Evalution of Non-Electrolytes Normal Values in Blood of Makuei Sheep Breed

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Abstract: In the present study, normal values of serum non-electrolytes were studied in Makuei sheep breed. A total of 248 samples from 5 age groups and each sex were selected and measured of serum non-electrolytes including (glucose, cholesterol, triglyceride, BUN, uric acid, total protein, albumin and creatinine) carried out with spectrophotometric method. According to the results of present research, there was only a significant difference between two sex concerning BUN and triglyceride values and between age groups concerning cholesterol, uric acid, BUN and total protein values (p<0.05), also there was a significant correlation between age groups concerning cholesterol, total protein and BUN levels (p<0.05).

Key words: Serum non-electrolytes, sheep, Makuei breed

INTRODUCTION

To recognize laboratory results as being abnormal, the ranges of different parameters from healthy animals must be known. There ranges are commonly referred to as reference ranges (normal values). The samples must be collected from healthy animals. Healthy animals are those that no apparent illness and that exhibit behavior considered to be normal for that species. In this research, we were considered to most important variation, which that affecte the test results (e.g., age, breed, sex). The purpose of this research was determination of the blood non-electrolytes normal values in Makuei sheep breed, which is one of the most important Iranian sheep breeds. In this study, we measured the serum non-electrolyte values including cholesterol, triglyceride, glucose, uric acid, BUN (Blood Urea Nitrogen), total protein, albumin and creatinine with spectrophotometric method. The same researches in the other Iranian sheep breeds (Mehraban, Sangsar, Shal) were carried out by Mojabi (2000). The normal range of glucose in sheep was reported by Mojabi (2000) 43-73 mg dL^{-1}, Benjamine (1989), Kaneko (1989), Coles (1986), Smith (1990), Duncan and Prasse (1986), Meyer (1989), Dhanotiya (2004) and Khaki *et al.* (2005) 50-80 mg dL^{-1}, Blood (1994) 30-65 mg dL^{-1}. According to the reports of Mojabi (2000) for various breeds of Iranian sheep, there was a significant difference between sex (p<0.05) and age groups concerning glucose (p<0.001). This range for the cholesterol was reported by Mojabi (2000) 51-100 mg dL^{-1},

Kaneko (1989), Coles (1986), Smith (1990), Duncan and Prasse (1986) and Dhanotiya (2004) 52-76 mg dL^{-1}, Blood (1994) 40-58 mg dL^{-1} and Meyer (1989) 50-140 mg dL^{-1}, Kabir (2002) 40-150 mg dL^{-1}. Mojabi (2000) was reported a significant difference between sexes concerning cholesterol level in other breeds of Iranian sheep (p<0.05). In sheep, the reference range of triglyceride was reported by Mojabi (2000) 21-49 mg dL^{-1} and there was a significant difference and correlation between age groups with triglyceride (p<0.001) (r = -0.2265). The normal values of creatinine was reported by Meyer (2004) 1.2-1.9 mg dL^{-1}, Kaneko (1989) 1.19-1.9 mg dL^{-1}, Kabir (2002) 0.9-2 mg dL^{-1}, Mojabi (2000) 0.89-1.32 mg dL^{-1} and this range for uric acid was determined by Kaneko (1989) 0-1.9 mg dL^{-1}, Kabir (2002) 0-2 mg dL^{-1}, Mojabi (2000) 0.25-0.71 mg dL^{-1}. A significant difference between sex and age groups concerning creatinine and uric acid was reported in other breeds of Iranian sheep (p<0.05) (Mojabi, 2000). The BUN normal value in sheep was determined by Mojabi (2000) 13.53-25.16 mg dL^{-1}, Kaneko (1989) 8-20 mg dL^{-1}, Meyer (1989) 18-31 mg dL^{-1}, Kabir (2002) 8-30 mg dL^{-1} and the total protein normal range was reported by Mojabi (2000) 5.97-8.23 g dL^{-1}, Kaneko (1989) 6-7 g dL^{-1}, Meyer (2004) 6-7.9 g dL^{-1}, Kabir (2002) 5.9-7 g dL^{-1}. Also, the reference range of albumin in various breeds of Iranian sheep was determined 3.15-4.41 g dL^{-1} (Mojabi, 2000) and other breeds of sheep 2.7-3.9 g dL^{-1} (Benjamine, 1989), 2.4-3.9 g dL^{-1} Meyer (2004). A significant difference was observed between sex and age groups concerning total protein, albumin and BUN

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values (p<0.05) (Mojabi, 2000). According to mentioned research in various breeds of Iranian sheep, there was a significant correlation between age groups concerning total protein (r = 0.6393) and albumin (r = 0.5792) values (p<0.001) (Mojabi, 2000).

