



SELECTED BIOACTIVE COMPOUNDS CONTENT OF CINNAMON SPICE

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INTRODUCTION

Cinnamon spice is obtained by peeling the inner bark of an evergreen tree *Cinnamomum zeylanicum* (fam. Lauraceae), native to Sri Lanka. It is one of the earliest known spices on the Asian continent. Today, it is highly valued and widely used all around the world, as a whole (bark sticks), ground spice or essential oil (Figure 1). Cinnamon has a long tradition of use in cooking (as flavoring agent), aromatherapy (as fragrant agent), traditional medicine (for treatment toothache, dental problems, bad breath, diabetes, rheumatism), and is also recognized in official medicine (show antioxidant, antidiabetic, antimicrobial, anti-inflammatory activities). The biological activity of cinnamon is attributed to a number of bioactive compounds, and as the most important stood out cinnamaldehyde and *trans*-cinnamaldehyde (Cin).

The aim of this study was determined the content of bioactive compounds of cinnamon spice purchased at a local market in Belgrade.

MATERIAL AND METHODS

In this study, dry, ground cinnamon was analysed to determine the content of: total phenolics (TPC), total flavonoids (TFC), total hydroxycinnamic acid derivatives (HCAs) and total carotenoids (TCC). Bioactive compounds were extracted by solvent extraction (SE) and ultrasound assisted extraction (UAE) in 80% acetone and warm water (50 °C). The content of bioactive compounds were determined spectrophotometrically and the results are expressed in the appropriate equivalents.

Extraction procedure

Warm water (50 °C)

Solvent extraction (SE)

2 g of spice were placed in plastic cuvette, filled with 10 mL of warm distilled water (50°C), and than heated in a water bath for 90 min at 50°C. After that, 10 mL of solvent was added, the sample was protected from light and shaken for 90 min.

Figure 2.

Ultrasound-assisted extraction (UAE)

The sample was prepared as described and sonicated in an ultrasonic bath at the maximum frequency (40 Hz), for 90 min, at 50°C. After sonication, the sample was, intensively shaken for 90 min.

80% acetone

Solvent extraction (SE)

2 g of powdered spice was poured with 2x10 mL of 80% acetone and intensively shaken for 2x90 min in plastic cuvette protected from the light, at room temperature.

Figure 3.

Ultrasound-assisted extraction (UAE)

The same procedure was applied as water extraction, except that in the case of acetone, the extraction was carried out at room temperature.



