

Serum Biochemistry Values in Raini Goat of Iran

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Abstract

Blood biochemical evaluation plays an important role in diagnosis of diseases. The majority of disorders are characterized by certain changes in the concentration of blood parameters. Serum biochemical parameters varied to breed, age, sex or even different environment. In the present study, the serum non-electrolytes of 194 Raini goat, the most valuable cashmere goat of Iran, and the possible effect of age and sex on them were studied. The mean values of 3.78 ± 0.74 mM/L, 15.08 ± 3.8 mM/L, 86.63 ± 26.52 μ M/L, 1.54 ± 0.36 mM/L, 0.46 ± 0.13 mM/L, 78 ± 6.9 g/L, 34.5 ± 4.7 g/L were resulted for Glucose, Urea, Creatinine, Cholesterol, Triglyceride, T.protein and Albumin, respectively. Statistical studies showed that means pertaining of examined factors were nearly close to mentioned values in other breeds. As age goes, Glucose, cholesterol, total Protein and Albumin were significant decreased, but Creatinine and Urea were increased ($p < 0.05$). Triglyceride values did not show significant difference in various ages. Male goats showed significantly increase in Creatinine and total Protein values and Cholesterol value was more significantly in females ($p < 0.05$). There was no significant difference between the two genders for other factors.

INTRODUCTION

The detection of a disease in the animal is based on a good history, obvious clinical signs and para clinical experiments. The Para clinical examinations are important for confirmation of a disease and have great value for diagnosis of some chronic or subclinical forms of a disease. An important part of such examination depends on measurements of serum constituents; electrolytes, non-electrolytes and enzymes. Because of the central role of serum constituents in the body homeostasis and the close relationship between serum constituents and their tissue concentrations, much information regarding the body's response to disease can be obtained by measuring these factors in the blood serum of the animal. Hence, to comparing a suspected serum specimen, a normal value of the special factors in the blood serum of the animal is needed and because of the normal values in a species may vary according to variants like breed, age, sex or environment, it seems that the data values in such variants should be gathered separately. The present study deals with the measurement of some non-electrolytes in the normal Raini goat in Iran. Raini goat is the most important cashmere variants in Iran that have great economic wealth for cashmere precious. This breed is seen in the south-east of Iran, Kerman province.

MATERIALS AND METHODS

The Raini goats are kept in the Institute of Agricultural Jihad Research in Rain, Kerman. This is the only registered farm in Iran and the goats have the same maintenance, veterinary care and nutritional management at this Institute. Raini goats divided in two genders and four age groups (<12 months, 12-23 months, 24-35 and >35 months). After blood taking, Serum harvested immediately and sent to the laboratory for measurement of serum biochemical's of Glucose, Urea, creatinine, Cholesterol, Triglyceride, total Protein and Albumin. The commercial kits (Pars-Azmun, Tehran, Iran) and Cobas Mira autoanalyser were used to measurements. Statistical analysis carried out by t-student test and analysis of variance (ANOVA) and significant values were tested by Duncan test.

RESULTS

Table 1 shows the mean biochemical factors in blood serum without respect to sex or age. Table 2 and 3 show these factors with respect to sex and age groups respectively. There is significant difference between two genders in creatinine, cholesterol and total protein values and as age goes, the value of glucose, cholesterol, total protein and albumin have significantly decrease but the creatinine and urea have significantly increase in serum ($P < 0.05$).

Figure 1

Table 1: Biochemical factors in blood serum of Raini goat of Iran

Biochemical Factor		Mean	Range
Glucose	mM/L	3.78±0.74	2.22-6.38
Urea	mM/L	15.08±3.8	6.07-23.92
Creatinine	μM/L	86.63±26.52	17.68-167.96
Cholesterol	mM/L	1.54±0.36	0.51-2.79
Triglyceride	mM/L	0.46±0.13	0.13-0.84
Total Protein	g/L	78±6.9	60-97
Albumin	g/L	34.5±4.7	23-51

Figure 2

Table 2: Biochemical factors in blood serum of Raini goat in two genders

	Glucose	Urea	Creatinine*
Male	3.90±0.92	16.47±3.2	93.70±22.1
Female	3.67±0.56	15.84±4.40	79.56±30.06

	Cholesterol*	Triglyceride	T.Protein*	Albumin
Male	1.46±0.35	0.46±0.13	80.3±7.2	34.3±5
Female	1.62±0.37	0.47±0.13	75.7±6.6	34.5±4.6

*values have significant difference (P<0.05)

Figure 3

Table 3: Biochemical factors in blood serum of Raini goat in different age groups

