

POST-NATAL DEVELOPMENT OF PRESCAPULAR LYMPH NODE IN ONE-HUMPED CAMEL (*Camelus dromedarius*): A MORPHOMETRIC STUDY

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ABSTRACT

The study aimed at forming a base line data on prescapular lymph node of one-humped camel (*Camelus dromedarius*) at post-natal stage of development and determination of the role of the lymph node in disease resistance of the animal species. A morphometric study was conducted on the prescapular lymph nodes of thirty camels (15 each from male and female) collected from Sokoto metropolitan abattoir over a period of three weeks at different post-natal ages. The approximate age of the camels was estimated using rostral dentition. The morphologic observations revealed that the lymph nodes were relatively large elongated, pinkish, palpable structures situated in the caudal and ventral part of the neck, cranial to the shoulder joint and between the superficial pectoral and the sternocephalic muscles. There is a progressive increase in length, width, weight and volume of the lymph nodes with advancement in age in both sexes. These biometrical variables are relatively higher in male than in female.

Keywords: Camel, Postnatal, Prescapular lymphnode, Gross, Morphometry.

INTRODUCTION

A camel is an even-toed ungulate within the genus *Camelus* bearing a distinctive fatty deposit known as “hump” on its back. Scientifically, camel is classified under; kingdom; animalia, phylum; *chordate*, class; mammalia, order; *artiodactyla*, family; *Camelidae* and genus; *Camelus* (Bello *et al.*, 2012). The family *Camelidae* contains two sub families: *Camelinae* (Old world camelids) and *Laminae* (New world camelids). The genus *Camelus* comprises two species: *Camelus dromedarius*, the dromedary, one-humped or Arabian camel and *Camelus bactrianus*, the Bactrian or two-humped camel (Wilson, 1984).

The lymphatic system is responsible for the immunological defense of the body. It protects the body from exogenous (foreign) and abnormal endogenous macro-molecules and from viruses, bacteria, and other invasive microorganisms (Bello *et al.*, 2014). It includes all the lymphatic organs: thymus, tonsils, spleen, lymph nodes and hemal nodes, and the diffuse lymphatic tissue and lymphatic nodules present in many mucous membranes (Bello *et al.*, 2012). The circulating

lymphocytes, as well as the lymphocytes and plasma cells that are widely disseminated throughout the organism, also participate in this protective system (Dyce and Wensing, 2010). 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). Though, they are seasonal breeders (Sharfee, 1989; Bello *et al.*, 2012) that are closely related anatomically to the South American Camelids (Heath and Nikles, 1991; Wilson *et al.*, 1990; Belknap, 1994; Umaru and Bello, 2012) little is known on the anatomy and physiology of the lymphnode of one humped camel (*Camelus dromedarius*).

The present study was conducted to investigate the normal gross anatomy of the prescapular lymphnode of one humped camel (*Camelus dromedarius*) with the aim of understand the teaching of anatomy and physiology in the field of medicine, surgery and immunology of the dromedarian Camel in the world.

MATERIALS AND METHODS

The study was carried out on thirty (30) normal Adult one-humped camel (male and female) collected from the metropolitan abattoir, Sokoto in winter season within a period of one month, using standard animal ethics approved by the faculty of veterinary medicine, Usmanu Danfodiyo University, Sokoto. The collected samples were then taken to the Veterinary Anatomy laboratory of Usmanu Danfodiyo University; where the gross and biometric values were determined.

Three lymph nodes each were obtained from male and female camels of 0-6 months, 6 months-2 year, 2-4 years, 4-7¹/₂ years and above 7¹/₂ years respectively. The camels were aged using rostral dentition according to Bello *et al.*, (2013). The positions of the lymph nodes were determined prior to removal.

Each lymph node was weighed using Metlar Electronic (digital) weighing balance (Model: MT 2000) with the capacity of 1000g/0.1g and recorded in grams. The length of each lymph node was measured in centimeter using a tape ruler. The cranial, middle and caudal width were measured and recorded in millimeter using an electronic digital caliper (C58093002). The volume was measured using water displacement technique (Archimedes' principle) in cubic centimeter. All the recorded weights, lengths and diameters were expressed as mean \pm standard error of mean (mean \pm SEM).

RESULT AND DISCUSSION

Morphology

The prescapular lymph nodes were represented on both sides of the neck. They were relatively large elongated palpable structures (Figure 1). Each node was situated in the caudal and ventral part of the neck, cranial to the shoulder joint and between the superficial pectoral and the sternocephalic muscles. It was related to the superficial cervical artery and sometimes to the external thoracic vein and the phrenic nerve. It was embedded in a large amount of adipose tissue, which separated the node from the muscles. The skin covered them ventrally. An elongated fissure on the deep face of the node represented the hilus. The lobulations were clear in all surfaces of the node especially around the hilus. The colour of the lymph nodes in all ages

was pinkish. Different structural variations of the lymph node were noted, these seems to be related to the degree of differentiation by age and/or sex.

