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RESEARCH ARTICLE

Determination of Lipid Profile in Anatolian Native Horses

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ABSTRACT

The aim of this study was to evaluate the lipid profile of Anatolian native horses. The study material consisted of 100 Anatolian native horses of different sexes, between the ages of 3-10, living under similar nutritional conditions in Kars, Ardahan and Iğdır regions. All results are given as Mean±SE. To determine the lipid profile of Anatolian native breed horses, total cholesterol (TC), triglyceride (TG), high-density lipoproteincholesterol (HDL-C), very low-density lipoprotein-cholesterol (VLDL-C) and low-density lipoprotein-cholesterol (LDL-C) levels were determined (respectively; 117.19±2.73, 75.36±1.11, 57.45±1.21, 19.13±0.30, 30.75±6.45 mg/dL,). As a result; In this study, lipid profile was determined for the first time in Anatolian native horses.
Keywords: Anatolia, Cholesterol, Horse, Lipid profile, Triglyceride

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Anadolu Yerli Atlarında Lipit Profilin Belirlenmesi

ÖZ

Bu çalışmanın amacı, Anadolu yerli ırkı atlarının lipid profilini değerlendirmekti. Çalışma materyalini Kars, Ardahan ve Iğdır bölgesinde benzer beslenme şartlarında yaşayan, 3-10 yaş aralığında, 100 adet farklı cinsiyetteki Anadolu yerli ırkı attan oluşmuştur. Tüm sonuçlar Mean±SE olarak verildi. Anadolu yerli ırkı atlarının lipid profilini belirlemek için ölçülen total kolesterol (TC), trigliserid (TG), yüksek yoğunluklu lipoproteinkolesterol (HDL-C), çok düşük yoğunluklu lipoprotein-kolesterol (VLDL-C) ve düşük yoğunluklu lipoprotein-kolesterol (LDL-C) seviyeleri sırasıyla 117,19±2,73, 75,36±1,11, 57,45±1,21, 19,13±0,30, 30,75±6,45 mg/dL olarak belirlendi. Sonuç olarak; yapılan bu çalışma ile Anadolu yerli atlarında ilk kez lipid profil belirlenmiştir.
Anahtar Kelimeler: Anadolu, At, Kolesterol, Lipid profil, Trigliserit

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INTRODUCTION

Horses have been bred for agricultural, transportation, military and sportive purposes throughout history and are one of the important elements of animal husbandry. However, due to technological developments in recent years, there has been a serious decrease in their number. While the number of horses in Turkey was 90,007 in 2020, it decreased by 7.2% in 2021 to 83,568 (TÜİK 2022).

The Anatolian native horse, which is one of the basic Turkish horse breeds, is considered to be the breed with the highest number in the Turkish horse population (Hendricks 1995, Kırmızıbayrak et al. 2004, Bayram et al. 2005, Yılmaz and Ertuğrul 2011, Yılmaz 2012, Çelik et al. 2015). These horses, which are small in size and commonly seen in central Anatolia, have all the color and decorations (Taşkın and Koçak 2010). Anatolian native horses, which show slow development, are also very resistant to diseases and adverse environmental conditions (Yılmaz and Ertuğrul 2011). In addition, these horses have strong legs and nails (Taşkın and Koçak 2010, Yılmaz, 2012). In studies on the effects of environmental conditions on horses, changes in lipid metabolisms are mentioned (Hasso et al. 2012). Therefore, geographic lipid profile is important in animal breeds and physiological effect assessments.

Cholesterol, cholesterol esters, triglycerides and phospholipids are the main plasma lipids (Kocaman and Fidancı 2016). Lipids and lipoprotein profile are used to evaluate the nutritional status of animals and to diagnose metabolic diseases such as ketosis, abomasum displacement and hypocalcemia (Raphael et al. 1973, Nazifi et al. 2002, Civelek et al. 2007, Kocaman and Fidancı 2016, Tunc et al. 2017). It has also been reported that lipid profile may differ according to breeds (Kedzierski and Bergero, 2006).

With this study, it was aimed to determine the lipid profile [total cholesterol (TC), triglyceride (TG), high-density lipoproteincholesterol (HDL-C), very low-density lipoprotein-cholesterol (VLDL-C), and low-density lipoprotein-cholesterol (LDL-C)] of Anatolian native horses and to evaluate the effects of age and gender differences on the lipid profile.

MATERIALS AND METHOD

Animal Material

In this study, it was carried out between January 01, 2022 and February 1, 2022, in Kars, Ardahan and Iğdır regions, which are important in terms of animal husbandry in Turkey, to determine the lipid profile of Anatolian native horses. In the study, 100 Anatolian native horses of different ages (between 3-10 years of age) and gender were used. Blood samples taken from the vena jugularis of the horses used in the study were centrifuged at 3000 g for 10 minutes and stored at -20 °C until analysis. The horses used in the study were selected by random sampling method.