MATERIALS AND METHODS

The study carried out on Makuei sheep breed. A total of 248 blood samples were collected according to their age groups (1-6 month, 7-12 month, 13-24 month, 25-48 month, >48 month) and sex. All animals were clinically healthy and no apparent illness. Samples were taken from the jugular vein using disposable syringes and blood was added to plain tubes for serum harvesting and measurement of non-electrolytes levels. Serum was separated following centrifugation for 10 min at 1200 g. The serum samples were analyzed for non-electrolytes by spectrophotometer apparatus (Shimadso, Japon). The results were statistically analyzed for non-electrolytes by using SPSS software. Duncan test was used to determine if there was any significant difference between age groups for non-electrolytes values. The mean, Standard Deviation (SD) and Standard Error (SE) were

determined for sex and age groups. Correlation between measured parameters was detected by pearson's method. The normal range of non-electrolytes was calculated with mean-SD and mean+SD formula.

RESULTS

According to the results of this research, normal values of blood non-electrolytes in Makuei sheep breed was determined, which this values are shown in Table 1.

In this study, pearson's method showed a significant correlation between age groups concerning cholesterol (r = 0.507), total protein (r = 0.388), albumin (r = 0.356), glucose (r = -0.226) and BUN (r = 0.351) values (p<0.05). In addition, a significant correlation was detected between sexes with BUN (r = -0.342), uric acid (r = 0.268) and triglyceride (r = 0.346) levels (p<0.05). In this study, a significant difference was observed between male and female animals concerning some parameters including glucose, uric acid, triglyceride and BUN levels (p<0.05).

The serum non-electrolytes levels and ranges of Makuei sheep breed according to sex are showen in Table 2.

Table 1: The normal values of serum non-electrolytes in Makuei sheep breed

	(M±SE)	Normal range
Glucose (mg dL^{-1})	43.1±1.78	23.9-63.01
Cholestrol (mg dL^{-1})	53.14±1.06	41.9-64.99
Triglyceride (mg dL^{-1})	38.17±1.42	22.33-54.01
Uric acid (mg dL^{-1})	0.85±0.04	0.35-1.35
BUN (mg dL^{-1})	16.05±0.61	10.90-21.2
Creatinine (mg dL^{-1})	1.14±0.05	0.72-1.42
Total protein (g dL^{-1})	6.14±0.12	5.03-7.77
Albumin (g dL^{-1})	3.65±0.05	3.2-4.1

M: Mean, SE: Standard error, SD: Standard deviation, Normal range: (M-SD)-(M+SD)

Table 2: The serum non-electrolytes levels and normal ranges in the Makuei sheep breed according to sex.

	Male (M±SE)	Male (normal range)	Female (M±SE)	Female (normal range)
Glucose (mg dL^{-1})	49.13±3.01*	26.18-72.08	43.44-2.03*	26.91-59.98
Cholestrol (mg dL^{-1})	51.34±1.29	40.84-61.84	55.19±1.7	42.17-68.21
Triglyceride (mg dL^{-1})	43.64±2.02*	27.19-60.09	31.95±1.65*	19.35-44.5
Uric acid (mg dL^{-1})	0.65±0.06*	0.38-0.92	0.42±0.02*	0.22-0.62
BUN (mg dL^{-1})	14.37±0.45*	11.25-17.5	17.95±0.38*	11.56-24.35
Creatinine (mg dL^{-1})	1.15±0.06	0.76-1.28	1.15±0.08	0.80-1.33
Total protein (g dL^{-1})	6.5±0.19	4.94-8.06	6.3±0.14	5.18-7.42
Albumin (g dL^{-1})	3.65±0.06	3-4.2	3.58±0.08	2.9-3.8

M: Mean, SE: Standard error, SD: Standard deviation, Normal range: (M-SD) – (M+SD), *: There was a significant difference between two sexes (p<0.05). Male (n)= 102, female (n)= 146

Table 3: The serum non-electrolytes levels in the Makuei sheep breed according to age (M±SD)