Figure 1. Cinnamon as bark sticks, ground spice and essential oil

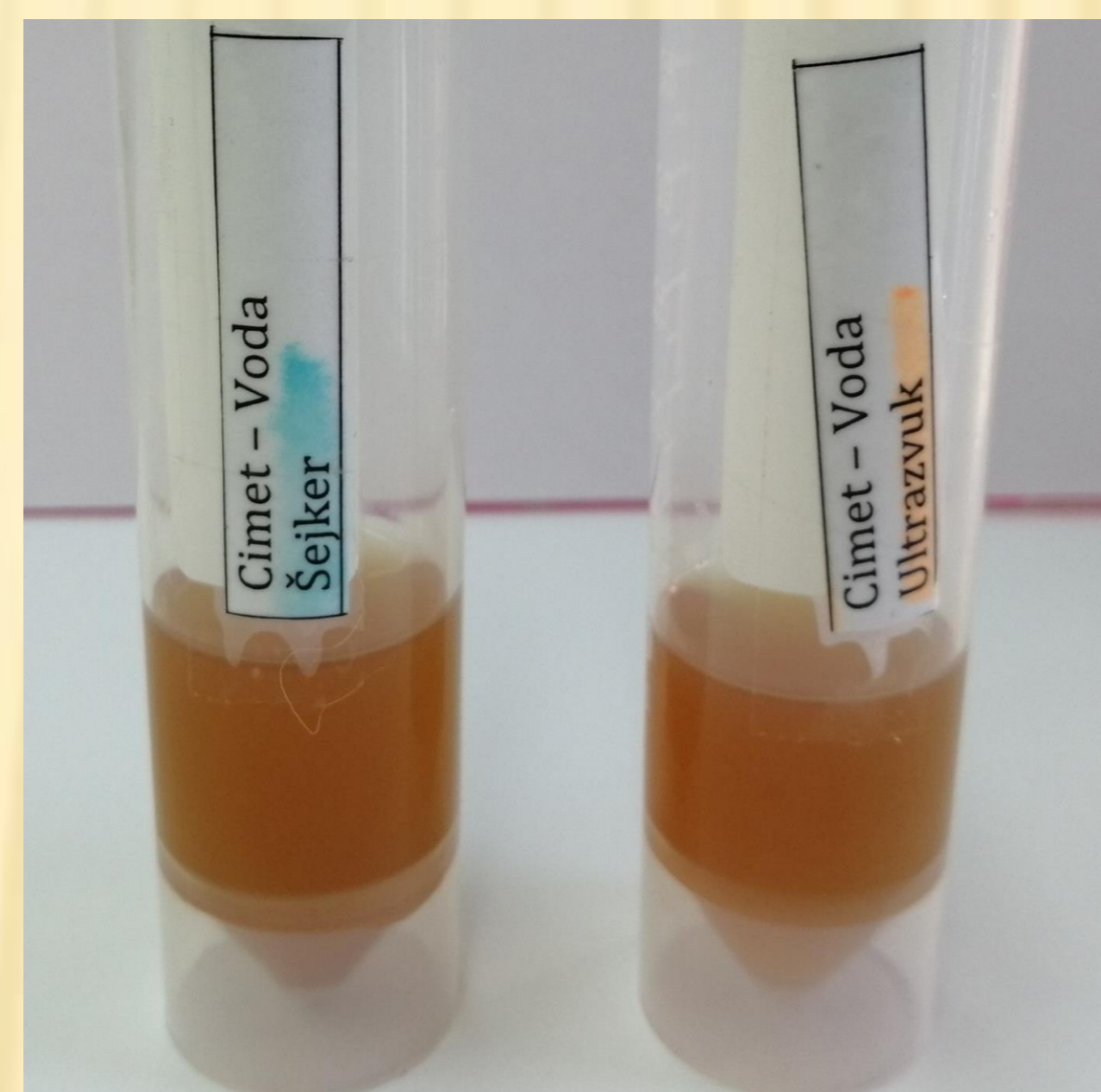


Figure 2. Water extracts of cinnamon

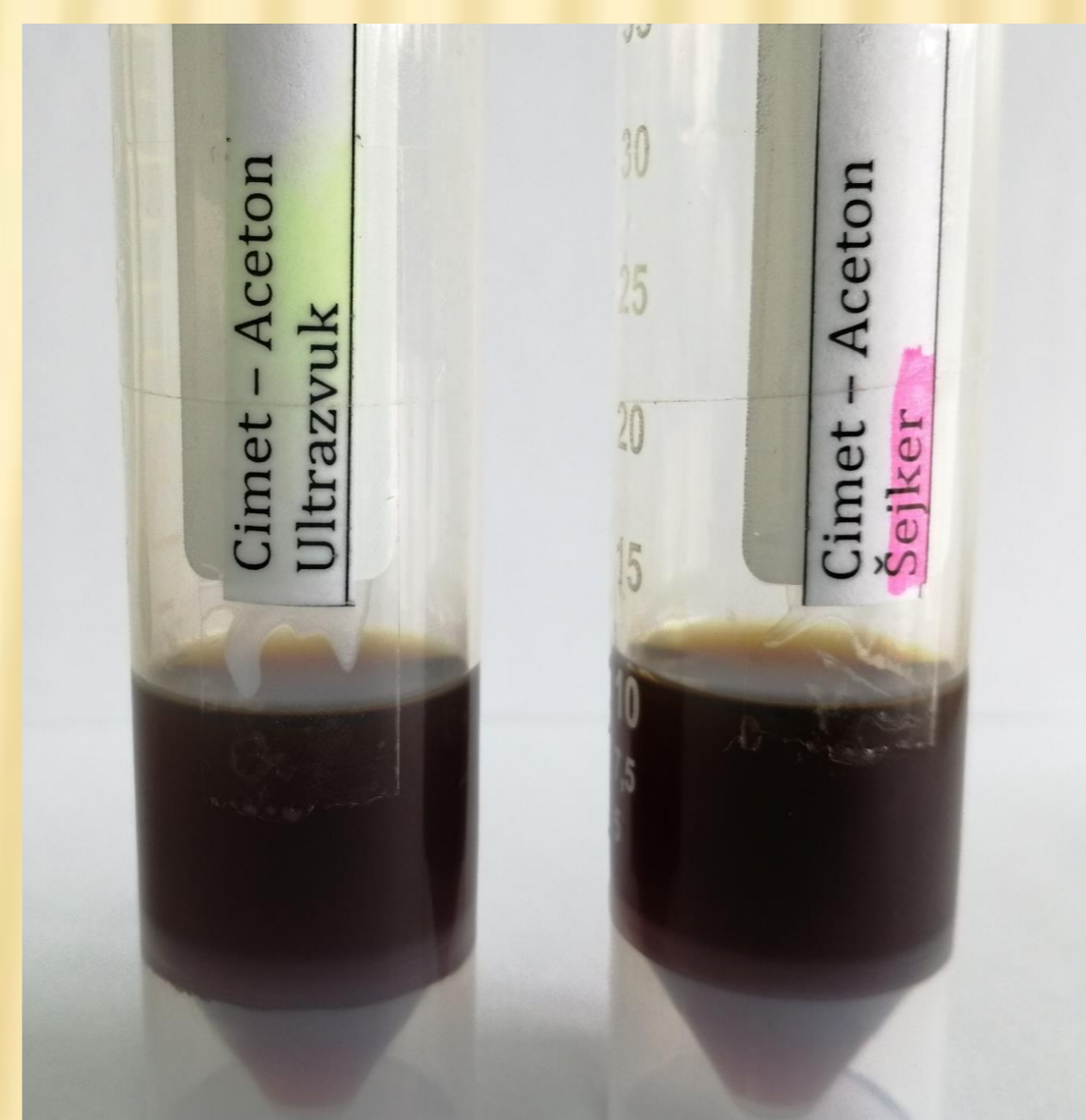


Figure 3. Acetone extracts of cinnamon

RESULTS AND DISCUSSION

The TPC in acetone extracts prepared by UAE was the highest, but did not show a significant difference in comparison to TPC achieved in acetone extract obtained by SE. The highest TFC and HCAs were observed in acetone extract prepared by SE, while the highest TCC was acquired in acetone extract prepared by UAE (Table 1).

Table 1. Content of selected bioactive compounds of cinnamon spice

Sample	ET	Solvent	TCC (µg/g) mean ± SD	TPC (mg/g GAE) mean ± SD	TFC (mg/g CE) mean ± SD	HCAs (mg/g CGAE) mean ± SD
Cinnamon spice	SE	80% Acetone	265.61 ± 10.61	29.79 ± 0.11	1.41 ± 0.17	14.59 ± 0.72
	UAE		277.10 ± 4.82	29.83 ± 0.02	1.19 ± 0.12	12.68 ± 0.17
	SE	Water (50°C)	/	13.11 ± 0.33	0.74 ± 0.06	1.90 ± 0.14
	UAE		/	12.71 ± 0.14	0.68 ± 0.01	1.85 ± 0.16

* ET - Extraction technique; SE - Solvent extraction; UAE - Ultrasound-assisted extraction; TCC - total carotenoid content; TPC - total phenolic content; TFC - total flavonoid content; HCAs - total dihydroxycinnamic acid derivatives content; GAE - gallic acid equivalents; CE - catechin equivalents; CGAE - chlorogenic acid equivalents.

The lowest content of selected bioactive compounds (TPC, TFC, HCAs) was achieved in water extracts, obtained by SE.

The application of ultrasound-assisted extraction resulted in a higher TCC content, while in the case of other bioactive compounds (TPC, TFC, HCAs), there is no significant increase in their content, compared to the application of solvent extraction. Similar results have been achieved in some scientific studies.

CONCLUSION

Cinnamon spice is a good source of bioactive compounds with potential health benefits, especially in phenols. Since, water extracts reflect the actual content of bioactive compounds of cinnamon, in this research it was found that the content of tested bioactive compounds of this spice in water extracts was higher compared to some spices described in recent studies.

