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STUDY OF BLOOD PROFILE FOR LIBYAN JIRD (MERIONES LIBYCUS) IN THE FIRST PORTION OF WESTERN DESERT OF AL-NAJAF PROVINCE

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ABSTRACT

The aim of this study was to investigate the effect of seasonal variation on the haematological and biochemical parameters in adult wild Libyan jird (Meriones libycus) The study was carried out in the first portion of western desert of Al- Najaf province , as far as about 65 Km from city center. Blood samples were collected from 46 animals (23 males and 23 females) were collected during two periods , the first period was in September as a part of dry season and the second period was in December as a part of fall season for analyzing hematological and biochemical parameters**.** In hematological parameters, haemoglobin, mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and white blood count (WBC) were significantly increased in winter compared with summer season. Whereas, only mean corpuscular volume (MCV) was significantly decreased in fall compared with dry season. Sodium, chloride, bicarbonate, calcium, albumin, globulin and total protein were significantly decreased in fall season compared with dry season. Whereas, urea was significantly increased in fall compared with dry season. In conclusion, heat stress during dry season caused deterioration in some hematological and serum biochemical constituents of Libyan jird (Meriones libycus).

KEYWORDS: Libyan jird, Season, Haematology, Biochemical Parameters.

INTRODUCTION

Lichtenstein, 1823, the Libyan jird, Meriones libycus is one of the most widely distributed wild rodents. It has a vast range extending from eastwards to Sinkiang in China and Morocco and Mauritania (North Africa) spanning Arabia[1] [2]. There are several subspecies within the species M. libycus but they have not been fully characterized and they were all based on old data and on geographic distribution without concrete molecular data[3]. In Arabia, the subspecies M. libycus erythrourus occurs east of the Euphrates while specimens from the west of the Euphrates are referred to as M. libycus syrius[4] [5]**.** Several studies have found that conducting researches on rabbits are beneficial for farmer requirements and animal's welfare. Hence, haematology and serum chemistry are becoming increasingly important diagnostic tools. Blood parameters are used as an aid tool for the diagnosis of infectious and several parasitic diseases. In addition to assess the metabolic condition of animals, haematological and biochemical parameters could be affected by many factors including: age, sex, reproductive status and seasonal variations[6] [7] [8] [9] [10]. On the other hand, it was reported that haematological parameters were not influenced by gestation[11] and sex[12]. In various studies, RBC count, haemoglobin and hematocrit parameters were reported to reach the highest levels during fall season in different rodents[13]. In contrast, these parameters were reported to be at the lowest level during fall season in large animals such as horses[14] and cows[15]. The physiological, nutritional and pathological conditions of animals are usually assessed, using Apart from genetic and morphological information, haematological data are of great value while working on the wild mammalian species both on temporal and spacial variations. There is no available report on the normal haematological values of M. libycus apart from the work conducted by[16]. Due to the limitation and lack of information about Libyan jird (*Meriones libycus).*

MATERIALS AND METHODS

location of Study

The study was carried out in the first portion of western desert of Al- Najaf province, as far as about 65 Km from city center. The area of study approximately rectangle shape ; the GPS of the northern west, southern west, northern east and southern east corners were 31°49'38.00"N 44° 7'43.40", 31°41'33.04"N 43°49'58.36"E, 31°26'18.94"N 44°31'53.30"E and °18'22.35"N 44°17'44.54"E respectively with total area near to 1853.18 Km^2,(figure 1.)

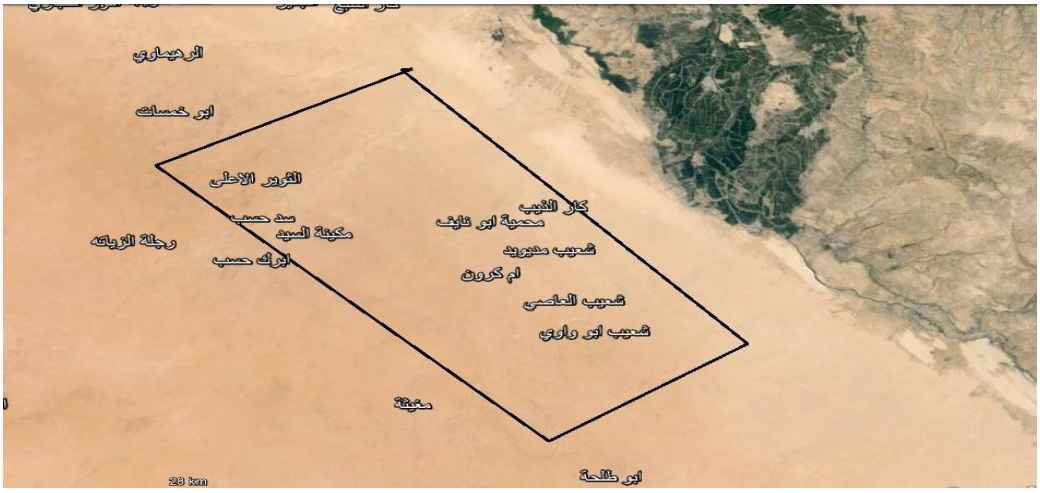

Figure 1: reveals the area of study the first portion of western desert of Al- Najaf province

The soil was sandy gravel with altitude range 57-181 m above sea level with some highland called locally "Garr" with many small valleys called locally "Shaeib ". The plant coverage in the area classified into two types, the plant related to fall season including Haloxylonsalicornicum, Cistanchetubulosa, Astragalusspinosus, Alhagigraecorum, Plantagoboissieriand Rumex vesicarius, the others with non-related to fall season including Lyciumshawii, Ziziphus lotus, Acacia tortilis Calotropisprocera and, Salvadorapersica, there are no any water sources except accumulation of some water in land's depressions after rain fall.

