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Comparison between the effect of crocetin and N-acetylcysteine on inhibition of protein glycation, misfolding and aggregation of Rat serum albumin in both in vivo and in vitro

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Abstract

Background and Aim : Misfolding and aggregation of proteins are the most important consequences of protein glycation that happens due to hyperglycemia. We previously showed the beneficial effects of some anti-glycating agents in diabetic rats. Here, the effect of crocetin (Crt, a saffron carotenoid) and N-acetylcysteine (NAC) was studied in diabetic-atherosclerotic rats. Then, its inhibitory effect on glycation intermediates, aggregation and misfolding of proteins was investigated in the in vitro condition

Methods: The effect of Crt and NAC was studied on the in vitro glycation of rat serum albumin (RSA). Then, the glycated products and markers of oxidation and inflammation, in addition to other markers of diabetes were studied in diabetic-atherosclerotic rats

Results: the data obtained in the in vitro study showed the inhibition of formation of all early, intermediate and advanced glycation end products of RSA. Similar results also obtained in the in vivo study. Both Crt and NAC lead to significant decrease of the increased blood glucose; inhibition of the formation of various glycation product and inflammatory markers, and improved lipid profile and atherosclerotic index in the diabetic-atherosclerotic rats; but Crt was the most effective in prevention of atherosclerotic lesions due to more reductive effect on oxidative products of LDL, Hs CRP and glyoxal than NAC in diabetic-atherosclerotic rats as well as no difference on end oxidation product of LDL in no-treated and treated with NAC diabetic-atherosclerotic rats. In vitro results also indicated the anti-glycating effect of all treatments and decrement of the misfolded protein but Crt showed more inhibitory effect on intermediates glycation products than NAC vice versa on AGEs (P < 0.001)

Conclusion: These results indicated that the treatments that have more reductive effect on LDL oxidation and inflammatory markers maybe more potent in prevention of vascular complications of diabetes.

Keywords : Glycated Products; Misfolding; Aggregation; Diabetic Complications; atherosclerotic Plaque; Rat Serum Albumin; Crocetin; N-acetylcysteine and Streptozotocin