Measuring Lipid Profile

Values of serum TC, TG, HDL-C, VLDL-C and LDL-C were measured with Cobas C501 autoanalyzer (Roche-Cobes, Switzerland).

Statistical Analysis

SPSS 20 package program was used for statistical analysis of the obtained data. In order to compare the changes in the parameters used to determine the lipid profile in horses; T-test was used independent of gender and ANOVA was used according to age changes. All results are given as Mean±SE. Results were presented as a table in all data.

RESULTS

In the study, the mean levels of TC, TG, HDL-C, VLDL-C and LDL-C in Anatolian native horses were determined as 117,19±2,73, 75,36±1,11, 57,45±1,21, 19,13±0,30, 30,75±6,45 mg/dL, respectively.

In the study, 100 horses of Anatolian native breed were used and 92% (92/100) of these animals were female and 8% (8/100) were male.

When Table 1 was examined, although there was a numerical increase in TC and LDL-C levels in female horses, no statistically significant difference was found ($P>0.05$).

The horses used in the study; 40% (40/100) are 5 years old and under, 36% (36/100) are 6-7 years old and 24% (24/100) are 8 years old and over.

When Table 2 was examined, although TC, HDL-C and LDL-C levels were higher in horses aged 6-7 years, no statistically significant difference was found ($P>0.05$).

Table 1. Changes of lipid profile by gender

Parametres	Gender	N	Mean±SE	T/P
TC (mg/dL)	Male	8	112,15±3,72	T= 0,852 P>0,05
	Female	92	117,49±1,82	
TG (mg/dL)	Male	8	76,66±3,67	T= 0,344 P>0,05
	Female	92	75,24±1,17	
HDL (mg/dL)	Male	8	58,06±4,82	T= 0,146 P>0,05
	Female	92	57,40±1,26	
VLDL (mg/dL)	Male	8	19,73±1,20	T= 0,593 P>0,05
	Female	92	19,07±0,31	
LDL (mg/dL)	Male	7	22,30±2,54	T= 0,360 P>0,05
	Female	92	31,39±6,93	

TC: Total cholesterol, TG: Triglyceride, HDL-C: High-density lipoproteincholesterol, VLDL-C: Very low density lipoprotein-cholesterol, LDL-C: Low-density lipoprotein-cholesterol.

Table 2. Changes of lipid profile parameters according to age

Parametres	Age	N	Mean±SE (Min-Max)	P
TC (mg/dL)	≤5	40	117,19±2,73 (89,60-149,80)	P>0,05
	6-7	36	118,83±2,91 (85,70-168,40)	
	≥8	24	114,21±3,30 (83,70-136,80)	
	Total	100	117,06±1,70 (83,70-168,40)	
TG (mg/dL)	≤5	40	73,76±1,65 (55,20-91,40)	P>0,05
	6-7	36	76,05±2,23 (58,60-110,60)	
	≥8	24	76,97±1,65 (62,90-92,40)	
	Total	100	75,36±1,11 (55,20-110,60)	
HDL (mg/dL)	≤5	40	57,49±1,74 (38,20-81,60)	P>0,05
	6-7	36	58,73±2,24 (39,20-81,90)	
	≥8	24	55,48±2,48 (39,20-80,60)	
	Total	100	57,45±1,21 (38,20-81,90)	
VLDL (mg/dL)	≤5	40	19,26±0,45 (14,60-26,50)	P>0,05
	6-7	36	19,27±0,54 (13,80-24,00)	
	≥8	24	18,69±0,60 (13,80-23,80)	
	Total	100	19,13±0,30 (13,80-26,50)	
LDL (mg/dL)	≤5	39	23,22±1,38 (10,90-44,20)	P>0,05
	6-7	36	40,38±1,63 (9,80-55,20)	
	≥8	24	28,52±2,35 (9,60-55,20)	
	Total	99	30,75±6,45 (9,60-65,20)	

TC: Total cholesterol, TG: Triglyceride, HDL-C: High-density lipoproteincholesterol, VLDL-C: Very low density lipoprotein-cholesterol, LDL-C: Low-density lipoprotein-cholesterol.

DISCUSSION AND CONCLUSION

Anatolian native horse; it's one of the basic Turkish horse breeds with a small build, slow development, all color and insignia, resistant to diseases (Taşkın and Koçak 2010, Yılmaz and Ertuğrul 2011, Çelik et al. 2015).

