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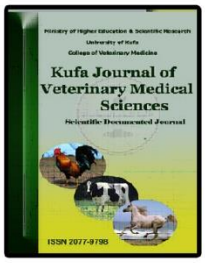

Comparative Anatomical Study of thyroid gland in adult indigenous gazelle (*Gazella subgutturosa*) and sheep (*Ovis aries*).

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Abstract

The present work was carried out on 12 adult healthy indigenous gazelle and sheep (6 gazelle and 6 sheep) to study the anatomical features of thyroid gland in these two animals and to compare between them. The present findings showed that the thyroid gland in both species was made up of two reddish- brown bi-lobed structure (right and left lobes) connected by a thin tissue ; an isthmus, they were asymmetrically located on the cranial portion on the lateral side of the trachea in gazelle, while in sheep they located ventrolaterally. The isthmus connect the right and left lobes from there caudal extremity in gazelle while in sheep from there caudal ends about 5 mm and it cross the ventral aspect of the trachea about 7^{th} – 8^{th} tracheal ring level in gazelle, whereas in sheep at 4^{th} tracheal ring. The anatomical data revealed no significant important in the weight of the gland between gazelle and sheep, and between left and right lobe in both gazelle and sheep in weight, dimensions and volume, but significantly importance between gazelle and sheep in the length, width and volume of isthmus at $p<0.05$ and in the length of the right and left lobe and only thickness of the right lobe between gazelle and sheep at $p<0.05$. thyroid gland was supplied by the cranial and caudal thyroid arteries in gazelle, while in sheep through the dorsal and ventral thyroidal arteries, all arteries were originate from the common carotid artery .

Keyword: Gazelle, Thyroid gland, Isthmus, Right lobe, left lobe**,** Thyroid artery.

دراسة شكليائية مقارنة للغدة الدرقية في الغزلان والاغنام البالغة المحلية

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الخلاصة

في هذا البحث تم اخذ 12 حيوان بالغ وذا صحة جيدة من الغزلان و الاغنام المحلية (6 غزلان و 6 اغنام) واستخدم كلا الحيوانين للدراسة التشريحية للغدة الدرقية و المقارنة بينهما.

اظهرت الدراسة التشريحة ان الغدة الدرقية في كل من الغزلان و الاغنام تتكون من فصين (ايمن و ايسر) ذات لون احمر – بني يرتبطان بواسطة البرزخ ويقع فصي الغدة الدرقية في اقصى الجزء الامامي وعلى الجانبين الوحشيين للرغامي في الغزلان وعلى الجانب البطني الوحشي في الاغنام وبشكل غير متناظر . يرتبط فصي الغدة مع بعضهما بواسطة البرزخ من النهاية الخلفية للفصين في الغزلان بينما في الاغنام يرتبط الفصين على بعد 5 ملم من النهاية الخلفية لهما و يعبر البرزخ من الجهة البطنية للرغامي عند مستوى الحلقة الرغامية السابعة و الثامنة في الغزلان و الحلقة الرغامية الرابعة في الاغنام.

اظهرت القياسات التشريحية بأن ليس هنالك فروقات معنوية في الوزن الكلي للغدة الدرقية في الاغنام والغزلان و بين الفصين الايسر و الايمن من ناحية الوزن , الابعاد , الحجم في كلا الحيوانين و لكن وجد فرق معنوي بينهما في الطول, العرض, الحجم للبرزخ في مستوى احتمالية $p < 0.05$ و طول الفصين الايمن والايسر وسمك الفص الايمن فقط بين الغزلان و الاغنام في مستوى احتمالية $p < 0.05$. التجهيز الدموي للغدة الدرقية عن طريق الشريانين الدرقيين الامامي و الخلفي في الغزلان بينما في الاغنام من خلال الشريان الدرقي الظهري والبطني وجميع هذه الشرايين تنشأ من الشريان السباتي العام

1.Introduction:

The *Gazelle subgutturosa* or Goitered Gazelle, Black-Tailed gazelle is one of the important animals, its a member of Bovidae family, Antilopinae subfamily, Genus Gazelle and Species subgutturosa. The Gazelle is a wide distributed in Asia continent and Iraq, its live in desert and semi- desert [1].

