The protective effect of astaxanthin on remote hepatic, renal, and cardiac tissues after lower extremity ischemia-reperfusion injury in rats

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Abstract

Astaxanthin (AST) is a powerful antioxidant [1]. As a naturally occurring carotenoid, AST is found in a variety of plants, marine products, crustaceans and algae [2]. The present study aims to examine the effect of Astaxanthin(ART) in preventing remote tissue injury resulting from the lower extremity ischemia-reperfusion (I/R). To that end, we determined the enzyme activity levels of malondialdehyde (MDA), reduced glutathione (GSH), and catalase (CAT) in heart, kidney, and liver tissues. Malondialdehyde (MDA) levels were observed to increase significantly (p<0.001) in the heart tissue in the I/R group in comparison with the control group while they decreased significantly (p<0.001) in the I/R+AST group when compared with the I/R group. As for the kidney and liver tissues, malondialdehyde (MDA) levels increased in the I/R group in comparison with the control group while they decreased to a certain extent in the I/R+AST and AST groups in comparison with the I/R group, albeit the lack of significance between the groups. GSH levels decreased significantly (p<0.05) in the heart tissue in the I/R and I/R+AST groups when compared with the control group while they increased significantly (p<0.05) as well in the I/R+AST group compared with the I/R group. As for the liver and kidney tissues, GSH levels decreased in the I/R+AST and AST groups in comparison with the control group while they increased significantly in the I/R+AST group as compared with the I/R group. Lastly, the activity of CAT as an important antioxidant enzyme was examined and found to decrease in the kidney and liver tissues in the I/R groups when compared with the control group while increasing in the I/R+AST group when compared with the I/R groups. In the liver tissue, CAT activity showed a significant decrease (p<0.05) in the I/R and I/R+AST groups compared to the control group while increasing significantly in the I/R+AST group in the I/R+AST group compared to the I/R group.

Keywords: Lower extremity, Remote tissue, ischemia-reperfusion, Astaxanthin

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