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B-mode Ultrasound Biometry of Intraocular Structures in Dromedary Camels (*Camelus dromedarius*)

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Abstract: Ultrasonography is a relatively easy, safe and non-invasive examination method which can be used in diagnosis of ocular disorders as complementary to routine ophthalmic examinations. As there has been no collated study undertaken on the normal measurements of ocular structures in live One-humped camel, obtaining these measurements could be a benchmark to diagnose some of the diseases and eye problems of this breed. Transcorneal ultrasonographic scanning of left and right eyes of 20 camels (10 male and 10 female) was performed using a 7.5-10 MHz transducer. Qualitative ultrasonographic findings of the eyes were described and measurements of the ocular structures were obtained. Mean±standard deviation of the anterior-posterior length of the eye axis, thickness of the lens, depth of the anterior chamber and depth of vitreous were as 32.01±0.32, 11.64±0.06, 4.83±0.81 and 15.99±0.12 mm, respectively. Also axial globe length and vitreous chamber depth in female camels is larger than male camels and lens thickness in male camels is larger than females. Therefore, it can be documented as the obtained values as the standard parameters of eye in camel.

Key words: *Camelus dromedarius* · Ultrasonography · Eye

INTRODUCTION

One-humped camel (*Camelus Dromedarius*) is found in Iran and many other countries of Middle East. This animal adapted to the rigorous climate of the desert where it is subjected to high temperature, fierce gale and the scorching sun rays [1]. Camel has remained neglected in comparison with other livestock species. Some interest and Attention has been drawn recently toward camel because of its unique adaptive characteristics for survivability in the desert ecosystem [2-4]. Camel has very good distance vision; there are no scientific investigations to support this folklore.

Corneal edema is a common clinical sign of corneal ulceration, keratitis, anterior uveitis and many systemic diseases and precludes the direct visualization of intraocular structures by ophthalmoscopy [5], under such conditions; alternative diagnostic methods for intraocular diseases must be explored [6-8].

Ocular biometry is a useful tool for the assessment of abnormalities such as phthisis bulb, microphthalmia, pseudoexophthalmia, scleral ectasia and congenital glaucoma [9, 10].

Additionally, biometry values are frequently used for the construction of schematic eyes in optics [11]. Schematic eyes have been designed for the human [12], cow [13], horse [13], sheep [13], pig [13], dog [13], rabbit [14] and rat [15]. Knowledge of the ultrasonographic appearance and normal dimensions of the eye would serve as a basis for ultrasonographic examinations when ocular disease may have caused alterations in the dimensions and appearance [7, 8 10]. The objectives

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of this study were: 1) to present the B-mode ultrasonographic appearance of the globe and intraocular structures of the one-humped camel eye, 2) to present the ultrasonographic measurements of the globe and intraocular structures of the one-humped camel eye.

MATERIALS AND METHODS

The left and right eyes of 20 pure registered healthy adult camel (10 females and 10 males) which had no history or clinical signs of eye problems were scanned ultrasonographically in using a SIUI CTS-900V ultrasound machine with a linear array transducer of 7.5-10 MHz.

To avoid trapping air between the transducer and the patient, the palpebral hair was thoroughly wetted before the acoustic gel was applied. After using enough gel on the upper eyelids, transcorneal scanning was started while the globe was imaged in both horizontal and vertical planes through the visual axis on the upper eyelid parallel and perpendicular to the upper palpebral fissure respectively for a complete examination. This produces a cross-sectional image of the eye with the medial canthus to the right and lateral canthus to the left of the horizontal images. Attempts were made not to cause pressure on the cornea during placement of the transducer on the eyelid. The gain was set so that there was an anechoic region between the anterior and posterior lens capsule.

Ultrasonographic appearance of the camel eye was described and dimensions of the globe and intraocular structures including anterior-posterior length of the eye axis (APL), diameter (thickness) of the lens (LD), depth of the anterior chamber (DAC) and depth of vitreous (DV) were measured. The measurements were achieved on sonograms of the horizontal planes. All measurements (APL, LD, DAC and DV) were made by the same observer. The means and standard deviations (SD) for each set of measurements were calculated. A statistical Comparison of left and right also male and female eye measurements was also done using GLM procedure with SAS software.

