

Impact of Polyphenols in Cardioprotection; A Perspective

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Polyphenols are the secondary metabolites of plants. The major classes of polyphenols are flavonoids, phenolic acids, lignans and stilbenes. The anti-oxidant activity of phenolic groups of polyphenols is conducted in many ways such as the hydroxyl group inhibits the initiation of new reactive oxygen cycle and produce relatively stable radical than the initial one, by chelating metal ions contributing in free radical generation or by inhibiting enzymes involve in free radical initiation [1]. Polyphenols are focus of research interest as they can play a beneficial role in prevention of many health issues particularly cardiovascular diseases.

Michalska, *et al.* reported that, besides antioxidant role of polyphenols (PPs), vasodilatory and immunomodulatory properties of polyphenols may also contribute to cardiovascular disease risk reduction [2]. According to the study by Borriello A., *et al.* reactive oxygen generation (ROS) generation starts upon the reperfusion of an ischemic tissue due to rebound hyperoxia and oxidation of reduced intermediates. Production of ROS such as the potent peroxy nitrite from superoxide and nitric oxide (NO) in the vessel lumen is a primary trigger for endothelial injury, an event that drives a marked inflammatory response and apoptosis [3].

Catalase and Superoxide dismutase (SOD) are the primary enzymes for the elimination of ROS. One study reported suggested that anti-oxidant activity of PPs can hinder the activity of ROS producing enzymes such as nicotinamide adenine dinucleotide phosphate (NADPH) oxidase and xanthine oxidase. PPs promotes the antioxidant activity of catalase (catalase) [4]. Murugesan, *et al.* detected a prominent decline in CAT and SOD activities in the isoproterenol-induced myocardial infarction in rats, due to production of free radicals by isoproterenol. The level of these two enzymes were restored near to normal by administration fenugreek PPs. This proves the antioxidant effect of polyphenols against myocardial injury caused by free radicals [5].

Stein, *et al.* found that short-term intake of grapes helps to improve Flow-mediated vasodilation (FMD) and decreases LDL susceptibility to oxidation in coronary artery disease (CAD) patients [6]. There are widespread evidences that the antiplatelet therapy reduces cardiovascular disease risk [7]. It is reported that flavonoids inhibit platelet aggregation, regarding the potential mechanisms of flavonoids on platelet function. Vitseva, *et al.* studied the role of grapes extracts on platelets. They detected that flavonoids are associated in reducing platelet aggregation, a decrease in formation of superoxide anion, and an increase in production of nitric oxide [8]. According to Du Y., *et al.* two major polyphenols; catechin and proanthocyanidin B4 pretreatment led to a striking reduction in xanthine oxidase enzyme, thus controlling the ROS production and cardiac cell apoptosis. These outcomes directed that polyphenols rich diet could protect against apoptosis of cardiac cell via the initiation of endogenous anti-oxidative enzymes [9].

There are still several challenges in current reported studies about the role of polyphenols in cardiovascular diseases. Firstly, the data about the amount and types of polyphenols in various foods is not sufficient, secondly incomplete reported databases and results and lastly very limited research studies are conducted on cardiovascular diseases. However, these studies provide support to the potential role of PPs and there are more quality pre-clinical and clinical studies are required for scientific confirmation of PPs active and beneficial role in cardiovascular diseases.

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