



TOTAL PHENOLIC CONTENTS OF SOME NATURAL FRUIT JUICES AND NECTARS FROM ROMANIAN MARKET

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Abstract: Total phenolic contents (TPC) of some natural fruit juices and nectars from the Romanian market were determined immediately after opening and after three days of refrigeration (4-8^oC). The highest TPC were revealed in aronia juice and black currant nectar (110.80 respectively 120.69 mg GAE/100 ml). The lowest TPC were registered in peach and apricot nectars (18.17 respectively 24.91 mg GAE/100 ml). After three days of refrigeration, there were significant differences in TPC for three samples: apple juice, blueberry juice and peach nectar. The natural fruit juices and nectars tested are a good source of antioxidants (especially aronia, blueberry and black currant).

Keywords: total phenols, fruit juices, nectars.

1. Introduction

Phenolic compounds are bioactive secondary metabolites that occur in a variety of fruits, vegetables, nuts, seeds and flowers.

Beneficial effects of phenolic compounds on human health are known, as they exhibit anti-carcinogenic, anti-ulcer, anti-thrombotic, anti-inflammatory, immunomodulating, antimicrobial, vasodilatory and analgesic effects [1-4]. Fruits and vegetables are an important dietary source of phenolic compounds. Phenolic content and antioxidant activity in food items of vegetal origin remain a subject of interest for many researchers [5-7]. Regarding the daily intake of fruit, Romania is at the bottom of the list (42%), while the EU average is 64% [8]. That is why natural fruit juices and nectar could be an alternative to fresh fruits, especially for the children that do not like eating fruits. The aim of this study was to determine

total phenolic contents of some natural juices and nectars from the Romanian market.

2. Materials and method

2.1. Samples

Natural fruits juices and nectars free of food additives and preservatives were purchased from supermarkets: aronia, apple, raspberry and blueberry juices, black currant, apricot and peach nectars. Fruits juices and nectars were obtained by soft evaporation in vacuum at 60^oC.

2.2. Reagents and standards

Folin Ciocalteu reagent, gallic acid and sodium carbonate were purchased from Sigma. Gallic acid stock solution in ethanol (1 mg/ml) was prepared and used for the preparation of working standard solutions necessary for calibration curve.

2.3. Total phenolic content (TPC) was determined by Folin-Ciocalteu assay [9].

Samples were filtered through Whatman No. 1 paper. Absorption spectrum of reduced Folin-Ciocalteu reagent was recorded with a UV Vis Able Jasco spectrophotometer V-550 (Fig. 1), and the absorption maximum was registered at 755 nm. The standard calibration curve was prepared in the concentration range of 100 to 500 μg GAE/ml and the correlation coefficient was 0.999800 (Fig. 2).

Results are reported at gallic acid equivalent (GAE) and were statistically processed using GraphPad Prism (version 7.00, GraphPad Software Inc., San Diego, 2007).

3. Results and Discussion

Total phenolic contents of seven Romanian natural fruit juices and nectars were determined immediately after opening (t_0) and after three days of refrigeration at 4-8°C (t_3), according to shelf life after opening indicated by producers (Table 1). The highest TPC were revealed in aronia juice and black currant nectar (110.80 respectively 120.69 mg GAE/100 ml). The lowest TPC were registered in peach and apricot nectars (18.17 respectively 24.91 mg GAE/100 ml). TPC in apple juice was comparable with that obtained by Wern et al. [10] in fresh apple juice (44.82 mg GAE/100 ml) and by Herken & Guzel [11] in commercial apple juice (2.3 mM GAE/l). Total phenol values for apricot and peach nectars were lower than those obtained by Herken & Guzel [11] in commercial juices (3.0 respectively 3.4 mM GAE/l). TPC in black currant nectar and raspberry were lower than values reported by Jakobek et al. [12] (2770.94 respectively 1234.27 mg GAE/l), and by Piljac-Zegarac et al. [13] (1919.8 mg

GAE/l for black currant juice). Also the value obtained for blueberry juice was lower than those obtained by Piljac-Zegarac et al. [13] in industrial juice (1795.5 mg GAE/l). TPC in aronia juice was lower than values obtained by Tolic [14] (11093; 9339; 8834 mg GAE/l) in fresh juice made in laboratory between 2012 and 2014. These differences could be explained by fruit cultivar, culture technology, weather conditions and juice manufacture methods used. After three days of refrigeration, there were significant differences in TPC for three samples: apple juice, blueberry juice and peach nectar. Fluctuations (increase) in TPC in fruits and vegetables juices during refrigeration were reported also by others authors. Piljac-Zegarac et al. [13] observed that all dark fruit juices exhibited fluctuations in total phenol values with a marked increase after 48 hours in refrigerated storage, and a greater overall total phenol content in 5/6 studied juices after 29 days. And Kim [15] reported fluctuations in total phenol values in green vegetables juices with maximum values at 21 days in shinsencho branch and kale branch juices.

