

BLOOD SERUM BIOCHEMICAL VALUES OF CAPE HUNTING DOGS (*LYCAON PICTUS*): VARIATIONS WITH AGE AND SEX

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Abstract

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Blood serum biochemical values were assessed in clinically healthy cape hunting dogs (*Lycaon pictus*) aged 2, 3, 4, 5, 8 to 12 months and 2 to 6 years. Total protein, creatinine and sodium level increased with age. Cholesterol, calcium, phosphorus and potassium level was higher in animals of the younger categories. Calcium: phosphorus ratio increased markedly with age. Glucose, urea, magnesium, chloride and sodium level, and aspartate aminotransferase (AST), alanine aminotransferase (ALT) and glutamyl transpeptidase activity showed no marked changes with age. As to variations with sex, significantly higher values were recorded for magnesium level in females aged 8 to 12 months and for chloride level in females aged 5 months.

Cape hunting dog (Lycaon pictus), blood serum, biochemistry, age

Our previous reports provided information on biochemical values in the blood serum of 6 male and 6 female adult cape hunting dogs (Pospíšil et al. 1987), on haematological values in the peripheral blood of healthy cape hunting dogs (Pospíšil, Kaše and Váhala 1987) and on the practices of breeding these animals in the East-Bohemian Zoological Garden (Holečková and Váhala 1988). The present study reports our results of biochemical examination of the blood serum of healthy cape hunting dogs of various ages, both adult animals and puppies.

Materials and Methods

In 1986–1989 a study was conducted in the East-Bohemian Zoological Garden to provide information on the development of cape hunting dog (*Lycaon pictus*) puppies. The breeding and rearing methods were described previously (Holečková and Váhala 1988). The puppies were restrained manually and were measured, weighed and examined for the development of dentition at 2, 3, 4 and 5 months of age. As part of this program blood collections were made from the vena saphena or the vena cephalica for biochemical examination of the blood sera. Further examinations and blood collections were carried out in animals aged 8 to 12 months and 2 to 6 years. Before being blood-sampled, the animals of these two age categories were immobilized by i. m. concurrent administration of Ketamine (90 to 120 mg per animal) and Xylazine (70 to 120 mg per animal). The numbers of animals (males and females) examined in the individual age groups are presented in Table 1. All of them were clinically healthy at the time of blood collection. Blood samples were collected into glass test tubes and were allowed to stand at laboratory temperature for 60 minutes. Afterwards they were centrifuged to obtain blood sera. Biochemical examination of the blood sera was carried out as described previously (Pospíšil et al. 1987) and covered total protein, glucose, creatinine, urea, cholesterol, magnesium, calcium, phosphorus, chloride, sodium

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and potassium levels and aspartate aminotransferase (AST), alanine aminotransferase (ALT) and γ -glutamyl transpeptidase activity.

From the values obtained for the individual age groups means (\bar{X}) and standard deviations (S. D.) were first computed separately for males and females and compared statistically. Where the differences between the mean values for males and females were not significant ($\alpha > 5$), means were computed for each age group as a whole. In those age groups where the differences between the means for males and females proved significant ($\alpha < 5$), the means were not pooled. The significance of the differences between the means for the individual age categories was then assessed by Student's *t*-test.

Results

As can be seen from Table 1, significant ($\alpha < 5$) differences between the mean values of males and females were recorded for magnesium level in animals aged 8 to 12 months [Table 1(a)] and for chloride level in animals aged 5 months [Table 1 (b)]. From Tables 1 and 2 it can be concluded that the blood serum total protein, creatinine and sodium levels increased proportionally to age. The blood serum cholesterol, calcium, phosphorus and potassium levels were higher in the younger animals. The calcium:phosphorus ratio increased markedly with age. The remaining biochemical values did not show consistent changes with advancing age.

Discussion

To our knowledge, the only published information on biochemical values in the blood serum of cape hunting dogs is to be found in the studies by Heerden (1970, 1985) and in our previous report (Pospíšil et al. 1987). The first of the two studies by Heerden (1970) is based on blood serum examination of 2 cape hunting dog puppies aged 22 days, 3 puppies aged 36 days and 3 puppies aged 200 days. The puppies aged 22 and 36 days were diseased animals (with anemia and hypoproteinaemia) and only those aged 200 days can be regarded as clinically healthy. The data reported in this study (Heerden 1970) included only blood serum total protein values (67.0, 67.0 and 68.0 g . l⁻¹) and γ -glutamyl transpeptidase values given in terms of IU . l⁻¹ (25 °C), the conversion of which to μ kat . l⁻¹ is problematic. The 2nd study by Heerden (1986) reported the results of examination for blood serum total protein (56.14 \pm 4.09 g . l⁻¹), creatinine (107 . 14 \pm \pm 15.68 μ mol . l⁻¹), urea (8.00 \pm 2.64 mmol . l⁻¹), chlorides (123.14 \pm 8.93 mmol . l⁻¹), sodium (152.85 \pm 4.59 mmol . l⁻¹) and potassium (4.54 \pm 0.36 mmol . l⁻¹). These results were obtained by examination of 4 male and 3 female adult cape hunting dogs. Our present investigation of sex-dependent differences in the blood serum chemistry revealed significantly higher values in females than in males for magnesium level in animals aged 8 to 12 months and for chloride level in those aged 5 months. In the remaining age groups no differences in the blood serum biochemical values of males and females were found. In our earlier study (Pospíšil et al. 1987) where we compared biochemical values in 7 adult male and 6 adult female cape hunting dogs a significant difference was found in the sodium level. This difference was not confirmed in the present study. The differences reported here between males and females in the magnesium and chloride levels in animals aged 8 to 12 months and 5 months, respectively, are difficult to explain because no significant variations with sex were found in the remaining age groups.

