



COMPARATIVE HISTOMORPHOLOGICAL STUDY OF THE ONE HUMPED CAMEL
(*Camelus dromedarius*) THYROID GLAND

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ABSTRACT

A histomorphological comparative study of the thyroid glands of 55 healthy adult (8-15 years) camels (*Camelus dromedarius*) of different sex group A (28 Males) and group B (27 Females), were investigated under gross and microscopic anatomical differentiation. Gross studies revealed that thyroid glands of both sex were located in between the third ring of trachea and the laryngopharynx portion of the pharynx and had two lobes, connected by an isthmus. The female gland appeared to be deeply reddish brown than the male in colour. The values of weight, length, width and diameter of both sex glands were shown to have significant difference with the male been greater than the female ($P>0.05$). Histological observation revealed that the male thyroid gland consisted of more connective tissue capsule than the female and trabeculae were found extending from the capsule deep into the parenchyma of the gland in the female than in the male, which divided it into lobules. These shown that lobation is more pronounced in female than in male with each lobule consisted of two sized follicles in variable numbers, the large and small. The large follicles predominate in the male and were lined by low cuboidal epithelium, while the small follicles predominate in the female were lined by high cuboidal to columnar epithelium. The follicles had colloid material in their lumen, probably an apocrine secretion from the lining epithelial cells of both sex.

Keywords: Comparative anatomy, Columnar epithelium, Sex, *Camelus dromedarius*, Thyroid gland

INTRODUCTION

The endocrine system is a global system that works through release of chemical messages called hormones (Bello *et al.*, 2012). The thyroid is an endocrine gland which secretes thyroglobulin, triiodothyronine and thyroxin hormones (Malie *et al.*, 1987; Banks, 1993). Thyroxin plays an important role in metabolism of the animal body. Thyroid gland consists of follicles lined by follicular cells. The interfollicular space has been reported to be filled with connective tissue (Asari *et al.*, 1985; Bello *et al.*, 2012). The most outstanding feature of the vertebrate thyroid gland is its ability to concentrate large amount of iodine for the synthesis of thyroxin (Georgieva and Gerov, 1975).

The normal anatomy and physiology of dromedarian camel is least understood when compared to Llama, Guanaco, Cattle, Sheep, Goat and Pig (Bello *et al.*, 2012). The description of dromedarian camel is usually made as if it is identical with Llama specie (Bello *et al.*, 2012, Franco *et al.*, 2004). Though, they are seasonal breeders (Belknap, 1994; Bello *et al.*, 2012 that are closely related anatomically to the South American Camelids (Georgieva and Gerov, 1975; Wilson *et al.*, 1990; Belknap, 1994; Umaru and Bello, 2012) little is known on the anatomy and physiology of the thyroid gland.

The present study was conducted to investigate the sex related differences (male and female) of normal microscopic anatomy of thyroid gland of one humped camel (*Camelus dromedarius*) with the aim of understand the teaching of comparative anatomy and physiology of the gland of the dromedarian Camel in the world.

Materials and Methods



The study was carried out on 55 normal Adult (8-15 years) one-humped camel of different sex group A (28 Males) and group B (27 Females), collected from the metropolitan abattoir, Sokoto in winter season, using standard animal ethics approved by the government. The collected samples were then taken to the Veterinary Anatomy laboratory of Usmanu Danfodiyo University; where the gross and biometric values were determined.

1cm² thick of sample from each segment was collected and fixed in 10% formalin solution. After fixation was achieved, the tissue sample was processed for paraffin blocks preparation. The sections of 5µm were subjected to haematoxylin and eosin for routine morphology (Luiz and Jose, 2005). The standard sections were examined under light microscope and micrographs taken using Sony digital camera(x5) with 12.1 mega pixel.

RESULTS AND DISCUSSION

Gross observations

Gross studies of thyroid gland of camel revealed that the gland of both sex were located in between the third ring of trachea and the laryngopharynx portion of the pharynx and had two lobes, connected by an isthmus. They female gland appeared to be deeply reddish brown and the male gland appeared to pale reddish brown in colour. An isthmus connected these lobes to each other was observed in all the sexes and was reddish brown in colour too. This finding is similar to other large animals like cattle and buffaloes (Getty *et al.*, 1986) i.e., with the first ring of trachea and consisted of two lobes on both side and an isthmus connecting these lobes. In some desert reptiles, the colour of the gland is in concordance with the findings of Schwartz and Dioli (1992).

