Red and white wine differently affect collagen-induced platelet aggregation

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Key Words

Platelets, flavonoids, wine

Abstract

Moderate consumption of wine is associated with reduced cardiovascular events, but the mechanism is not fully elucidated. Aim of the study was to seek if consumption of red or white wine, that are known to have different amount of polyphenols, differently influenced platelet aggregation.

20 healthy subjects were randomly allocated to consume for two weeks 300 ml of red or white wine; both wines had the same concentration of alcohol. At baseline and 12 hours after last drink collagen-induced platelet aggregation was performed. At baseline no difference of laboratory values was observed between the two groups. At the end of treatment subjects given red wine had lower response to platelet agonist than those given white wine (<0.005). No ethanol could be found in plasma 12 hours after last drink.

This study shows that red and white wine have different effect on platelet activation likely because of the different content of polyphenols present in the two types of wine.

Introduction

Moderate intake of wine has been suggested to lower the incidence of cardiovascular disease (1-3). This suggestion has been recently corroborated by a metaanalysis indicating that light-to-moderate wine intake is associated with a reduced risk of cardiovascular events (1). The mechanism accounting for these results is unclear as alcoholic and nonalcoholic components of wine could potentially be responsible for lowering vascular accidents. For instance, both alcohol and polyphenols, the nonalcoholic components of wine, possess antiplatelet activity and could simultaneously contribute to the antithrombotic activity of wine (4-10). In order to explore if moderate intake of wine has an inhibitory effect on platelet function we performed an interventional study in which healthy subjects consumed 300 ml/day of red or white wine for 15 days. As either wine had the same percentage of alcohol, this allowed us to indirectly examine the contribute of polyphenols in eliciting an antiplatelet effect. As it is well known that red wine has about 10 fold more polyphenols than white wine.

Methods

Study design

We recruited 20 healthy volunteers who had no evidence of cardiovascular disease and had no risk factors for atherosclerosis such as hypertension, diabetes, dislipidaemia, obesity and smoking habit.

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None of the subjects took antioxidant vitamins or other types of antioxidants or antiplatelet drugs in the month before the study.

All gave informed consent to participate in the study which was approved by the Ethical Committee of our University.

All subjects underwent a run-in period of one week during which they refrained from assuming wine or alcohol and NSAID and were checked for the type of diet they usually followed.

All consumed a typical Mediterranean diet based on carbohydrates, olive oil, fruit and vegetables with no apparent difference in the amount of flavonoids consumed with the food; all subjects were refrained from assuming chocolate, tea or coffee one week before and during the whole period of the study. After the run-in phase, the subjects were randomly allocated to consume a total of 300 ml/day of red (n=10, males 4, females 6, mean age 45+6) or white (n=10, males 5, females 5, mean age 42+5) wine during dinner. Throughout the follow up any other type of alcoholic drink was forbidden. At baseline and after 15 days of follow up a blood sample was taken between 8 and 9 a.m. from each subject who had fasted for at least 12 hours; therefore the interval between the last drink and blood collection was 12 hours. A bottle of wine (750 ml) was given to each subject every two days and the residual amount present in each bottle was measured to check for compliance. One subject randomly allocated to white wine followed the protocol for 2 weeks but refused to come back for measurement of blood variables. Apart from routine analysis, laboratory study consisted in measuring collagen-induced platelet aggregation. All analyses were performed blind.

Platelet preparation and aggregation

Blood mixed with 0.13 mM sodium citrate (ratio 9:1) was collected from each subject.

The lag phase and light transmission of Collagen induced platelet aggregation was evaluated according to (11,12) by an aggregometer (Helena Laboratories: Beaumont, Texas).

Statistical analysis

The effect of treatment was analysed by two-way repeated measures analysis of variance (ANOVA). Data were presented as mean + SD, median and 95% confidence limits. Only two-tailed probabilities were used for testing statistical significance. A p value <0.05 was regarded as statistically significant (13). All calculations were made using personal computer software (Stat View II, Abacus Concepts, Berkley, California).

Results and discussion

Previous studies demonstrated that wine and polyphenols are inhibitor of platelet aggregation(4, 5, 7 , 14), but the relevance of these findings in the context of moderate consumption of wine in human has not been explored. For instance, in previous reports inhibition of platelet aggregation in vitro has been achieved with concentration of polyphenols that are much higher that that achievable in vivo after wine supplementation (5, 14 , 15). We performed a peculiar study characterised by using red and white wines that had the same concentration of alcohol. This would exclude confounding factors related to the antiplatelet effect of alcohol content of wine.

At baseline no difference of the lag phase of collagen induced platelet aggregation was observed between the two groups, at the end of the treatment the lag-phase was prolonged by 57.5% (p<0.002) in subjects given white wine, and 148.0% (p<0.001) in subjects given red wine. The two groups showed a significant difference of the lag phase at the end of treatment (p<0.05)(fig 1). No difference of light trasmission was detected in either groups at the end of the follow up.

These data suggest that moderate consumption of wine elicits a weak but significant inhibition of platelet activation. Even if blood ethanol was not detected in human circulation 12 hours after last drink we cannot fully exclude that such inhibition is also related to the alcohol content of wine. However, as both wines had the same percentage of alcohol, the different concentration of polyphenols is likely to explain the higher inhibition of platelet activation observed after red wine intake.

In conclusion this study shows that red and white wine differently affect platelet function likely in virtue of the different amount of poliphenols contained in the two types of wines.

Fig. 1. Lag-phase of collagen induced platelet aggregation before (A) and after (B) white (o) and red (•) wine consumption.

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