Study the Role of Selenium or Zinc as Organic form on some Antioxidant and Liver Enzymes of Rams

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Abstract

This study was conducted to detect the role of the organic form of Selenium or Zinc that supported with yeast (*Saccharomyces cerevisiae*) on the liver function and antioxidant enzymes. Twenty-one rams that their average weight of 38±2 kg. The males divided into three groups. The first group (G1) late without treatment, group two (G2) was administrated with (*Saccharomyces cerevisiae*-Zinc) (0.2 g/kg/ body weight), while group three (G3) was administrated with (*Saccharomyces cerevisiae*-Selenium) (0.03 g/kg/ body weight). Blood samples were collected from males at zero 45 and 90 days of experiment. The results of AST, ALT and ALP showed non-significant differences between different groups. While the activity antioxidant enzymes recorded a significant improvement, through a significant increased ($P \leq 0.05$) of Glutathione peroxidase and catalase concentrations of the group that treated with organic selenium or zinc compare with a control group, from another hand, the treated group with organic selenium has been shown the significant increases ($P \leq 0.05$) of Glutathione peroxidase compared with the animals that treated zinc at the third period. Whereas, the treated groups recoded a significant increment ($P \leq 0.05$) with the progress of ages. From results concluded that the feeding selenium and zinc as an organic form that fortified by yeast *Saccharomyces cerevisiae* significantly increases antioxidant enzyme activity and have a protective role to the liver.

***Keywords**: Selenium, Zinc, Yeast, Antioxidant, Sheep.*

Introduction

Animals production depend on a healthy and normal physiological status. The disorder in the oxidative stability and the physiological factors in the body caused many problems in animal and the human body. Alteration in the activity of the ant oxidative enzymes is a considerable bio indicator due to the significant role of ant oxidative enzymes in establishing the reactive oxygen species stability of the organism [1].

Trace elements play an important role in certain physiological and biochemical processes and vitally important Human and animals development [2]. Therefore, it is important to provide trace elements to a ration of the animal, especially ruminant, the imbalance of antioxidants which triggers dramatic changes in the behavior of an animal as well as the influence of livestock production and also some modifying the blood components and causes diseases that may not respond to the medication [3]. Dietary antioxidants such as vitamins have been reported to inhibit physiological disorders, thus increasing the performance and consistency of the meat [4]. Selenium is complicated in cellular antioxidant protection by the action of glutathione peroxidase, a self-dependent enzyme catalyses, its significant decrease of hydrogen peroxide as well as organic peroxide to water and the corresponding stable alcohol, while still suppressing the production of free radicals [5]. Selenium, it is one of the rare and naturally occurring elements in many foods that are used as a nutritional supplement, and it is one of the necessary and important nutrients for organism, and it consists of further than about 20 kinds of selenoprotein, which have important role in the thyroid hormone activity as well as the construction of DNA, in addition antioxidant and protection against many infections as well as in reproduction [6].

Since there was an acute deficiency of selenium in the blood of sheep, it was found necessary to add selenium to their ration, which is among the necessary requirements for the animal to provide the largest production and health of the animal [7]. zinc, it is the instant and most copious element and it is very necessary for all living organisms, as it does not oxidize under biological situations, and this describes why the element zinc achieves important physiological roles and is different from biological processes [8]. It cannot be stored in the body so it requires its addition its importance in promoting growth, it is an anti-bacterial agent, and it regulates interactions and reproduction in animals [9]. It also affects the activity and potency of antioxidant enzymes [10].

The using Saccharomyces Cerevisiae is necessary to enhance the microbial growth and enhancing the permanence of the fermentation of rumen. From another hand, the supplement yeast be responsible for most of the important mineral nutrients during the digestion process that will positively affect the microbial assemblages and their functions in the rumen, as many studies have indicated that there are beneficial effects of the yeast on the number and activity of microbes in the rumen [11,12] .Therefore, this study aimed to the study the role Saccharomyces cerevisiae fortified with organic selenium and Saccharomyces cerevisiae fortified with organic zinc as an organic form on the enzymes transporting amines (ALT), (AST) and (ALP) and anti-oxidant enzymes in the blood serum of domestic male sheep as protective and improvement effect.