The values of weight, length, width and diameter in camels of different sex groups viz male and female are presented in Table 1. The mean weight was 50.55 ± 0.26g and 45.70 ± 0.35g, the mean length 6.36 ± 0.33cm and 5.36 ± 0.46cm; the mean width 3.53 ± 0.21cm and 3.35 ± 0.29cm and the mean diameter 1.05 ± 0.14cm and 0.97 ± 0.13cm in two groups respectively, which was showing significantly higher in male than in the female. The result showed slightly lower than previously reported value of 52.7 gm in camel (Abdel-Wahab and Hamza, 1970). It has been reported that in summer the size of the gland increases (Yagil *et al.*, 1978). The mean diameters recorded were 0.97 and 1.05 cm which fell in the range of 0.5 in female to 1.5 cm in male adult camels (Schwartz and Dioli, 1992). The mean length recorded was 5.36cm in female and 6.36 cm in male, and is in contrary to the range of 3cm in female to 8 cm in male as reported by Abdel-Wahab and Hamza, (1970) in llama. Similarly, the width of gland recorded was 3.35cm in female and 3.53cm in male which was contrary to the range of 2cm in female and 4.5cm in male as reported earlier in this species (Schwartz and Dioli, 1992). The statistical analysis revealed non-significant difference in various parameters between the two sex groups. However, the values of all the parameters were relatively higher in male camels compared with female group.

Table 1: Values (Mean ± SD) of different parameters in camels of two Sex groups

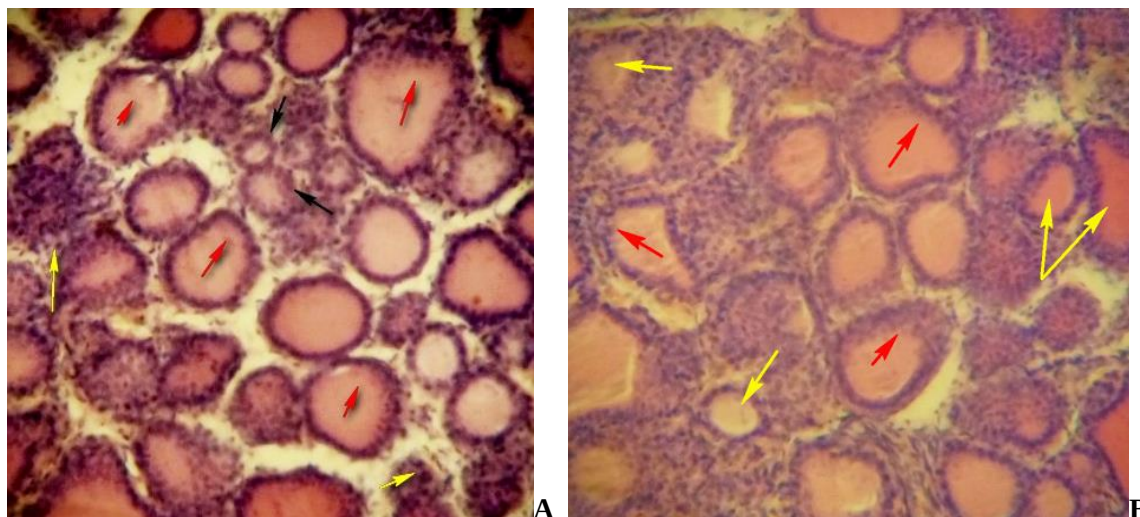
Parameters	FEMALE	MALE
Weight (g)	45.70 ± 0.35 ^a	50.55 ± 0.26 ^b
Length (cm)	5.36 ± 0.46 ^a	6.36 ± 0.33 ^b
Width (cm)	3.35 ± 0.29 ^a	3.53 ± 0.21 ^b
Diameter(cm)	0.97 ± 0.13 ^a	1.05 ± 0.14 ^b