	< 12 month	12 – 23 month	24- 35 month	> 35 month
Glucose	4.62±1.03	3.80±0.63	3.42±0.63	3.30±0.66
Urea	14.89±3.89	15.09±4.60	17.48±3.06	17.19±3.62
Creatinine	85.75±25.64	83.98±9.72	84.86±20.33	90.17±18.56
Cholesterol	1.71±0.35	1.62±3.33	1.48±0.39	1.34±0.35
Triglyceride	0.47±0.13	0.45±0.14	0.45±0.16	0.49±0.09
T.Protein	70.6±5.3	79±7.6	81±7.7	81.6±7
Albumin	37.6±4.8	35.6±4.2	31.9±3	32.8±6.9

DISCUSSION

The mean concentration of glucose of this study was 3.78±0.74mM/L(2.22-6.38mM/L).There is no significant difference between genders whereas as age goes, the concentration decreased, so that goats with less than a year old had significant 59.more concentration(4.62±1.03 mM/L).The most important role of glucose is to supply 60.the energy demand of the animal. The concentration of glucose in the blood normally 61.is regulated by the hormones but it is influenced by several other factors as well.

The concentration of glucose in the normal goat is at the range of (2.78-3.89 mM/L(63.Benjamin 1989,Coles 1986 and Smith 2002).Kaneko(1989) reported the range of 64.2.78-4.16 mM/L)for glucose. Experiments of Sharma et al (1990) on Pashmina Cheghu-goats showed lower concentration of

glucose than to the otherbreeds (2.59±0.17mM/L) with no significant difference neither in the sex nor in the age.Measurments of Bennis et al(1991) and Castro et al (1977) on Moroccan Sahara and Pygmy goats, showed values of 38.1±1 mM/L)and 6.39± 0.62 mM/L respectively. They suggested that males have more glucose level than females and as age goes, the concentration will be increased. Mbassa et al(1993) reported the value of 71.3.8± 0.65 mM/L for glucose in Landrace Danish goats and suggested that young goats have higher level than adults and there is no significant difference for different sexes.

The concentration of glucose in this study is close to the measurements of the

other breeds. The most of sources, like present study, claimed no significant difference between genders and young goats have more glucose concentration. The mean urea concentration in the present study was 15.08±3.8 mM/L(6.07-23.92 mM/L).There is no significant difference between genders and the concentration was more significantly in the two last age groups(24-35 months and >35 months).

Urea provides a non toxic means for excretion of ammonia generated by amino acid catabolism and the intestinal micro flora. Urea production occurs almost exclusively in the liver, and liver failure is frequently associated with a decrease in urea. Some situations like dehydration or renal failure may produce increase of serum urea(Carlson 2002).

Kaneko(1989) reported the value of 3.57- 7.14 mM/L for urea in the normal goats. Benjamin (1989) and Smith (2002) suggested urea concentrations of 7.64-22.92 mM/L and 7.64-15.28 mM/L respectively.

Measurements of Behera et al (1993) on Black Bengal goats revealed a range of 12.37-20.50 mM/L for them. According to Castro et al (1977) the mean urea concentration in Pygmy goats was 17.80 ± 3.13 mM/L. Mbassa et al (1993) and Gray et al (1988) reported the mean value of 5.34 ± 2.29 mM/L and 7.40 mM/L respectively in Landrace Danish goats and cross-bred goats. Several reports supported that urea concentration is lower in young goats than to adults and there is no significance difference between genders (Castro et al 1977, Deangelino et al 1990, Mbasa et al 1993, Bennis et al 1991, Otesile et al 1992).

The urea concentration of this study has wider range than the measurements of the other breeds. Most of sources, in agreement with present study, suggested no significant difference between genders and young goats have lower urea concentration.

This study showed that the creatinine concentration is 86.63 ± 26.52 μ M/L (17.68-167.96 μ M/L) and the concentration was significantly more in the last group (>35 months). The male goats had significantly more concentration than females.