Materials and Methods

This study was conducted on the Twenty-one males sheep 1 to 1.5 years of age, with an average weight 38±2 kg. The animals were fed with concentrated feed, as recommended (2%) of the body weight of all study animals, while hay and alfalfa were fed ad libitum. The animals were divided into three treated groups of equal number (seven males for each group). The first treatment group (G1) left untreated as a control group. Second treatment group (G2) was administrated the yeast (*Saccharomyces cerevisiae*) fortified with organic zinc at a dose of 0.2 g / kg. / Live weight) according to [13], the third treatment (G3) was administrated yeast (*Saccharomyces cerevisiae*) fortified with organic selenium at a dose of (0.03 g / kg / live weight) according to [13].

Samples of blood were collected from the jugular vein throughout three time periods. (beginning (Zero time), middle (45 days) and end of the experiment (90 days), which lasted for 90 days, to measure the level of amine transporting enzymes, which are amine transporter alanine (ALT), amine transporter aspartate (AST) and alkaline phosphatase (ALP) in the blood serum by CORMAY Kit made in Poland by an auto biochemistry analyzer (Model accent 200) made in Poland.

Statistical analysis between the parameters was performed for each time period using Analysis of Variance for complete random design, and the Least significant difference between the means of the different parameters used to identify significant differences under $P \leq 0.05$ by using the statistical program SPSS. Issue 25.

Results and Discussion

Table (1, and 2) it has been shown non-significant differences in the concentration of AST, ALT and ALP between the experiment treated groups over the length of the study period, but a significant increase ($P \leq 0.05$) was observed during the time period within the one column for the three treatments compared to the first week of the experiment. The results of the current study are in agreement with [14] , who found, the adding selenium with vitamin E at 2 ml/animal, showed non-significant differences between treated groups, and agreed with[15] when adding zinc as organic and inorganic forms, observed non-significant differences in ALT concentration. As well as the results are agreement with [16] , who recorded that were non-significant differences in the enzymes transporting the amine ALT, AST and ALP after added organic and inorganic selenium (sodium selenate) at a concentration of 0.3 mg/kg feed in lambs. Also, the results were agreement with [17] who observed, non-significant differences in the level of ALT, AST and ALP between the treatments compared with the control when administering Saccharomyces cerevisiae yeast. While the results disagree with [15] who found, the adding zinc as organic and inorganic forms, caused an increase in the level of ALP and a decrease in AST, and disagreed with [18] when adding the inorganic selenium and zinc and their mixtures, an increase in the level of ALT and AST. From other hand, results agree with [19,20] , whereas recorded increased ALT, AST and ALP in the selenium addition group compared with the control group. The major benefit high intake of Se is to preserve liver damage under certain circumstances [21, 22]. Dietary Se has been reported to protect toward toxic substance, leading to reduced serum ALT. While [23] has been recorded a dramatic increase concentration of zinc in the serum, a decline concentration of CRP, Il-6 and TNF-a in the ability to respond to zinc supplementation. In the inflammatory condition, adipose tissue generates cytokines including (interleukin-6) IL-6, that the liver release of C reactive protein. Certain researches have also shown beneficial properties of zinc toward oxidative damage [24].

Table (3) showed that there are significant differences ($P \leq 0.05$) in the concentration of antioxidant enzymes between different treated groups during the study period. The results recorded a significant increment ($P \leq 0.05$) of Glutathione peroxidase and catalase concentration of the group that treated with Saccharomyces-selenium or Saccharomyces-zinc compare with a control group, from other hands, the animals that treated with Saccharomyces-selenium showed a significant increment ($P \leq 0.05$) of Glutathione peroxidase compared with the animals that treated Saccharomyces-zinc at the third period. Whereas, the treated groups recoded a significant increment ($P \leq 0.05$) with the progress of ages. The results of the study are agreed with [25, 26] who concluded the zinc and selenium have improved effect on antioxidant enzymes in chicken muscles, results are also consistent with results of study [27, 28] that the glutathione peroxidase in the meat of beef and hogs meat was increased when they had been fed with saccharomyces cerevisiae that supported with selenium. This results can explain by the role of zinc and selenium as antioxidants the decreased the against reactive oxygen species and it's the most major elements of the antioxidant protective mechanism [1]. Selenium have a high efficiency of the Se-dependent enzyme Glutathione [29] Selenium plays a lot of significant biological activity, such as the regulation of antioxidant enzymes activity improvement of health and productivity [30] .

