EVALUATION OF POLYPHENOLIC CONTENT OF THE LOCAL MOLDOVAN FRUITS (APPLES, PEARS, QUINCES)

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Abstract: *In this study we aim to evaluate the potential of local Moldovan fruits , namely quince (Muscat, Port), pear (Conference, Victoria) , apple (Golden, Jonathan) as sources of beneficial and bioactive compounds (polyphenols and antioxidants), studying the effect of different extraction solvents. The samples were followed by extraction with ethanol in different concentrations (25%, 50%, 75%). They were taken both from the pulp and from the surface of the products. The results show that the polyphenolic content is higher in the samples extracted in the concentration of 75% ethanol and taken from the surface of the product. This correlation is positive for quince and pear, and negative for apple, because the highest polyphenolic content in apples was found in the concentration of 25% ethanol.*

Keywords: *Polyphenols, Antioxidant activity, spectrophotometry, Moldovan fruits.*

Introduction

Phenolic compounds are a main class of secondary metabolites in plants and are divided into phenolic acid and polyphenols. These compounds are found combined with mono- and polysaccharides linked to one or more phenolic group, or can occur as derivatives, such as ester or methyl esters.

Among the several classes of phenolic compounds, the phenolic acids, flavonoids, and tannins are regarded as the main dietary phenolic compounds. Many studies have shown a strong and positive correlation ($p \leq 0.05$) between the phenolic compound contents and the antioxidant potential of fruits and vegetables.

Plant-based foods such as vegetables and fruits tend to be high in polyphenols. Nowadays, the extraction and purification of polyphenols from natural sources is required, since these bioactive substances are often used in functional foods, food additives and nutraceutical industries . The determination of polyphenol content and antioxidant capacity of food extracts are also important to know the health potential of different foods.

Apples, pears and quinces are constantly used in our diet in a fresh condition, therefore we are interested in making of our research based on samples taken from these types of fruits [1,2]. Any minerals and vitamins are best preserved in fresh fruits, polyphenols are not an exception to this rule [3,4].

The number of polyphenols in a food can vary depending on where the food is grown, how it is farmed and transported, how ripe it is, and how it is cooked or prepared. The average 100 grams fresh weight of fruits (grapes, apple, pear, quince) contain up to 300 mg of polyphenols. It is known that with various types of treatments, such as drying, the content of polyphenols in the product drops significantly. Therefore, we carried out the extraction in samples not subjected to any changes in order to obtain the most favorable result. As samples for our research, we purchased products of local origin , most often can be seen both in the supermarket and on someone's table. In the Republic of Moldova, some of these fruits are apples, pears and quinces.

1. Materials and methods.

Fruit samples were purchased in the supermarket. We chose apples (Golden and Jonathan), pears (Conference and Victoria), quince (Muscat and Port) for our research.

Each fruit was washed and cut into the slices of equal size. The extraction was carried out in ethanol (25%, 50 %, 75%) with a solvent ratio of 1 g : 10 ml of alcohol . The extraction process was carried out by shaking at 22 ° C for 24h. The extracts were decanted and stored in dark glass bottles at + 4 ° C.

Each sample of 1g was taken from the skin and pulp of the product and placed in ethanol solvent with various concentrations: 25%, 50%, 75% . For the skin, only a concentration of 75% was used. After 24 hours, we have prepared samples for the spectrophotometry and have conducted an analysis at a wavelength of 765nm. The total phenolic content (mg) in the extracts of pears, apples and quinces was determined by the Folin-Ciocalteu method [5] , and all results were listed in Table 1.

2. Results and discussion.

The results showed that the extraction was primarily affected by the solvent concentration. Based on table 1, it can be concluded that the largest amount of polyphenols was obtained at a concentration of 75% from the surface of the fruit, with the exception of apple Golden. This variety is an exception, since the highest amount of polyphenols in apples of this variety was obtained at a concentration of 50%. From the all samples of the local fruits more richest in polyphenols are quince Port and apple Jonathan.

Table 1 Polyphenol content in mg on 100 g of fresh fruits

Solvent concentration	Pear		Apple		Quince	
	Victoria	Conference	Golden	Jonathan	Muscat	Port
25% pulp	4,0	0,8	17,2	26,4	16,5	23,0
50% pulp	6,2	5,1	32,8	31,2	25,8	31,9
75% pulp	8,5	5,8	25,3	33,9	29,1	36,2
75% surface	11,9	10,9	26,2	57,0	95,1	---

The most visual comparison of the content of polyphenols in certain types of fruit can be traced in the following figures: Figure 1, Figure 2, Figure 3.

On the Figure 1, you can see that Victoria pears are richer in polyphenol content at any concentration of solvent solution in comparison with the variety Conference in the samples taken from the pulp and are practically equal on the surface.