The absolute muscle mass and level of physical activity may influence of creatinine serum concentration. In ruminants creatinine is a more reliable indicator of alterations in renal function than urea. Kaneko (1989), Benjamine (1989) and Smith (2002) reported the concentration of 88.4- 159 μ M/L for creatinine in normal goats. According to Behera et al (1993) the creatinine concentration in Black Bengal goats was 45.97- 83.98 μ M/L. In experiments of Sharma et al (1990) on Pashmina Cheghu- goats the mean concentration

of creatinine was 157.35 ± 7.07 μ M/L and although the goats of less than 6 months had significantly lower amounts than to adults, there was no significant difference between two genders. Bennis et al (1991) reported the mean concentration of 35.36 ± 13.54 μ M/L in Spanish goats and significant increase in concentration of females. Mbassa et al (1993) reported the value of 66.6 ± 15.8 mM/L for Landrace Danish goats. They suggested that the amount of creatinine is significantly lower in goats of less than 6 months than to adults and males have more concentration. According to Castro et al (1977) the mean concentration of creatinine in goats of Saopaulo was 99.01 ± 39.78 μ M/L and the amount was significantly more in males and also in adults. The absolute muscle mass and level of physical activity may influence of creatinine serum concentration. In ruminants creatinine is a more reliable indicator of alterations in renal function than urea.

The concentration of creatinine in this study is close to the measurements of the other breeds. Several sources, like this study, reported significantly more creatinine concentration for males, although some studies support more values for females. The most sources, like present study, suggest that the adult goats have more creatinine concentration.

In the present study, the mean value of triglyceride was 0.46 ± 0.13 mM/L (0.13- 0.84 mM/L). Neither sex nor age did not affect on the concentration.

Storage of excess energy as fat is crucial to animals in which fat mobility

plays an important role. During periods of negative energy balance, tissue fat is mobilized to free fatty acids, non-esterified fatty acids and glycerol for use as energy in the liver. Triglycerides eventually leave the liver as very low-density lipoproteins, which are phospholipids cholesterol, triglyceride and apoprotein. Increase in serum triglyceride and sometimes in cholesterol occurs mainly in horses. Increase in triglyceride in sheep and goats is seen in pregnancy toxemia although does seem to be more resistant to the disease (Carlson 2002).

There are few studies on triglyceride concentration of goat breeds. Bennis et al (1991) reported the value of 0.30 ± 0.24 mM/l in Spanish goats with no effect of sex. Marcos et al (1990) showed that the least amount of serum triglyceride in the cow is during the mid-lactating period.

The cholesterol concentration in the present study was 1.54 ± 0.36 mM/L (0.51 - 2.79 mM/L). The females had significantly more concentration (3.67 ± 0.56 mM/L) and the concentration was more in the two last age groups (24-35 months and >35 months). Several sources reported the value of 2.07 - 3.36 mM/L for cholesterol in goat (Kaneko 1989, Benjamine 1989, Coles 1986 and Smith 2002). Sharma et al (1990) on Pashmina Cheghu goats reported the mean value of 3.75 ± 0.31 mM/L. They suggest that the concentration increases as age goes and females have significantly more amounts. Experiments of Mbassa et al (1993) on Landrace Danish goats resulted in the mean value of 2.33 ± 0.84 mM/L with no significant difference between genders but the amounts had decreasing as age goes. Deangelino et al

(1990) reported the value of 2.36 ± 1.02 mM/L in goats without any significant difference among different ages.

The range of concentration of cholesterol in this study is wider than to the measurements of the other breeds. The effect of the sex and age on the cholesterol value is controversial, however, this study showed that both of them can affect on this value in the Raini goats. Proteins play an integral role in numerous physiologic processes. Because of the central role proteins play in the body's homeostasis and the close relationship between plasma proteins and tissue proteins, much information regarding the body's response to disease can be obtained by measuring total plasma protein and its fractions, albumin, the globulins and fibrinogen. When a dysproteinemia is suspected, evaluation of total plasma/serum protein concentration, the albumin to globulin ratio, serum protein electrophoresis and plasma fibrinogen concentration are indicated. Age is an important consideration when interpreting plasma protein concentration. Through colostrums absorption, passive transfer of immunoglobulin causes a rise in the total protein concentration of the newborn. Adult protein concentration remains relatively stable (Smith 2002).

The mean concentration of total protein in the present study was 70.80 ± 6.9 g/L (60 - 97 g/L). The value had significant difference between genders (80.03 ± 7.2 g/dl and 75.7 ± 6.6 g/L in male and female respectively) and the concentration was more in the first age group (<12 months).

The concentration of total protein in normal goat reported in 64-70

g/L, 60-75 g/L and 64-79 g/L by Kaneko(1989), Radostits(2000) and Benjamin(1989) respectively. According to Castro et al (1977) the mean concentration of total protein in Pygmy goats was 73 ± 7 g/L and there was no significant difference between genders but the concentration significantly went more as age goes. Sharma et al (1990) in study on Pashmina Cheghu goats reported the mean value of 76 ± 2.2 g/L with significant difference between genders and different ages so that, more concentration is in males and adult goats. Mbassa et al(1993) in study on Landrace Danish goats reported the mean value of 58 ± 7 g/L with no significant difference between genders but there was significant difference in age and adults had more concentration. Deangelino et al (1990) suggested that the total protein concentration in young goats is significantly lower than adults. The concentration of T.protein in this study is in agreement with results obtained by the other studies. Most of sources, unlike present study, claimed no significant difference between genders but most of them, like this study, reports that adult goats have more concentration.

