Some Physical Variables, Biochemical and Haematological Parameters in Hassawi Ass

K.A. AL-Busadah A.M. Homeida
College of Veterinary Medicine and Animal Resources, King Faisal University
AL-Ahsa, Kingdom of Saudi Arabia

Abstract :

Physical characteristics, haematologic and serum biochemical values were described in thirteen Hassawi donkeys. Physical values were significantly different between males and females. Higher values of RBC, WBC, creatine kinase, glucose and cholesterol were observed compared to other animals. Similar values of minerals and lower values of some enzyme activities in Hassawi donkeys compared to other domestic animals were also reported.

Introduction

The domestic donkey (Equus asinus) is a member of the horse family . Although there are advances in farm mechanization and transport, donkeys are still valuable animals . In these places it is still used as a source of draught power and transport . One of the most famous breeds of donkeys in Saudi Arabia is the Hassawi ass , which as the name implies , originated in Al-Ahsa area in Eastern Saudi Arabia . Unfortunately this fact has been missed by a famous animal breeder (Mason , 1976) who included the Hassawi ass in the list of donkeys that originated in Egypt.

The Hassawi ass originated in Al-Ahssa area and is reputed worldwide as superb riding donkey . Unfortunately , the numbers of the Hassawi ass are decreasing because its traditional role in agriculture is taken over by automobiles . The Hassawi ass may become extinct unless efforts are made to preserve it and promote its breeding .

There have been studies of donkeys blood values , but these were derived from small numbers of animals or from specific breeds (Nayeri 1978) . Studies on feral donkeys reported higher hemoglobin and leukocyte concentration in female than male donkeys (Zinkl et al 1990)

Unfortunately there is paucity of information about the productivity of donkeys at both national and international levels, which partly explains the slow growth in donkeys numbers . There is need to correct this deficiency and promote research in donkeys .

This study was conducted to determiner base-line data regarding some hematological and biochemical variables in the blood of Hassawi donkeys , which may help in clinical diagnosis of diseases in this species .

Materials and Methods

Animals

Thirteen adults (4 years of age) Hassawi donkeys of both sexes (7 males and 6 females) ware used in this study. All animals were apparently health .

Collection of Samples

Blood was drawn from jugular vein into 2 ml EDTA vacutainer tubes for haematological analysis and into 10 ml plain tubes for serum biochemical analysis.

Daily Protocol

Heart rate, respiratory rate and rectal temperature were measured routinely.

Haematological measurements

Blood with EDTA was used for determination of packed cell volume by Hawksley rnicrohaematocity centrifuge. Hemoglobin concentration by cyanomethaemoglobin method. Red and white cell counts by Coulter Counter (ZF6, Shimadzu, Kyoto, Japan). Differential white cell count by Haemoscan differential cell counter.

The blood values were estimated by standard hematological techniques (Jain, 1993). Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated according to formulae of Jain (1993) .

Biochemical measurements

Fresh blood was used for measurement of glucose spectrophotometrically by Boehringer kit. Serum was used for measurment

of minerals, matebolites and enzymes using commercial kits (Boehringer, Germany).

Statistical analysis

The data was compared by student "t" test (Winer, 1971) and P‹ 0,05 was considered statistically significant .

Results

Features of Hassawi donkey is described in Table 1. Hind length , circumference and rear length are significantly (p<0-05) different between male and female . Mean rectal temperature, heart and respiratory are given in Table 2.

The results of haematological values of thirteen healthy donkeys are presented in Table 3. Highest differential WBC count was reported for neutrophils followed by lymphocytes. Erythrocyte sedimentation rate was 42 ± 3 mm at 75 minutes.

