

Determination of reference values of some serum biochemical parameters of healthy Donkeys in Iraq

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Summary

This study is conducted to establish the profile of some serum biochemicals which included creatinine, urea, glucose, total protein and albumin concentrations in 104 clinically normal donkeys (65 males and 39 females) aged 2-4 years. Animals were classified on the basis of age and sex, in Baghdad city/ Iraq. The Results showed that the, mean values \pm standard error (SE) of serum creatinine and urea concentrations were as follows: Creatinine 65.55 ± 2.01 $\mu\text{mol/L}$ and urea 6.79 ± 0.20 mmol/L , while serum concentrations of glucose, total protein and albumin were 54.7 ± 3.09 g/dl , 123 ± 14.3 and 3.4 ± 0.08 mmol/L , respectively. Creatinine values showed a significant difference between 4 years and more than 4 years old subgroups. However, there were no differences in serum urea concentration between male and female and compared with biochemical ranges obtaining for another donkey breeds. This suggested that most biochemical values determined in this study serve as reference ranges for Iraqi donkey and could be used in health control and diagnosis of diseases. In conclusion a significant increase in serum creatinine was recorded at age 4 and more than 4 years as compares with serum urea and no differences in serum glucose, total protein and albumin.

Keywords: Donkeys, Creatinine, Urea, Albumin, Total protein, Glucose, Biochemical parameters.

Introduction

Equids are important draught animals used by human for a long time, playing important roles in the agricultural part transportation, farm cultivation, pack, riding, milk and meat production for human (1). Donkeys, working animals, are considered best than other draught animals because of their tolerance for thermal, low wetting rate and dehydration (2). The donkey used by man for hundreds of years; however, despite this, in the past, little attempt has been made to study any aspect of this animal (3). Determination of the normal hematological and serum biochemical indices of animals helps veterinarians to confirm clinical diagnosis, estimate the severity of cases, administer appropriate treatment and evaluate treatment outcomes (4).

Many countries have established the normal reference values of serum biochemical parameters for their local donkey (5 and 6). Urea and creatinine levels could be estimated by laboratory analysis, which used for diagnosis of diseases in preventive medicine (5, 7 and 8). Research on donkeys that focuses on health and welfare should be strengthened (9). The biochemical values obtained from

American, European, African or Asian donkeys might not be useful information under the condition of Iraq. These values influenced by multiple factors, including environmental factors, especially food intake, climate and breeds of donkeys. There are petty information to evaluate biochemical references in Iraqi donkeys related with sex and age. The present study was aide as a reference for those biochemical profiles.

Materials and Methods

This study was carried out in Baghdad government. A total number of 104 adult donkeys of the Iraqi breed, were divided according to sex (65 males and 39 females) and ages (2-4) years, the animals used to drought. The feeding basically constitutes between straw and grass, some time grain the clinical signs were tested every day. Each donkey was restrained by human before blood sample was taken, the skin was disinfected with alcohol 10 % concentrate, a blood sample was collected from the jugular vein by using avacutainer tube. The collected blood samples were placed at room temperature for 30 minutes. The samples were centrifuged (4000 round/min),

the serum only was transferred with apipette to another test tube to analyzed for serum urea, creatinine, glucose, total protein, and albumin (Randox company), according the procedures mentioned by (7 and 10). The samples of serum were analyzed by spectrophotometer apparatus and use specific kit of urea and creatinine (Urea was determined by using the urease-modied Berthelot enzymatic reaction. Creatinine was determined by using the Colorimetric End point method in the department of Internal and Preventive Medicine/ University of Baghdad. Urine analysis is useful to help detect renal or bladder pathology and to investigate Cases of septic nephritis, cystitis or urethritis. Samples should be collected without the use of diuretics (which alter urine composition) into a sterile, empty universal container.

The results obtained were statistically analyzed by using SAS program. Data were subjected to Analysis of Variance (ANOVA) and significant means were compared by T-test at a level ($P < 0.05$) (11).

Results and Discussion

The values of Serum creatinine, urea glucose, total protein, and albumin concentrations for donkey were illustrated in the (Table, 1) according to total animals, and (Table, 2) according to gender too. These values agreed with the published values for donkeys in other countries; however, there were some differences. There were no differences between mean values of Serum creatinine and urea concentrations in both sexes. Also there were no differences. The mean value recorded in serum creatinine ranged (44.2-111.384 $\mu\text{mol/L}$) 65.552 \pm .01 and in serum urea (3.91-9.69 mmol/L) 6.79 \pm 0.20. The values of creatinine in male were 63.99 \pm 4.11 mmol/L, female 67.72 \pm 2.99 mmol/L, urea values were 15.02 \pm 0.54 and 14.61 \pm 0.50 mmol/L, respectively in male and female. There were no differences in serum creatinine concentrations according to age, the mean value of creatinine were recorded in age 4 years 60.98 \pm 2.30 and > 4 years 97.75 \pm 2.05. The mean values of serum glucose, total protein and albumin mean values showed no differences 54.7 \pm 3.09 g/dL, 123 \pm 14.3 and 3.4 \pm 0.08 mmol/L, respectively.

Table, 1: Biochemical parameters (Serum creatinine, urea glucose, total protein and albumin concentrations) for Iraqi donkeys (Range and Mean \pm SE).

