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SOME STUDIES ON THE MALE REPRODUCTIVE SYSTEM AND SERUM BIOCHEMICAL PARAMETERS OF THE EGYPTIAN FOX SPECIES

(With 2 Tables and 2 Figures)

By

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(Received at 25/5/1996)

بعض الدراسات على الجهاز التناسلى الذكرى والقياسات البيوكيميائية لمصل دم فصائل الثعالب المصرية

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أجريت هذه الدراسة على عدد ١١ ثعلب (٥ ثعلب أحمر عمر ٣-٤ سنوات، ٥ ثعلب رمل عمر سنة واحدة وعدد واحد ثعلب منك عمر سنة وذلك لاستبيان الصفة التشريحية للجهاز التناسلى الذكرى وكذلك اجراء بعض القياسات البيوكيميائية لمصل الدم فى الثعالب البالغة. تم عمل قياسات متمثلة فى الوزن والطول للاجزاء المختلفة من الجهاز التناسلى لعدد ثلاثة ذكور ممثلة للأنواع الثلاثة. أثبتت الدراسة غياب غدتا الحويصلة المنوية، غدتا جراب الوعاء الناقل وكذلك غدتا كوبر وان الغدة الوحيدة الموجودة هى غدة البروستاتا. أظهرت الدراسة وجود اختلافات ملحوظة فى الاوزان والطول لاجزاء الجهاز التناسلى فى الثعالب المختلة يعذى الى اختلاف العمر. أوضحت الدراسة أن متوسط القياسات البيوكيميائية لمصل الدم لبعض العناصر فى الثعالب البالغة كانت متشابهة كما فى الكلاب البالغة. ألذناب والثعالب الفضية بينما بعض العناصر الاخرى كانت قياساتها مرتفعة عن الحيوانات سالفة الذكر وقد اعذى هذا الارتفاع الى الاجهاد والهياج الناتج عن التعامل معها.

SUMMARY

Basic male reproductive anatomy was studied in eleven alive foxes captured from Sinai desert, representing three species of the foxes 5 adult red foxes (Vulpes vulpes), 5 immature sand foxes (Vulpes ruppellii) and one immature fennec fox (Fennecus zerda). The reproductive organs of all examined foxes were carefully dissected and investigated. As far as the age of the available foxes in each species was nearly similar data regarding weight, dimensions and absence of any segment were recorded for one fox representing each species. The present study declared the absence of ampulla ductus deferens, seminal glands and bulbourethtal glands in foxes. The only present gland is the prostate gland. The present investigation showed a marked difference in weight and length of the different segments of reproductive tract between species which were attributed mainly to age of the animals. The mean serum level of glucose, alkaline phosphatase, choifesterol, total protein, albumin, creatinine, calcium, phosphorus and sodium were estimated in adult red foxes.

Key words: *Egyptian fox-Reproductive system-serum parameters*

INTRODUTION

Information on the male reproductive system of fox species in Egypt can improve the captive breeding management of these critically endangered wildlife species. The red foxes (Vulpes vulpes), sand foxes (Vulpes ruppellii) and fennec fox (Fennecus zerda) are critically endangered wild canidae inhabit the Egyptian desert that need intensive conservation and management strategy to survive and save them from extinction.

As wildlife population diminish in their natural habitat, it is vital to establish the reproductive potential of these wild species and their fertility status to maximize their reproductive effeciency.

Knowledge about the form, location, presence or absence of reproductive organs in foxes, also weight, dimensions and relative relationships of these organs are important for understanding their normal and abnormal function. Unfortunately there is little published informations on the gross anatomy of reproductive tract of male foxes and their serum biochemical parameters. Further studies would be necessary to confirm a more detailed investigations

about the form, position, size, relative relationship of these organs, any reproductive abnormalities, diseases and semen examination.

The aim of the present study was directed to provide a knowledge about the gross anatomical structure of the male reporductive system of three fox species in Egypt and at the same time to study the mean serum biochemical values in adult foxes (red foxes).