The mean concentration of albumin in this study was 34.5 ± 4.7 g/L(23-51 g/L) without significant difference between genders but the two last age groups(24-35 months and >35 months) showed significant lower concentration. Kaneko(1989), Smith (2002) and Benjamin(1989) reported the albumin concentration of 27- 39 g/L in normal goats. According to Deangelino et al (1990) the mean concentration of albumin in goats of Saopaulo was 28 ± 5.4 g/L without significant difference in various ages. According to experiments of Castro et al (1977) the

mean albumin concentration in male Pygmy goats(36 ± 4 g/L) was significantly more than females(31 ± 6 g/L). However, Bennis et al (1991) reported that the albumin concentration is significantly more in female Spanish goats. The concentration of albumin in this study is nearly close to the other studies. Most of sources suggest no significant difference between genders. The more concentration of albumin in the lower age may be due to age effect.

CONCLUSION

This study showed that the means pertaining of examined factors were nearly close to the mentioned values for the other breeds. However there are some findings that are not in agreement with the same in the other breeds like the mean and the range of cholesterol concentration and the difference of total protein between genders in the Raini goats. Normal value of measurable factors in different breeds should be gathered individually, to best compare the suspected specimens, although there may be some similarities among the measurements of different breeds.

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References

1. Behera, P.C., Bisoi, P.C., Mohanty, B.P., Panda, G.M., 1993. Clinically important serum constituents of black Bengal goats. *Ind. Vet. J.* (8) 713-717
2. Benjamin, M.M., 1989. Outline of veterinary clinical pathology. 3rd Edition, Iowa state university press, pp. 55-75
3. Bennis, A., Farge, F., Kessabi, M., Hamliri, A., Valdi, G.P., Rico, A.G., Braun, J.P., 1991. Normal serum biochemical values of goats in the Moroccan Sahara. *Revue de Medicine Veterinaire* (11) 831-837
4. Carlson, G.P., 2002. Clinical Chemistry Tests. In: Large Animal Internal Medicine. 3rd Edition, Mosby Company, pp. 409-411
- 5.

- Castro, A., Dhinsa, D.S., Hoversland, A.S., Metcalf, J., 1977a. Serum proteins and protein electrophoretic pattern in normal Pygmy goats. *Am. J. Vet. Res.* (5) 665-667
6. Castro, A., Dhinsa, D.S., Hoversland, A.S., Malkus, H., Rosenthal, C., Metcalf, J., 1977b. Serum biochemistry values in normal Pygmy goats. *Am. J. Vet. Res.* (12) 2085-2087
7. Coles, E.H., 1986. *Veterinary Clinical Pathology*. 4th Edition, Saunders, Company, pp. 293-299, 195-199
8. Deangelino, J.L., Ishizuka, M.M., Ribeiro, L., Tucci, T.V., Birgel, E.H., 1990. Standard serum biochemical values of healthy goats reared in Saopaulo state, Brazil. *J. Vet. Res. Anim. Sci.* (1) 91-97
9. Gray, R.R., Berg, C., Windsor, R., 1988. Blood parameters of goats. *Vet. Bullt.* (12) 7987
10. Kaneko, J.J., 1989. *Clinical biochemistry of domestic animals*. 4th Edition, Academic Press, pp. 146-159, 612-647
11. Marcos, E., Mazur, A., Cardot, P., Rayssiguier, Y., 1990. The effect of pregnancy and lactation on serum lipid and apolipoprotein B and A levels in dairy cow. *J. Anim. Phys. and Anim. Nutr.* (3) 133-138
12. Mbassa, G.K., Poulsen, J.S., 1993. Reference ranges for clinical chemical values in Danish Landrace goats. *Small Rumin. Res.* (2) 133-142
13. Otesile, E.B., Kasall, O.B., 1993. Effects of age and sex on serum proteins, urea nitrogen and transaminase concentration in Ethiopian highland sheep. *Vet. Bullt.* (9) 6253
14. Radostits, O.M., Gay, C.C., Blood, D.C., 2007. *Veterinary Medicine*. 9th Edition, Saunders, pp. 1726-1727

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