In ruminants, selenium as an organic form, including selenomethionine, is mainly excellently absorbed compared to inorganic selenium, mainly requires the addition of inorganic selenium to amino acids by microflora [31].

Organic selenium has been much more efficiently absorbed into the body than inorganic selenium, contributing to higher glutathione peroxidase activity in the cow [32]. Therefore, using the organic form in the current study. In addition, Zinc helps to reduce oxidative damage by engaging in the production of antioxidative enzymes [33]. Biological zinc accumulation prevents the development of ROS products, includes, superoxide anion and radical hydroxyl and H_2O_2 [34]. Zinc play a pro-antioxidant role and protect against oxidative stress[35]. Zinc consumption improves the scavenging functions including its antioxidative enzymes Catalase and glutathione toward oxidation [36] these roles and function of Se and Zn have act a protect the livers and other organs.

Table 1.Showed AST and ALT (U/l) concentration in the serum of male sheep.

	AST (U/l)			ALT (U/l)		
Date Treated	**1st period Zero time**	**2nd period Mid time**	**3rd period End time**	**1st period Zero time**	**2nd period Mid time**	**3rd period End time**
Control (T1)	59.83±1.28 b	70.91±0.39 a	74.25±0.41 a	6.35±0.25 b	8.55±0.52 ab	12.72±0.83 a
Zinc+ yeast (T2)	59.71±0.77 b	72.27±0.26 a	71.34±1.17 a	6.98±0.54 b	7.71±0.32 b	12.42±0.41 a
Selenium + yeast (T3)	57.49±1.22 b	71.77±0.36 a	69.71±0.73 a	6.11±0.62 b	8.69±0.26 b	11.31±0.57 a
LSD	4.80			2.67		

The lower case characters indicate significant variations between the times ($P \leq 0.05$)

Table 2.Showed ALP (U/l) concentration in the serum of male sheep.

	ALP (U/l)		
Date Treated	**1st period Zero time**	**2nd period Mid time**	**3rd period End time**
Control (T1)	70.97±1.60 b	75.11±1.63 ab	76.52±1.29 a
Zinc+ yeast (T2)	70.28±2.65 b	76.67±2.59 ab	79.42±2.35 a
Selenium + yeast (T3)	71.84±2.52 b	78.78±2.24 a	82.46±2.30 a
LSD	6.02		

The lower case characters indicate significant variations between the times (P≤0.05)

Table 3.Showed Glutathione peroxidase (U/l) and Catalase (KU/l) concentration in the serum of male sheep.

	Glutathione peroxidase (U/l)			Catalase (KU/l)		
Date Treated	**1st period Zero time**	**2nd period Mid time**	**3rd period End time**	**1st period Zero time**	**2nd period Mid time**	**3rd period End time**
Control (T1)	31.8 ±6.5	33.2±8.6 B	32.9±3.5 C	248.5±20.4	251.8±53.2 B	276.6±14.0 B
Zinc+ yeast (T2)	33.6±4.9 b	37.6±5.1 a AB	36.5±3.6 A B	261.8±8.9	291.4±24.4 AB	298.7±29.4 AB
Selenium + yeast (T3)	32.7±6.8 b	38.1±6.2 a A	39.1±7.7 aA	252.1±22.9 b	326.8±32.6 a A	329.6±22.7 a A
LSD	2.6			41.20		

The lower case characters indicate significant variations between the times (P≤0.05)

The upper case characters indicate significant variations between the treated groups (P≤0.05)

Conclusion

Selenium and zinc as organic form that fortified by yeast Saccharomyces cerevisiae significantly increases antioxidant enzyme activity and have a protective role to liver. Therefore, the dietary organic Se and zinc may exert a favorable effect on antioxidant ability through enhancing enzymes activities.

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