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Some Trace Elements and Vitamins A, C, and E Levels in Ewes Infected with Gastrointestinal Parasites

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Abstract: *The aim of this study was to investigate some trace elements and vitamins A, C, and E levels in sheep with gastrointestinal parasites and uninfected sheep. This study was conducted on 30 Akkaraman sheep consisting of 10 healthy sheep and 20 sheep infected with some gastrointestinal parasites. In the statistical analyses, serum Cu, Zn, Fe and vitamins A, C, and E levels in sheep with gastrointestinal parasitism were found to be less than those of control group ($p < 0.01$, $p < 0.01$, $p < 0.05$, $p < 0.001$, $p < 0.001$ and $p < 0.001$, respectively).*

In the final course of our investigation we came to the conviction that the Cu, Zn, Fe and vitamins A, C, E preparations should be used in order to obtain a more affective and earlier cure against gastrointestinal parasites in the sheep infected with gastrointestinal parasites together with the other treatment protocols.

Key Words: Sheep, Gastrointestinal Parasites, Trace Elements, Vitamins

Mide-Barsak Parazitlerle Enfekte Koyunlarda Bazı İz Elementler ve Vitamin A, C ve E Düzeyleri

Özet: *Bu çalışmanın amacı mide-barsak parazitlerle enfekte koyunlarda ve parazitsiz koyunlarda bazı iz elementler ve vitamin A, C ve E düzeylerini araştırmaktır. Çalışma; 10 sağlıklı ve 20 mide-barsak parazitlerle enfekte olmak toplam 30 koyun üzerinde yürütüldü.*

İstatistiksel analizde;mide-barsak parazitlerle enfekte koyunların serum Cu, Zn, Fe ve vitamin A, C ve E düzeyleri sağlıklı koyunlara göre önemli düzeyde düşük ($p < 0,01$, $p < 0,01$, $p < 0,05$, $p < 0,001$, $p < 0,001$ ve $p < 0,001$ sırasıyla) bulundu.

Bu araştırmanın sonucunda, mide-barsak parazitleriyle enfekte koyunlarda anti paraziter tedaviye ek olarak Cu, Zn, Fe ve vitamin A, C ve E içeren preparatlarının kullanılmasının da daha etkili olacağına inanılmaktadır.

Anahtar Kelimeler: Koyun, Mide-barsak, parazit, İz Element, Vitamin

INTRODUCTION

Gastrointestinal nematodes are chronic pervasive infections that contribute worldwide to morbidity and mortality in humans and livestock (10). In general gastro intestinal nematodes reduce nutrient availability to the host through both reductions in voluntary feed intake and / or reductions in the efficiency of absorbed nutrients although the underling mechanisms of the depression in appetite have not been fully elucidate (5). Studies done to determine copper (Cu) status in sheep with parasites, plasma zinc (Zn) concentration and serum iron (Fe) concentration in man and animals in variety of conditions, including bacterial and viral infections and following the administration of endotoxins were significantly lower than healthy (2, 6, 22).

In recent years a great deal of information has accumulated for livestock on vitamin function, metabolism and supplemental needs. These nutrients play important roles in animal health by inactivating harmful free radicals produced through normal cellular activity and from various stressors (13).

The aim of this study was to investigate some trace elements and vitamins A, C, and E levels in ewes with gastrointestinal parasites and uninfected ewes. The values obtained from infected and uninfected ewes were also compared to find out the effects of parasite infection on the above parameters.

MATERIAL and METHODS

In this study 30 Akkaraman ewes were used as material, consisting of 10 healthy ewes (control group) and 20 ewes infected with some gastrointestinal parasites. Their fecal samples were also examined by native, floatation and Modified Benedek Sedimentation Method (4) to find out the presence of some gastro-intestinal parasites such as nematodes, cestodes and eimeria. After fecal examination ewes having either of the parasites considered as infected group (ewes infected with gastrointestinal parasites, n=20). Egg and oocyst count in the gram stool fecal samples were also determined by the modified Mc Master technique (23). On the other hand, ewes did not have any parasites eggs or oocyst in their stool samples considered uninfected (control) group (n=10). Blood samples for biochemical analysis were also taken from infected and uninfected ewes two days after stool samples examination. Measurements for levels of serum mineral elements were carried out by Atomic Absorption Spectrophotometer (UNICAM 929). Vitamins A and E levels in the samples were determined by HPLC (high performance liquid chromatography) method (14, 18) and plasma vitamin C was determined by Kaya (8).

The results were analyzed using SSPS for MS-Windows Release 11.0.

RESULTS

In clinical examined, inappetence, weakness, diarrhea, dehydration, weight loss, and impaired of quality of wool were observed in ewes infected with gastrointestinal parasites. In the examination of parasitological analyses *Nematodirus spathiger, Haemonchus contortus, Marshallagia marshalli, Trichostrongylus colubriformis, Oesophagostomum columbianum, Chabertina ovina, Trichuris globulosa, Avitellina centripunctata, Moniezia expansa* and *Eimeria spp.* were observed. The mean fecal egg counts (FEC) in infected ewes with nematodes were 1251±72 EPG (Eggs per gramme) and the mean oocyst count was 3150±25 OPG (Oocysts per gramme).