Folin-Ciocalteu reagent reacts with many reducing substances. Increases in TPC values for two samples (apple juice and peach nectar) during refrigeration could be explained by some juices chemical composition change.

Also decrease in TPC during refrigeration was reported. Kim [15] observed a decreasing tendency of total polyphenolic contents of leaf parts after 4 days (shinsencho leaf) or 7 days (kale leaf). Decrease in TPC in blueberry juice may be due to enzymatic / nonenzymatic degradation.

More investigations are necessary on fruit juices available on the market.

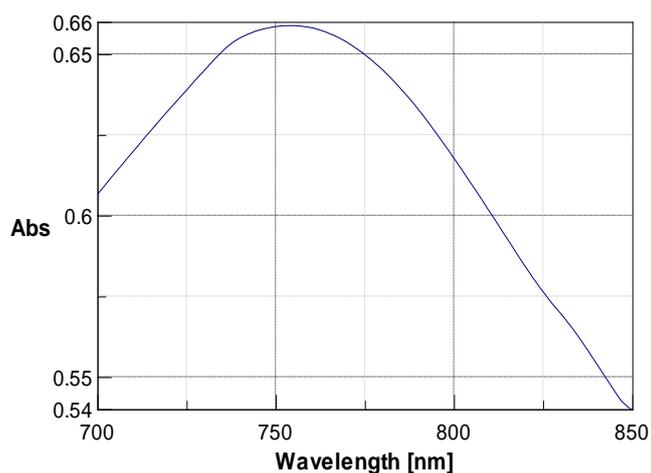


Fig. 1. Absorption spectrum of the reduced Folin -Ciocalteu reagent

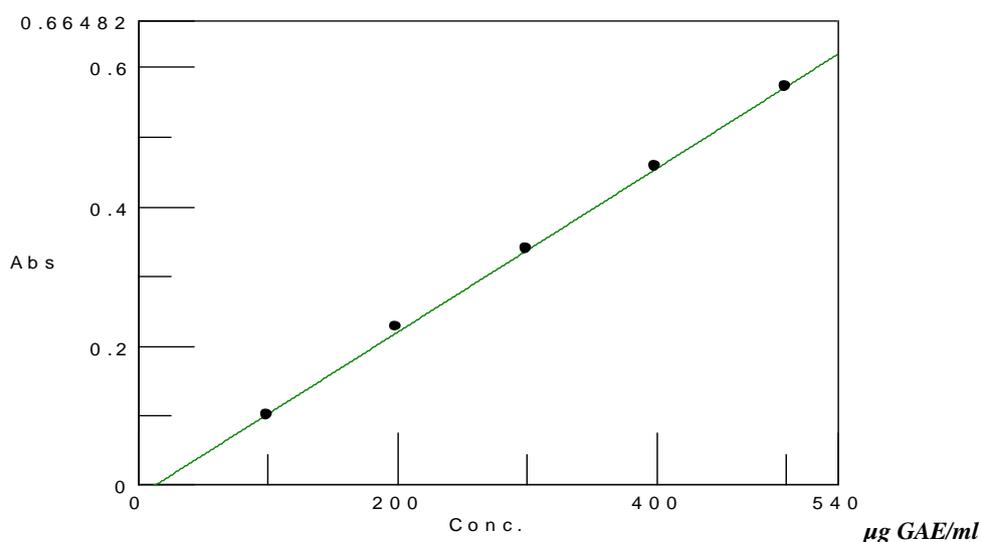


Fig. 2. Folin Ciocalteu gallic acid standard curve

Table 1.

Total phenolic contents of some natural fruits juices and nectars from Romanian market (Folin-Ciocalteu assay)

Sample	TPC (mg GAE/100 ml)±SD	
	<i>t</i> ₀	<i>t</i> ₃
Aronia juice	110.80±30.33	112.25±23.60
Apple juice*	48.51±4.40	54.91±7.99
Raspberry juice	33.44±8.24	34.92±8.29
Blueberry juice*	95.54±12.65	91.91±7.83
Black currant nectar	120.69±66.47	120.39±35.23
Apricot nectar	24.91±7.88	27.15±12.06
Peach nectar*	18.17±0.56	20.50±4.4

SD=standard deviation (n=3); *t*₀= immediately after bottles opening; *t*₃= after three days of refrigeration (4-8°C); GAE= gallic acid equivalent; *p<0.05.

4. Conclusion

The results showed that natural fruit juices and nectars are a good source of antioxidants (especially aronia, blueberry and black currant). After three days of storage in refrigerator, there were significant differences in TPC for three samples: apple juice, blueberry juice and peach nectar.

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The author declares no conflict of interest.

6. References

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