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RESEARCH ARTICLE

Determination The Levels of Some Biochemical Parameters in Female Hair Goats in Cukurova Region

Cenk ER[1]*, Mahmut OK[2]

[1]Cukurova University, Faculty of Veterinary Medicine, Veterinary Internal Medicine Department, 01930, Adana, Turkey
[2]Selcuk University, Faculty of Veterinary Medicine, Veterinary Internal Medicine Department, 42250, Konya, Turkey

ABSTRACT

This study aimed to determine the average value of some biochemical parameters of hair goats that are widely cultivated in Turkey.For this purpose, Alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyltransferase (GGT), cholesterol, triglycerides, glucose, calcium (Ca), magnesium (Mg), phosphorus (P), urea (BUN), creatine (Cr), albumin (Alb), total protein (TP) and total bilirubin (T.Bil) measurements were made in peripheral blood which are collected from 133 healthy female hair goats. As a result of this study, some serum biochemistry parameters of female hair goats were determined for the first time and, the values obtained from the study were measured via IBM SPSS Statistics 22 program. It was revealed that there were differences between them and other goat breeds. It was also observed that some values may change due to altitude differences. The data obtained as the result of this study is important in terms of providing resources for the studies to be performed on hair goats. Besides, for the first time, it has been shown that altitude has an effect on some blood parameters in hair goats and it should be considered in future studies.
Keywords: Hair goat, Serum biochemistry, Altitude, Turkey

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Çukurova Yöresi Dişi Kıl Keçilerinde Bazı Biyokimyasal Parametre Düzeylerinin Belirlenmesi

ÖZ

Bu çalışmanın amacı; ülkemizde yaygın olarak yetiştiriciliği yapılan kıl keçilerine ait bazı biyokimyasal parametrelerin ortalama değerini ortaya koymaktı. Bu amaçla 133 adet sağlıklı dişi melez kıl keçisinden toplanan perifer kanda Alkalen fosfataz (ALP), alanin aminotransferaz (ALT), aspartat aminotransferaz (AST), gamma-glutamyltransferase (GGT), kolesterol, trigliserid, glikoz, kalsiyum (Ca), magnezyum (Mg), fosfor (P), üre (BUN), kreatin (Kr), albümin (Alb), total protein (TP) ve total bilurubin (T.Bil) ölçümleri yapıldı. Elde edilen değerler IBM SPSS 22 istatistik programı yardımıyla değerlendirildi. Çalışma sonucunda dişi melez kıl keçilerine ait bazı serum biyokimyası parametreleri ilk kez belirlenmiş ve diğer keçi ırklarıyla aralarında farklılıklar olduğu ortaya konmuştur. Ayrıca bazı değerlerde rakım farklılıklarına bağlı değişimlerin olabileceği de gözlenmiştir. Çalışma sonucunda elde edilen veriler kıl keçileri ilgili yapılacak çalışmalara kaynak sağlayabilmesi bakımından önemlidir. Ayrıca ilk kez bu çalışma ile kıl keçilerinde rakımın bazı kan parametreleri üzerine etkisi olduğu ve gelecekte yapılacak çalışmalarda göz önünde bulundurulması gerektiği ortaya konmuştur.
Anahtar Kelimeler: Kıl keçisi, Serum biyokimyası, Rakım, Türkiye

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ORCID ID; CE: 0000-0002-9980-6447, MO: 0000-0002-8210-6735
*Corresponding author e-mail: cenker@cu.edu.tr

INTRODUCTION

Goats are abstinent animals, because of that goat breeding is more intense in mountainous, arid and arable rural areas where land structure, climate, and vegetation are not suitable for husbandry and breeding of other species(Gupta et al. 2013).In our country which has different geographical and climatic characteristics, hair goat, mohair goat, Kilis goat, Saanen goat, and other crossbred goat breeds are widely cultivated today due to the suitability of the geographical structure of the region(İriadam 2004, Elitok 2012). According to the data ofTurkey Statistical Institute 's, there are 10,634,672 goats in Turkey and this constitutes 17.6% of our total number of animals being. In the same year, 13603 tons of goat meat, 42489 tons of goat milk, 5796 tons of hair and 356 tons of mohair were produced in our country. (Anonymous 2017). Goat breeding is an important livestock breeding branch in the maquis and mountainous regions of Osmaniye, which is located in the eastern part of Çukurova region, where there is no suitable pasture structure and goat breeding is also carried out intensively in this region. The number of goats reared in Osmaniye province is 57.065 and most of them are hair goats that are adapted to the geographical and climatic conditions of the region (Anonymous 2017). The reason that goat is widely grown in the region is that it can evaluate shrubland and shrubland areas that cannot be evaluated by other farm animals (Şimşek et al. 2007).

