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Determination of the Activity of ALT and AST Enzymes of Blood in the Sheep Infected with Helminthes

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Abstract

This study determined liver enzymes activity (ALT) and (AST) in blood of sheep and faecal egg counts in the dry (August) and wet (November) seasons in Absheron region of Azerbaijan. Total 84 sheep were included for this study. Research results showed that faecal egg counts were significantly higher in the wet compared with the dry season and the significant higher activity of ALT and ALT in animals were recorded in the wet season (autumn) than dry (summer) period.

Keywords: Sheep; AST; ALT; Enzymes activities

Introduction

Cattle are parasitized by various helminths species, the most important being gastrointestinal nematodes, lungworms and liver fluke. Helminths infections of cattle affect productivity in all classes of stock, and are amongst the most important production-limiting diseases of grazing ruminants. This disease causes severe losses because of reduced growth and productivity, immune suppression, and death of heavily infected animals [1].

Determination species of eggs or oocytes of helminths infecting sheep and the determination of levels liver enzymes is usefully in capable of detecting subclinical metabolic disorders [2] and, therefore, reflects the actual status of the animal. In addition, determination of levels of blood parameters is useful in predicting health problems that reduce animal performance and might result in mortalities [3].

Rumosa et al. was to determine the relationships between age of the animal and faecal egg counts, liver enzymes, and minerals in the wet and dry seasons in male and female Nguni goats of South Africa. Blood was analyzed for phosphorus, calcium, magnesium, alkaline phosphatase (ALP), alanine transaminase (ALT), creatine kinase (CK), aspartate aminotransferase (AST), and gamma-glutamyltransferase (GGT) levels. Faecal egg counts were significantly higher in the wet compared with the dry season. Most ($P<0.05$) of the goats were within the reference values for calcium, phosphorus, and magnesium in both seasons. Higher AST, CK, and GGT concentrations were recorded in the wet compared to the dry season ($P<0.05$). Higher CK and AST were recorded in male than in female goats while for ALP, the values were higher in female than in male goats. Linear negative relationships ($P<0.05$) existed between age and ALP, phosphorus, and FEC, while quadratic relationships existed between age and strongyles and Strongyloides egg counts [4].

Siwela et al. the metabolizing enzymes glutathione peroxidase (GPX), DT -diaphorase (DTD) and succinate dehydrogenase (SDH) were assayed accordingly using liver samples from the control and infected birds. Malondialdehyde (MDA), a marker of lipid peroxidation, was also assayed. Results showed that cestode eggs occurred at twice the amount of nematode eggs in the faeces of infected ostriches. Infected birds showed significantly higher DTD activity when compared to non-infected birds [5].

Sissay studied of helminths of small ruminants involved the collection of viscera from 655 sheep and 632 goats from 4 abattoirs in eastern Ethiopia. There were 13 species of nematodes and 4 species of flukes present in the sheep and goats, with *Haemonchus contortus* being the most prevalent (65-80%), followed by Trichostrongylus spp. and he studies also demonstrated the roles of other factors (age, sex and susceptibility of host animals, parasite fecundity, stocking density, peri-parturient rise, hypobiosis and agro-climatic zones) in the epidemiology of GI nematode and fluke infections of small ruminants in eastern Ethiopia [6].

The aim of present study was to determine activity of ALT, AST enzymes and faecal egg counts in wet and dry season in sheep of Absheron.

Methodology

Faecal samples for helminthic parasitological examination and blood samples for enzymatic assays were collected from 84 sheep. Faecal samples were collected per rectum for each animal using latex glove. Faecal samples were transported to the laboratory for analysis. Faecal egg counts (FEC) were determined by the modified McMaster technique with saturated solution of sodium chloride as the floating medium. 4 g of faeces were mixed in 56 ml of saturated solution of sodium chloride. The number of nematode eggs per g of faeces was obtained by multiplying the total number of eggs counted in the two squares of the McMaster slide by the dilution factor of 50 [7]. Samples were screened for flukes by means of the sedimentation method described by Soulsby [8]. Blood samples from each animal were collected via the jugular vein into a plain test tube. The blood was centrifuged at 1000 g for 10 min to obtain serum. Alanine transferase level in the blood serum was analyzed spectrophotometrically according to the method by Bürger et al. [9], aspartate aminotransferase (AST) by Bergmeyer et al. [10].

Results

Helminths infections, or helminthoses, thus refer to a complex of conditions caused by parasites of the nematoda, cestoda and trematoda. Although all grazing sheep may be infected with the above-mentioned parasites, low worm burdens usually have little impact on animal health. But as the worm numbers increase, effects in the form of reduced weight gain and decreased appetite occur. With heavier worm burdens clinical signs such as weight loss, diarrhea, anemia, or sub-mandibular oedema (bottle jaw) may develop.

