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Assessment of Cardioprotective Effect of Deferiprone on Doxorubicin-Induced Cardiac Toxicity in a Rat Model

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Abstract : Introduction: Doxorubicin (DOX)-induced cardiotoxicity is widely known as the most severe complication of anthracycline-based chemotherapy in patients with cancer. It is unknown whether Deferiprone (DFP), could reduce the severity of DOX-induced cardiotoxicity by inhibiting free radical reactions. Thus, this study was performed to assess the protective effect of Deferiprone on DOX-induced cardiotoxicity in a rat model. Methods: The rats were divided into five groups. Group one was a control group. Group 2 was DOX (2 mg/kg/day, every other day for 12 days), and Group three to five which receiving DOX as in group 2 and DFP 75,100 and 150 mg/kg/day, for 19 days, respectively. DFP was starting 5 days prior to the first DOX injection and two days after the last DOX injection throughout the study. Electrocardiographic and hemodynamic studies, along with histopathological examination, were conducted. In addition, serum sample was taken and total cholesterol, Malone dialdehyde, triglyceride, albumin, AST, ALT, total protein, lactate dehydrogenase, total anti-oxidant and creatine kinase were assessed. Result: Our results showed the normal structure of endocardial, myocardial and pericardial in the control group. Pathologic data such as edema, hyperemia, bleeding, endocarditis, myocarditis and pericarditis, hyaline degeneration, cardiomyocyte necrosis, myofilament degeneration and nuclear chromatin changes were assessed in all groups. In the DOX group, all pathologic data was seen with mean grade of 2±1.25. In the DFP group with a dose of 75 and 100 mg, the mean grade was 1.41± 0.31 and 1±.23, respectively. In DFP group with a dose of 150, the pathologic data showed a milder change in comparison with other groups with e mean grade of 0.45 ±0.19. Most pathologic data in DFP groups showed significant changes in comparison with the DOX group ($p < 0.001$). Discussion: The results also showed that DFP treatment significantly improved DOX-induced heart damage, structural changes in the myocardium, and ventricular function. Our data confirm that DFP is protective against cardiovascular-related disorders induced by DOX. Clinical studies are needed to be involved to examine these findings in humans.

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