

Red Wine and Vascular Reactivity: Evidence And Uncertainties

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Editorial referring to the article: *Comparison of the Effects of Alcoholic and Non-Alcoholic Red Wine on Flow-Mediated Dilation and Brachial Artery Vasodilation*

Despite the absence of long-term randomized clinical trials on alcohol consumption, several studies have found that light to moderate alcohol consumption is associated with reduced cardiovascular mortality and a decreased risk of Coronary Artery Disease (CAD) compared with no alcohol consumption or excessive alcohol consumption. However, other studies have questioned this benefit, and no level of alcohol consumption has been shown to be beneficial for other cardiovascular disease outcomes (stroke, hypertension, heart failure, etc.).¹

The French paradox, which states that mortality from CAD is lower in France than would be expected from the country's high national prevalence of smoking and saturated fat consumption, has been attributed to the frequent consumption of red wine, which contains phenolic and flavonoid substances with antithrombotic and antioxidant properties.² Its consumption has also been associated with improvements in heart rate variability,³ which may contribute to a better prognosis of CAD.

Some studies suggest that all alcoholic beverages offer cardioprotective benefits, while others indicate that this effect is stronger for wine. A meta-analysis of 13 cohort studies, involving 209,418 individuals, reported a strong and statistically significant benefit associated with moderate consumption of beer and wine. However, the effect was pronounced for wine (32% versus 22% reduction in relative risk) concerning vascular risk.⁴ Red wine and two of its antioxidants, but not other alcohol sources, also prevent activation of mononuclear cell nuclear factor kappa B. This redox-sensitive transcription factor is involved in processes that may contribute to atherosclerosis.⁵ It was demonstrated that antioxidants like N-acetylcysteine and resveratrol from wine inhibited the production of reactive oxygen species in macrophages and promoted cell migration by restoring focal adhesion kinase activity. Other potentially beneficial effects of alcohol include increased High-Density Lipoprotein (HDL) cholesterol, increased insulin sensitivity, and anti-inflammatory effects.

The health of the vascular endothelium plays a key role in regulating fluid filtration, platelet activation, inflammation, cell proliferation, and vascular tone. Endothelial dysfunction is

associated with cardiovascular diseases such as CAD, arterial hypertension, renovascular disease, and atrial fibrillation. Flow-Mediated Dilation (FMD), known as brachial artery reactivity, is a noninvasive technique to assess endothelial function through endothelium-dependent vasodilation of the peripheral brachial artery. The prognostic value of FMD for cardiovascular events has been demonstrated through several meta-analyses.⁶ Numerous studies have used brachial FMD to examine the effects of alcohol consumption on endothelial function. The results are inconsistent. This may be due to several factors, including heterogeneity of individual characteristics, type and quantity of alcohol, and timing of measurement (acute vs. chronic consumption). A systematic review was carried out by Hwang *et al.*⁷ in which 31 studies were included; 14 studied acute effects. Most studies had predominantly male and young participants (mean age between 21 and 36 years). In studies with wine, when comparing with or without alcohol, the results were conflicting. Some studies have found that polyphenols may acutely increase FMD and prevent its reduction after alcohol consumption, while others have suggested that polyphenols may not affect FMD.

In this issue, a FMD analysis was carried out on a group of 22 participants, the majority of whom were women with an average age of 25 years and were physically active.⁸ The controlled intake of red wine with standardized alcohol content over three weeks was evaluated, compared to a control group with a similar diet and routine. A slight improvement was observed in endothelial function parameters and a more favorable inflammatory profile in the group exposed to red wine, although without robust statistical significance. Alcoholic wine was associated with reduced FMD, suggesting that ethanol may negatively interfere with endothelial function. However, the study has a substantial methodological limitation: the lack of strict criteria for excluding individuals with patterns of alcohol abuse in the past. Although the sample is composed of participants who have already consumed alcoholic beverages occasionally, behavioral heterogeneity may introduce biases in the interpretation of the results. There was also no information about the phase of the menstrual cycle or the use of oral contraceptives. Ovarian hormones, such as estradiol, fluctuate throughout the menstrual cycle and can affect vascular function.

This work contributes to the debate on lifestyle habits and cardiovascular health, rekindling interest in bioactive substances present in foods and beverages. Many of the health benefits and risks of alcohol consumption may represent associations unrelated to alcohol consumption. Further studies on the dynamic modeling of endothelial function through dietary or other lifestyle habits may be beneficial.

Keywords

Wine; Vasodilatação; Alcohol Drinking

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