The Awasi sheep or *Ovis aris* it's a very important ruminant and the dominant type in Iraq for meat, milk and wool, belongs to family Bovidae, subfamily Caprine, Genus Ovis.

The thyroid gland an important endocrine glands present in all mammals that secretes T3, T4 and Calcitonin hormones [2]. These hormones plays a critical role in body metabolic activities regulation [3,4], calorigenesis and normal reproductive function, milk and fibers production of domesticated animals [5]. Also thyroid hormones are play a key controllers and maintenance of high and constant mammalian body temperature [6,7], differentiation of all cells in the body and fetal development and growth [8,7]. According to these functions and many others, a lot of studies had been done on the thyroid gland in different species despite of this fact, gazelle and sheep thyroid gland received a few attention, Therefore this study aimed to: Throw a spot of light on the anatomical features of the thyroid gland in indigenous gazelle (*Gazelle subgutturosa*) and sheep (*Ovis aris*), and to compare this features between them.

2. Materials And Methods:

Twelve indigenous healthy Gazelle and Sheep (6 males Gazelle and 6 sheep) Were used for this study. All animals were weighed by a manual weighing balance, recording in kilogram. The gazelle were collected from Baghdad, AL- MAdaen reservoir, while sheep from AL-Shuala abattoir. Gazelle and sheep were humanly sacrificed and thyroid gland were dissected out following exposure by a ventral incisions along the neck. Thyroid glands were washed with distilled water, then the gross anatomical features that include shape ,color, weight (mg), length (mm), width (mm), thickness(mm) and the volume (ml) of each lobe and isthmus were recorded using sensitive laboratory balance (Digital scale, model:SF-830/China), Vernier caliber and water displacement respectively. All measurements were expressed as mean ± SE and analyzed by using the Statistical Analysis System- SAS (2012) program to effect of difference factors in study parameters.

To study the blood supply of the thyroid gland in gazelle and sheep ,these animals have been given a time to bleeding by doing small longitudinal section in the common carotid artery until they died. Then they injected by using syringes of 20ml connected to a catheter and inserted in to a pinhole opened in the same artery. Firstly normal saline was used to wash the blood vessels, followed by a mixture of ammonium hydroxide, mixture of latex with carmine stain to coloring the arterial blood supply. Concentrated hydrochloric acid was used to prevent the leakage of latex, finally the common carotid artery were closed by the use of artery forceps and the whole body of sheep and gazelle were fixed in 10%

formalin solution for 48 hours, then carefully dissected to study the blood supply of the thyroid glands in both indigenous gazelle and sheep.

3.Result

The anatomical results of our study in the indigenous male indigenous gazelle (*Gazelle subgutturosa*) and sheep (*Ovis aris*)revealed that the thyroid gland in both species appear as reddish brown compact mass bi-lobed organ (left and right lobes), both lobes were connected with a thin isthmus from their caudal ends in gazella (Fig.1) whereas in sheep about 5 mm from their caudal ends (Fig. 2), this result was similar to that found in buffalo [9] and in goat [10] but differ from that observed in buffalo [9]. The isthmus in both gazelle and sheep were shorter than that found in buffalo which appeared as long and wide band structure measured 80 to 100 mm in its length and 8 mm to 10 mm in its width [9] . The isthmus cross the ventral surface of 7th - 8 th tracheal rings in gazelle (Fig.3) , while in sheep cross at the level of the 4th tracheal ring (Fig.4), the connection of the isthmus with the two lobes and its crossing the ventral surface of the tracheal ring was differ between gazelle and sheep and with other animals, this results were differ from that observed in sheep in which it cross at the level of 5th tracheal ring[11].In gazelle, the two lobes were situated in the lateral aspect of the cranial part of the trachea (Fig.3) while in sheep were situated ventrolaterally (Fig.4) . They appears as elongated oval or elliptical mass with round cranial end and narrow caudal ends in both gazelle and sheep (Fig. 1,2).

