

## Abstract

# In Search of Biological Activity of Orange Wines: Polyphenolic Profile and In Vitro Inhibition of Digestive Enzymes <sup>†</sup>

Ivana Beara <sup>1,\*</sup> , Tatjana Majkić <sup>1</sup>, Ljiljana Milovanović <sup>1</sup> and Ljilja Torović <sup>2</sup> 

<sup>1</sup> Department of Chemistry, Biochemistry and Environmental Protection, Faculty of Sciences, University of Novi Sad, 21000 Novi Sad, Serbia; tatjana.majkic@dh.uns.ac.rs (T.M.); ljiljana.milovanovic@dh.uns.ac.rs (L.M.)

<sup>2</sup> Department of Pharmacy, Faculty of Medicine, University of Novi Sad, 21000 Novi Sad, Serbia; ljilja.torovic@mf.uns.ac.rs

\* Correspondence: ivana.beara@dh.uns.ac.rs

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**Abstract:** Orange wine, a traditional Georgian winemaker's product, has recently received outstanding global interest from both winemakers and wine lovers. Orange wines are made from white grape varieties through prolonged contact of the skin and seeds in the fermentation process, which is actually a technique for producing red wines. It is well known that wine polyphenols have certain biological activity and, therefore, can contribute to the health benefits of moderate (red) wine consumption. But, data on chemical composition and bioactivity of orange wines are scarce. Thus, we collected 24 Serbian orange wines present at a market in 2022. The analyses of seven phenolic acids, six flavonoids, two stilbenes, fifteen anthocyanin glucosides, galactosides and arabinosides using HPLC-UV/VIS techniques was applied to elucidate differences in samples' polyphenolic profiles.  $\alpha$ -Amylase,  $\alpha$ -glucosidase and lipase in vitro inhibition activities were evaluated using spectrophotometry. The most abundant polyphenols in the examined samples were gallic acid (0–49.5 mg/L), caffeic acid (0–22.2 mg/L) and catechin (0–76.7 mg/L). Piceid was detected in some samples (0.1–0.3 mg/L), while only five samples had a sporadic, low content of several anthocyanins. Principal component analyses (PCA) showed grouping of most of the samples in the central part, while sample 19 (produced in a north-Serbian winery) was obviously distinguished, mostly due to its highest content of gallic acid and catechin. The discriminating power was lower than 1.0 for all polyphenols. The analyzed orange wines had considerable hypoglycemic potential: activity ranged from 0.2 to 5.9 and 0.1 to 433 mg acarbose eq/mL of wine for  $\alpha$ -amylase and  $\alpha$ -glucosidase, respectively. Lipase inhibition was also notable: 7–43 ng orlistat eq/mL of wine. Direct correlation between expressed activity and determined polyphenols was not found, but PCA revealed samples 10, 16, 18 and 24 as the wines with the most prominent digestive-enzymes-inhibition activity. The presented results are just a part of our intensive research on the bioactivity of orange wines. Overall, our results should elucidate the possibility of health benefits of moderate consumption of orange wines, but also to contribute, at least partially, to the increase in recognition of Serbian orange wines in the domestic and global market.



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