To increase productivity and sustainability in goat breeding, modern production and breeding activities should be carried out in goat breeding areas. First of all, it is necessary to determine the hematological parameters and the requirements of the animal (Kataria et al. 2011, Pradhan 2016). Although many studies have been conducted in domestic animals for this purpose, farm animals and different goat breeds in our country, there is not enough data about hair goats and their race characteristics (İriadam 2004, Elitok 2012, Gürgöze and Gökalp 2018). Therefore, breeders and veterinarians in our country refer to the previous studies of researchers in other countries (İriadam 2004).Although these studies are of partial benefit, they remain inadequate because all other vital values, especially biochemical parameters, show significant differences according to climate, race, age, and gender (Gwaze et al. 2012).Some researchers have pointed out that because of that reason,it is not possible to determine a universal reference range in goats, hence reference values should be determined for each goat raceliving in different geographic areas in their own (Tibbo et al. 2008).

Biochemical parameters frequently used in goat breeding as in other types of animal husbandry are Alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST)(Çimtay and Şahin 2000), gamma-glutamyltransferase (GGT) (Djuricic et al. 2011), cholesterol, triglycerides, glucose(Gupta et al. 2013), calcium (Ca), magnesium (Mg), phosphorus (P), urea (BUN), creatine (Kr), albumin (Alb), total protein (TP) and total bilirubin (T.Bil) (Mbassa and Poulsen 1993).Biochemical parameters of different goat breeds have been determined by many researchers before and the clinical usefulness of the values have been demonstrated(Pradhan 2016).The same parameters are used in the clinical diagnosis, determination and the course of effective treatment method, decidingtreatment application and evaluation of the response to treatment in goats(Piccione et al. 2010).

The objective of this study is to contribute to resource creation byidentifying the average ranges of some biochemical parameters belonging to hair goats, which are widely cultivated in our country, to contribute to the diagnosis of diseases, planning of treatment and follow up of the patient.

MATERIALS and METHODS

Permission of Research Application from the Ministry of Agriculture and Forest obtained at 20/03/2019, and Ethics Committee Report regarding to that permission obained at 03/04/2019 from Local Ethic Committee of Cukurova University before the start of research. The material of the study consisted of 133 clinically healthy and 1 to 4 years old female hair goats in Osmaniye. The goats were divided into three groups as Group I (87 Altitude, n = 70), Group II (129 Altitude, n = 43) and Group III (756 Altitude, n = 20) according to the altitude of the area they are settled in. All of the animals were grazed in pasture and forest areas during the day, and in the evening they were fed with total mix ration which consists of soy straw, corn silage, peanut meal, and barley. All goats were clinically examined prior to blood collection. For this purpose, information was obtained from the owner about the history of the goat, and then the patient's general examination was performed respectively. Clinically healthy female hair goats with no recent history of the disease, and not given birth in the last six months were accepted in the study. Blood was collected from the vena jugularis in October and November, in order to eliminate the seasonal effect and during the daytime when they were in the volley, under the rules of asepsis and antisepsis. The collected blood was centrifuged at 3000 rpm for 10 min in the same day as described in the literature(Gürgöze and Gökalp 2018). Separated serum was kept at –20 ° C until analysis day (Daramola et al. 2005). Serum ALP, ALT, AST, GGT enzyme activities, BUN, Cr, TP, Alb, T. Bil, Cholesterol, Triglyceride and Glucose, Ca, Mg and P levels were measured by commercial kits via auto

analyzer (Brand: Abbott architect, version: C8000, USA).

Statistical Analysis

The values obtained from the study were measured via IBM SPSS Statistics 22 program. . After determining the reference values with descriptive statistics, one-way analysis of variance (One Way ANOVA / Welch) was used to reveal the differences between the groups and Dunnett T3 test methods were used to test the source of the difference and confidence interval was accepted as 95% ($p < 0.05$). The reason to choose to this test method, instead of Duncan, was different sample values that each group contains as described in elsewhere (Weaver et al. 2017).

