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PROCEEDINGS

Effect of supplementation with vitamin E and C on plasma hsCRP level and cobalt–albumin binding score as markers of plasma oxidative stress in obesity

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Introduction

About 50% of patients presenting acute coronary syndrome not displayed classical risk factors, remaining inaccessible for prevention. Plasma hsCRP [1] and cobalt–albumin binding (ABSU) test [2] were recently introduced as more informative cardiovascular risk markers. Ischemia modified albumin (IMA) assessed with ABSU test, appears to be an indicator of oxidative stress, may not be specific for cardiac ischemia. Data about IMA concentrations in non-cardiac ischemia are limited. Vitamin E and C, potent antioxidants have several anti-atherogenic effects [3].

The aim of the study

The aim of study was to assess the effects of short-term dietary supplementation with vitamin E and C on the relation between plasma hsCRP, IMA level and oxidative stress/antioxidant capacity parameters.

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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 C (2×100 mg and 2×200 mg daily, respectively) was administered to obese subjects and the control group during dinner, for 14 days, after 14 days of washing period. All subjects were evaluated using lipoprotein profile, plasma hsCRP and cobaltalbumin binding assay (ABSU expressed as IMA/alb ratio) as ischemia marker [3], 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 (AUC LDL), and antioxidant potency parameters: ferric reducing/antioxidant power test (FRAP), thiol/albumin ratio (SH, SH/alb), LDL oxidative resistance (LDL lag phase), vitamin E and C plasma levels were measured. Redox compensation index (RCI) was calculated from formula: $\mathrm{RCI} = [\mathrm{FRAP}/\text{plasma LOOH}/\text{cholesterol}]/100$.

Results

hsCRP, IMA/alb ratio, and biomarkers of oxidative damage were higher, biomarkers of antioxidant defense were lower in obese subjects compared to control group (Figs. 1, 2). Plasma hsCRP and IMA/alb high-risk tertile revealed oxidative alteration of LDL, higher plasma content of hydroperoxides and TBARS, RCI was significantly reduced. HsCRP and IMA directly correlated with BMI, WHR and the percent of body fat (Tables 1, 2). The short supplementary therapy with vitamins augmented plasma

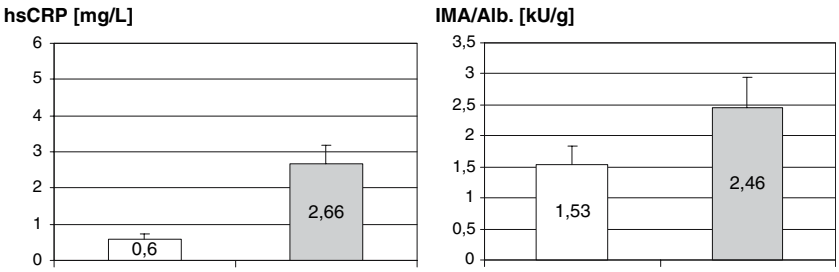

Fig. 1 Plasma hsCRP and IMA/alb level in obese subjects compared to control group (*white bar* control group, *grey bar* obese group). $*P < 0.05$

