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Editorial

Beneficial Effect of Natural Product Derivative Diosmin on Myocardial Infarction

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Cardiovascular diseases (CVD) are a heterogeneous group of disorders that affect the heart and blood vessels. According to the World Health Organization in 2019, 17.9 millions of deaths were due to coronary heart disease and it is projected that by 2030 almost 23.6 million people will die from CVD. Myocardial infarction is a death of a segment of heart muscle, which follows interruption of its blood supply. During myocardial infarction, there is huge generation of various reactive oxygen species (ROS) such as superoxide anion, hydrogen peroxide, and hydroxyl radicals. Many epidemiological studies have suggested that myocardial infarction is one of the greatest risk factors for morbidity and mortality [1]. The animal models of myocardial infarction are essential to understand the prevention, diagnosis and management of human myocardial infarction.

Flavonoids are present in fruits and various plants which are pharmacologically active and can be used for the treatment of degenerative diseases. Diosmin (3′, 5, 7-trihydroxy-4′-methoxyflavone 7-rutinoside) is an unsaturated flavone that is present mainly in Hyssop and Rosemary. It has been receiving much attention because of its wide array of biological properties. Diosmin is considered as a vascular protecting agent in the treatment of hemorrhoids, lymphedema, varicose veins and different types of cancer. Also, intake of certain flavonoids associated with lessened risk of cancer, diabetes mellitus and cardiovascular disease because of their antioxidant and free radical scavenging properties [2].

My research aims to evaluate the protective effects of diosmin on experimentally induced myocardial infarcted rats. The study shows that diosmin provides cardio protection by preventing the accumulation of lipids by its free radical scavenging and antihyperlipidaemic effects [1].

Membrane bound enzymes such as sodium-potassium dependent adenosine triphosphatase (Na^+/K^+ ATPase), calcium dependent adenosine triphosphatase (Ca^{2+} ATPase) and magnesium dependent adenosine triphosphatase (Mg^{2+} ATPase) of cardiac cells play a major role in the contraction and relaxation cycles of cardiac muscle. They also act as key messengers in signal transduction pathways in the heart. But ATPases dysfunction affects the functioning of heart. Hence, ATPases are considered as one of the new therapeutic targets for myocardial infarction [2].

The main source of cellular ROS is mitochondria. Oxidative phosphorylation takes place in mitochondria. During myocardial infarction, oxygen supply is limited. Hence, mitochondrial energy production is impaired. For the cardiac contraction and relaxation, adenosine triphosphate synthesis and electron transport chain which takes place in mitochondria are essential. Mitochondrial damage in myocardial infarction due to oxidative stress causes excessive ROS production, cellular injury, and dysfunction of mitochondria, thereby affecting cardiac contraction and relaxation. Thus, mitochondria are the source and target of ROS-mediated cardiac injury in myocardial infarction [3].

Antioxidant therapy can inhibit oxidative stress and prevent myocardial infarction. Also, preserving cardiac mitochondrial function is one of the best therapeutic approaches to prevent myocardial infarction. Based on the antihyperlipidaemic effects of diosmin, we hypothesized that diosmin can prevent oxidative stress in mitochondria. In this context, the preventive effects of diosmin on altered lipid peroxidation, antioxidant system, tricarboxylic acid (TCA) cycle enzymes, calcium ions (Ca^{2+}), and structure of mitochondria in isoproterenol-induced myocardial infarcted rats heart were evaluated. Further, to know the mechanism of action of diosmin, *in vitro* ferric reducing antioxidant power (FRAP) assay was done. Diosmin attenuates cardiac mitochondrial oxidative stress in isoproterenol-induced myocardial infarcted rats and prevents mitochondrial damage, by virtue of its antioxidant and negative inotropic properties [3].

Currently, there has been an increased interest globally to identify natural compounds that are pharmacologically potent and have low or no adverse effects for use in preventive medicine.

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