	1-6 (month)	7-12 (month)	13-24 (month)	25-48 (month)	> 48 (month)
Glucose (mg dL^{-1})	50.42±25.92	47.3±22.58	46.0±15.87	44.27±8.95	43.83±19.05
Cholestrol (mg dL^{-1})	45.59±4.09^{b,c}	44.31±2.54^c	51.83±11.7^b	60.45±11.22^c	60.59±12.99^c
Triglyceride (mg dL^{-1})	40.34±14.07	37.37±16.19	39.5±17.21	34.6±13.35	36.9±18.38
Uric acid (mg dL^{-1})	0.71±0.23	0.54±0.20	0.99±0.54	0.94±0.58	0.80±0.59
BUN (mg dL^{-1})	13.76±2.68^b	13.21±1.26^b	15.71±4.41^{a,b}	18.11±6.81^a	18.42±6.34^a
Creatinine (mg dL^{-1})	0.85±0.25	0.94±0.32	0.84±0.28	0.97±0.42	0.89±0.38
Total protein (g dL^{-1})	5.6±1.44^b	5.19±1.25^b	6.7±1.27^a	6.57±1.13^a	7.07±1.02^a
Albumin (g dL^{-1})	3.21±0.35^a	3.34±0.21^a	3.46±0.41^{a,b}	3.62±0.31^b	3.76±0.4^b
	N = 48	N = 50	N = 50	N = 50	N = 50

M: Mean, SD: Standard deviation, There was a significant difference between age groups with different code (a, b, c)(p<0.05)

DISCUSSION

The glucose reference range of the Makuei sheep breed in the present study was consistent with previous reports for some breeds of Iranian sheep (i.e., Shal (24.94-71.3 mg dL^{-1}), Sangsar (22.96-69.44 mg dL^{-1}) breeds) (Mojabi, 2000), but this range is a little lower than reference values reported by others, (Kaneko, 1989; Meyer, 2004; Coles, 1986; Smith, 1990; Benjamine, 1989; Dhanotiya, 2004; Khaki *et al.*, 2005) 50-80 mg dL^{-1} and Mojabi (2000) 43.5-73.15 mg dL^{-1} in Mehraban sheep breed. The cholesterol level of the total sheep in the present study was consistent with Blood's (1994) report but lower than previous reports for other Iranian sheep breeds (Mojabi *et al.*, 2000) and other breeds (Kaneko, 1986; Meyer and Harwey, 2004; Kabir and Pazdezh, 2000; Smith, 1990; Duncan and Prasse, 1986; Dhanotiya, 2004). This difference relate to the feed lipid content, sex and method of husbandary. In addition, the triglyceride level in this sheep breed was consistent with previous reports for some breeds of Iranian sheep and others (Mojabi, 2000; Kabir and Pazdezh, 2002). As triglyceride level, the uric acid level in Makuei sheep breed was consistent with previous reports for sheep (Kaneko,1989), but higher than in previous reports for the other breeds of Iranian sheep (Mojabi, 2000). Probably, this difference relate to breed. The creatinine, BUN, albumin, total protein levels in present study was consistent with other reports for sheep (Mojabi, 2000; Coles, 1986; Meyer and Harwey, 2004). In this study, the significant correlation between age with total protein (r = 0.388), albumin(r = 0.356), BUN(r = 0.351), glucose(r = -0.226) and cholesterol (r = 0.507) levels were observed but the significant correlation between age with cholesterol and BUN are in contrast with previous reports in other breeds of Iranian sheep (Mojabi, 2000) and with significant negative correlation in dogs (Meyer and Harwey, 2004). In addition, the significant correlation was observed between sex with BUN (r = -0.342), uric acid (r = 0.268) and triglyceride (r = 0.346) levels, this significant correlation between age groups with BUN and uric acid are consistent with previous reports in the other Iranian sheep breeds (Mojabi, 2000), but the significant correlation between sex and triglyceride is in contrast with other reports (Mojabi, 2000).

CONCLUSION

In the Makuei sheep breed, there was a significant difference between sex with BUN, uric acid and triglyceride serum levels and between age groups with cholesterol, total protein, albumin and BUN serum levels (p<0.05). A significant correlation between age groups with total protein (r = 0.388), albumin (r = 0.356), BUN (r = 0.351), cholestrol (r = 0.507) and glucose (r = -0.262) levels were observed. Similarly, a significant correlation between sexes with BUN (r = -0.342), uric acid (r = 0.268) and triglyceride (r = 0.346) levels were detected.

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