Bioavailability of antioxidant vitamins. Relation between the modality of intake and plasma markers of oxidative stress

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Introduction

Experimental and epidemiological data suggest that antioxidant vitamin supplementation may prevent cardiovascular events [1]. Clinical trials have generally failed to confirm benefits [2, 3], possibly due to the modality of intake, in relation to food.

The aim of the study

The aim of the study was to assess the relation between the modality of vitamin intake with plasma markers of oxidative stress.

Patients and methods

Forty-four cardiovascular event-free obese men without others CHD risk factors, without symptoms of inflammatory disease and the control group of normoweight healthy subjects ($n = 18$) were included in the study. Combined

supplementary vitamin E and vitamin C (2×100 and 2×200 mg daily, respectively) was administered to obese subjects and the control group on an empty stomach (mode “Fasting”) or during dinner (mode “Meal”), for 14 days, after 14 days of washing period in cross-over study. All subjects were evaluated using lipoprotein profile, anthropometric parameters, body composition (BMI, WHR, % of adipose tissue) and insulin resistance (HOMA-IR). Parameters of oxidative stress: TBARS, total plasma lipid hydroperoxides (LOOH), LDL oxidative susceptibility, and antioxidant potency parameters: ferric reducing/antioxidant power test (FRAP), thiol/albumin ratio, vitamin E, C were measured. Redox compensation index (RCI) was calculated from formula: $RCI = [FRAP/plasma\ LOOH/cholesterol]/100$.

Results

Biomarkers of oxidative damage were higher, parameters of antioxidant defense were lower in obese subjects compared to control group (Figs. 1, 2). Plasma vitamin level increased after supplementation similarly in both groups. Vitamin E and C absorption was increased by food intake (Fig. 3). Plasma antioxidant potency was increased and oxidative stress parameters were markedly diminished by antioxidant supplementation and food intake (Fig. 4).

Conclusion

Food intake increases the bioavailability of antioxidant vitamins and improves their free-radical-scavenging activity.

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Fig. 1 Biomarkers of plasma oxidative stress in obese subjects compared to control (*white bar* control group, *gray bar* obese group)

Fig. 2 Biomarkers of plasma antioxidant defence in obese subjects compared to control (*white bar* control group, *gray bar* obese group)

Fig. 3 Vitamin E and C absorption in relation to food intake (*white bar* control group, *gray bar* obese group, *MF* fasting mode, *MM* meal mode, % = percent of change)

Fig. 4 The effectiveness of the combined supplementary vitamin E and vitamin C in relation to food intake (*white bar* control group, *gray bar* obese group, *MF* fasting mode, *MM* meal mode, % = percent of change)

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