This study investigated the preventive effects of diosmin in ISO-induced myocardial infarcted rats. ISO administration resulted in significant increase in the activities of cardiac markers in serum. Pretreatment with diosmin (5 and 10 mg/kg) daily for a period of 10 days significantly decreased the activities of these cardiac markers in the serum of ISO-induced myocardial infarcted rats. Diosmin also reversed the changes of ECG in ISO-induced myocardial infarcted rats.

The levels of C-reactive protein and homocysteine were increased in the serum of ISO-induced myocardial infarcted rats. Oral pretreatment with diosmin decreased C-reactive protein and homocysteine levels in the serum of myocardial infarcted rats, by its anti-inflammatory activity.

The levels of lipid peroxidation products such as TBARS and LOOH were increased in the heart of ISO-induced myocardial infarcted rats. Oral pretreatment with diosmin inhibited the lipid peroxide formation and free radical production in myocardial infarcted rats. Lowered activities/levels of enzymic and non-enzymic antioxidants were observed in the heart of ISO-induced rats. Oral pretreatment with diosmin maintained the antioxidant system in ISO-induced myocardial infarcted rats.

Isoproterenol administration to rats significantly increased the levels of serum and heart lipids indicating its hyperlipidemic effects. Alterations in the levels of plasma lipoprotein fractions were also observed. Diosmin pretreatment maintained the levels of lipids and lipoproteins in myocardial infarcted rats.
In ISO-induced myocardial infarcted rats, the activity of HMG-CoA-reductase was increased in the liver. Diosmin pretreatment prevented the increase in the activity of HMG-CoA reductase in the myocardial infarcted rats.

The levels of serum and heart glycoprotein components such as hexose, hexosamine, fucose and sialic acid were increased in ISO-induced myocardial infarcted rats. Pretreatment with diosmin decreased the levels of these glycoprotein components in the serum and heart of ISO-induced myocardial infarcted rats.

The concentrations of TBARS were increased and the activities of TCA cycle enzymes were reduced in ISO-induced myocardial infarcted rats. Diosmin pretreatment decreased the concentration of TBARS and increased the activities of TCA cycle enzymes in the heart mitochondrial fraction of myocardial infarcted rats, by its free radical scavenging effects.

Administration of ISO-increased the levels of mitochondrial lipids (cholesterol, TGs, FFAs) and decreased the levels of phospholipids. Oral pretreatment with diosmin restored the levels of mitochondrial lipids, indicating the effect of diosmin on maintaining the integrity of mitochondrial membrane in myocardial infarcted rats, by its antihyperlipidaemic effects.

Significant decreases in the activities/levels of mitochondrial antioxidant system were observed in ISO-induced myocardial infarcted rats. Pretreatment with diosmin enhanced the mitochondrial antioxidant system in myocardial infarcted rats. This might be due to the antioxidant property of diosmin.
Isoproterenol -induction led to decreased activity of Na\(^+\)/K\(^+\)-ATPase and increased activities of Ca\(^{2+}\) and Mg\(^{2+}\)-ATPases in the heart. Pretreatment with diosmin increased the activity of Na\(^+\)/K\(^+\)-ATPase and decreased the activities of Ca\(^{2+}\) and Mg\(^{2+}\) -ATPases in ISO-induced myocardial infarcted rats. Diosmin also maintained the levels of electrolytes in myocardial infarcted rats.

Histopathology findings of the ISO-induced myocardium showed necrosis, inflammatory cells and edema. Diosmin pretreatment decreased the severity of damage in the myocardium of ISO-induced myocardial infarcted rats. TEM study on the structure of heart mitochondria also confirmed the preventive effects of diosmin in ISO-induced myocardial infarcted rats.

The results of in silico studies showed moderate intestinal absorption, protein plasma binding of more than 90% and no blood brain barrier penetration. From the toxicity predictions, it is found that diosmin is aerobically non-biodegradable and non toxic in lesser doses. From the docking results, diosmin is showing highest binding affinity with human HMG-CoA reductase and has better affinity with other cardioprotective targets. The present study provides experimental evidence that the oral pretreatment of diosmin (10 mg/kg) was safe and highly effective in cardiac dysfunction. The results of the present study provided the basis for a new application of diosmin to prevent MI. Our results show that diosmin was safe and highly effective against MI in rats possibly due to its antihyperlipideamic, antilipid peroxidation, antioxidant, anti-inotropic, membrane stabilizing and free radical scavenging activities. Collectively, these data support the potential importance of diosmin in regular diet. Since, current therapies with available drugs show many side effects and heterogeneous etiology
of MI. Our study recommends the inclusion of diosmin in a healthy diet to prevent myocardial infarction. Based on the findings of this research work, diosmin seems to be one of the promising molecules to explore therapeutic alternatives in the prevention of MI. Further, clinical trials are necessary before diosmin could be developed as a drug for the treatment of MI in humans. A greater understanding of the ways in which diosmin may protect the heart from MI could help to establish effective therapeutic interventions with diosmin-rich foods. Considering the preventive effects of diosmin on MI, the results of this study open the way to promote products which are rich in diosmin.