In gazelle the right lobe was cranial than the left one and it extend from the 1st to the 6th tracheal ring (Fig. 3), while the left lobe was extend from 2nd tracheal ring to the 7th tracheal ring and making pouch -like depression (Fig.5) whereas in sheep the left lobe was cranial and extended from the cricoid cartilage to the 6th tracheal ring and the right lobe extend from the 1st tracheal ring to the 5 th tracheal ring (Fig.4), in goat the thyroid lobs extend between the4th to 8th tracheal ring[10] . Each lobe had lateral and medial surfaces with dorsal and ventral borders, as observed in camel[12] .

The mean gazelle thyroid weight, relative weight (%) and volume were 16.66 , 0.0088, 3.00 respectively, while in sheep were 31.45 ,0.0054 ,2.14 respectively, (Table 1), the mean weight of thyroid gland in gazelle and sheep was recorded lower values than reported in male and female camel[12,13]. The morphometrical and statistical observations revealed that the weight, length, width and volume of the left lobe in both Gazelle and sheep were 0.713± 0.05 mg, 25.026± 1.26 mm, 9.886± 0.73 mm,1.08± 0.07 ml, 0.84± 0.02 g, 28.91 ± 1.47mm, 10.84 ± 0.48mm and 1.20 ± 0.03ml respectively were larger than that of right one which reach 0.62± 0.04 mg , 23.94± 1.07 mm,9.87± 0.54 mm, 1.060 ± 0.03ml respectively in gazelle and in sheep 0.78± 0.02 g , 27.48± 0.93 mm, 10.60± 0.63 mm and 1.066± 0.02 ml respectively but there was no significant differences at $p<0.05$ (Table 2), this finding was in agreement with that found in goat [10]. The mean values of the weight, length, width and volume of the isthmus in Gazelle were 0.10 ± 0.02 g , 25.45 ± 1.16 mm, 1.983± 0.008 mm, 0.733± 0.025 respectively, while in sheep were 0.137± 0.006 g ,31.80± 1.41 mm, 0.93± 0.04 mm, and 0.05± 0.01 ml respectively (Table 3), the statistical analysis revealed a significant difference in a length, width and volume of isthmus between gazelle and sheep at $p<0.05$ (Table3). The dimensions of thyroid in gazelle and sheep were less that observed in goat in which the left lobe weight reach (1g), 30 mm in length and 10mm in width while the right lobe weight were 1.5 to 2 g, 20.5 mm in length and 10.5 mm in width as

reported [14] .The current study revealed that there were a significant differences only in the length and thickness of the right lobe and the length only of the left lobe between Gazelle and sheep (Table 4), this result may be due to the species differences. The blood supply of thyroid gland in gazelle through the common carotid artery that give rise to the cranial and caudal thyroid arteries (Fig.6).

The cranial thyroidal artery was direct contentious of the laryngeal artery that originate from the common carotid artery at the cranial end of the larynx, Passing caudally over the dorsal surface then gives two branches to the larynx and contentious as cranial thyroid artery that divided into two branches before enters the cranial extremity of the gland. The caudal thyroidal artery was originate from the common carotid artery at the level of the 3rd tracheal ring and directed caudoventrally toward the caudal end of the gland and it divided in to three small branches: the first branch supply the cranial part of trachea, the second one was supply the caudal part of the gland, whereas the third branch was supplied the isthmus (Fig. 6,7).

