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MAIN PROBLEMS OF STUDYING METHODS FOR DETERMINATION OF HYDROXYCINNAMIC ACIDS IN VARIOUS KINDS OF MEDICINAL PLANTS

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Aim and objectives. The aim of this article is to determine the qualitative and quantitative content of hydroxycinnamic acids by various methods such types of medicinal plants as Blueberry fruits, Cotton thistle, Allium cepa and set their importance.

The objective of this article is to investigate the methods by which it is possible to identify hydroxycinnamic acids in various types of medicinal plants.

Object of study. The objects of the study are various types of medicinal plants containing hydroxycinnamic acids, namely Blueberry fruits, Cotton thistle, Allium cepa.

Methods and tools for research. To determine the amount of hydroxycinnamic acids in medicinal plant raw materials, the following methods are used: chromatography on paper, liquid chromatography, ultraviolet spectrophotometry, mass spectrometry.

Scientific novelty and practical significance of the results obtained. The scientific novelty of this study is that many scientists are engaged in studying the composition of herbs in order to create new effective drugs. The chemical composition is determined in many types of medicinal plants by various modern methods, for example, spectrophotometry and chromatography. Hydroxycinnamic acids play an important role in the manufacture of drugs.

Hydroxycinnamic acids or hydroxycinnamates are phenolic compounds belonging to non-flavonoid polyphenols. They are present in all parts of fruits and vegetables although the highest concentrations are found in the outer part of ripe fruits, concentrations that decrease during ripening, while the total amount increases as the size of the fruits increases.

Their dietary intake has been associated with the prevention of the development of chronic diseases such as: cardiovascular disease, cancer, type-2 diabetes.

These effects do seem to be due not only to their high antioxidant activity (that depends upon the hydroxylation pattern of the aromatic ring, see below), but also to other mechanisms of action such as, e.g., the reduction of intestinal absorption of glucose or the modulation of secretion of some gut hormones. Hydroxycinnamic acids (HCAs) possess a simple chemical backbone consisting of a phenylpropanoid C6-C3 structure and are the major subgroup of phenolic acids with ubiquitous distribution in the plant kingdom.

Cinnamic acids have been categorized as structural and functional constituents of plant cell walls and also as bioactive ingredients of the diet. Hydroxycinnamic acids antioxidant efficacy is strongly dependent on their structural features and intrinsically related to the presence of hydroxyl function(s) in the aromatic structure.

They are abundantly found in tea leaves, coffee, red wine, various fruits (especially red ones), vegetables and whole grains. Hydroxycinnamic acids, such as p-coumaric, caffeic, ferulic, and sinapic acids, are known to play an important role in nature. In fact, their wide distribution and high concentration provide them with a key role in the biosynthesis of more complicated phenolic systems.

The variety of cinnamic derivatives in plants is dependent on the species. In general, plants of the Solanaceae family provide both chlorogenic acid (5-caffeoylquinic acid) and free hydroxycinnamic acids, such as caffeic acid. Actually, derivatives of cinnamic acid exist in all fruit parts, but concentrations are higher in the outer parts of ripe fruit.

Research results. Quantitative content of hydroxycinnamic acids was conducted in such medicinal raw materials: Blueberry fruits, Cotton thistle, Allium cepa. Blueberry fruits –

(Fructus Myrtilli) are widely used in the medical and pharmaceutical practice. Decoctions of blueberry fruits are used as an astringent in therapy of colitis, enterocolitis and diarrhea. Bines and leaves of blueberry are used as a hypoglycemic agent in the form of decoctions in the folk and scientific medicine. For determining the qualitative composition of the hydroxycinnamic acids in the extract dimensional method using paper chromatography. The analysis was performed on the Agilent Technologies 1100 chromatograph.

Results were as follows: «Coffee, chlorogenic, p-coumaric acids have been identified. Five substances which are derivatives of p-coumaric acid could not be identified. It has also been established in the quantitative content of extract. Also, quantification of hydroxycinnamic acid derivatives was carried out by spectrophotometry. It was established that content of hydroxycinnamic compounds was 24.9% in the dry extract of the leaves of blueberry» (Khomenko M. A).

The Cotton thistle generation numbers forty species but there is only one species in Ukraine. This is Cotton thistle, which is widespread all over the country as a weed. In folk medicine, the raw materials of Cotton thistle are used as anti-inflammatory, diureticand antimicrobial drug. The quantitative content of hydroxycinnamic acids was studied by spectrophotometric method at a wavelength of 525nm.

The result of the research showed that the herb, which was prepared in vegetation phase (formation stem), contained small quantity of hydroxycinnamic acids. In the herb and fruit of Cotton thistle are also present sources caffeic and chlorogenic acids. However, the herb, which was prepared in phase of mass flowering, contained at least 4% of hydroxycinnamic acids. The quantitative content of hydroxycinnamic acids in fruit of Cotton thistle was at least 2.5% (Oproshanska T. V).

Allium cepa is botanical name of common red onion. It belongs to plant family Liliaceae. Onion is not only food but also a medicine. It is sharp and pungent in taste and has tonic, aphrodisiac, stomachic, appetizer, stimulant, diuretic and expectorant in action. In homeopathy tincture of the onion or of whole fresh plant is used to prepare medicine.. Onion is one of the richest sources of flavonoids and organosulphur compounds. They possess high level of antioxidant activity at tribute to flavonoids quercetin and pigments such as anthocyanins. Wide spectrum of biological activities makes A. cepa a potential therapeutic agent.

Allium cepa has many pharmacological properties such as antimicrobial activity, antioxidant activity, anticarcinogenic activity, antimutagenic activity, antihyperglycaemic or antidiabetic potential etc. Although rarely used specifically as a medicinal herb, the onion has a wide range of beneficial actions on the body, when eaten (especially raw) on a regular basis will promote the general health of the body. The study was set qualitative and quantitative characteristics of Allium cepa. By the method of paper chromatography the presence of chlorogenic, neochlorogenic, fumaric and caffeic acids was shown. Quantitative content of hydroxycinnamic acids was determined by the method of spectrophotometry, which was 1.12% in terms of chlorogenic acid (I. M. Shevtsov).

Conclusions. Thus, we can make the conclusions that investigational medicinal herbs contain a large number of hydroxycinnamic acids, such as caffeic, chlorogenic, p-coumaric acids. Hydroxycinnamic acids possess potent antioxidant and anti-inflammatory properties. Antioxidants, used to prevent or inhibit the natural phenomena of oxidation, have a broad application in diverse fields as they have a huge importance as either industrial additives or health agents.These compounds were also showed potential therapeutic benefit in experimental diabetes and hyperlipidemia.

Keywords: hydroxycinnamic acids, Blueberry fruits, Cotton thistle, Allium cepa, paper chromatography, spectrophotometry, antioxidant activity, anti-inflammatory properties.