Table 1

Blood serum biochemical values of cape hunting dogs of different ages

Examination for	A			B			C			D			E			F		
	2 months			3 months			4 months			5 months			8-12 months			2-6 years		
	N	X	SD	N	X	SD	N	X	SD	N	X	SD	N	X	SD	N	X	SD
TP	26	50.23	3.93	35	50.51	4.99	41	55.90	10.27	34	54.91	8.09	41	57.36	7.28	34	61.79	8.43
Gl	26	7.02	1.23	35	6.25	0.89	31	7.53	1.24	35	8.12	2.18	41	6.52	1.05	30	6.83	2.19
Cr	23	84.56	16.04	27	108.20	40.52	41	88.97	14.72	35	94.25	18.90	35	131.2	17.1	32	139.8	21.4
Ur	21	6.43	1.81	35	8.51	1.68	41	8.14	2.95	35	8.85	2.13	40	6.76	1.27	34	9.03	3.47
Cho	24	8.96	2.28	34	8.36	1.83	33	7.88	1.08	35	8.12	1.74	41	5.51	1.09	32	5.43	1.12
AST	24	0.198	0.064	35	0.269	0.048	41	0.257	0.072	34	0.256	0.210	41	0.229	0.100	34	0.370	0.146
ALT	23	0.285	0.065	34	0.334	0.044	40	0.339	0.094	33	0.469	0.289	41	0.377	0.116	34	0.498	0.232
Mg	25	0.917	0.130	34	0.960	0.069	33	0.987	0.067	34	0.949	0.039	(a)			27	0.932	0.079
Ca	25	3.019	0.255	33	3.048	0.241	42	2.878	0.345	35	2.692	0.360	41	2.773	0.347	27	2.401	0.892
P	25	3.040	0.326	34	2.677	0.248	42	2.999	0.563	35	2.704	0.379	41	1.768	0.344	34	1.295	0.346
Chl	20	107.2	4.9	35	111.2	5.8	40	113.0	6.9	(b)			41	116.0	8.8	33	115.2	5.7
Na	22	138.1	9.1	29	139.5	9.2	42	126.5	18.8	33	141.9	12.9	41	146.2	7.3	26	147.1	12.5
K	24	6.055	0.290	34	5.646	0.530	42	5.329	0.773	35	5.010	0.578	41	4.634	0.450	27	4.438	0.438
Ca/P	23	0.996	0.163	32	1.149	0.132	42	0.966	0.250	35	1.013	0.201	41	1.623	0.398	27	1.977	0.748
GGT	23	0.113	0.073	21	0.105	0.048	30	0.079	0.068	15	0.107	0.076	23	0.109	0.091	-	-	-

(a) males N 22 \bar{X} 0.898 SD 0.058females N 18 \bar{X} 0.944 SD 0.050(b) males N 19 \bar{X} 116.2 SD 5.8females N 15 \bar{X} 120.6 SD 4.3N = No. animals examined, \bar{X} = Mean, SD = Standard deviation

Explanations of the symbols used in Table 1

TP = total protein g. l⁻¹, Gl = glucose mmol. l⁻¹, Cr = creatinine μ mol. l⁻¹, Ur = urea mmol. l⁻¹, Cho = cholesterol mmol. l⁻¹, AST = aspartate aminotransferase μ kat. l⁻¹, ALT = alanine aminotransferase μ kat. l⁻¹, Mg = magnesium mmol. l⁻¹, Ca = calcium mmol. l⁻¹, P = phosphorus mmol. l⁻¹, Chl = chlorides mmol. l⁻¹, Na = sodium mmol. l⁻¹, K = potassium mmol. l⁻¹, Ca/P = calcium : phosphorus ratio, GGT = γ glutamyl transpeptidase μ kat. l⁻¹.