Biometry

There is a progressive increase in length, width; weight and volume of the lymph nodes with advancement in age in both sexes Table 1 and 2. These biometrical variables are relatively higher in male than in female. The nodes are broader and heavier in male than in female. The progressive increase in biometrics of the nodes agrees with the reports of Dyce and Wensing (1971) and Sisson and Grossman (1975).

The qualitative and quantitative analysis of prescapular lymph nodes of camel in this study suggested that the topography of the node in camel resembles that of cattle as described by Dyce and Wensing (1971), Wenk *et al.* (1974) on mouse, Belz and Heath (1995) on dog and Sarma *et al.* (2001) on goat. The only difference lies in their anatomical relations.

CONCLUSION

Base on the above findings, it can be observed that the lymphnode in camel are elongated, palpable and clearly lobulated organ that resembles that of ruminants grossly. Observation shown that, camel lymph nodes are larger and heavier in male than in female of the same age and lymph nodes increase with advancement in age.

RECOMMENDATIONS

There is a need to study the organ at various stages of development (prenatally) in order to make a complete documentation considering the important of the organ in disease diagnosis.

REFERENCE

- Abdel-Magid, E.M. (1986). A preliminary ultrastructural investigation of the lateral retro-pharyngeal lymph node. *Group Document No. SRC 12. International Livestock Centre for Africa (ILCA)*, 61-72.
- Abdel-Magied, E.M., Taha, A.A.M., Al-Qarawi, A.A. and Elfaki, M.G. (2001). The Parotid, Mandibular and Lateral Retropharyngeal Lymph Nodes of the Camel (*Camelus dromedarius*). *Anatomia Histologia Embryologia*, 30:199-203.

- Bello A, Onyeausi BI, Sonfada ML, Adeyanju JB, Umaru MA, et al. (2014): Gross Embryonic Differentiation of the Stomach of the One Humped Camel (*Camelus dromedarius*). *Anat. & Physiol* 4: 131. Doi: 10.4172/2161-0940.1000131. <https://www.omicsonline.org/open-access/gross-embryonic-differentiation-of-the-one-humped-camel-camelus-dromedarius-stomach-2161-0940.1000131.php?aid=23477>
- Bello A., Onyeausi B.I., Sonfada M.L., Adeyanju J.B. and Umaru M.A. (2012). A biometric study of the digestive tract of one-humped camel (*Camelus dromedarius*) foetus. *Science journal. Zoology*. 1(1) : 11-16.
- Bello, A. and Umaru, M.A. (2013): AN OVERVIEW ON THE ANATOMY AND PHYSIOLOGY OF MALE ONE HUMPED CAMEL (*Camelus dromedarius*) REPRODUCTIVE SYSTEM: *Scientific Journal of Review*: 2(12) 340-347. doi: 10.14196/sjr.v2i12.1093 <http://www.sjournals.com/index.php/SJR/article/view/1093>
- Bello, A., Sonfada, M.L., Umar, A.A., Umaru, M.A., Shehu, S.A., Hena, S.A., Onu, J.E. and O.O. Fatima (2013). Age estimation of camel in Nigeria using rostral dentition; *Scientific Journal of Animal Science* (2013) 2 (1).
- Belz, G.T. and Heath, T.J. (1995). Lymph pathways of the medial retropharyngeal lymph node in dogs. *Journal of Anatomy*, 186/3: 517-526.
- Dhablania, D.C., Tyagi, R.P.S. and Khatra, G.S. (1994). Morphological studies of the lymph nodes of head in buffalo calves. *Indian Veterinary Journal*, 71/5: 469-473.
- Dyce and Wensing (2010). A Text book of Veterinary Anatomy, fourth edition; the organization of the lymphatic system, Saunders publishers; 7: pg 256-267.
- Heath, T.J. and Nikles, S.A. (1991). Relationships between lymph nodules and lymph sinuses in lymph nodes: a study in horses. *Journal of Anatomy*, 178: 39-43.
- Nikles, S.A. and Heath, T.J. (1992). Pathways of lymph flow through intestinal lymph nodes in the horse. *Anatomica Record*, 232/1: 126-132.
- Sarma, K. and Sarma, K. and Goswami, R.N. (2001). A note on the various dimensions of superficial lymph nodes of adult Assam local goat. *Indian Veterinary Journal*, 78/2: 136-138.
- Schwartz H.J., Dioli M. (1992). The one-humped camelin Eastern-Africa. Editions Verlag, Weikersheim (Allemagne). 288pp.
- Sharfee, N.A.-H.M. (1989). Some Morphological Studies on the Lymphoid Organs of the Camel. M.Sc. Thesis, University of Khartoum. Veterinary Science.
- Smuts, M.M.S. and Bezuidenhout, A.J. (1987). Anatomy of the Dromedary. Clarendon Press. Oxford.
- Wenk, E.J., Orlic, D., Reith, E.J. and Rhodin, J.A.G. (1974). The Ultrastructure of Mouse Lymph Node Venues and the Passage of Lymphocytes across Their Walls. *Journal of Ultrastructure Research*, 47: 214-241.
- Wilson, R.T. (2004). The Camel. First Edition. Longman Group Ltd. London. New York. Rhodin.