Animals

Atotal of 46 (23 males and 23 females) adult jirds identified as M. libycus were were collected during two periods, the first period was in September as a part of dry season and the second period was in December as a part of fall season as demonstrated in table

Season	**Dry**		**Fall**		**Total**
Sex	male	Female	male	Female	
Jird	11	11	12	12	46

All animals were collected at night with aid of spot light and hand net and placed in suitable rat cage with sand bed and transmitted as soon as to laboratory for blood sampling**.**

Anesthesia and Blood sampling

Ketamine and xylazine are diluted prior to administration in animals, 1 ml of 100 mg/kg ketamine with 9 ml sterile 0.9% saline for a solution of 10mg/ml ketamine and 1 ml of 20 mg/ml xylazine with 9ml sterile 0.9% saline for a solution of 2 mg/ml. The volume

administered is based on the dosage and weight of the animal, the injected animal was placed in a cage until complete induction of anesthesia. the anesthetized animal was placed on the back and after determination the place of highest heartbeat ,1.5 ml of blood was collected by 21G needle fitted to 2ml disposable syringe, immediately 0.5 of collected blood was placed in tube containing EDTA for examination of blood indices and blood smear, while the rest portion of blood was poured in gel plain tube and incubated in 37C for one hour, then centrifuged at 3000 rpm for 10 minutes for serum separation, the separated serum was stored in Eppendorf tubes at -20C until blood biochemistry examination was collected according to the method outlined by[17].

Blood analysis

The EDTA sample was analysed immediately after collection using (Automated hematology analyzer Veterinary Diagnostics) for erythrocyte (Red blood corpuscles) counts (RBC), haemoglobin (HB), haematocrit or packed cell volume (PCV), leucocyte (white blood cell) counts (WBC), lymphocytes, monocytes, granulocytes, platelet counts (PLT), mean platelet volume (MPV), plateletcrit (PCT), platelet distribution width (PDW) and erythrocyte indices were calculated from the values of RBC, HB and PCV which included mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular volume (MCV) as indicated in Jain (1986). and Serum biochemistry was performed using the biochemistry analyser (Bs-200 chemistry analyzer, Mindary ,Germany) biochemical parameters determined included: total protein (TP), albumin (ALB), globulin (GLOB), blood urea nitrogen (BUN), glucose (GLU), creatinine (CREAT), and cholesterol and biochemistry analyser determined the Plasma electrolytes and minerals included calcium (Ca), sodium (Na), potassium (K), and bicarbonate etc)by using the (GE-300 electrolyte analyzer, Genius Electronics, USA) were calculated from the values obtained for these parameters.

Statistical analysis

Data were analyzed by using the SPSS (SPSS Inc., Chicago, IL, USA). Statistical significances between full and dry season were determined by t-test. A P value less than 0.05 was considered significant asmention by[18].

RESULTS

All rodents sampled for the present study appeared healthy and no parasites products (ova, cysts, or larvae) were demonstrated in the standard floatation/sedimentation techniques.

Haematological and biochemical data obtained from the males and females M. libycus are presented in Tables 1 and 2, respectively. There were some differences in the haematological profiles between all groups but such differences were not significant. As shown in table 1, 2 As shown in table 1, there is significant increasing ($p \leq 0.05$) Of RBC in group 4(males fall season) compare with other groups and there is significant increasing($p \leq 0.05$) Of RBC levels in group2(females fall season) compare with group 1 (females dry season) and there is no significant different Of RBC between group 3 (males dry season) with group2(females fall season) compare with group 1 (females dry season) ,there is significant increasing($p \leq 0.05$) of HGB concentration in group 2 and group 4(males fall season)compare with group 1 and group 3, there is significant increasing ($p \leq 0.05$) of MCV concentration in group 1 compare with group 4 and there is no significant different of MCV concentration between group 2 and group3 compare with other groups, there is significant increasing ($p \leq 0.05$) of MCHC concentration in group 4 season compare with group 1 and there is no significant different of MCHC concentration between group 2 and group1 and group 4 also there is no significant different of MCHC concentration between group 3 and group 1, there is no significant different of HCT,MCH and RDWC between all groups.

Table 1: The erythrocytic levels in male and famle Libyan jird during dry and fall season.

