Effect of 2Gly.ZnCl₂.2H₂O on antioxidant status in rats under fasciolosis

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Abstract. The aim of our study was to assess the liver antioxidant status (SOD, GPx, vitamins A, C and E, Se, Zn, MDA) and parasite burden in male Wistar rats experimentally infected per os with Fasciola hepatica (25 metacercariae) and treated with a daily dose of 6 mg 2Gly.ZnCl₂.2H₂O. During the acute (4 weeks) and chronic stage (6-10 weeks) of fasciolosis, antioxidant/oxidant imbalance occurred. SOD activity, levels of vitamins A, C, E, Zn and Se were reduced whereas the amount of MDA was increased. Body weights were lower in the infected rats during the acute and chronic stages. Application of 2Gly.ZnCl₂.2H₂O increased the enzymatic activities, the levels of vitamin E and A, Zn and Se, and reduced MDA concentration. Body weights increased but the parasite burden was not changed after treatment. The compound did not show antiparasitic action.

Introduction

The fluke Fasciola hepatica is distributed worldwide and is responsible for the major liver parasitic infections in humans and domestic ruminants. Recent studies indicated that fasciolosis led to oxidative stress which is the causative agent for the initiation and progression of lipid peroxidation in the host [Gabrashanska et al. 2007, Kołodziejczyk et al. 2005].

Many antioxidant defenses depend on micronutrients (Zn, Cu, Se, Mn) or are micronutrients themselves [Halliwell and Chirico 1993]. Among them, zinc has received increasing attention because of the recently available evidence that its deficiency may have serious consequences in humans and animals [Alaf et al. 2002]. It is an essential constituent of various enzyme molecules, proteins and biomembranes. This element plays a fundamental role in the immune system, as well as in the cellular metabolism, rapidly increasing the cell turnover [Fraker 2000]. It can modulate host resistance to various infections [Powell 2000]. Zn has been shown to play an antioxidant role in defined chemical systems. Administration of pharmacological doses of Zn in vivo has a protective effect against prooxidants in general but also against those that are liver-specific [Sidhu et al. 2005].

The present study is aimed at determining the effect of 2Gly.ZnCl₂.2H₂O on oxidative and antioxidant systems in rats infected with Fasciola hepatica in an acute (4 wpi) and chronic stage (6-10 wpi). Vitamins A, C, E, Zn, Se and molonidaldehyde (MDA) levels, as well as glutathione peroxidase (GPx) and CuZn superoxide dismutase (Cu,Zn-SOD) activities were the parameters of oxidative/antioxidant status that have been investigated in animals.

Material and methods

80 4-week-old male Wistar rats were divided into 4 groups (20 rats each group): Group 1: control, Group 2: control and treated with 2Gly.ZnCl₂.2H₂O, Group 3: infected experimentally with F. hepatica, Group 4: in-