RESULTS

In B-mode ultrasonography, four major echoes include cornea, anterior lens capsule, posterior lens capsule and retina-choroid sclera complex were easily seen. The cornea was represented as a curved hyper echoic interface immediately under the eyelid. In some of the sonograms, the cornea could be seen as three thin layers, in which the anterior and posterior layers were quite hyper echoic and the middle layer appeared anechoic. Anterior chamber of the eye, lens cortex and nucleus and the vitreous were anechoic. Other echoic structures including Ciliary body, iris and optic disc could also be distinguished. The results of the measurements on camel's eye were recorded in Table 1.

Table 1: Average Values (In Mm) of Optical Components in Camel's Eye

	Lens thickness	Vitreous chamber depth	Anterior chamber depth	Axial globe length
Total Average	11.64±0.06	15.99±0.12	4.83±0.81	32.01±0.32
Female	11.48±0.08**	16.36±0.17**	4.12±1.19Ns	32.53±0.33*
Male	11.78±0.08**	15.64±0.16**	5.45±1.14Ns	31.55±0.32*
Left	11.96±0.18Ns	15.96±0.17Ns	4.29±1.19Ns	32.12±0.33Ns
Right	11.62±0.08Ns	16.05±0.16Ns	5.28±1.14Ns	31.95±0.32Ns

Ns: None Significant

*: Significant P<0.05

**: Significant P<0.01

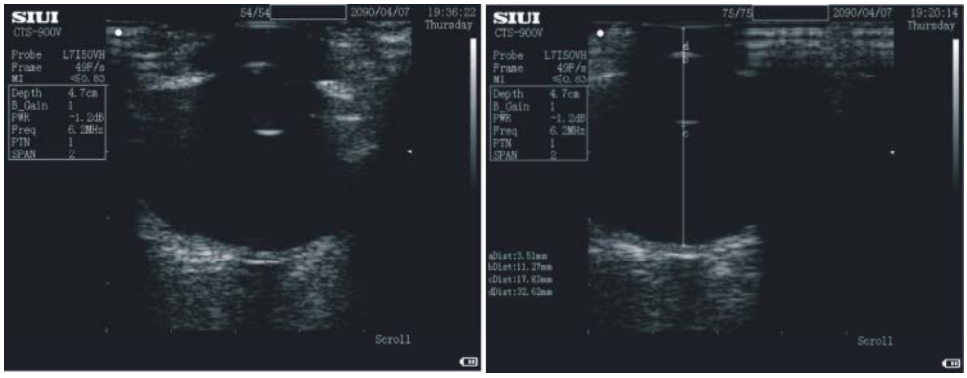

Fig. 1: B-mode Ultrasonography of camel eye with intraocular dimensions

As it shown in this table there is a significant difference between Female and male axial globe length ($P<0.05$) and differences between lens thickness and Vitreous chamber are significantly true ($P<0.01$). Current study showed axial globe length and vitreous chamber depth in female camels is larger than male camels and lens thickness in male camels is larger than females.

DISCUSSION

Ocular ultrasound is an addition to, not a replacement for, routine ophthalmic examination including assessment of menace, blink and papillary light response, fluorescein staining, nasolacrimal evaluation, determination of intraocular pressure and examination of anterior and posterior segments using a bright focal light source and direct and indirect ophthalmoscopy or bio microscopy, respectively [16, 17]. Several studies have been done on the eye ultrasonography in different kind of animals [13-15]. The most common clinical indications for ocular ultrasound are to evaluate for the presence of a retinal detachment in eyes with a cataract, intraocular lesions including lens displacement, intravitreal hemorrhage and intraocular foreign bodies. In addition, orbital evaluation can be performed in instances of exophthalmoses or orbital trauma [18-20]. In the study reported here APL, LD, DAC and DV were measured in normal eyes of camel to establish mean and standard deviation values. No difference was detected in any ocular component measurement between the right and left eyes of the one humped camel. It was in agreement with other investigations similar studies on enucleated eye of camel have been done [21]. But there is a significant difference between Female and male axial globe length and differences between lens thickness and Vitreous chamber are significantly true. Therefore, it can be documented as the obtained values as the standard parameters of eye in camel.

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