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CLINICAL TRIAL STUDY

Anti-inflammatory effect of *Crocus sativus* on the Serum Cytokines Levels in Subjects with Metabolic Syndrome: A Randomized, Double-blind, Placebo-controlled Trial

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Abstract: ***Background/Aims*:** A growing body of evidence supports an important role of inflammatory-cytokines in development and progression of metabolic-syndrome (MetS), which ~~explain~~ at least in part, its relationship with an increased cardiovascular-risk. Several studies have reported the therapeutic-impact of crocus-sativus in preclinical/clinical setting. Here we have explored the effects of crocus-sativus, saffron, on the modulation of twelve serum cytokines in subjects with MetS in a randomized control trial.

***Methods*:** Forty four adult volunteers, who met the diagnostic-criteria of MetS, were enrolled and randomly divided into 2 groups, to receive 100 mg/day crocus-sativus for 12 weeks. 12 cytokines, including IL-1α, IL-1β, IL-2, IL-4, IL-6, IL-8, IL-10, TNF-α, MCP-1, IFN-γ, EGF, and VEGF were measured using ~~a~~ sandwich chemi-luminescence assays before/after therapy.

***Results*:** Our findings showed that MetS-patients who received ~~therapy~~ had significantly (P<0.05) lower levels of total-cholesterol, low density-lipoprotein-cholesterol and triglyceride (TG), fasting-blood-sugar and hsCRP, however the serum concentration of high density-lipoprotein-cholesterol markedly enhanced after therapy (*e.g.*, TG level reduced from 148.86±71.49 to 101.90±38.19 after therapy, P= 0.003). Moreover, we observed that Crocus-sativus was ~~able to modulate~~ the serum-concentrations of some pro-/anti-inflamatory cytokines. In particular, the level of VEGF was increased from 12.64 pg/mL (95% CI: 9.60-17.67) to 16.59 (95% CI: 11.33-35.98, P= 0.033. Similar results were detected for IL-6 and EGF.

***Conclusion*:** Our findings provide a novel insight on the therapeutic role and mechanisms of this therapy in treatment of MetS patients *via* perturbation of cytokines and reducing the levels of triglyceride and LDL/TC, supporting further studies in a larger population.

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INTRODUCTION

Metabolic syndrome (MetS) consists of a ~~group~~ of metabolic abnormalities including central obesity, dyslipidemia, insulin resistance, hypertriglycemia and raised blood pressure. Individuals with metabolic syndrome show more susceptibility to development of diabetes, heart and blood vessel diseases [1, 2]. The prevalence of metabolic syndrome has been increasing globally, varies ~~upon~~ ethnicity and a prevalence of 40% has been reported in Iranian northeast population [2].

The molecular ~~mechanism behind~~ metabolic syndrome ~~is~~ not known but it is considered to be a complex interaction

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