

Determination of Oxidant / Antioxidant Levels in Sheep with Hydatite Cyst in Liver

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Abstract

The larval form of *Echinococcus granulosus*, hydatid cyst is an important parasitic zoonosis commonly seen in animals and humans. The aim of this study was to investigate the efficacy of oxidative stress on the pathogenesis of cystic echinococcosis with antioxidant / oxidant status in sheep sera. The material of the study was composed of sheep infected with hydatid cyst and healthy cut in slaughterhouse in Van province. The general health status of the sheep before slaughtering was checked by physical examination and blood samples were taken. After slaughtering, cyst hydatid examination was performed in different organs of the animals. The control group consisted of 25 sheep study cases with positive (fertile cyst) and 15 sheep without any pathological lesion on organ examinations and healthy on physical examination. Blood samples taken from animals infected with healthy and hydatid cysts were transported to the laboratory under appropriate conditions and centrifuged. Total antioxidant / oxidant status, paraoxonase and arylesterase activities were measured by using commercial kits. Compared with cystic echinococcosis group and healthy group, the importance was calculated on the TAS, PON1 activities ($P < 0.01$), TOS, ARES activities differences ($P < 0.001$), It decreases. This may cause tissue necrosis and increased inflammation. Decrease in antioxidant reserves; excessive free radical formation in the ewes with cystic echinococcosis causes deterioration of the normal histological structure of the organ in the cyst.

Key words: Cystic Echinococcosis, sheep, PON1, ARES, TAS, TOS,

Introduction

Echinococcus granulosus (E. Granulosus) emerged with cystic echinococcosis the larval development of intermediate hosts to settle in Turkey and the world, is a parasite that threaten human and animal health and zoonoses. In our country, cystic echinococcosis shows a wide spread due to the different distribution of animal species in the regions, climatic conditions and socio-economic development level of the society.

E. Granulosus eggs thrown from the feces which contain adult parasites, cause infection in different types

of animals such as sheep, goats and cattle. The disease are known to settle such as organs, especially the liver; kidney, spleen, brain, bone, heart^{1,2}.

For the maintenance of vital and biochemical functions, the balance between pro-oxidants and antioxidants is very important. The deterioration of this balance in favor of pro-oxidants (oxidative stress) can lead to oxidative damage³. However, measuring these markers separately is both time consuming and costly⁴. Therefore, total oxidant status (TOS) and total antioxidant status (TAS) are measured and oxidative stress index (OSI) is calculated in recent years⁵⁻⁷.

Paraoxonase 1 (PON1, EC.3.1.8.1) and arylesterase are enzymes encoded by the same gene and have similar active centers. Although the natural substrate of both enzymes is different, the PON1 enzyme has the ability to show both arylesterase and paraoxonase activity by

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hydrolyzing phenylacetine, the substrate of arylesterase. In addition, plasma high-density lipoprotein (HDL)-dependent antioxidant enzyme PON1 has been reported to protect low-density lipoprotein (LDL) and HDL against oxidation caused by free radicals and to reduce oxidative stress⁸.

Oxidative stress plays a role in the pathogenesis of various diseases⁹. In parasitic infections, the host creates a reaction mechanism to parasites by free radicals¹⁰, which cause oxidative stress. There are many studies that show that oxidative stress has occurred in animals infected with parasites¹¹⁻¹⁵.

Significant changes have been reported in blood parameters and host biochemistry of animals exposed to parasitic invasion¹⁶. In studies conducted with endoparasites infected animals, serum protein, serum globulin, cerulo-plasmin, vitamin A, C, E and B12 and some enzyme and mineral level changes were observed.

This project, total oxidant / antioxidant status, oxidative stress index levels, paraoxonase, arylesterase enzyme activities were investigated in the animals infected with hydatid cyst and the effects of oxidative stress on the pathogenesis of cystic echinococcosis were investigated.

In this project, total oxidant / antioxidant status, oxidative stress index levels, paraoxonase, arylesterase enzyme activities were investigated in the animals infected with hydatid cyst and the effects of oxidative stress on the pathogenesis of cystic echinococcosis were also evaluated.