Lipid profile is used to evaluate the nutritional status of animals and to diagnose metabolic diseases (abomasum displacement, hypocalcemia, ketosis, etc.) (Raphael et al. 1973, Nazifi et al. 2002, Kocaman and Fidancı 2016). Therefore; reference hematological and biochemical values are needed to compare them with abnormal values indicative of a disease state.

It has been reported that the level of TG in horses is between 4-44 mg/dL (Altıntaş and Fidancı 1993). In different studies, TG levels were reported as 36.9±2.25, 25.50±42.03 and 23.63±9.09 mg/dL in British, Arabian and Turkmen horses, respectively (Özcan et al. 2002, Mohri et al. 2005, Oktay and Eren 2014). In another study, TG levels were reported as 11.88, 22.86, 38.70 and 41.04 mg/dL in Yili, Kazakli, Yanqi and Crossbred horses, respectively (Xinxin et al. 2021). In Iranian racehorses, the TG level was determined as 93.81±1.77 (Hasso et al. 2012). In our study, TG levels in Anatolian native horses were lower than Iranian racehorses, and higher than British, Arabian, Turkmen Yili Kazakh, Yangi and Crossbreed horses.

It has been reported that the level of TC in horses is 75-150 mg/dL (Kaneko et al. 1997). In different studies, TC levels in Turkmen, American Morgan and Arabian horses have been reported as 93.84, 98.6, 98.88 mg/dL, respectively (Mohri et al. 2005, Nadeau et al. 2006, Kocaman and Fidancı 2016). In another study, the TC level was found to be 116.22±1.93 in Iranian racehorses (Hasso et al., 2012). Although the TC level determined in our study was within the reference value range and parallel to the level of Iranian racehorses, it was found to be higher than the Turkmen, American Morgan and Arabian horses.

High-density lipoproteincholesterol, VLDL-C and LDL-C levels has been reported 47.87, 3.72, 114.28 mg/dL in Turkmen horses, 50.11±2.11, 2.42±1.37, 38.68±3.98 mg/dL in Arabian horses and 57.92±0.03, 21.24±0.02, 35±1.54 mg/dL in Iranian racehorses (Nazifi et al. 2003, Kocaman and Findancı 2016). In a different study, Yili, Kazakh, Yanqi and Crossbred horses HDL-C levels were reported as 16.02, 24.12, 20.7, 28.44 mg/dL, and LDL-C levels as 39.24, 36.72, 60,12, 57.96 mg/dL, respectively (Xinxin et al. 2021). In our study, HDL-C, VLDL-C and LDL-C levels in Anatolian native horses were found to be similar to Iranian racehorses. However, when compared to other breeds, HDL-C and VLDL-C levels were higher in Anatolian native horses, and LDL-C levels were lower than other breeds. HDL-C and VLDL-C reveal the rate of lipid processing that can be used when needed. Low levels of LDL-C may be due to high lipid flows (Weber 2009). This situation can be explained by the resistance of horses to geographical conditions.

In a study conducted on Turkmen horses, it was reported that TC, TG, HDL-C, VLDL-C and LDL-C levels increase with increasing age (Nazifi et al. 2003). In another study, it was reported that TC, TG and VLDL-C levels increased until the age of 5 years and then decreased (Hasso et al. 2012). In our study, although TC, HDL-C and LDL-C levels were found to be high in horses aged 6-7 years, no statistically significant difference was found.

Factors such as gender can affect blood parameters (Lumeij and Bruijne 1985). However, in a study conducted on Turkmen horses, it was reported that gender had no effect on the lipid profile of horses (Nazifi et al. 2003). In our study, although there was a numerical increase in TC and LDL-C levels in female horses, no statistically significant difference was found. It is thought that this may be due to the insufficient number of males in the animals used in the study.

As a result; In this study, lipid profile was determined for the first time in Anatolian native horses. It has been reported that lipid profile may differ according to breeds (Kedzierski and Bergero 2006). The results of the study revealed that the lipid profiles of Iranian racehorses and Anatolian native horses are similar. It can be said that this is due to the fact that the vegetation and plant-rich soils of the Iran-Turan region are similar to the Kars, Ardahan and Iğdır regions. It has been reported that lipid profile may differ according to breeds (Kedzierski and Bergero 2006). In our study, it can be said that breed changed the lipid profile, while age and gender changes did not. It has been reported that animals can reveal unique mechanisms in energy storage and transport depending on effort and environmental conditions (Weber 2009). Although high effort and work do not change the gross muscle mitochondrial composition ratios, it has been reported that the mitochondrial content can increase by as much as twofold when looking at physiological integration (Davies et al. 1981). It has also been reported that the season increases the TC level (Gündüz et al. 2000). For these reasons; it can be said that care, feeding methods and environmental conditions (altitude, climate, etc.) cause changes in the lipid profile of animals.

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