

Vasodilatory and antioxidant activity of Prošek dessert wine in comparison to standard wine

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INTRODUCTION

Prošek is traditional Croatian dessert wine produced by fermentation of dried grapes. It results with wine of distinctive organoleptic properties, high alcohols and unfermented sugars. In comparison to standard wines, biological effects of dessert wines are scarcely investigated. Our aim was to analyze and compare biochemical, antioxidant and direct vasodilatory activity of Prošek produced from *Plavac mali* with the corresponding standard red wine.

METHODS

Three vintages of Prošek (2007, 2008 and 2009) were compared with standard wine from 2007. All wines were analyzed spectrophotometrically for the content of total phenolics, flavonoids, non-flavonoids and anthocyanins and by HPLC for the content of selected flavanols and phenolic acids. The antioxidant activity was determined by Ferric Reducing Antioxidant Power (FRAP). The vasodilatory activity was determined in the isolated rat aortic rings (N=24 rats) precontracted by noradrenaline (10⁻⁷ M). Wines were applied in cumulative concentrations from 1:10000 to 5:1000.

RESULTS

The direct maximal vasodilatory effect of Prošek relative to the standard wine was 20 - 30% lower. Similarly, Prošek had lower antioxidant capacity than corresponding standard wine. While total phenolic and flavonoid content was higher in standard red wine, anthocyanins content did not differ between the wines. Prošek had higher content of flavonoids, epicatechin and epicatechin gallate and non-flavonoids, 4-dihydroxybenzoic acid.

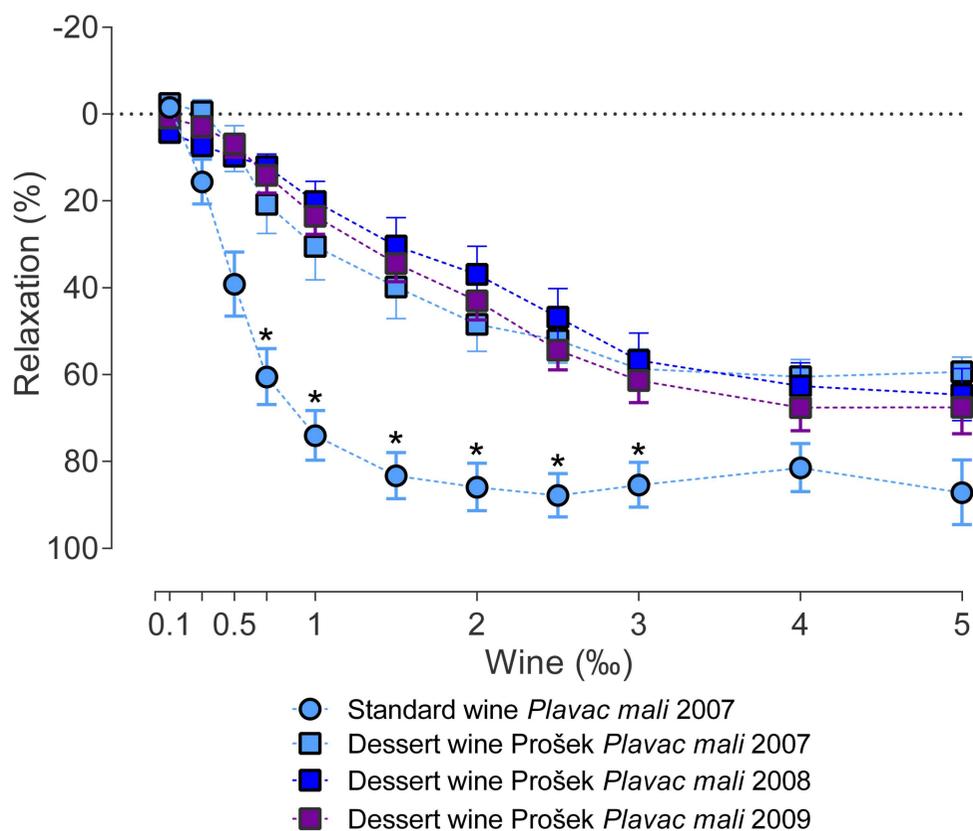


FIGURE 1. Relaxation in noradrenaline-precontracted rat aortic rings following exposure to standard and dessert wines. Results are shown as mean±SEM, n=6 rats per wine sample.

Table 1. Vasodilatory effectiveness and potency the standard and dessert wines

	Wine 2007.	Prošek 2007.	Prošek 2008.	Prošek 2009.
E _{max} (%)	87±5*	60±4	64±6	68±6
EC ₅₀ (95% CI)(‰)	0,5 (0,5-0,6)*	1 (0,8-1,1)	1,6 (1,4-1,9)	1,4 (1,2-1,6)

E_{max}, maximal vasodilatory effect is shown as mean±SEM, EC₅₀, concentration giving 50% of relaxation relative to the sample's own maximal relaxation) is calculated by nonlinear regression analysis and shown as mean with the 95% confidence interval. *P<0.05, by two-way analysis of variance and Bonferroni's post hoc test.

Table 2. Content of total phenolics, main phenolic fractions, and antioxidant activity of the standard and dessert wines

	Wine 2007.	Prošek 2007.	Prošek 2008.	Prošek 2009.
Total phenolics (mg of GAE/l)	3243±165*	2161±38	2607±64	2776,5±105
Flavonoids (mg of GAE/l)	3119±44*	1396±14	2062±32	2007±29
Non-flavonoids (mg of GAE/l)	200±4*	766±34	794±44	708±31
Anthocyanins (mg of C-3-GE/l)	41±3	41±3	40±2	41±1
FRAP (mmol of TE/l)	9±0,1*	6±0,1	6,5±0,1	7±0,1

Data are shown as mean±SEM values. *P<0.05, by two-way analysis of variance and Bonferroni's post hoc test.

FRAP, ferric reducing antioxidant capacity; GAE gallic acid equivalents; C-3-G, cyanidin-3-glucoside equivalents; TE, Trolox equivalents.

Table 3. Concentration of selected phenolic compounds in the standard and dessert wines

Concentration (mg/l)	Wine 2007.	Prošek 2007.	Prošek 2008.	Prošek 2009.
(+)-Catechin	9,9±1,1*	4,8 ±0,1	4,9±0,2	1,8±0,1
(-)-Epicatechin	45,4±4,6*	75,5±2,1	76,3±0,3	72,8±0,2
Epicatechin gallate	5,3±0,8*	10,6± 0,1	16,2±0,9	7,8±0,3
Gallic acid	60,9±0,3	23,8±0,2	30,7±0,1	58,1±0,1
3,4-Dihydroxybenzoic acid	4,5±0,2*	26,2±0,1	22,4±0,1	21,1 ±1,5
Vanillic acid	ND	3,1 ±0,1	4,8± 0,1	3,9 ± 0,1
p-Coumaric acid	2,9±0,2	2,1 ± 0,1	9,2 ±0,1	15,9±0,1
trans-Resveratrol	0,84±0,01	ND	0,05±0,01	0,54± 0,01

Data are shown as mean±SEM values. P<0.05, by two-way analysis of variance and Bonferroni's post hoc test.

ND, not detected

CONCLUSION

Prošek proved inferior to standard red wine in direct vasodilatory and antioxidant activity despite of higher content of individual flavonoid and non-flavonoid compounds.