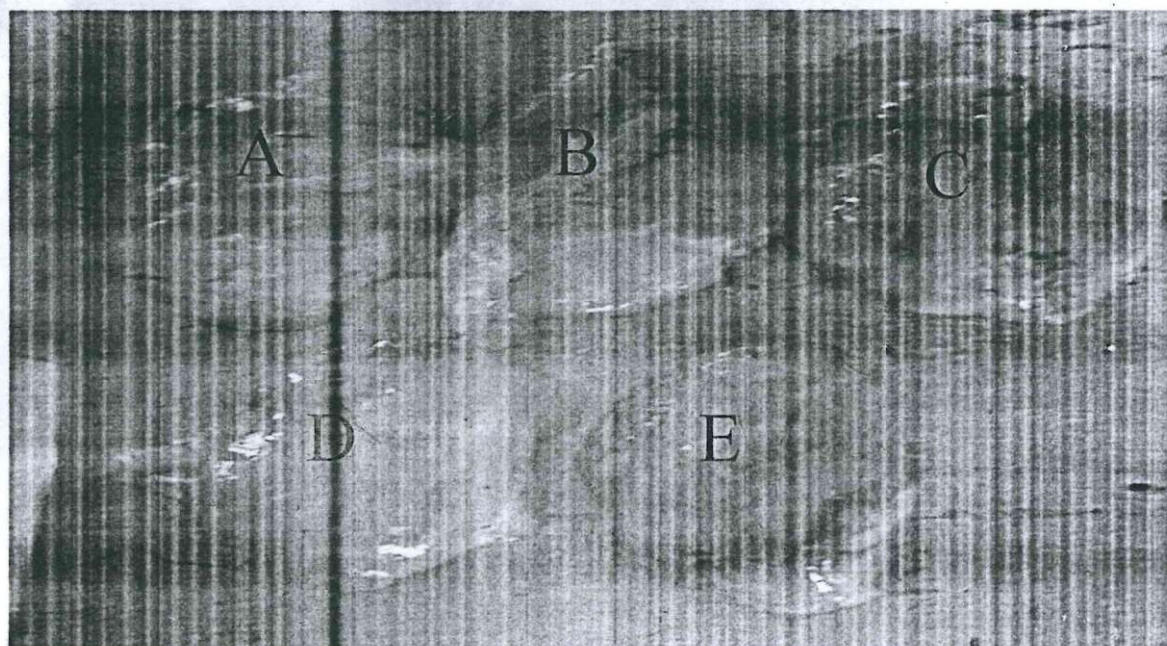


Fig .1: Photograph of camel prescapular lymphnode at various ages A (0-6 months), B (6 months-2 year), C (2-4 years), D (4-7¹/₂ years), and E (above 7¹/₂) and sexes male (A, Band D) and female (C and E) x25.

Table 1: The biometric data of the lymph nodes of Male animals .

Male					
Parameters	0-6 moths	6mth-2yrs	2-4yrs	4-7 ¹ / ₂ yrs	Above7 ¹ / ₂ yrs
No. of samples	3	3	3	3	3
Length	5.97±0.75	8.93±0.45	9.33±0.76	10.50±1.80	9.37±0.55
Width					
Cranial	10.99±3.29	22.33±5.94	20.98±4.00	20.89±1.25	27.79±2.31
Middle	17.97±3.16	30.62±8.89	31.71±1.57	29.49±4.53	37.63±3.29
Caudal	10.04±2.68	17.28±2.86	15.48±1.87	16.60±0.70	20.13±0.70
Weight	12.33±3.25	22.67±3.62	25.33±1.53	38.00±8.05	46.33±8.31
Volume	9.47±2.97	17.57±2.80	20.33±2.52	28.67±4.16	34.17±5.49

Table 2: The biometric data of the lymph nodes of Female animals .

Female					
Parameters	0-6 moths	6mth-2yrs	2-4yrs	4-7 ¹ / ₂ yrs	Above7 ¹ / ₂ yrs
No. of samples	3	3	3	3	3
Length	5.73±0.65	8.60±0.52	8.70±0.35	9.33±0.76	9.80±0.69
Width					
Cranial	12.84±0.12	12.06±2.54	19.27±0.62	21.09±0.63	20.68±1.62
Middle	16.13±2.81	15.35±1.33	21.29±0.30	25.84±3.23	24.79±1.50
Caudal	12.56±0.33	10.88±0.93	16.15±1.70	17.24±1.07	20.52±1.87
Weight	7.33±1.53	12.67±2.36	18.17±2.08	20.33±1.61	27.80±1.75
Volume	7.53±1.36	11.83±1.26	15.83±1.04	19.00±2.65	23.03±2.00