RESULTS

Some serum biochemistry levels belonging to hair goats are presented in Table 1 and the parameters of goats divided into three groups according to the altitude they are settled in are presented in Table 2.
As shown in Table 2, ALP levels of goats reared at low altitude were found to be significantly higher compared to groups raised at high altitude, on the contrary, AST levels increased significantly with elevation($p<0.05$). ALT activities, which is another liver enzyme, were decreased first and then increased again due to the increase in altitude and a similar effect has been detected in serum bilirubin levels vice versa. GGT enzyme, another parameter used in the diagnosis of hepatobiliary diseases, did not show any changes due to altitude differences.

BUN levels, a member of the kidney panels, decreased first and then increased together with altitude raise as there was no significant difference observed in Cr levels according to altitude changes. Total protein and albumin levels were not affected by altitude differences also. Cholesterol and triglyceride levels decreased continuously due to the increase in altitude, whereas glucose levels, on the contrary, showed a steady and significant increase with increasing altitude. Phosphorus level decreased significantly due to the increase in altitude, while there were no significant differences in Ca and Mg levels.

DISCUSSIONS

Some hematological values of different goat breeds raised in our country have previously been put forward by some researchers (İriadam 2004, Elitok 2012, Gürgöze and Gökalp 2018). Determination of levels of some biochemical values belonging to hair goats, which constitute the majority of the goat population in our country and which have an important place especially in the livelihood of the mountain villagers, has been one of the important gains of this study. The sample size in our study is higher than the previous studies performed in Turkey forthe same purpose. While 94 goats were used in a study conducted on Ankara and Aleppo goats in 2018 (Gürgöze and Gökalp 2018), 72 goats and kids were used totally in a study on Saanen goats in 2012 (Elitok 2012). In another study, the number of adult goats was 95 (İriadam 2004). In this respect, our study is in the first place among the studies carried out so far in our country in terms of sample size.

In previous studies about changes in serum levels of biochemistry parameters of goats, race, gender, age, season, sexual cycle, geographical area and feeding have been reported to have significant effects on these parameters (Mbassa et Poulsen 1993, Kataria et al. 2011, Gwaze et al. 2012, Gürgöze and Gökalp 2018). When the results of our study were compared with the previous studies of adult female goats in our country, ALP, AST, BUN, Total Protein, Cholesterol, Glucose and P values were found to be different from adult Ankara and Aleppo goat breeds (Gürgöze and Gökalp 2018). The differences in ALP, ALT, AST, BUN and cholesterol levels obtained from the previous study of adult Saanen breed female goats may suggest that goat species and geography may be effective in blood parameters (Elitok 2012). After the comparisons and considerations of the previous publications, it seemed necessary to determine the blood biochemical parameters of each breed separately and to take into consideration the race intervals when evaluating the biochemical parameters. Although the geographic region where the goats are raised is the same, the effect of altitude differences on the biochemical parameters of the goats has been demonstrated for the first time in this study. In the present study, it was shown that some serum biochemistry parameters especially ALP and ALT activities were affected by altitude differences (Table 2). Previous studies on liver enzyme levels in goats revealed the effect of season, sex, race and sexual cycle on enzyme activities (Tibbo et al. 2008, Pradhan 2016, Allaoua and Mahdi 2018). In this study, it was thought that altitude differences may have an effect on liver enzyme levels in goats and this situation should be taken into consideration during clinical evaluation. Although there is a significant difference in ALT, another liver enzyme, this change is similar to the change seen in BUN level, and although the altitude increases, enzyme levels return to their previous values after a certain elevation. Therefore it was evaluated that the changes seen in ALT and BUN parameters may not be caused by altitude differences alone.

Cholesterol, triglyceride and glucose levels, which are frequently used together for the evaluation of fat metabolism, diabetes mellitus, endocrine disorders, and other system functions, were also significantly affected by altitude differences as shown in Table 2.