In sheep the thyroid gland receive their blood supply through the common carotid artery that give rise to the two arteries; (Fig.**8**) the dorsal thyroidal artery which divided into two branches, the first was enter the cranial end of gland while the second extend along the dorsal border of gland and penetrated the middle region of the gland, and the second was the ventral thyroidal artery pass to the ventral border of the gland, It give branch to the mandibular salivary gland and several small branches to the ventral border of the gland (Fig.**8**).

4.conclusion:

The current finding were firstly recorded in indigenous sheep and gazelle. The two thyroid lobes in both sheep and gazelle were located in the upper cranial portion of the trachea as in other domestic animals and they asymmetrically positioned. The isthmus was present in both sheep and gazelle. No accessory thyroid tissue was present in both sheep and gazelle. Statistically, no major significant importance between the studied animals, the blood supply of thyroid gland through two branches of the common carotid artery.

5. Acknowledgment: The authors are grateful to the University of Baghdad. They would like to extend thanks to the Collage of Veterinary Medicine for providing laboratory facilities.

Table (1): Shows the anatomical parameters of thyroid gland in indigenous gazelle and sheep:

Parameters	Gazelle Mean± SE	Sheep Mean± SE	T-Test
Total weight of gland (g)	1.47 ± 0.06	1.72 ± 0.03	0.267 NS
Weight of animal(kg)	16.66 ± 1.07	31.45 ± 2.53	5.482 *
Relative weight (%)	0.0088 ± 0.57	0.0054 ± 0.19	1.974 *
Total volume of gland (ml)	3.00 ± 0.06	2.14 ± 0.03	0.448 *
*** (P<0.05) significant, NS: Non-Significant.**			

Table (2): Shows the anatomical parameters of right and left lobes in indigenous gazelle and sheep:

Type of animal	Part of gland Anatomical parameter	Right Lobe Mean± SE	Left Lobe Mean± SE	T-Test
Gazelle	Weight (g)	0.62 ± 0.04	0.713 ± 0.05	0.178 NS
	Length (mm)	23.94 ± 1.07	25.026 ± 1.26	2.962 NS
	Width (mm)	9.87 ± 0.54	9.886 ± 0.73	0.926 NS
	Thickness (mm)	4.156 ± 0.17	4.37 ± 0.13	0.428 NS
	Volume (ml)	1.060 ± 0.03	1.08 ± 0.07	0.258 NS
Sheep	Weight (g)	0.78 ± 0.02	0.84 ± 0.02	0.166 NS
	Length (mm)	27.48 ± 0.93	28.91 ± 1.47	1.653 NS
	Width (mm)	10.60 ± 0.63	10.84 ± 0.48	0.594 NS
	Thickness (mm)	3.52 ± 0.06	3.79 ± 0.04	0.397 NS
	Volume (ml)	1.066 ± 0.02	1.20 ± 0.03	0.173 NS
NS: Non-Significant.				

Table (3): Shows the anatomical parameters of isthmus of thyroid gland in indigenous gazelle and sheep:

Animals / Anatomical parameter	Gazelle Mean± SE	Sheep Mean± SE	T-Test
Weight (g)	0.10 ± 0.02	0.137 ± 0.006	0.0482 NS
Length (mm)	25.45 ± 1.16	31.80 ± 1.41	2.509 *
Width (mm)	1.983 ± 0.008	0.93 ± 0.04	0.662 *
Volume (ml)	0.733 ± 0.025	0.05 ± 0.01	0.216 *
*** (P<0.05) significant, NS: Non-Significant.**			

Table (4): Shows the anatomical parameters of right and left lobe of thyroid gland in indigenous gazelle and sheep:

Part of gland	Animals / Anatomical Parameter	Gazelle Mean± SE	Sheep Mean± SE	T-Test
Right lobe	Weight (g)	0.62 ± 0.04	0.78 ± 0.02	0.248 NS
	Length (mm)	23.94 ± 1.07	27.48 ± 0.93	2.574 *
	Width (mm)	9.87 ± 0.54	10.60 ± 0.63	1.039 NS
	Thickness (mm)	4.156 ± 0.17	3.52 ± 0.06	0.771 *
	Volume (ml)	1.060 ± 0.03	1.066 ± 0.02	0.263 NS
Left lobe	Weight (g)	0.713 ± 0.05	0.84 ± 0.02	0.209 NS
	Length (mm)	25.026 ± 1.26	28.91 ± 1.47	2.017 *
	Width (mm)	9.886 ± 0.73	10.84 ± 0.48	1.272 NS
	Thickness (mm)	4.37 ± 0.13	3.79 ± 0.04	0.578 NS
	Volume (ml)	1.08 ± 0.07	1.20 ± 0.03	0.095 NS

*** (P<0.05) significant , NS: Non-Significant.**

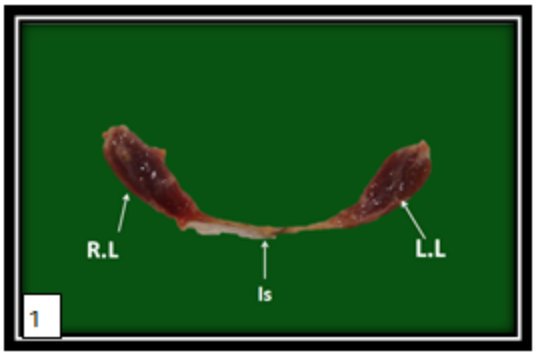

Figure (1): Shows the thyroid gland of indigenous gazelle: Right lobe (R.L), Isthmus (Is), Left lobe (L.L).

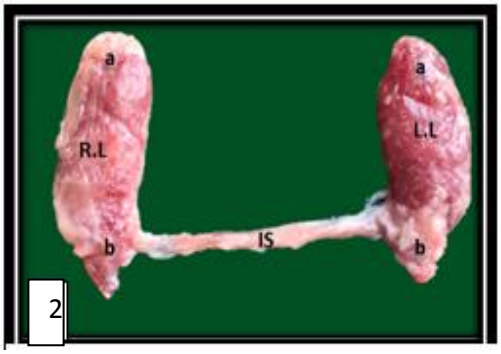

Figure (2): Shows the lateral surface of thyroid gland of indigenous sheep: a- cranial end, b- caudal end. Right lobe R.L, Isthmus Is, Left lobe L.L.

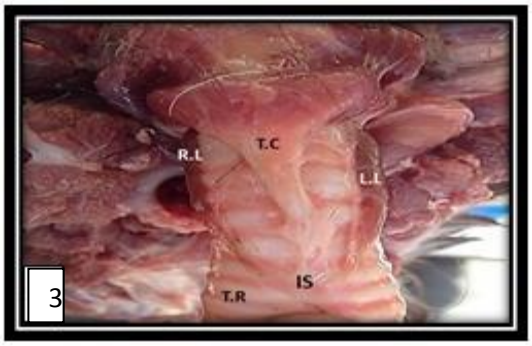

Figure (3): Shows the thyroid gland of indigenous gazelle:Right lobe (R.L), Isthmus (Is), Left lobe (L.L), Thyroid cartilage (T.C) and Tracheal ring (T.R).

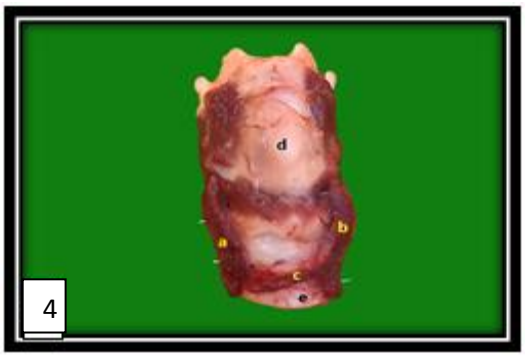

Figure (4): Shows the thyroid gland of sheep: a- Right lobe. b- Left lobe. c- isthmus. d- thyroid. cartilage. e- trachea.