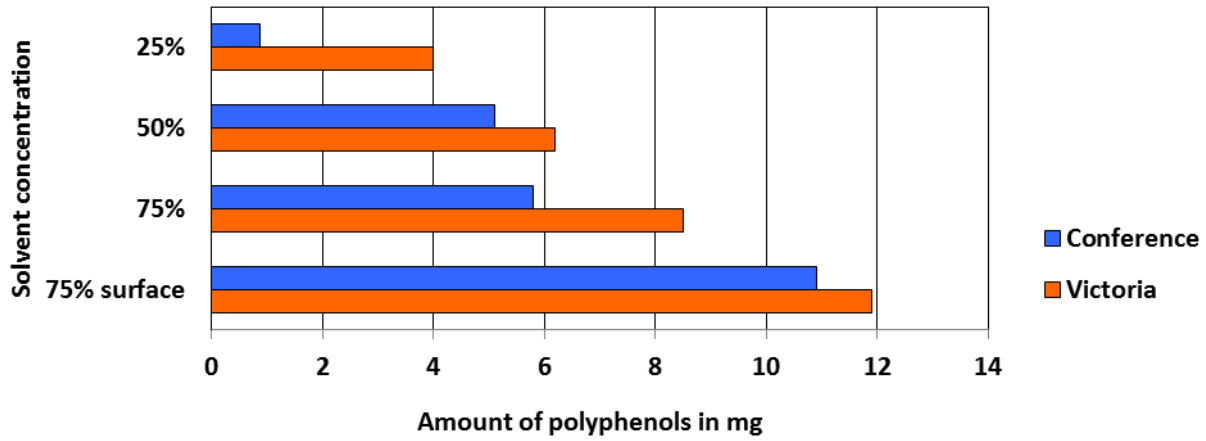

Fig.1. Polyphenolic content in mg on 100g of pears

In the samples taken from the pulp of apples, the amount of polyphenols is about the same (32,8 – 33,9 mg/ 100 g), on the surface the situation is different. In Jonathan apples, the amount of polyphenols on the surface is two times more than in the Golden variety (26,2-57,0 mg/100g) (Figure 2).

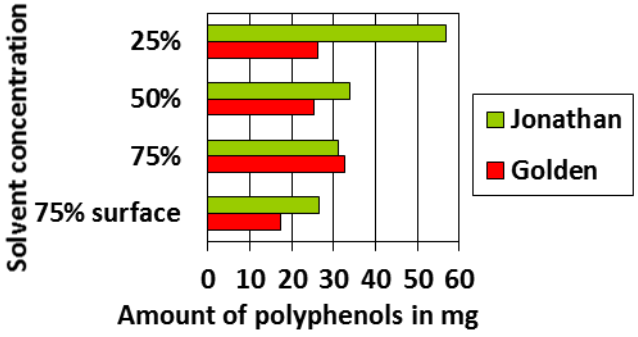

Fig.2 Polyphenolic content in mg on 100g of apples

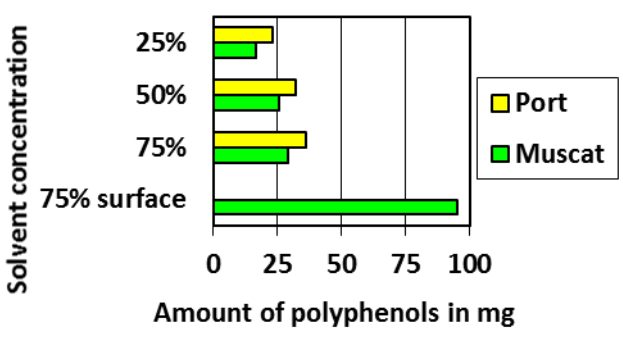

Fig.3 Polyphenolic content in mg on 100g of quinces

Also, based on the results of the table, it can be seen that polyphenols were not detected on the surface of quince (Port) at a concentration of 75% (Figure 3). In the Port quince, the content of polyphenols is higher in the pulp, and polyphenols are completely absent on the surface, which is surprising, since in the Muscat variety on the surface the amount of polyphenols is 95.1 mg, which is several times higher than in any other fruit and at any other concentration .

Conclusion. Based on the results obtained, we can state that the concentration of the solvent greatly influenced the process of extraction of polyphenols. On the surface of each sample of individual varieties, the content of polyphenols is higher than in the pulp. So, the solvents 75% ethanol were the most efficient in the extraction of total phenolics, with the exception of samples taken from apples varieties golden.

In apples of variety Golden, the most efficient solvent was 50% with the polyphenolic content of 32,8 mg. The largest amount of polyphenols was found on the surface of the quince variety Muscat-95,1 mg. The content of polyphenols in samples taken from fruits of local origin does not coincide with the existing standards for each of the varieties.

Despite this, as a result of our research, we managed to get the amount of polyphenolic compounds in fruits that would play a positive role in maintaining and strengthening the body and human health in general. Quinces, pears and apples turned out to be excellent sources of polyphenols, from which it can be concluded that these fruits must be included in the daily diet of each person.

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