Cholesterol and triglyceride levels were decreased as the altitude increased in accordance with each other and maintained this level after a certain altitude. Glucose levels increased due to the increase in altitude and maintained this level after a certain altitude. According to the results obtained in the present study, the change in cholesterol and triglyceride levels is in the same direction, whereas the change in glucose level is in the opposite direction. This finding is consistent with previous studies (Waziri et al. 2010). As a result, it was concluded that changes in triglyceride, cholesterol, and glucose levels are compatible with each other and altitude differences should be taken into consideration while evaluating these parameters together.

In our study, it was observed that the only mineral level affected by altitude differences was P and that the blood P level did not change to a certain altitude but it decreased significantly as the altitude continued to increase (Table 2). Previous studies performed in goats showed that Ca, Mg and P minerals were compatible with the changes in each parameter (Yatoo et al. 2013). However, in this study, it was suggested that only the change of P level and the absence of the expected change in Ca and Mg levels related to P could be affected by the altitude differences of the endocrine system and that future studies may investigate the alterations of endocrine system functions in terms of altitude differences.

Table 1. Mean values of serum biochemical parameters of female hair goats obtained in the study.

Parameters	Mean Values (Mean±SD)
ALP (U/L)	80,49±56,21
AST (U/L)	67,32±26,83
ALT (U/L)	18,41±5,34
GGT (U/L)	43,38±17,16
BUN (mg/dL)	24,23±10,81
Creatine (mg/dL)	0,56±0,21
TP (g/dL)	5,61±1,82
Albumin (g/dL)	2,16±0,69
T. Bil (mg/dL)	0,06±0,04
Cholesterol (mg/dL)	78,22±34,36
Trigliserid (mg/dL)	27,08±14,21
Glikoz (mg/dL)	30,00±10,25
Ca (mg/dL)	7,77±1,89
Mg (mg/dL)	2,18±0,64
P (mg/dL)	4,63±1,52

Table 2. Variation of parameters according to altitude differences

Parameters	Grup I (n = 70)	Grup II (n = 43)	Grup III (n = 20)	F Value	P Value
ALP (U/L)	99,00±57,39 a	60,93±47,18 b	57,75±48,94 b	9,01***	< 0,001
AST (U/L)	63,20±19,95 b	63,37±24,58 b	92,35±37,98 a	11,97***	<0,001
ALT (U/L)	19,96±4,79 a	15,35±3,85 b	19,55±7,12 a	12,22***	<0,001
GGT (U/L)	44,97±14,28	42,05±21,74	40,65±15,43	0,68 (-)	0,508
BUN (mg/dL)	28,63±12,37 a	17,14±3,47 b	24,10±6,70 a	19,18***	<0,001
Creatine (mg/dL)	0,57±0,26	0,57±0,15	0,55±0,12	0,06 (-)	0,946
TP (g/dL)	5,82±1,67	5,21±1,98	5,74±1,89	1,58 (-)	0,210
Albumin (g/dL)	2,27±0,63	2,07±0,76	2,01±0,71	1,75 (-)	0,177
T. Bil (mg/dL)	0,48±0,40 b	0,72±0,40 a	0,51±0,45 ab	4,69*	0,011
Cholesterol(mg/dL)	90,69±35,26 a	67,21±29,54 b	58,25±22,14 b	11,87***	<0,001
Triglycerides(mg/dL)	32,70±16,00 a	21,84±9,23 b	18,65±5,62 b	14,33***	<0,001
Glucose (mg/dL)	25,53±8,75 b	34,70±10,05 a	35,55±8,53 a	17,65***	<0,001
Ca (mg/dL)	7,99±1,65	7,57±2,20	7,42±1,95	1,04 (-)	0,356
Mg (mg/dL)	2,22±0,62	2,09±0,69	2,21±0,58	0,52 (-)	0,595
P (mg/dL)	4,85±1,64 a	4,64±1,17 ab	3,84±1,54 b	3,53*	0,03

a, b : Differences between groups carrying different letters on the same line are important
*: p<0,05 **: p<0,01 ***:p<0,001 (-): Insignificant

CONCLUSIONS

As a result, biochemical parameter levels in healthy female hybrid hair goats were determined for the first time in our country. These parameters are very important in terms of reference to future studies related to hair goats.Besides, for the first time, the effect of altitude on biochemical parameters in hair goats has been demonstrated and it is also recommended to consider it in future studies.

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Official permission letters are added to attachment which received from the Ministry of Agriculture and Forestry, and Local Ethics Committee, indicating that Ethics Committee permission is not required.

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