Table (1)
Physical characteristic values of variable among donkeys (n=13) used in the study

Variable	Adult male (4 years old) (n=7)	Adult female (4 years old) (n=6)
Head	50 ±2.6	42±2.1
Head girth	147±2.6	116±3.2
Height	125±5.5	113±3.5
Back length	128±2.1	98.6±2.4
Neck	61±3.2	46.6±3*
Hind length	138±2.5	121.3±2.4*
Circumference	178±3.6	141±4.2*
Rear length	155±4.1	121±4.5*

* P < 0.05

Table (2)
Mean ± SD Rectal temperature , heart and respiratory rate of donkeys (n=13) during experimental period

Parameter	Mean ± SD	Number of observations
Rectal temperature (^{o}C)	37.60 ± 0.03	(34)
Heart rate (beats /minute)	46.5 ± 0.3	(33)
Respiratory rate (respiration / minute)	14.0 ± 0.5	(33)

Table (3)
Mean ± (SD) of haematological parameters in donkeys (N=13)

Parameter	**Value**
Packed cell volume (%)	37.5 ± 3.6
Hemoglobin (g / dL)	12.04 ± 1.48
Red blood cells count (x10^{12} / Liter)	7.7 ± 1.1
Mean corpuscular volume (fL)	48.1 ± 1.1
Mean corpuscular hemoglobin (pg)	15.1 ± 1.2
Mean corpuscular hemoglobin concentration (g/ dL)	31.5 ± 1.5
Erythrocyte sedimentation rate (mm)	
15 minute	1.6 ± 0.3
30 min	11± 2
45 min	24 ± 2
60 min	35 ± 3
75 min	42 ± 3
White blood cell count (x 10^{9} / litre)	14.6 ± 2.3
Differential white cell count %	
Neutrophils	59 ± 2.1
Lymphocytes	31 ± 1.2
Eosinophils	7.3 ± 1.1
Monocytes	2.1± 0.3
Basophils	0.7 ± 0.03

The enzyme activity, the metabolites profile and the serum concentration of minerals obtained are given in Table 4. These parameters values were similar in the male and female donkeys , therefore they are pooled .

Table (4)
Serum biochemical values of donkeys (N=13)

Parameter (u/L)	Mean ± SD
Creatinekinase (u/L)	168.6 ± 10.07
Lactic dehydrogenase (u/L)	235 ± 15.8
Aspartate transaminase (u/L)	269.5 ± 20.3
Alanine transaminase (u/L)	15.7 ± 1.4
Alkaline phosphatase (u/L)	253 ± 9.1
Glutamic transaminase (u/L)	77.4 ± 6.2
Total protein (g/dL)	7.6 ± 0.68
Albumin (g/dL)	3.5 ± 0.08
Glucose (mg/dL)	93.3 ± 9.5
Cholesterol (mg/dL)	118 ± 8
Triglyceride (mg/dL)	80.4 ± 13.4
Urea (mg/dL)	25.5 ± 4.3
Creatinine (mg/dL)	1.25 ± 0.05
Na (mEq/L)	145 ± 18
K (mEq/L)	4.8 ± 0.1
Cl (mEq/L)	116 ± 4
Mg (mEq/L)	2.5 ± 0.3
Ca (mg/dL)	10.5 ± 0.6
Phosphorous (mg/dL)	5.2 ± 0.3
Iron (mg/dL)	82 ± 8.3

Discussion:

The Hassawi donkey reaches a height of 1.3 meter while the largest is the Poitous ass of Italy, which stands 1.5 meter at the shoulder (Mason, 1976). Values of packed cell volume and haemoglobin concentration were in accordance with those obtained for donkey, horse , sheep and cattle (Nayeri, 1978; Zinkle et.al.,1990; Reece, 1997) . Higher values of RBC

were observed in donkeys than in other animals . The values of MCV and MCH in donkeys were similar to those in horses , but MCHC were lower in donkeys than in horses . The erythrocyte sedimentation rate was faster in donkeys than in horses (Jain,1993; Reece 1997).