Parameters	Range	Mean \pm SE
Serum creatinine $\mu\text{mol/L}$	44.2-111.38	65.55 \pm 2.01
Serum Urea mmol/L	3.91-9.69	6.79 \pm 0.20
Serum glucose (g/dL)	33- -68.0	54.7 \pm 3.09
Serum total protein mmol/L	122-125	123 \pm 14.3
Serum albumin mmol/L	2.7-4.1	3.4 \pm 0.08

The normal values of creatinine and urea concentration in current research were in accordance with previous normal reference values except creatinine in subgroups related to the age in interpretation due to environmental condition such as good feeding and a good intake of the water lead to good renal function and prevent renal dysfunction (12). The concentration of creatinine in Iraqi Donkeys was also recorded by (13) who found that the concentration of creatinine in donkeys was 0.88 mg/dl. These results agree with current result. Also, agree with a result of (14) who showed the creatinine level at average 69.3 $\mu\text{mol/l}$. The results of the present study disagreed with results of many researchers (15-17) who found that the levels of creatinine were higher. Creatinine value concentration depends upon the total body content of creatinine, which in turn, depends upon dietary intake and muscle mass or due to variation among age groups (18).

The level of creatinine is independent of drinking water, protein feeding, exercise and rate of urine production. Increase of serum creatinine indicates impaired of kidney excretion. Results showed a significant increase in serum creatinne in the cold season compared with hot season. This may be result of interaction with renal function. These results agree with (19), but they are lower than normal reported by (20). Increase serum urea levels in adult donkeys may be due to type of diet and metabolism of protein. The results of current study about urea disagreed with most other study (6, 13 and 17) who found that the levels of urea were higher than present results. These might perhaps reflect the differences in the feeding conditions between different groups of donkeys, the components of feed intake regard to the high level of nitrogen

containing basic organic compound in natural pasture especially proteins as already reported by (21). Urea and creatinine generally can help in assessing renal disease in animals and humans (5). The values of glucose, total protein and albumin concentration were similar or agree with results of (22), and different from previously studies (23). These differences might be differences in seasons of study, age, working condition of the animals,

type of food, breed, Glucose was higher in Hassawi donkeys compared with other donkeys, these donkeys mainly eat dates, its contain high sugars, fats and minerals. Furthermore, Hassawi donkeys were kept mainly as pet animals and sometime for transport, the donkeys are better able than other stock and use low quality forage to meet their maintenance requirements (24).

Table, 2: Serum creatinine, urea, glucose, total protein and albumin concentrations expressed according to sex, and age factors (Mean \pm SE).

Factors	Subgroup	No. of Donkeys	Parameters (Mean \pm SE)				
			Serum Urea mmol/L	Serum creatinine mmol/L	Serum glucose mmol/L	Serum total protein mmol/L	Serum albumin (g/dL)
Gender	Males	65	15.02 \pm 0.54	63.99 \pm 4.11	47.1 \pm 2.61	125 \pm 13	3.5 \pm 0.08
	Females	39	14.61 \pm 0.50	67.72 \pm 2.99	44.5 \pm 0.73	124 \pm 14	2.7 \pm 0.3
Age Group	< 4 years	30	7.29 \pm 0.26	54.54 \pm 1.91	38.5 \pm 3.4	123.67 \pm 4.11	2.7 \pm 0.14
	4 years	33	4.23 \pm 0.67	60.98 \pm 2.30	48 \pm 0.1	125.24 \pm 4.01	3.1 \pm 0.15
	> 4 years	41	9.20 \pm 0.59	97.75 \pm 2.05	54.7 \pm 3.9	125 \pm 13	3.6 \pm 0.22

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تحديد القيم المرجعية لبعض المعايير الكيموحيوية للحمير في العراق

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الخلاصة

إنّ الهدف من هذه الدراسة هو تقييم وظيفة الكلية عن طريق قياس تراكيز الكرياتينين واليوريا والكلوكوز والبروتين والالبومين لـ 114 حمار سليم سريريا (65 ذكر و 39 اناث) حيث تراوحت أعمارها بين 2-4 سنوات والموجودة في محافظة. أظهرت النتائج أنّ قيم المدى والمعدلات والخطا القياسي لكل من تراكيز الكرياتينين واليوريا في المصل كانت كما يأتي: الكرياتينين 2.01 ± 65.55 مايكرومول/لتر، يوريا 6.79 ± 0.20 ملي مول/لتر. في حين كانت القيم للكلوكوز والبروتين والالبومين 54.7 ± 3.09 غم/ديسيلتر و 123 ± 14.3 و 3.4 ± 0.08 ملي مول/ لتر على التوالي. تستنتج الدراسة عدم وجود فروق معنوية في مستويات يوريا الدم بين المجاميع التي درست. في حين اظهرت قيم الكرياتينين فروقا معنوية بين المجموعة العمرية وبمستوى معنوية ($P < 0.05$) وكذلك لقيم اليوريا والكلوكوز والبروتين والالبومين في هذه الدراسة مع فروق معنوية للكرياتينين للفئة العمرية 4 سنوات وأكثر من 4 سنوات.

الكلمات المفتاحية: الحمير العراقية، تركيز اليوريا والكرياتينين والكلوكوز والبروتينات والالبومين في المصل.