a basis for correlating the possible functions of the thyroid gland in relation to growth and diagnosis of deficiency syndromes in this breed.

Materials and Methods

The present study was conducted on the thyroid gland of eight weeks old 12 apparently healthy Chabro chickens (six males and six females) reared in winter season. The birds were procured from Poultry Farm, DUVASU, Mathura after approval of CPCSEA. For biometrical study, the chickens were sacrificed and the thoracoabdominal cavity of each bird was exposed by making a ventro-median incision. The shape, colour, location and relative topographic *in-situ* position of the thyroid gland were recorded. Then the thyroid glands were harvested out of the body cavity and the weight of both (right and left) thyroid gland was measured through electrical weighing balance. The length, width and thickness were recorded by using non stretchable thread and digital Vernier's caliper. The data generated by biometrical observations were subjected to statistical analysis (Snedecor and Cochran, 1994) with the help of SPSS 20.0 software.

Results and Discussion

The thyroid gland of Chabro chicken was paired organ i.e. right and left thyroid as described earlier by Bradley and Grahame (1960) in fowl, Koch (1973), Nickel *et al.* (1977), Mc Lelland (1990), Dyce *et al.* (2002) and Doneley (2010) in birds, Egawa and Kameda (1995), Yamatsu and Kameda (1995) and Paul *et al.* (2011) in chicken, Breit *et al.* (1998) in poultry, Firdous *et al.* (2012) in Kuttanad ducks, Bose and Das (2012) in Yellow footed Green pigeon, Onuk and Kabak (2012) in Long –Legged buzzard, Sinha *et al.* (2016) in Pati ducks and Ali and Mirhish (2015) in Iraqi turkey. A connection between left and right thyroid, the isthmus could not be observed in Chabro chicken. Similarly, Bradley and Grahame (1960) in fowl, McLeod *et al.* (1964) and Sturkie (1976) in avian did not observe isthmus. The isthmus was reported in mammalian thyroid (Dyce *et al.*, 2002, Konig and Liebich, 2007 and Getty, 2012 in domestic animals; Tadjalli and Faramarzi, 2016 in Indian gray mongoos and Choudhary and Doley, 2017 in Jamunapari goats). Absence of isthmus might be due to species variation.

The thyroid glands were located on the ventral surface of the base of the neck just caudal to the junction of subclavian and common carotid arteries. The parallel observation was reported by Bradley and Grahame (1960) in fowl, Koch (1973), Nickel *et al.* (1977), Mc Lelland (1990), Dyce *et al.* (2002) and Doneley (2010) in birds, Egawa and Kameda (1995), Yamatsu and Kameda (1995) and Paul *et al.* (2011) in chicken, Breit *et al.* (1998) in poultry, Firdous *et al.* (2012) in Kuttanad ducks, Bose and Das (2012) in Yellow footed Green pigeon, Onuk and Kabak (2012) in Long –Legged buzzard, Sinha *et al.* (2016) in Pati ducks and Ali and Mirhish (2015) in Iraqi turkey. Both the left and right thyroid glands were placed asymmetrically (Fig. 1). However, Ali and Mirhish (2015) in Iraqi turkey observed symmetrically located right and left thyroid glands. The left thyroid gland was placed more cranially than the right one in both male and female Chabro chicken reared in winter season. This finding was akin with the finding of Breit *et al.* (1998) in chicken. However, Teresa and Tomasz (2004) in budgerigar reported that the right thyroid gland was placed more cranially than the left one. In the present study, the left and right thyroid glands were located between 12th to 13th and 13th to 14th cervical vertebrae, respectively. Although, the left thyroid was located more cranially than the right thyroid both in male and female Chabro chicken, the location of right and left thyroid gland with respect to tracheal rings varied greatly. In winter, the extension of right and left thyroid gland in male Chabro chicken was 99th to 118th and 97th to 115th tracheal rings, respectively. The extension of right and left thyroid glands in female chabro chicken was 95th to 109th and 86th to 105th tracheal rings, respectively. The present data could not be compared due to lack of literature.



Figure 1: Photograph showing the location of right (R) and left (L) thyroid gland, trachea (T), Tracheal muscle (T_m) and syrinx (S) in 8 weeks old male Chabro chicken reared in winter season.