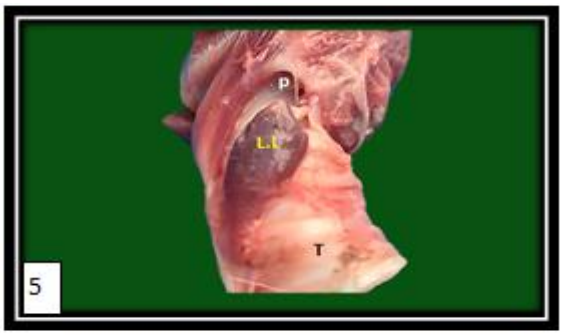

Figure (5): Shows the thyroid gland in indigenous gazelle: Left lobe L.L , pouch of left thyroid gland, Trachea T.

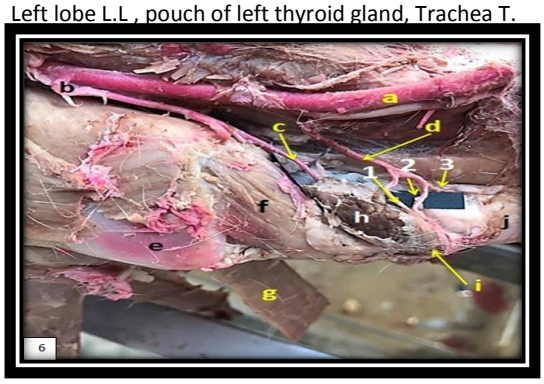

Figure (6): Shows the blood supply of thyroid gland in indigenous gazelle: a- common carotid artery, b- laryngeal artery, c- cranial thyroidal artery, d- caudal thyroidal artery (1-2-3 branches of caudal thyroidal artery), e- thyroid cartilage, f. cricothyroidus muscle, g- sternothyrohiodus m, h- thyroid gland.(right lobe),i- isthmus, j- trachea.

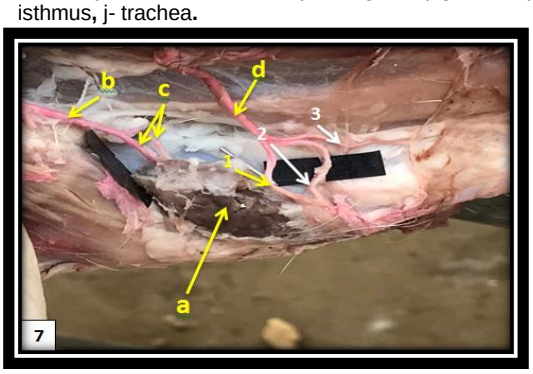

Figure (7): Shows artery blood supply of thyroid gland in indigenous gazelle:a-thyroid gland, b- cranial thyroidal artery, c- branches of crania thyroidal gland, d- caudal thyroidal artery,(1-2-3 branches of caudal thyroidal artery)

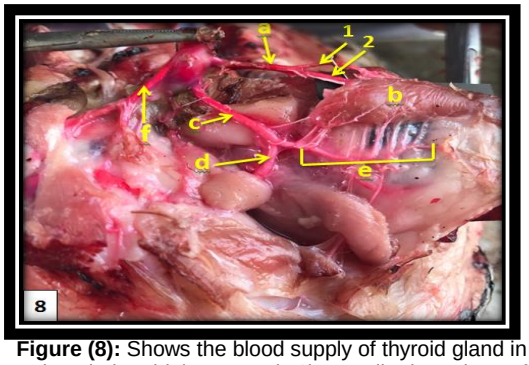

Figure (8): Shows the blood supply of thyroid gland in sheep: a-dorsal thyroidal artery, (1,2)- small branches of dorsal thyroidal artery, b- thyroid gland, c- ventral thyroidal artery, d-branch of mandibular salivary gland, e- small branches of ventral thyroid artery, f- branch of mandibular artery

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