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Modulation of liver antioxidant ability under chronic fascioliasis and $(\text{Zn}_x\text{Cu}_{1-x})_2(\text{OH})_3\text{Cl}$ supplementation

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Key words

fasciolosis – rats – Zn – Cu – antioxidant defense

Abstract. Aim: This aim of this study was to assess the antioxidant status (vitamin C, E, A, zinc, copper, superoxide dismutase, catalase, glutathione peroxidase and malondialdehyde) of rat liver in chronic stage of fasciolosis after treatment with Zn-Cu mixed basic salt. Methods: White Wistar rats were infected per os with 25 metacercariae of *fasciola hepatica*. Application of $(\text{Zn}_x\text{Cu}_{1-x})_2(\text{OH})_3\text{Cl}$ salt started 6 weeks after the infection and was performed during 10 consecutive days. Results: During the chronic stage of fasciolosis in the liver, a decrease of concentrations of vitamins C, E, A and of the trace elements Zn and Cu were observed together with a reduction of the Cu,Zn-superoxide dismutase (SOD) activity and an increase of catalase and glutathione peroxidase activities. Malondialdehyde concentration was elevated. Application of $(\text{Zn}_x\text{Cu}_{1-x})_2(\text{OH})_3\text{Cl}$ salt increased the concentrations mainly of vitamin E, but also of vitamin C and of the trace element Zn. On the other hand, only the activity of SOD was enhanced after salt treatment. Conclusions: It seems that antioxidant imbalance was developed in the *fasciola hepatica* infected liver rats during the chronic fasciolosis and that Zn-Cu salt improved the antioxidant defense abilities.

Introduction

Free radical oxidants production increased during various infections and detoxification of different compounds in the body [Szilagy et al. 2001]. Lipid peroxidation may occur, producing damaging effects in the tissues [Kolodziejczyk 1996, 2005]. On the other hand, it is well known that relationships do exist between micronutrient deficiencies and oxidative stress [Szilagy et al. 2001].

Mineral compounds play an important role in the treatment of metabolic disturbances occurring under parasitoses [Gabrashanska et al. 2006]. Neutral salts are used more often to correct infected host mineral deficiencies but long-term treatment may cause some negative adverse effects such as depressed growth, higher mortality, vomiting, etc. [Vasques et al. 1990]. Recently, experiments have been carried out with better tolerated by the organism with hydroxyl (basic) salts of 2d transition elements [Galvez-Morros et al. 1995, Tsocheva-Gaitandjieva et al. 2002].

The purpose of this work was to investigate the combined effect of chronic fasciolosis and double hydroxychloride salt of zinc and copper on the antioxidant properties of the liver in the rats.

Material and methods

Animal treatment

Experiments were performed on 40 male albino 30-day-old Wistar rats. The animals were housed in a temperature (22 °C) and humidity (45 – 55%) controlled environment under a 12-h light/dark cycle with food and water made available ad libitum.

Experiments were conducted on the basis of the recommendations outlined in the Bulgarian Animal Care and Use Guide.

Rats were divided into four groups (10 rats each group): Group I: control rats, Group II: control and treated with $(\text{Zn}_x\text{Cu}_{1-x})_2(\text{OH})_3\text{Cl}$ rats I, Group III: *F. hepatica*-infected rats

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