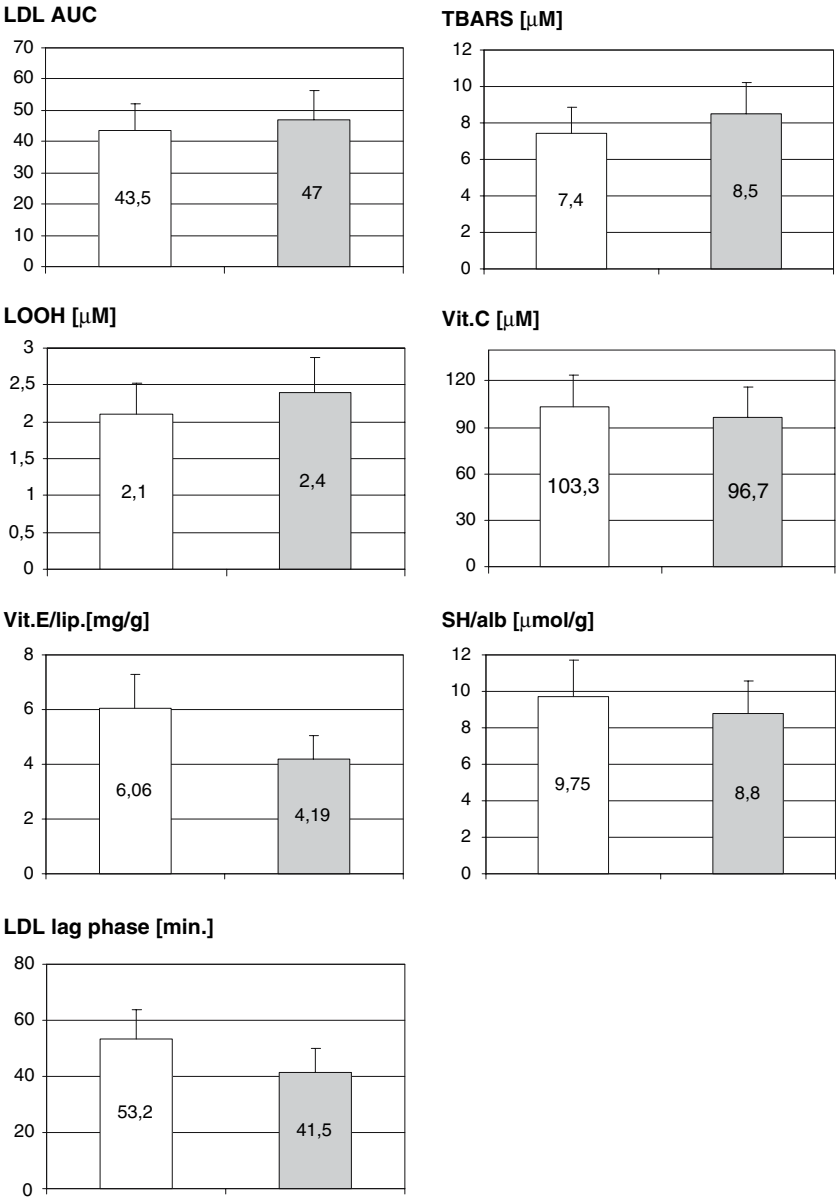

Fig. 2 Biomarkers of oxidative damage and antioxidant defence in obese subjects compared to control group (*white bar* control group, *grey bar* obese group). $*P < 0.05$

antioxidant potency (Fig. 3). The magnitude of oxidative stress reduction in response to vitamin supplementation was related to hsCRP and ischemia modified albumin plasma levels (Tables 3, 4).

Conclusion

Plasma hsCRP and cobalt–albumin binding score may serve as potential marker of oxidative stress in obesity and