MATERIAL and METHODS

Eleven male fox species (5 adult red foxes, 5 sand foxes and 1 fennec fox) were live captured from Sinai desert, Egypt, using steel baited-traps. The age of red foxes was 3-4 years while both sand and fennec foxes were one year. Blood samples (5-10 ml) were collected from the cephalic vein of the adult red foxes before anaesthesia into sterile well cleaned dried centrifuge tubes for serum separation to estimate some biochemical parameters. Animals were chemically restrained for easily handling before examination using an intramuscular drug combination of xylazine 1.0 mg/kg body weight and ketamine 20.0 mg/kg body weight after Kreeger et al. (1990). Examined animals were fasted 24 hours prior to anaesthesia.

The reproductive organs of all examined foxes were carefully dissected and investigated. Due to similarity of age of foxes representing each species. Data regarding weight, dimensions, and absence of any segment were recorded for one fox representing each species, Serum glucose, alkaline phosphatase, cholesterol, total protein, albumin, creatinine, calcium, phosphorus and sodium of adult red foxes were evaluated according to the method of Trinder (1969); Belfield and Goldberg (1971); Allain (1974); Doumas and Biggs (1972); Faulkner and King (1976); Gindler and King (1972); El-Marzabani et al. (1977) and Trinder (1951) respectively.

The mean and standard deviations (+SD) of serum biochemical parameters were estimated according to Snedecor and Cochran (1967).

RESULTS

The obtained results in Table (1) declared the absence of seminal glands, ampulla ductus deferens and bulbourethral glands. The only present accessory gland in foxes is the prostate gland which was found at the neck of the urinary bladder resembling horseshoe in appearance. The pelvic genitalia for the three species was the same except the variation in size which was related to the age. The two testes with their surrounding scrotum which was

covered with thick hair were situated in the perineal region ventral to the anus. The raphe scroti was not very distinct. The freshly dissected testis was ovoid and thick dorsoventrally from side to side. The epididymis was relatively large and attached to the dorsal part of the lateral surface of the testis (Fig. 1). The vas deferens was a very small tube and lacks ampullae and each one was extended from the tail of the epididymis and pierce the prostate gland to open into the urethra. The measurement of the non erected penis ranges from 3.0-7.0 cm (Table. 1). The os penis was longer in fox species. It ranges from o.8 to 4.5 cm in length depending on the age and size of animal. The male urethra varies in length from 6.8 to 16.5 cm according to the age. The weight and dimensions of reproductive organs for the three fox species were illustrated in table (1). One red fox and one sand fox were photographed (Fig. 2). The mean serum glucose, alkaline phosphatase, cholesterol, total protein, albumin, creatinine, calcium, phosphorus and sodium in adult red foxes were presented in table (2).

DISCUSSION

This was the first broad-based studies of the male reproductive status carried out on the free-ranging fox species in Egypt. The informations obtained from this survey will help the identification of the current reproductive health ststus of the free-ranging fox populations and has an improtant value for zoo conservation and captive breeding programmes.

Hopefully, the results of this study will provide incentive and guidance to inhance breeding success of these fox species inside zoological gardens in Egypt.

The fox species populations in Egypt were declined and facing extinction especially those living in the wild due to habitat destruction, illegal hunting and scare of prey items in the Egyptian deserts. On the other hand, failure of breeding in zoological gardens as it is nocturnal animal and breeding takes place in its burrow (Asdell, 1964).

The fox species are carnivorous animals inhabiting Sinai desert which was extremely arid environment, where little or no free water was available. Foxes were occasionally observed drinking when free water was available (Osborn and Helmy, 1980).

The male genital system of the fox species consists of two testes, duct system, prostate gland, which is the only accessory gland present and the penis which differs from most mammals described by Young (1975).

