

Side Effects of Anthracycline Chemotherapy on the Heart of Laboratory Animals

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Abstract

Anthracycline is one of the chemical drugs commonly used worldwide for the treatment of various types of cancer. The high doses of it cause unwanted toxic side effects on the tissues. Our study designed to demonstrate the physiological and histopathological effect of the drug on the heart organ of experimental animals. For this purpose, twenty adult male rats were used in this study and were divided into four main groups. Control group, Azoxymethane treated group, Azoxymethane and anthracycline treated group, and anthracycline treated group only. Blood of the experimental animals was collected in order to measure biochemical parameters such as glutathione, lactate dehydrogenase, malondialdehyde, peroxynitrite, Creatinine Kinase, C-reactive protein, Creatine kinase-myocardial band, and Myoglobin concentrations. In this study a significant increase and decrease was observed in biochemical parameters. Histological examination on the heart shown that rats treated with AOM have been revealed only hypertrophy of cardiac muscles, while other groups were observed hypertrophy of cardiac muscles furthermore. Aorta in AOM group have been revealed adverse histological changes and transformation in the thickness aortic wall layers. The tissue sections of the groups treated with Anthracycline showed a negative effect on the aortic wall layers, the endothelial layer and the middle layer, as well as the outer layer in the sections prepared from these groups.

Keywords: Cancer, chemotherapy, anthracycline, azoxymethane.

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INTRODUCTION

Cancer is one of the most dangerous and widespread diseases in countries of the world, as the uncontrolled growth of normal cells as a result of changing the genetic material leads to the formation of cancer cells that invade peripheral tissues and then spread to the rest of the organs, causing the destruction of cells in various organs of the body (Kumar *et al.*, 2003). When a normal cell is exposed to carcinogenic factors, these substances cause changes in the genetic material, and the primary genes in the normal cell are transformed into a mutant cell, which then acquires the character of a tumor cell in the initiation process (Butel., 2000). Then it suffers from division, forming a cancer cell, then it grows, forming a distinct tumor through the process of promotion (Steen, 2000), and then these cells begin to multiply through the process progression, it spreads at the expense of normal cells and migrates

through the bloodstream to other sites in the body in process metastasis (Nevidjon & Sowers, 2000). One of the side effects of cancer cells is an increase in body fat and its deposition in the walls of blood vessels and in the heart muscle, causing myocardial infarction and the emergence of heart and arterial diseases, as well as the production of large quantities of free radicals that cause damage to tissues and organs, numerous studies have demonstrated that abnormal levels of lipids are intimately related to carcinogenesis and cancer metastasis. Malignant transformation and accelerated cancer cell proliferation are in high demand for energy, which induces alterations in lipid metabolism to allow the survival of cancer cells (Zhu *et al.*, 2016).

Anthracycline is widely used and is one of the effective anti-tumor treatments derive from the Streptomyces bacterium. Despite its effectiveness against a group of solid and malignant blood tumors, its