Parameter	Females dry season	Females fall season	Males dry season	Males fall season
	Mean±SE	Mean±SE	Mean±SE	Mean±SE
RBCs(10^6 /µI)	A 7.8±0.3	b 9.5±0.4	ab 8.7±0.4	c 10.7±0.3
HGB(g/dl)	A 8.7±0.3	b 11.4±0.3	a 8.7±0.4	b 11.9±0.4
PCV (%)	A 35.9±1.2	a 40±0.45	a 35.5±3	a 40±0.45
MCV(fl)	A 47.1±2.7	ab 43±1.8	ab 41.6±4.2	b 37.6±1
MCH (pg)	A 11.4±0.57	a 12.1±0.8	a 10.5±0.7	a 11±0.5
MCHC (g/dl)	A 24.6±1.2	ab 28.4±0.8	ab 24.3±2.1	B 29.6±0.8
WBC (10^3/µl)	a 9.1±0.25	a 9.1±0.8	A 8±0.3	a 9.8±1

Different litters= Significant Differences ($p<0.05$) Group 1 =Females dry season Group2 =Females fall season Group3 = Males dry season Group 4 = Males fall season.

Table16: The serum biochemical parameters of male and female Libyan jird during dry and fall season.

Parameter	Females dry season	Females fall season	Males dry season	Males fall season
	Mean±SE	Mean±SE	Mean±SE	Mean±SE
Total protein (g/dl)	a 4.07±0.1	A 4.02±0.2	b 6.2±0.2	b 6.2±0.2
Albumin (g/dl)	a 1.7±0.06	A 1.9±0.14	b 3±0.13	b 3.1±0.15
Globulin (g/dl)	a 2.35±0.1	A 2.1±0.1	b 3.2±0.1	b 3.1±0.2
Urea (mg/dl)	a 18.7±0.35	A 18.1±0.33	a 16.8±0.4	a 13.9±2.8
Blood glucose (mg/dl)	ab 107.1±1.6	B 100.3±3.2	c 122±1.8	a 111.5±1.6

Different litters= Significant Differences ($p<0.05$) Group 1 =Females dry season Group2 =Females fall season Group3 = Males dry season Group 4 = Males fall season.

There was significant increasing of total protein concentration in group 3 and group 4 compare as with group 1 and group 2 and there was no significant different of Total protein concentration between in group 3 and group 4 also there was no significant different of total protein concentration between group 1 and group 2, there was significant increasing of albumin concentration in group 3 and group 4 compare as with group 1and group 2 and there was no significant different of albumin concentration between in group 3 and group 4 also there was no significant different of albumin concentration between group 1 and group 2, there was significant increasing of globulin concentration in group 3 and group 4 compare as with group 1 and group 2 and there was no significant different of globulin concentration between in group 3 and group 4 also there was no significant different of globulin concentration between group 1(female dry season and group 2, there was significant increasing of glucose concentration in group 3 compare as other groups. and there was significant decreasing of glucose concentration in group 2 compare as with group 3 and group 4 and there was no significant different of glucose concentration between group 1 compare as with group 2 and group 4.

DISCUSSION

The obtained data showed significant changes in some heamatological parameters which is in according to the study of[19] who also reported heamatological changes in rabbits during winter season. These s changes may be due to the lower water intake during fall season

compared to dry season. The presented data showed similarities between the Libyan jird and other rodents in most parameters studied with some differences in others.[20] [21] Previous studies reported that this variation may be related to environmental acclimatization because the fall season low ambient temperatures requires a higher metabolic rate for body temperature regulation could stimulates erythropoiesis which would be of great advantage in oxygen transport and delivery to the tissues[22] [23] [24] [25] [26]. Total WBC numbers was significantly higher in the Libyan jird during the fall season. In contrast, in dry season,[27]. observed decrease in the number of WBC numbers in rabbits. On the other hand, some studies demonstrated that haematological parameters reached the highest value during fall months in rodents[28] whereas, these parameters reached the lowest level in large animals such as horses and cows[29] [30] [31]. These differences may be due to from the difference in species, intensity of season, diet and other environmental factors. We observed significant difference in electrolytes in this study. Nevertheless, Libyan jird could manage with low levels of plasma electrolyte in the fall season. From this study it seems the Libyan jird have adaptive mechanism to manage with the variation in the plasma electrolytes in the dry and fall seasons. Total protein and albumin concentrations were higher during dry than fall season. since the ambient temperatures was higher and relative humidity was lower during dry season, the Libyan jird may be dehydrated during dry season which might have elevated the concentration of the plasma proteins as described by[32] and[33]. Urea was higher in fall season than dry season. This result is similar to observation made[34] and[35]. The increase of serum urea level maybe due to the efficient digestion of dietary protein. There are considerable alterations in the haemotoligical and serum biochemistry in both seasons. In conclusion, the present study presents baseline haematoligcal and biochemical information for apparently healthy Libyan jird (M. libycus) from central Saudi Arabia. The data will allow for further comparison with wild-caught Libyan jird or other rodents in Saudi Arabia and to assess health condition of Libyan jirds especially in laboratory experimental infections.

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