Histological findings

Histologically, the thyroid gland of both sex consisted of a connective tissue capsule composed of coarse and fine collagenous fibers with scattered fibroblast and small blood vessels all over the capsule (Fig.1, 2 and 3). The trabeculae of the female gland were seen extending from the capsule into the parenchyma of the gland and dividing it into lobules (Fig.1and 2). Blood vessels were also present in the connective tissue of the trabeculae. Each lobule consisted of aggregation of follicles as shown in figure1and 2. Three types of follicles were identified in sexes, large (A), medium (B) and small (C) (Fig. 3). The large follicles (A)



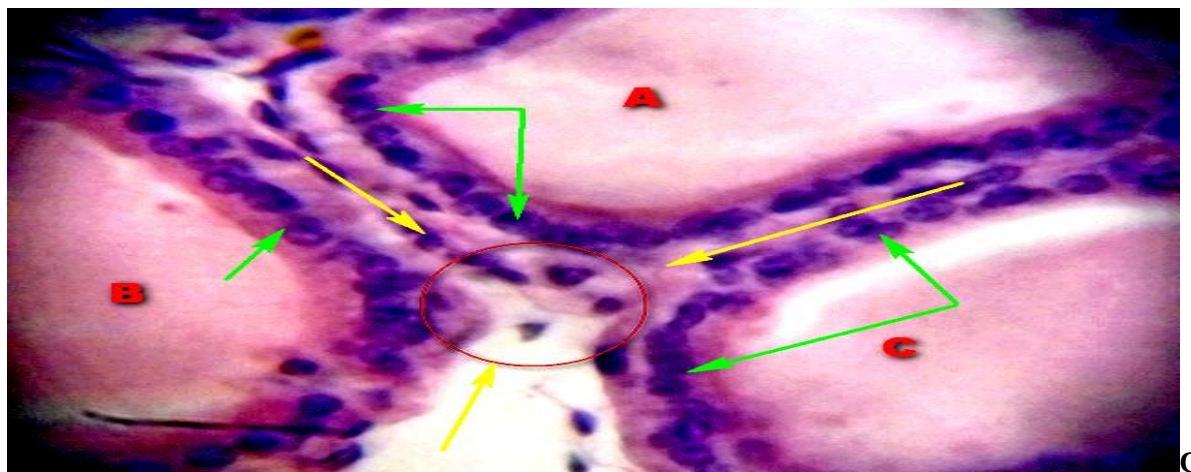
were lined by low cuboidal epithelium having flattened nuclei and were assumed to be inactive cells while the medium follicles (B) were lined by columnar epithelium having oval nuclei. The small follicles (C) were lined by cuboidal epithelium with rounded nuclei, these were active cells. Each follicle was filled with a gel-like material called colloid (Fig. 3). The colloid is a storage form of follicular epithelial secretion. There is no evidence of para-follicular or C-cells in thyroid glands of camel of both sexes. This result shown similar observations as reported previously in camel (Abdel-Magied *et al.*, 2000; Atoji *et al.*, 1999) i.e. the gland consisted of follicles of variable sizes with smaller lined by low cuboidal to semi squamous epithelium, while the larger ones were lined by high cuboidal to columnar epithelial cells. The parafollicular or C-cells were found missing but has been reported in cattle and buffaloes (Miyandad, 1973). Similar observations have been recorded by Abdel-Magied *et al.* (2000).



Key:-

A: - Photomicrograph showing male thyroid gland follicle with tall cuboidal epithelium (**H and E X150**)

B: - Photomicrograph showing female thyroid gland follicle with short cuboidal epithelium (**H and E X150**)



Key:- Photomicrograph showing female thyroid gland follicle (A,B,C) with cuboidal epithelium (green arrow), inter follicular connective tissue (yellow arrow) and zone of blood vessels (red circle) (**H and E X150**)



CONCLUSION

Base on the above findings, it can be concluded that thyroid gland of male dromedarian camel is larger, thicker and heavier than the female dromedarian camel. Histological observation further revealed that, the male thyroid gland consisted of more connective tissue capsule than the female and traberculae were found extending from the capsule deep into the parenchyma of the gland in the female than in the male, which divided it into lobules. These shown that lobation is more pronounced in female than in male with each lobule consisted of two sized follicles in variable numbers, the large and small. The large follicles predominate in the male and were lined by low cuboidal epithelium, while the small follicles predominate in the female were lined by high cuboidal to columnar epithelium.

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