Table 2

Statistical significance of the differences of the mean blood serum biochemical values of cape hunting dogs of different ages

Total protein					Glucose					Creatinine					Urea				
A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
B /					B 1					B 5					B 1				
C 1	1				C /	1				C /	1				C 5	/			
D 1	1	/			D 5	1	/			D 5	/	/			D 1	/	/		
E 1	1	/	/		E /	/	1	1		E 1	1	1	1		E /	1	1	1	
F 1	1	1	1	5	F /	/	/	5	/	F 1	1	1	1	/	F 1	/	/	/	1
Cholesterol					AST					ALT					Calcium				
A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
B /					B /					B 1					B /				
C 5	/				C 1	1				C 1	1				C /	5			
D /	/	/			D /	/	/			D 1	1	/			D 1	1	5		
E 1	1	1	1		E /	5	/	/		E 1	5	/	/		E 1	1	/	/	
F 1	1	1	1	/	F 1	1	1	5	1	F 1	1	5	/	1	F 1	1	1	/	5
Phosphorus					Sodium					Potassium					Ca/P ratio				
A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
B 1					B /					B 1					B 1				
C /	1				C 1	1				C 1	5				C /	1			
D 1	/	1			D /	/	1			D 1	1	5			D /	1	/		
E 1	1	1	1		E 1	1	1	/		E 1	1	1	1		E 1	1	1	1	
F 1	1	1	1	1	F 1	5	1	/	/	F 1	1	1	1	/	F 1	1	1	1	5

Continuation of Table 2

A	B	C	D	E					
B /									
C /	/	/	/	/					
D /	/	/	/	/					
E /	/	/	/	/	γ glutamyl transpeptidase				
F -	-	-	-	-					
A	B	C	D	E					
B /									
C 1	/	/							
D /	/	/	1						
E m	/	1	1	1	Magnesium				
F f	/	/	5	/					
	/	/	1	/					
A	B	C	D	E					
B 5									
C 1	/	/							
m	1	1	/		Chlorides				
D f	1	1	1						
E 1	1	1	/	/					
F 1	1	/	/	/					

Explanations of the abbreviations and symbols

A = cape hunting dogs aged 2 months
 B = cape hunting dogs aged 3 months
 C = cape hunting dogs aged 4 months
 D = cape hunting dogs aged 5 months
 E = cape hunting dogs aged 8 to 12 months
 F = cape hunting dogs aged 2 to 6 years
 m = males
 f = females

Symbol 1 stands for $\alpha \leq 1$
 Symbol 5 stands for $\alpha \leq (1.5)$
 Symbol / stands for $\alpha > 5$
 Symbol - stands for no statistical evaluation

Our comparison of the blood serum biochemical values of cape hunting dogs in relation to age showed that total protein, creatinine and sodium level increased proportionally to age, whereas cholesterol, calcium, phosphorus and potassium level was higher in the younger animals. The remaining biochemical values did not show consistent changes with age. The changes found by us in calcium and phosphorus level are in keeping with the report of Bush (1981) who claimed that increased calcium and phosphorus levels are indicators of the growth activity of bone tissue. According to Stogdale (1981) blood serum phosphorus level is highest in young growing animals. Similarly, total protein level may be influenced by age (Homolka 1971), which is also in keeping with our findings. However, in contrast to Homolka (1971) according to whom blood creatinine level is, on the whole, constant, showing almost no changes at all, we found higher levels of creatinine in the older animals. This fact, together with our findings of increased sodium level and decreased potassium and cholesterol level with advancing age, are difficult to explain; here an association with changes in renal activity seems possible. Comparison of the present findings with our previous results (Pospíšil et al. 1987) revealed no marked differences in cape hunting dogs aged 2 to 6 years.

Biochemické hodnoty krevního séra psů hyenových (*Lycaon pictus*) v závislosti na věku a pohlaví

Byly určovány biochemické hodnoty krevního séra klinicky zdravých psů hyenových (*Lycaon pictus*) starých 2, 3, 4, 5, 8–12 měsíců a 2–6 let. Hladina celkových bílkovin, kreatininu a sodíku se zvyšovala se stářím zvířat. Hladina cholesterolu, vápníku, fosforu a draslíku byla vyšší v krevním séru zvířat mladších kategorií. Poměr vápník: fosfor se stářím zvířat výrazně zvyšoval. Hladina glukózy, močoviny, hořčičku, chloridů, sodíku a aktivita aspartátaminotransferázy (AST), alaninaminotransferázy (ALT) a γ -glutamyltranspeptidázy se výrazně stářím zvířat neměnila. V závislosti na pohlaví jsme zjistili signifikantně vyšší hladinu hořčičku u samic věkové kategorie 8–12 měsíců stáří a chloridů u věkové kategorie 5 měsíců stáří.

Биохимические величины кровяной сыворотки *Lycaon pictus* в зависимости от возраста и пола

Проводили определение биохимических величин кровяной сыворотки клинически здоровых особей *Lycaon pictus* в возрасте 2, 3, 4, 5, 8 – 12 месяцев и 2 – 6 лет. Уровень общих белков, креатинина и натрия с возрастом животных увеличивался. Уровень холестерина, кальция, фосфора и калия был выше у животных младшего возраста. Соотношение кальция: фосфор с возрастом животных существенно увеличивалось. Уровни глюкозы, мочевины, магния, хлоридов, натрия и активность аспартатаминотрансферазы (AST), аланинаминотрансферазы (ALT), и гамма-глутамилтранспептидазы существенно с возрастом животных не менялись. В зависимости от пола нами было установлено, что уровень магния значительно выше у самок в возрасте 8 – 12 месяцев и хлоридов у индивидов в возрасте 5 месяцев.

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