



ORIGINAL ARTICLE

Red wine intake but not other alcoholic beverages increases total antioxidant capacity and improves pro-inflammatory profile after an oral fat diet in healthy volunteers



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Received 18 March 2015; accepted 8 July 2015

Available online 18 August 2015

KEYWORDS

Alcohol intake;
Oral fat diet;
Inflammation;
Oxidative stress

Abstract

Introduction: Different alcoholic beverages exert different effects on inflammation and oxidative stress but these results are controversial and scanty in some aspects. We analyze the effect of different alcoholic beverages after a fat-enriched diet on lipid profile, inflammatory factors and oxidative stress in healthy people in a controlled environment.

Methods: We have performed a cross-over design in five different weeks. Sixteen healthy volunteers have received the same oral fat-enriched diet (1486 kcal/m²) and a daily total amount of 16 g/m² of alcohol, of different beverages (red wine, vodka, brandy or rum) and equivalent caloric intakes as sugar with water in the control group. We have measured the levels of serum lipids, high sensitivity C-reactive protein (hsCRP), tumor necrosis factor α (TNF α), interleukin 6 (IL-6), soluble phospholipase A2 (sPLA2), lipid peroxidation (LPO) and total antioxidant capacity (TAC).

Results: Red wine intake was associated with decreased of mean concentrations of hsCRP, TNF α and IL-6 induced by fat-enriched diet ($p < 0.05$); nevertheless, sPLA2 concentrations were not significantly modified. After a fat-enriched diet added with red wine, TAC increased as compared to the same diet supplemented with rum, brandy, vodka or the control (water with sugar) ($p < 0.05$).

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PALABRAS CLAVE

Consumo de alcohol;
Dieta rica en grasas;
Inflamación;
Estrés oxidativo

Conclusions: Moderate red wine intake, but not other alcoholic beverages, decreased pro-inflammatory factors and increased total antioxidant capacity despite a fat-enriched diet intake in healthy young volunteers.

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El consumo de vino tinto pero no otras bebidas alcohólicas aumenta la capacidad antioxidante y mejora el perfil pro-inflamatorio después de una dieta rica en grasas oral en voluntarios sanos

Resumen

Introducción: El efecto de las bebidas alcohólicas sobre la inflamación y el estrés oxidativo es variable y solo parcialmente conocido.

Objetivo: : analizar el efecto de diferentes bebidas alcohólicas sobre el perfil lipídico, factores de inflamación y estrés oxidativo en personas sanas con ingesta de una dieta enriquecida en grasas.

Métodos: Se diseñó un estudio cruzado durante cinco semanas. Dieciséis voluntarios sanos recibieron la misma dieta enriquecida con grasa oral (1.486 kcal/m²) más 16 g/m² de alcohol diarios, consumido como vino tinto, vodka, brandy o ron, o un equivalente calórico en el grupo control (azúcar y agua). Se midieron lípidos en suero, proteína C reactiva de alta sensibilidad (PCR-as), factor de necrosis tumoral (TNF) α , interleucina 6 (IL-6), fosfolipasa A2 soluble (sPLA2), la peroxidación lipídica (LPO) y la capacidad antioxidante total (TAC).

Resultados: La ingesta de vino tinto se asoció con una disminución significativa de las concentraciones de PCR-as, TNF α e IL-6, inducida por una dieta rica en grasas ($p < 0,05$). Las concentraciones de sPLA2 no se modificaron. El consumo de vino tinto, aún con una dieta rica en grasas, aumentó la capacidad antioxidante total comparada con el ron, brandy, vodka o el control (agua con azúcar) ($p < 0,05$).

Conclusiones: La ingesta moderada de vino tinto, pero no de otras bebidas alcohólicas, disminuyó las concentraciones de factores proinflamatorios y aumentó la capacidad antioxidante total, a pesar de la dieta enriquecida en grasa en voluntarios jóvenes sanos.

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Introduction

Atherosclerosis is considered to be a chronic local micro-inflammatory process in the subintimal space of arteries due to the deposit of oxidized LDL particles, where inflammatory factors and oxidative stress play a role.¹ Dietary composition plays a role in atherogenesis, not only by modifying cholesterol levels, but also by modifying the prooxidant/antioxidant and pro-inflammatory/anti-inflammatory profile. Several cohort studies have shown that the western diet, rich in saturated fat, increases cardiovascular events and cardiovascular mortality.² However, the incidence and prevalence of cardiovascular disease in some populations with a fat-rich diet are similar to those of countries with a lower fat intake.^{3,4} Moderate red wine intake has been related to this effect, which has been known as "the French Paradox"⁵ due to the increase in HDL cholesterol and the benefits on haemostatic factors.⁶ In fact, since the French paradox was reported, many studies have demonstrated that moderate alcohol intake has a cardioprotective effect.⁶ However, the lifestyle, socio-economical factors, the pattern of consumption and the type of alcoholic beverage

could be important confounding factors when analyzing this association.

The relationship between alcoholic beverage intake, inflammation and antioxidant metabolism is controversial. Some prospective studies have proved that light-to-moderate alcohol intake is associated with lesser concentrations of inflammatory factors, including C reactive protein (CRP) and interleukin 6 (IL-6).⁷⁻⁹ However, no information on the impact in inflammatory mediators such as soluble phospholipase A2 (sPLA2) is available. This association could be explained by an ethanol-dependent effect.¹⁰ Moreover, some prospective studies have shown that the results are better for the consumption of red wine than for beer or other alcoholic drinks.^{11,12} Data are controversial concerning the oxidative damage. Intervention studies have shown that moderate alcohol consumption is linked to increase in free radicals and lipid peroxidation^{13,14} but, on the other hand, moderate alcohol consumption decreased DNA oxidation markers¹⁵ and increased antioxidant capacity.¹⁶

Polyphenols, which are found in abundance in red wine, are thought to stimulate the prevention of atherosclerosis, and a regular moderate intake of wine has been shown to

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