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Research Article

ANATOMICAL STUDY OF KIDNEY IN 90 DAYS FOETUSES OF CAMELUS DROMEDARIES

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ABSTRACT
This study was carried out to investigate the morphological development of kidney in the foetal stage between 85± 95 days of gestation. In this study, twenty numbers of camelus dromedaries embryos were selected based on their crown-rump length, kidneys demonstrated circle shape and No renal pelvis was evident in all kidneys under study. In 85± 95 days old foetuses, bean shape kidneys were present, renal pelvis was distinct and extensive with a well developed ureter that originated from the middle of the pelvis in both left and right kidneys, in this age, length, width and thickness of kidneys were more increased. Significant variation in measurement of length, width and thickness has been resulted between right and left kidneys.

Keywords: *Camelus dromedarius, Kidney, Development, Growth*

INTRODUCTION
Prenatal development is a very crucial period for animal development. It is important to know the normal developmental anatomy and histogenesis of urinary system for better understanding of various congenital renal conditions. Kidneys develop in intermediate mesoderm of animal embryos in cranio-caudal direction. These are pronephric kidney, mesonephric kidney and metanephric kidney (Kuure *et al.,* 2000). The kidney is an important organ involved in the removal of unwanted nitrogenous substances, excess water and relative maintenance of osmotic concentration of the blood.

Certain features of the renal anatomy of different mammals and variations with the aridity of their habitat have been reported (Sperber, 1944).

The anatomy and histology of the adult kidney of domestic animals is described in numerous textbook of histology and anatomy (Fawcett and Raviola, 1994; Eurell *et al.,* 2006; Dyce, 1995; Sisson, 1975) also numerous research studies investigated kidney development and morphology: The morphometric observations on the kidney of camel (Abdalla *et al.,* 1979), One Horned Rhinoceros (Talukdar *et al.,* 2003), biometrical study of the kidney of buffalo (Malik *et al.,* 1978), morphometric study on kidney of African rat (Onyeanusi *et al.,* 2007), Histogenesis of human renal cell(El-Kott *et al.,* 2005), Measurement of renal dimension (Moorthy, 2011).

The available reports were entirely concerned with adult structures of the kidney and much less have been written about the prenatal development of the kidney in camel. In this research morphometry and detailed sequential changes involved in the development of the kidney in one-humped camel (camellus dromedaries), an important breed of camel in Iran, will be described.

MATERIALS AND METHODS
Kidneys used for this study were obtained from 20 foetuses. Camel uteruses were gathered from slaughter house in yazd province. After dissecting the uteruses, the age of foetuses were meagered by crl formula (using crown-to-rump length), (age of foetus) =crl +23.9 / 336, according to (Mcgeady, 2006), foetuses about 85±95 days were selected. These foetii were fixed in 10% buffered formaline solution for 48 hours. Then the biometrical parameters of the kidneys were recorded. The greatest length, width and thickness of the kidneys were measured by digital Vernier Calipers, separately for right and left kidneys (figure 1, 2, 3).

Figure 1: Measerment of kidney width with digital vernier calipers in camelus dromedaries Embryoes (90 days old)

Figure 2: Measerment of kidney length with digital vernier calipers in camelus dromedaries Embryoes (90 days old)

Figure 3: Measerment of kidney thickness with digital vernier calipers in camelus dromedaries Embryoes (90 days old)

RESULTS AND DISCUSSION

Both kidneys were irregularly elongated and redish-brown in colour in vivo. In foetus of about 90 days, kidney morphologicaly shifted to bean-shape. All kidneys were smooth and covered with a thin fibro-muscular capsule. The kidneys were attaching the posterior extremity of the adrenal gland at the respective sides. In this age, each kidney had a cranial and coudal surface, a media and a lateral border, an upper and a lower pole. Adipose tissue surrounded the hilus and sides of the kidney. The lateral border was convex in shape and the medial border was concave and indented at the hilus. The major renal vessels had their entry and exit at the hilus. In 90 days fetuses, right kidney were shifted rostrally more than left kidneys (Malik &Vais, 1998) also reported that the right and left kidneys shifted rostral with advancement of age in ruminant. This cranial positioning of the kidneys might be due to relative variation in growth of different organs in the abdominal and pelvic cavities during various phases of embryonic development. The pelvis became well demarcated from the medulla with a sharp demarcating line in this age and length, width and thickness of kidneys were increased. Various biometrical parameters pertaining to right and left kidneys of this age have been measured. The measurements of all the parameters varied between the right and left kidneys (figure 4).

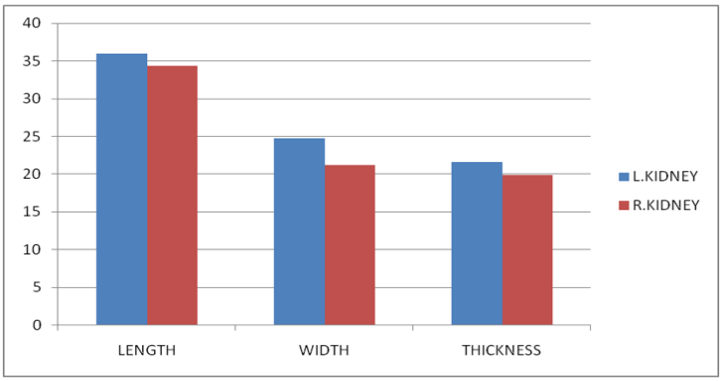

Figure 4: Percentage of increase in growth in terms of various biometrical parameters of right and left kidneys of camelus dromedaries Embryoes

The length of the left kidney was found having higher values than its right counterpart in all kidneys. Also, the values pertaining to width of the left kidney were more than the right one in all kidneys. The thickness of the right kidney was recorded less than those of the left kidney in all kidneys.