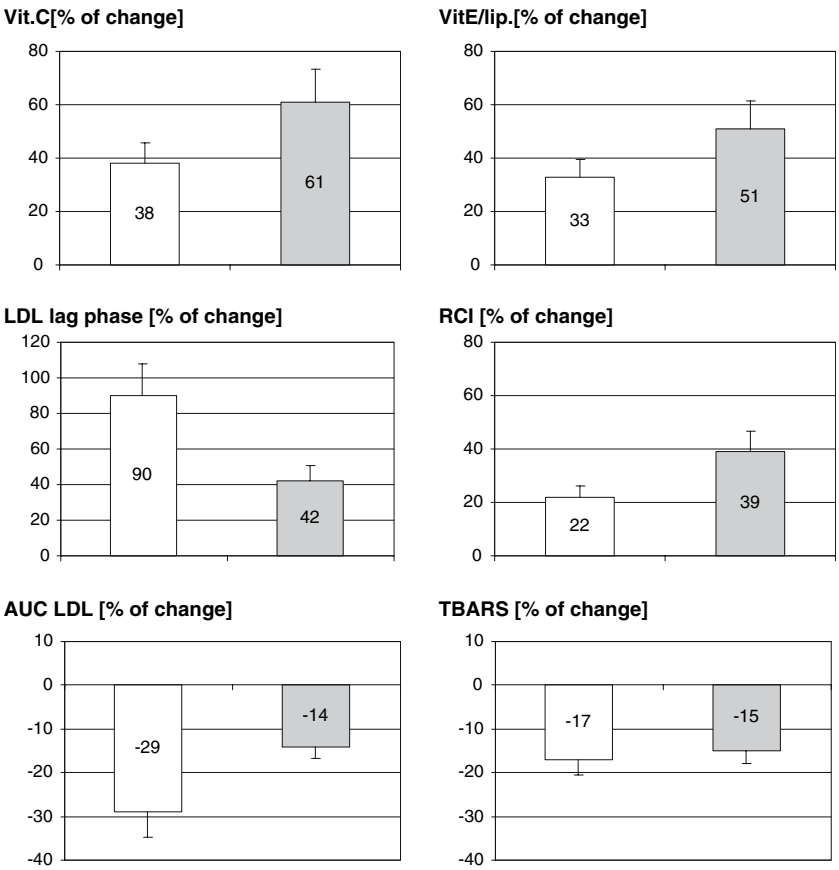

Fig. 3 The effect of antioxidant therapy on plasma markers of antioxidant defence/oxidative stress in obese subjects compared to control group(*white bar* control group, *grey bar* obese group). *$P < 0.05$

Table 1 Relation of hsCRP with plasma markers of oxidative stress/antioxidant defense and anthropometric parameters

	SBP (mmHg)	DPB (mmHg)	BMI (kg/m^2)	Waist (cm)	WHR (cm/cm)	Adipose tissue (%)
Baseline hsCRP (mg/l)	$r = 0.33$*	$r = 0.38$*	$r = 0.54$*	$r = 0.57$*	$r = 0.55$*	$r = 0.54$*
	Tg (mmol/L)	Log (Tg/HDL)	HDL-chol (mmol/L)	Vit E (μM)	Vit C (μM)	FRAP (mM)
Baseline hsCRP (mg/l)	$r = 0.31$*	$r = 0.34$*	$r = –0.20$*	$r = –0.35$*	$r = –0.26$*	$r = –0.27$*
	SH (μM)	LDL lag phase (min.)	IMA/alb (kU/g)			
Baseline hsCRP (mg/l)	$r = –0.38$*	$r = –0.23$*	$r = 0.36$*			

* $P < 0.05$

Table 2 Relation of IMA/alb with plasma markers of oxidative stress/antioxidant defense and anthropometric parameters

	SBP (mmHg)	DBP (mmHg)	WHR (cm/cm)	Adipose Tissue (%)	Vit E (μM)	SH (μM)
Baseline IMA/alb (kU/g)	$r = 0.43$*	$r = 0.36$*	$r = 0.21$*	$r = 0.28$*	$r = –0.51$*	$r = –0.41$*
	FRAP (mM)	RCI	LDL lag phase (min)	AUC LDL	hsCRP (mg/l)	
Baseline IMA/alb (kU/g)	$r = –0.50$*	$r = –0.22$*	$r = –0.40$*	$r = 0.47$*	$r = 0.36$*	

* $P < 0.05$

Table 3 Effectiveness of the antioxidant therapy in relation to hsCRP

	vit. E/lip. (% of change)	FRAP (% of change)	
hsCRP before supplementation	$r = 0.42$*	$r = 0.38$*	
	IMA/alb after supplementation	WitE/lip after supplementation	SH/alb after supplementation
hsCRP after supplementation	$r = 0.30$*	$r = –0.32$*	$r = –0.39$*

* $P < 0.05$

Table 4 Effectiveness of the antioxidant therapy in relation to IMA/alb

	vitE (% of change)	vit. E/lip. (% of change)	vitC (% of chang)e	LDLlag phase (% of change)	AUC LDL (% of change)
IMA/alb before supplementation	$r = 0.28$*	$r = 0.35$*	$r = 0.26$*	$r = 0.39$*	$r = – 0.30$*
	hsCRP after supplementation				
IMA/alb after supplementation	$r = 0.30$*				

* $P < 0.05$

may be useful for selecting patients who are candidates for supplementation with antioxidant vitamins.

References

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