Serum Cu, Zn, Fe and vitamins A, C, and E levels in ewes with gastrointestinal parasitism and uninfected (control) ewes were given in Table 1. Serum Cu, Zn, Fe and vitamins A, C, and E levels in ewes with gastrointestinal parasitism were found to be less than those of control group ($p < 0.01$, $p < 0.01$, $p < 0.05$, $p < 0.001$, $p < 0.001$ and $p < 0.001$, respectively)

Table 1. Some Elements and Vitamins A, C, and E Levels

Parameters	Control (n=10) $\overline{X} \pm Sd$	With Gastrointestinal parasites (n=20) $\overline{X} \pm Sd$
Cu (µg/dl)	101.4 ± 17^{a}	86.6 ± 6^{c}
Zn(µg/dl)	94.3 ± 64^{a}	50.8 ± 14^{c}
Fe (µg/dl)	289 ± 96^{a}	203 ± 69^{d}
Vit A (µg/dl)	175.43 ± 9.44^{a}	120.00 ± 4.40^{b}
Vit E (mg/dl)	1.239 ± 0.19^{a}	0.854 ± 0.38^{b}
Vit C (mg/dl)	1.494 ± 0.42^{a}	0.658 ± 0.38^{b}

a, b, c, d: The significance of difference between groups has been shown in small letters
ab: $p < 0.001$. **ac**: $p < 0.01$. **ad**: $p < 0.05$.

DISCUSSION

Gastrointestinal (GI) helminth parasites cause significant production losses in grazing ruminants throughout the world, particularly, in young and in periparturient ewes, goats and cattle (20, 24). In this study, inappetence, weakness, diarrhea, dehydration, weight loss, and impaired of quality of wool were observed in sheep infected with gastrointestinal parasites. These results are coherence with investigations (20, 24).

Reduced hydrolysis in the abomasums when pH is elevated by nematode infection may contribute to reduced copper availability and absorption (2). Nazki and Rattan (16) reported that the average copper levels in ewes through different seasons to be between 106.66 and 201.66 µg/dl. Kozat et al. (11) have also reported serum copper levels in Akkaraman ewes were 89.8±0.15 µg /dl. In spite of the fact that the normal serum levels of Cu show a wide distribution, the serum levels of the subjects in the group with gastrointestinal parasitism decreased and the control group approximated to those levels reported by Nazki and Rattan (16) and Kozat et al. (11). In our study, copper status in sheep with gastrointestinal parasitism showed significant lower serum copper concentration than control sheep. In this state, reduction copper uptake can therefore probably be directly attributed to the effect of infection in increasing the pH of the contents of abomasums and proximal regions of the intestine.

Several workers (6, 15) pointed out that plasma Zn concentrations fall in a variety of diseases associated with anorexia and speculated that low Zn concentrations may affect appetite and taste. Serum concentration of Zn in infected group was lower than the serum concentration of Zn in uninfected group. However, the results show that small intestinal infection with *Trichostrongylus colubriformis* reduces Zn concentration as did the conditions reported by Symons (21) and Beisel (3). Plasma Zn concentrations in the infected sheep were reduced by 17 per cent whereas they were unchanged in the uninfected groups. Plasma Zn concentrations in sheep infected with *Trichostrongylus colubriformis* fell from 1.42 µg/ml before inappetence to 1.00 µg/ml when was almost completely anorexic (21). In this study, serum Zn levels of sheep with gastrointestinal parasitism were significantly lower than control group ($p<0.01$). These results were reported by researches (3, 21).

Serum iron (Fe) concentrations in young merino sheep with *Haemonchus contortus* were lower than uninfected sheep (1). In this study, serum Fe concentrations of sheep with gastro-intestinal parasitism were significant lower than control group. These results were supported by Albers et al. (1).

A recent Brazilian study examined the influence of Ascaris and Giardica and vitamin A / Zn supplementation on the serum levels of vitamin A. They determined that Ascaris and the protozoan Giardia may impair intestinal absorption of retinol and that Zn along with vitamin A supplements may assist in repletion of vitamin A status (12). In our study, Zn and vitamin A levels in sheep with gastrointestinal parasitism were significant lower than control sheep. Our results supported to results of researches (12).

Plasma ascorbic acid level decreased in infectious diseases because of inappetence and especially decrease intake of proteins. As a result of this, the immune system will be depressed (9, 17). It has been demonstrated that plasma ascorbic acid concentration was decreased in animals with protozoa and infection disease (7). In this study, in the control group vitamin C was 1.494 ± 0.42 mg/dl and in the infected group it was 0.658 ± 0.38 mg/dl. In the infected group serum vitamin C levels were below the normal range. According to the variance analysis, in the infected sheep vitamin C values were significantly lower than those in the control group ($P < 0.001$). Sarin et al. (19) found that in hosts infected with different parasites the concentrations of vitamin E fell in comparison to healthy controls. In this study vitamin E levels in sheep with gastrointestinal parasitism were significant lower than control sheep ($P < 0.001$).

As a result, trace elements play an important role against gastrointestinal parasitism, but much more scientific work is required. Our review of study would suggest that several important issues require investigation.

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