Statistical analysis revealed that, the variation in growth between the left and right kidneys in terms of length were significant ($p<0.05$). The width of kidneys varied significantly ($p<0.05$) between left and right ones. Significant variation ($p<0.05$) between the right and left kidney was recorded in terms of thickness.

In the present study, maximum growth in length which was observed in this age, in right (34.3%) and left (36%) kidneys, respectively, the growth being more in the left one. percentage of growth in width of the right kidney were observed in 90 days fetuses (21.2%) and (24.7%) in left kidney. Similarly highest percentage of growth in thickness were documented in right kidney (19.8%) and left kidney (21.6%). This result indicated a greater embryogenesis of both kidneys pertaining to the early stages of development in camelus dromedaries embryoes Similar findings were also reported in foetal goats (Malik & Vais, 1998). Similar patterns of embryonic growth were recorded in cerebral ventricles (Malik *et al.*, 1992) and scrotum (Malik *et al.*, 1995) in foetal goats.

The variation in growth among the left and right kidneys, pertaining to embryonic life in terms of length, width and thickness was highly significant ($p< 0.01$). This trend of growth was accordance with the findings of Patten & Carlson (1977), who reported that variable growth and structural diversities at different stages of development of an organ is a normal phenomena for accommodating and molding of the organ. According to Farbman (1991), there is an intimate relationship between the feeding habits and the development of the most organs. Studies by (Tisher,1971) have shown that rhesus monkey produced concentrated urine in the absence of a well developed inner medulla and loop of henle (Moutairou *et al.*, 1996) have also suggested that protein binding mechanism involving calbidin might be responsible for the ability of the rat to live with restricted drinking water According to Abdalla *et al.*, (1979) anatomical requisites for the production of concentrated urine are to be found in the kidney of the camel, but further studies will be needed to elucidate this fact that special anatomical adaptation in the urinary system for water economy originated from prenatal period and continued in the postnatal life.

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REFERENCES

Abdalla MA and Abdalla O (1979). Morphometric observations on the kidney of the camel, camelus dromedaries. *Journal of Anatomy* **129**(1) 45-50.

Dyce KM, Sack WO and Wencing CYG (1995). *Text Book of Veterinary Anatomy* (*Sannders Company*) 136.

El-kott AF, Ismaeil MF, Ei-Moneim MM and Ei-Baz MA (2005). Histogenesis of human renal cell carcinoma by using electron microscopy and immunohistochemical techniques. *International Urology and Nephrology* **37**(3) 439-45.
Eurell JA, Frappier BL and Dellman H (2006). *Textbook of Veterinary Histology*, 6th edition (Lea and Febiger) Philadelphia 174-175.
Fawcett DW and Raviola E (1994). *Bloom and Fawcett, A Textbook of Histology*, 12th edition (Champan and Hall) New York.
Kuure S, Vuolteenaho R and Vainio S (2000). Kidney morphogenesis: cellular and molecular regulation. *Mechanisms of Development* **92**(1) 31-45.
Malik MR and Vais Rakhi (1998). Morphogenesis of kidney in goat (Capra hircus). *Indian Journal of Veterinary Anatomy* **11**(2) 161-7.
Malik MR, Taluja JS and Parmar ML (1992). Histogenesis and mode of growth of choroids plexus in goat fetuses. *Indian Journal of Animal Sciences* **62**(12) 1151-9.
Malik MR, Taluja JS and Parmar ML (1995). Histogenesis and mode of growth of scrotum in foetal goat. *Indian Journal of Animal Sciences* **65**(4) 409-13.
Malik MR, Tiwari GP and Singh AP (1978). The biometry of the kidney of buffalo (Bubalusbubalis). *Journal of Anatomical Society of India* **27** 11-4.
McGeady TA, Quinn PJ, Fitzpatrickand ES and Ryan MT (2006). *Veterinary Embryology*, 1st edition (Blackwell publishing) 331-336.
Moorthy HK and Venugopal P (2011). Measurement of renal dimensions invivo: A critical appraisal. *Indian Journal of Urology* **27**(2) 169-75.
Moutairou K, Hayez N, Pohl V, Pattyn G and Pochet R (1996). Calbindin localization inAfrican giant rat kidney (Cricetomysgambianus). *Biochimica et Biophysica Acta* **1313**(3) 187-93.
Onyeanusi BI, Adeniyi AA, Ayo JO and Nzalak JO (2007). Morphometric study on the kidney of the African Giant rat. *Journal of Animal and Veterinary Advances* **6**(11) 1273-1276.
Patten BM and Carlson BM (1977). *Foundations of Embryology*, 3rd edition (Tata Mcgraw Hill) New Delhi.
Sisson S (1975). Ruminant Urogenital system. In: *Sisson and Grossmans the Anatomy of the Domestic Animals*, 6th edition (W.B. saunders company) 937.
Sperber I (1944). Studies on the mammalian kidney. *Zoologiskabidragfrån Uppsala* **22** 249-432.
Talukdar M, Sarma M and DevChoudhury K (2003). Macromorphology of Kidney of One Horned Rhino calf. *Indian Journal of Animal Sciences* **73**(2) 184.
Tisher CC (1971). Relationshiip between renal structure and concentrating ability in the rhesus monkey. *American Journal of Physiology* **220** 1100-1106.