ABSTRACT

Platelets play an indispensable role in human health and disease. They are very sensitive to oxidative stress, as it leads to mitochondrial damage resulting in cell death via apoptosis. Further, apoptotic platelets release phosphatidylserine-positive membrane fractions called microparticles, which are involved in the promulgation of a host of disease conditions including cardiovascular diseases. In this context, mention can be made of several phytochemicals reported to be cardioprotective and work by targeting platelet activation and aggregation. Ample reports focus on the positive effects of phytochemicals on normal physiology of platelets, but do not focus on their adverse effects. Moreover, platelets are reported to be extremely sensitive to therapeutic and dietary components in the blood. Hence, in this study, several therapeutically important phytochemicals were screened and two molecules sesamol and crocin were selected, because of their contrasting effects on platelet functions. Crocin is a carotenoid isolated from saffron. The present study demonstrated that it dose-dependently ameliorated endogenous generation of ROS and \( \text{H}_2\text{O}_2 \) in platelets. It also abolished the \( \text{H}_2\text{O}_2 \)-induced events of intrinsic apoptotic pathway. Further, it hindered collagen-induced platelet aggregation and adhesion. Sesamol is a phenolic lignan present in sesame seeds and oil. It was reported to inhibit platelet aggregation at concentrations below 100 µM, and has anti-cancer effect at 1 mM. In the present sesamol (>0.25 mM) was shown to induce platelet apoptosis through ROS-mediated mitochondrial pathway. However, even at high concentration of 2 mM sesamol inhibited agonist-induced platelet aggregation. Furthermore, the inhibition of sesamol-induced platelet apoptosis by crocin was also demonstrated. Thereby, crocin can be deemed as a prospective candidate in the treatment regime of platelet-associated diseases including cardiovascular diseases. On the other hand, even though sesamol inhibits platelet aggregation, it has the tendency to elicit platelet apoptosis at higher concentrations. Thus, it has a potential as thrombolytic agent, nevertheless the study highlights the significance of an appropriate dosage of sesamol when it is used as a therapeutic drug. Moreover, the need for scrutiny of therapeutic compounds for their effects on platelets before including them in treatment regimen is also being emphasized.