Many studies on the breeding of foxes in the farms have been reported by Fougner and Forsberg (1987); Forsberg et al. (1989) and Forsberg (1990). They used semen collected by electroejaculation for commercial breeding where the semen was collected and kept frozen untill used in artificial insemination. Serum level of glucose, alkaline phosphatase, cholesterol, total protein, albumin, creatinine, calcium, phosphorus and sodium in adult red foxes were nearly similar. The mean serum level of alkaline phosphatase, cholesterol, total protein, albumin, creatinine and calcium in adult foxes agreed with that reported for adult domestic dogs by Wolford et al. (1986); coyotes by Smith and Rongstas (1980) and silver foxes by Benn et al. (1986). The mean serum level of glucose was 127.4 + 28.2 mg/dl. It was somewhat elevated than in the domestic dog and this elevation may be attributed to stress (Seal et al., 1975; Smith and Rongstad, 1980 and Karns and Crichton, 1978). The mean serum phosphorus level in adult foxes was 5.37 + 1.4 mg/dl. It was elevated in comparison with values reported for adult dogs (Wolford et al., 1986) and coyotes (Smith and Rongstad, 1980), The mean serum sodium level in adult foxes was 150.4 + 2.2 mEq/l. Sodium level was found slightly higher than normal values for the domestic dog (Duncan and Prasse, 1983). In conclusion the gross anatomical structure of the male reproductive system of foxes declared the absence of the seminal glands, bulbourethral glands and ampullae ductus deferens with a great similarity to domestic dogs and further studies would be necessary for a more detailed examination of the reproductive organs.

The mean serum biochemical parameters for the adult foxes showed a great similarity to that of the domestic dogs. However, some parameters were slightly higher than that reported for adult dogs and this may be attibuted in some cases to capture stress. Therefore, minimizing stress is required for captured wild foxes also hyperexcitation during the initial stages of handling should be avoided.

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Table (1) : Weight and dimensions of male reproductive organs of three fox species.

Fox species	Age	Testis R.	Testis L.	Epid. R.	Epid. L.	Pelvic urethra	Os penis	Glans penis	penis	Bulb of urethra	Prostate gland	Total urethra
		Weight (gm)				Length (cm)						
Red Fox	3-4 Years	1.25	1.13	0.20	0.18	4.5	4.5	1.0	7.0	5.0	1.0 b:0.7	16.5
Sand Fox	one Year	0.37	0.37	0.17	0.18	1.5	1.0	0.5	4.0	3.0	0.5 b:0.4	8.5
Fennec Fox	one Year	0.31	0.25	0.16	0.15	1.3	0.8	0.4	3.0	2.5	0.4 b:0.35	6.8

b: Breadth of prostate gland

Table (2) : Mean (±SD) Serum biochemical parameters of adult red fox species in Egypt.

Parameters	Glucose (mg/dl)	Alkaline phosphatase IU/l	Cholesterol (mg/dl)	Total protein (gm/dl)	Albumin (gm/dl)	Creatinine (mg/dl)	Calcium (mg/dl)	Phosphorus (mg/dl)	sodium (mEq/l
Mean (x) SD	127.4± 28.2	41.2± 31.5	142.6± 43.1	5.4± 0.6	2.9± 0.33	0.58± 0.26	8.1± 0.93	5.37± 1.4	150.4± 2.2

S.D: Standard deviation

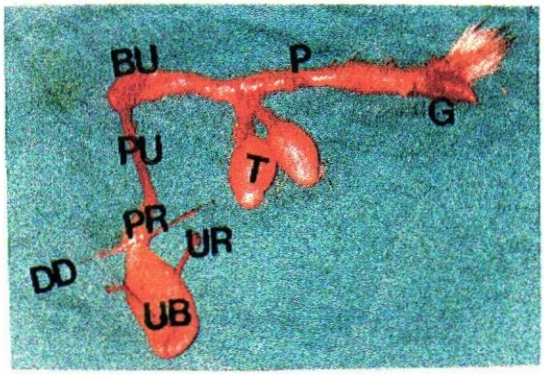

Fig. 1: Male reoroductive organs of Egyptian red fox (Vulpes vulpes), no seminal vesicles and bulbourethral glands.
UB: Urinary bladder; UR: Ureter; DD: Ductus deferens; PU: Peivic urethra; UB: Bulb of urethra; P: Penis G: Glans penis and T: Testis.

Fig. 2: Adult male red fox (Vulpes vulpes) and sand fox (Vulpes ruppellii) after chemical immobilization