In this paper based on egg counts and microscopic identification, nematodes and cestodes were found in rectal faeces of animals and identified as Trichostrongylus and Moniezia (Table 1).

Season	No. Examined	Nematodes	Cestodes	P-Value
autumn	46	14 (30.4)	12(26)	0.02
summer	38	8 (21.1)	6 (15.7)	0.01

Table 1: Faecal egg count of nematode and cestode.

Table 1 shows that count faecal egg of nematode and cestode were significantly higher in the autumn compared with the summer season in sheep from Absheron. The nematode and cestode faecal egg counts of sheep flock showed that increased during the short rain period (beginning of October to November) (P<0.02). Thereafter, faecal egg counts of sheep the decreased during the short dry period (end of June to mid-August), to peak approximately in July.

AST is considered as the most sensitive indicator in the diagnosis of fatty liver in sheep. AST is located in the cytoplasm and mitochondria of different tissues and organs, but the maximum activity determined in skeletal muscle, heart and liver in sheep. Accordingly, changes in activity of this enzyme in the blood may be due to damage to the cellular structure of the body (primarily the liver) [11].

AST activity is widely distributed in human tissues, heart, liver, skeletal muscle and kidney being the richest source, but smaller amount are found in the pancreas, spleen and lung. The greatest amount of alanine amino transferase is found in the liver. The ALT activity in tissues is generally much less than AST. It was showed that aspartate-transaminase enzyme activity in goat blood reaches a maximum value in the spring season (94.5 ± 3.5 U/L), and minimal in the autumn season (42.1 ± 1.1 U/L). The change in aspartate-aminotransaminase activity in the blood of invasive goats was revealed. The maximum increase was noted in the spring (3.59 times). In the summer, autumn and winter periods, the increase in the enzymatic activity in 2.60, 1.76, 1.68 times, respectively, compared with the blood of almost healthy animals was revealed [11].

Pechova et al. [12] showed that serum liver enzymes, AST in particular, are closely correlated with the degree of fatty infiltration and degeneration of liver cells. According to this paper, only the serum activities of AST significantly correlated (P<0.05) with the activities of GGT and LDH. AST can be considered as the most sensitive indicator in the assessment of the functional state of the liver in dairy cows.

Based on our results shows the data on the determination of aspartate-aminotransaminase activity in the blood of sheep, in autumn and summer seasons aspartate-aminotransaminase activity in sheep blood is maximally increased (53.78 ± 1.8 U/L) (P<0.05) during the autumn period of time, i.e., in September . The minimum increase (35.09 ± 2.5 U/L) (P<0.01) of the enzyme activity, was noted in August. In summer, in June is maximally increased of the enzyme was observed 37.05 ± 1.2 U/L (P<0.02).

Aspartate-transaminase activity in sheep blood, U/ L			
Autumn		Summer	
53.78 ± 1.8	September	37.05 ± 1.2	June
50.42 ± 1.4	October	36.02 ± 1.3	July
48.02 ± 1.6	November	35.09 ± 2.5	August
Alanin-transaminase activity in sheep blood, U/ L			
51.21 ± 1.3	September	33.04 ± 1.2	June
48.42 ± 1.2	October	32.01 ± 1.3	July
46.05 ± 1.6	November	31.08 ± 1.5	August

Table 2: Aspartate-transaminase and alanin-transaminase activity in sheep blood.

Table 2 also shows the data on the determination of alanin-transaminase activity in the blood of sheep, in autumn and summer seasons. Alanin-transaminase activity in sheep blood is maximally increased (51.21 ± 1.3 U/L) (P<0.001) during the autumn period of time, i.e., in September. The minimum increase (31.08 ± 1.5U/L) (P<0.01) of the enzyme activity, was noted during the summer period of time, i.e., in August. In summer, in June is maximally increased of the enzyme was observed 33.04 ± 1.2 U/L.

Discussion

The present investigations showed increased mean value maximally increase in blood of sheep infected by nematodes and cestodes during wet period of time (ALT-53.78 ± 1.8 U/L), i.e., in September and minimum increase in dry period (ALT-31.08 ± 1.5U/L) i.e., in August. AST activity in the blood of sheep maximally increased (53.78 ± 1.8 U/L) during wet period of time (53.78 ± 1.8 U/L) i.e., in September and minimum increase in dry period (AST-35.09 ± 2.5 U/L) i.e., in August.

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