In all Chabro chickens, the thyroid was light pink in colour (Fig. 2 & 3). Whereas, it was recorded reddish purple in fowl (Bradley and Grahame, 1960), deep red in avian (King and McLelland, 1975), reddish brown in birds (Nickel *et al.*, 1977 and Dyce *et al.*, 2002), deep red (Getty, 2012) in chicken, pale in budgerigar (Dyce *et al.*, 2002) and reddish brown in Pati ducks (Sinha *et al.*, 2016). The variation in colour of thyroid might be due to variation of the environment, breed, species and nutrition.



Figure 2: Photograph showing the right (R_F) and left (L_F) thyroid gland of 8 weeks old female Chabro chicken reared in winter season.



Figure 3: Photograph showing the right (R_M) and left (L_M) thyroid gland of 8 weeks old male Chabro chicken reared in winter season.

The shape of the thyroid gland in Chabro chicken was oval (Fig. 2 & 3) as described by Bradley and Grahame (1960) and Nickel *et al.* (1977) in fowl, Koch (1973) and Dyce *et al.* (2002) in birds and King and McLelland (1975) in avian. However, it was described as spindle shaped in pigeon (Nickel *et al.*, 1977), lenticular and elliptical body in chicken by Breit *et al.* (1998) and (Getty, 2012), respectively, oval or spherical and rounded in Iraqi turkey (Ali and Mirhish, 2015) and oval or elliptical in Pati ducks (Sinha *et al.*, 2016).

Thyroid gland contributed 0.018 % and 0.023 % of the proportionate carcass weight of chicken reared in winter in male and female respectively. Lucy *et al.* (2009) in Kuttanad ducks noticed that the thyroid gland contributed 0.052 and 0.045 % to the body weight in day old and in the adults (22 weeks) ducks, respectively. Similarly, Firdous *et al.* (2012) in Kuttanad ducks observed that the thyroid gland contributed 0.025 % to the body weight in day old ducklings and in the adults (at 24th week), it contributed 0.070 %. The reason for this dissimilarity in results might be due to variation in season, environment and feeding status. In males the average weight of right and left thyroid glands measured 0.11 ± 0.02 and 0.13 ± 0.01 g, respectively in winter season. The average weight of left thyroid gland was higher in male Chabro chicken reared in winter season. In female Chabro birds, the average weight of right and left thyroid gland measured 0.12 ± 0.02 g. The average weight of right and left thyroid glands was equal in female Chabro chicken reared in winter season. Ali and Mirhish (2015) also reported higher weight of left thyroid in male and right thyroid in female Iraqi turkey. But the values of weight differed from the present study might be

due to variation in species, age, environmental conditions and nutritional status. Sinha *et al.* (2016) in eight weeks old Pati ducks reported that the average weight of left thyroid gland (0.338 ± 0.004 g) was slightly more than right thyroid gland (0.331 ± 0.004 g). While comparing the weight of gland sex wise it was found that in winter the average weight was almost equal (0.24 ± 0.02 g) in both the sexes. Ali and Mirhish (2015) also reported that the weight of thyroid gland in Iraqi male turkey was more than the female. The weight of thyroid gland in chickens reared in winter was 0.24 ± 0.01 g. Bell and Freeman (1971) and Hodges (1974) in fowl reported that the weight of thyroid gland varied widely according to iodine content and season. Further research works are needed in this direction.

In winter season, the average length of right thyroid gland (9.48 ± 0.39 mm) was higher than left one (9.29 ± 0.24 mm) in male chabro chicken. In females the average length of right thyroid gland was more than left thyroid. In winter the average length of right and left thyroid gland was 8.39 ± 0.43 and 8.32 ± 0.33 mm, respectively. Ali and Mirhish (2015) reported that the length of left thyroid gland of was more than right one in both male and female Iraqi turkey. The difference in length from present study might be due to variation in species, age, environmental conditions and feeding behaviour. While comparing the length of gland in male and female chicken it was found that in male thyroid gland was longer (9.38 ± 0.26 mm) than in female (8.35 ± 0.21 mm). Similar observations were recorded by Ali and Mirhish (2015) in Iraqi turkey. The average length of thyroid gland in winter was 8.87 ± 0.22 mm. Breit *et al.* (1998) and Dyce *et al.* (2002) described the length of thyroid as 10 mm in chicken and Dyce *et al.* (2002) reported 2-3 mm in budgerigar. The difference in length of thyroid gland in Chabro chicken from duck, fowl, goose, chicken and budgerigar might be due to differences in species, breed and age.