The total number of WBC in donkeys blood is the highest among domestie animals (Nayeri,1978; Reece 1997). Lower values of WBC in donkeys were reported elsewhere (Zinkl et. al., 1990). However, like other species the total and differential leukocyte counts maybe altered by factors such as age , nutritional statous, pregnancy and lactation (Reece 1997). A description of blood chemistry has been reported in donkeys in one study in USA (Zinkl et. al., 1990). Most of enzyme activities , metabolites and mineral profile obtained were in reasonable agreement with other domestic animals with some differences. CK activity was much higher and LD and ALT activities were lower in Hassawi donkey than those reported for donkey and other animals (Zinkl et. al., 1990: Jain 1993) . Total protein and albumin concentration were in agreement with those reported for donkeys in Tanzania (Wilson 1981 , Aboud et al 1999) and horses (Jain, 1993). Serum concentration of sodium, potassium ,chloride, calcium, phosphorous and magnesium in donkeys were similar to those in donkeys (Zinkle et. al., 1990) . Also, lower sodium concentrations were reported in Iraian donkeys (Nayeri,1978) Levels of calcium phosphorous, magnesium and iron were higher in donkeys than those reported for horses (Jain 1983). Glucose and triglyceride concentration were much higher in Hassawi donkeys than other donkeys (Nayeri,1978; Zinkle,1990; Aboud et. al., 1999). This is probably because of the type of feeding of Hassawi donkeys . These animals were mainly fed on dates which is expected to yield more sugars , fats and minerals. Furthermore, Hassawi donkeys were kept mainly as pet animals and sometime for transport, pulling carts in case of poor owner . It is generally assumed that donkeys are better able than other stock to utilize low quality forage to meet their maintenance requirements (Tisserand 1991). However, where donkeys have to perform energy demanding duties, it is not likely that the type of diets given to them would be adequate to meet their requirements.

Acknowledgements

The authors thank the Deanship of Scientific Research for financial support .

References

1. Aboud, A.A.O., Mutayoba, B.M. and Mollel , E.L.(1999) Supplementary feeding of Working donkeys :Influence of nutrition on body condition and levels of blood metabolites Sudan J. Anim. Prod. 12,5-15 .
2. Jain, N.C. (1993). Essential of Veterinary Haematology. Lea and Febiger, Philadelphia, USA.
3. Mason, I. L. (1976). A World Dictionary of Livestock breeds, types and varieties. CAB , Edingbourh.
4. Nayeri, G. D. (1978). Blood characteristics of the adult donkey. Zentrablatt Veterinarmed. 25, 541-547.
5. Reece W.O. (1997) In : Physiology of Domestic Animals ed. William Reece . Williams & Wilkins New York .
6. Tisserand, L.J. (1991). Microbial digestion its consequences for feeding in the horse. In: Donkeys, Mules and Horses in Tropical Agricultural. Fielding D and Pearson R.A. (eds). Karger, Basel, Switizerland.
7. Wilson , R.T. (1981) . Distribution and importance of the domestic donkey in Sub Sahara Africa. Africa. Singapore Journal of Tropical Geography 2 (2) : 136-143.
8. Winer, B.J. (1971) . Statistical principles in experimental design. (2^{nd} ed). McGraw-Hill Book Co. New York, USA.
9. Nayeri G.D (1978) Blood characteristics of the adult donkey . Zentrablatt Veterinarmed , 25 , 541 – 547 .
10. Zinkl, J.G., Mae, D., Merida, P.G., Faver, T.B. and Humble, J.A. (1990). Reference ranges and influence of age and sex on hematologic and serum biochemical values in donkeys. (Equs asinus). Am. J.vet. Res. 51,408-413.

بعض الصفات القياسية والبيوكميائية ومعايير الدم في الحمار الحساوي

خالد أحمد البوسعده - عبدالقادر موسى حميده

كلية الطب البيطري والثروة الحيوانية – جامعة الملك فيصل

الأحساء – المملكة العربية السعودية

الملخص:

لقد تم وصف بعض الصفات القياسية والبيوكميائية ومعايير الدم في ثلاثة عشر من الحمير الحساوية في هذه الدراسة . لقد اختلفت الصفات القياسية بين الذكر و الأنثى. وأظهرت الدراسة معدلات أعلى لخلايا الدم الحمراء وأنزيم الكرياتين كاينيز و الجلوكوز و الكوليستيرول من مثيلاتها في الحيوانات الأخرى. و كان تركيز الأملاح مشابهة للحيوانات ونشاط بعض الأنزيمات أقل من مثيلاتها في الحيوانات المستأنسه .