Materials and Methods

Material

The material of the study was composed of 2-3 aged Morkaraman sheep brought to Özalp slaughterhouse in Van province. The pre-cut sheep's general health conditions were checked by physical examination and blood samples were taken. After harvesting, cyst hydatid examination was performed in different organs of the animals. The experimental group of the 25 sheep study, positive for the protoscolex (fertile cyst), the control group consisted of 15 sheep who had no pathological lesion in their organ examination and who were healthy in physical examination. Blood samples were transferred to the laboratory at + 4°C and their sera were removed by centrifugation at 3000 rpm and + 4 ° C for 10 minutes

Method

Total antioxidant status in serum samples of sheep blood, total oxidant status levels, and paraoxonase, arylesterase, activities "Rel Assay Diagnostics-Bursa / Turkey" brand autoanalyzer using commercial kits (Selectra proxl Clinical Chemistry System-The Netherlands) were determined.

Statistical Analysis

SPSS 16.0 Windows program (SPSS Inc., Chicago, IL) was used for statistical analysis of the data. Independent t test was used to determine the differences between the groups and the results were given as mean ± SE (standard error). P <0.05 was considered significant for statistical significance

Results & Discussion

At the completion of the project, the averages of the measured values were tabulated and evaluated statistically. The difference between the control and cystic groups' mean values of TAS and PON1 (p≤ 0.01), TOS and ARES levels (p≤ 0.001) were found to be significant.

Table 1. Serum TAS, TOS, PON1 and ARES levels of cystic echinococcosis and healthy sheep.

PARAMETERS	GROUP	X±SE	P
TAS (mmol trolox Equiv./L)	Hydatid cyst	1.30±0.04	0.01
	Healthy	1.42±0.02	
TOS (µmol H2O2 equiv./L)	Hydatid cyst	7.21±0.46	0.001
	Healthy	5.81±0.23	
PON1 (U/L)	Hydatid cyst	914.21±79.07	0.01
	Healthy	1109.84±77.41	
ARES (U/L)	Hydatid cyst	1254.62±91.13	0.001
	Healthy	1441.43±65.51	

Cystic echinococcosis is a parasitic disease that causes significant economic losses in animal husbandry¹⁷. This disease is more prevalent in human

and animals in developing and underdeveloped countries, which are engaged in agriculture and animal husbandry, environmental health and preventive medicine services are inadequate¹⁸. In our country, due to reasons such as the fact that slaughtering of slaughtered animals cannot be controlled under strict rules, cyst hydatid continues to be an important parasitic infection affecting both animal and human health¹⁹.

Hydatid cyst causes phagocytic cell activation in the immune defense system of the host organism and as a result, reactive oxygen products and reactive nitrogen products are released by macrophages and leukocytes of the host organism in response to cyst pathogenicity, and reactive nitrogen products are released²⁰.

There are many indicators for the evaluation of oxidative stress and antioxidant status and different methods of measuring them. However, measuring these markers separately is both time consuming and costly⁴. Therefore, total oxidant status (TOS) and total antioxidant status (TAS) are measured and oxidative stress index (OSI) is calculated in recent years⁶⁻⁷.

Bakır et al.,²¹ reported that oxidative stress increased in patients with hydatid cyst. In the same study, serum total antioxidant status, total oxidant status levels and oxidative stress index levels were found to be significantly higher in hydatid cyst patients compared to control, whereas paraoxonase and arylesterase activities were significantly lower in hydatid cyst patients compared to control. In this study, it was found that the difference between TAS, TOS, PON1 and ARES levels of cystic echinococcosis and healthy sheep in terms of TAS, PON1 (P <0.01), TOS and ARES levels (P <0.001) was found to be significant and these findings were consistent with the results reported in the literature.

As a result, paraoxonase and arylesterase activities are decreased due to increased oxidative stress in sheep infected with hydatid cyst. This may cause tissue necrosis and increased inflammation. Decrease in antioxidant reserves causes the formation of excessive free radicals in sheep with cystic echinococcosis and deterioration of the normal histological structure of the organ with cyst.

Conflict of interest: Not

Ethical Clearance: The study was approved by the ethical committee of the University of Van Yuzuncu Yil / College of Veterinary Medicine.

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