In male Chabro birds, the average width of left thyroid gland was higher (6.99 ± 0.25 mm) than right thyroid gland (5.71 ± 0.31 mm) in winter season. In female Chabro the average width of right thyroid gland in winter was 6.75 ± 0.19 mm and left thyroid gland was 6.86 ± 0.43 mm. In female the average width of right thyroid gland was lesser than left thyroid gland in winter. Whereas, Ali and Mirhish (2015) stated that the average width of right thyroid gland was less than left thyroid in Iraqi turkey (both male and female). While comparing the width of gland sex wise it was found that thyroid gland in female birds in winter was wider (6.80 ± 0.35 mm) than male (6.35 ± 0.22 mm) which might be due to higher growth rate in female. Ali and Mirhish (2015) reported that the width of thyroid gland in Iraqi male turkey was more than female. This might be due to difference in climate and breed.

The average width of thyroid gland in chickens reared in winter was 6.58 ± 0.21 mm. Nickel *et al.* (1977) described that the width of thyroid gland varied between 5-7 mm in fowl, 4-5 mm in duck and 6-8 mm in goose. Similarly, Breit *et al.* (1998) and Dyce *et al.* (2002) in chicken described the width of thyroid as 6 and 5 mm, respectively. Dyce *et al.* (2002) reported the width as 1-2 mm in budgerigar and Firdous *et al.* (2012) reported 5.1 mm in 8 weeks old Kuttanad ducks. The difference in width of thyroid gland in Chabro chicken from duck, fowl, goose, chicken and budgerigar might be due to difference in species, breed and age. The average thickness of right thyroid gland in male and female was higher in winter season. The average thickness of right thyroid gland in male Chabro reared in winter season measured 4.49 ± 0.31 mm and left thyroid gland measured 4.26 ± 0.21 mm. The co-figures in female were measured 4.61 ± 0.31 mm for right thyroid and 4.24 ± 0.18 mm for left thyroid. While comparing the thickness of gland sex wise it was found that female thyroid gland was thicker than male in winter season. In winter it was 4.43 ± 0.19 and 4.38 ± 0.25 mm in female and male Chabro chicken, respectively.

The average thickness of thyroid of chickens reared in winter was 4.40 ± 0.15 mm. Breit *et al.* (1998) described that the thyroid gland of chicken was 2 mm thick. Firdous *et al.* (2012) reported that the average thickness of thyroid gland was 4.1 mm in 8 weeks old Kuttanad ducks. The difference in thickness of thyroid gland in Chabro chicken might be due to different species, breed and age. The average length of thyroid gland in chickens reared in winter was significantly correlated ($r = 0.628$) with the average carcass weight of chickens as reported earlier by Firdous *et al.* (2012) in eight weeks old Kuttanad ducks (irrespective of season). In winter, the average width of male thyroid gland was significantly correlated with weight of male thyroid gland ($r = 0.835$) and length of female thyroid gland ($r = 0.863$). Firdous *et al.* (2012) reported that the width showed positive correlation with body weight ($r = 0.910$) at five per cent level of significance in eight weeks old Kuttanad ducks. The average thickness of thyroid gland in chickens reared in winter was significantly correlated with the average weight of thyroid gland ($r = 0.841$) in chickens reared in the same season. The thickness of thyroid gland in male Chabro was significantly correlated with weight of thyroid gland in male ($r = 0.917$) reared in winter. Firdous *et al.* (2012) reported that the thickness showed positive correlation with body weight ($r = 0.85$) at five percent level of significance in eight weeks old Kuttanad ducks.

Conclusion

From the present investigation it can be concluded that in male Chabro chickens the average weight and width of left thyroid gland were more than right thyroid gland but average length and thickness of right thyroid gland were more than left thyroid. In female Chabro chickens the average length and thickness of right thyroid gland were more than left thyroid but average width of left thyroid was more than right one. The variation in the biometrical parameters of the gland may be due to effect of sex hormones.

Conflict of Interests

There is no conflict of interest.

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