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GY Starchenko

Assistant of Pharmacy
Department, Ivano-Frankivsk
National Medical University,
Ukraine

AR Grytsyk

Professor, Head of Pharmacy
Department, Ivano-Frankivsk
National Medical University,
Ukraine

Correspondence

GY Starchenko

Assistant of Pharmacy
Department, Ivano-Frankivsk
National Medical University,
Ukraine

Analysis of amino acid composition of *Calluna vulgaris* L. (Hull.)

GY Starchenko and AR Grytsyk

Abstract

The quantitative content of *Calluna vulgaris* L. (Hull.) amino acids was determined for the first time using amino acid analyzer T AAA 339 M (Czech Republic) in accordance with GOST (State standard of Ukraine) ISO 13903: 2005. As a result of conducted research 17 amino acids were identified in *Calluna vulgaris* L. (Hull.) herb. In aerial plant material of *Calluna vulgaris* the following amino acids dominated: alanine (0.98%), aspartic acid (0.92%), threonine (0.87%), histidine (0.78%) and lysine (0.75%).

Keywords: *Calluna vulgaris* L. (Hull.), amino acids, primary synthesis substances

1. Introduction

Amino acids are substances of the primary synthesis contained in the over ground and underground plant organs, synthesized from simple inorganic compounds and participating in the synthesis of proteins, nucleotides, flavonoids, steroidal compounds, polyphenols, complex carbohydrates, fats, vitamins and pigments. They are found in plants that are easily digestible for the human body and are biologically available in concentrations, and therefore they have higher physiological activity compared with synthetic analogues. This is what causes the actuality of work on the selection of the most valuable species of plants that contain a complex of amino acids [1].

Currently there are nearly 300 known plant amino acids and 20 of them are part of the structural proteins and enzymes. According to the latest scientific research in plants are located around 30% of the overall concentration of organic substances amino acids in free or bound state. The prevalence of amino acids in plants and their high biological activity promote effective action on the organism of a medicinal plant, drugs as well as obtained from it. Amino acids of plants have an important role in the functioning of various systems and organs of the human body and are characterized by distinct pharmacological properties, they promote faster absorption and potentiate the effect of other available biologically active compounds in the plants. In green plants, essential amino acids are synthesized, which in human and animal organisms cannot be formed (tryptophan, phenylalanine, methionine, lysine, valine, threonine, leucine and isoleucine). Arginine and histidine belong to conditionally essential amino acids [1, 2]. At present, the amino acid composition of the most officinal and food plants, including *Calluna vulgaris* is not studied enough. That's why the aim of our work was to conduct the analysis of amino acid composition of *Calluna vulgaris* of over ground parts harvested in Ivano-Frankivsk region.

2. Materials and Methods.

The object of research was *Calluna vulgaris* herb collected in summer during the mass flowering in Ivano-Frankivsk region. The analysis was conducted comparing with standard amino acid hydrolysates according to GOST (State standard of Ukraine) ISO 13903: 2005. To determine the amino acid composition of the investigated objects 100 mg of the sample were dried at 60 °C and placed in a test tube for hydrolysis, and after that equal amounts (5 ml) of purified water and concentrated hydrochloric acid were added and mixed. Hydrolysis was carried out at 120 °C for 15 min. Then the sample was neutralized with dry NaOH to pH = 11 and transferred to a porcelain cup for 1 hour in order to accelerate the evaporation of ammonia. After that, the solution of hydrochloric acid was added to the sample to obtain pH = 2.2, the sample was filtered, 0.1 - 0.5 ml of liquid was selected and its volume was adjusted to 2 ml by buffer solution with pH = 2.2. The analysis was conducted on amino acid analyzer AAA 339 T N (Czech Republic) [3].

3. Results and Discussion

17 amino acids were identified, 7 of which are essential (leucine, valine, threonine, lysine, methionine, isoleucine, phenylalanine) and 2 are essential for children (histidine and arginine). The results of research are represented in Figure 1. Analyzing the content of amino acids in *Calluna vulgaris* herb we can predict the pharmacological effect of extracts. Leucine has an important role in muscle contraction; it is the part of ovalbumin, myosin, fibrinogen and other proteins. Glutamic and aspartic acids involved in the process of transamination of amino acids and neutralize ammonia, are part of albumins and globulins of blood and have neurotransmitter function. Glycine functions as inhibitory

mediator in the spinal cord and in the majority of brain stem structures; it is prescribed for treatment of alcoholism and depression. Alanine is an important source of energy for the brain and central nervous system, it strengthens the immune system by stimulating the production of antibodies and participating in the synthesis of lymphocytes, it is actively involved in the metabolism of sugars and organic acids and it is one of the major components of connective tissue^[4].

The data on the quantitative content of essential and non-essential amino acids indicate the perspective of using investigated raw material for receiving herbal remedies in treatment of the nervous and cardiovascular systems and gastrointestinal tract diseases.

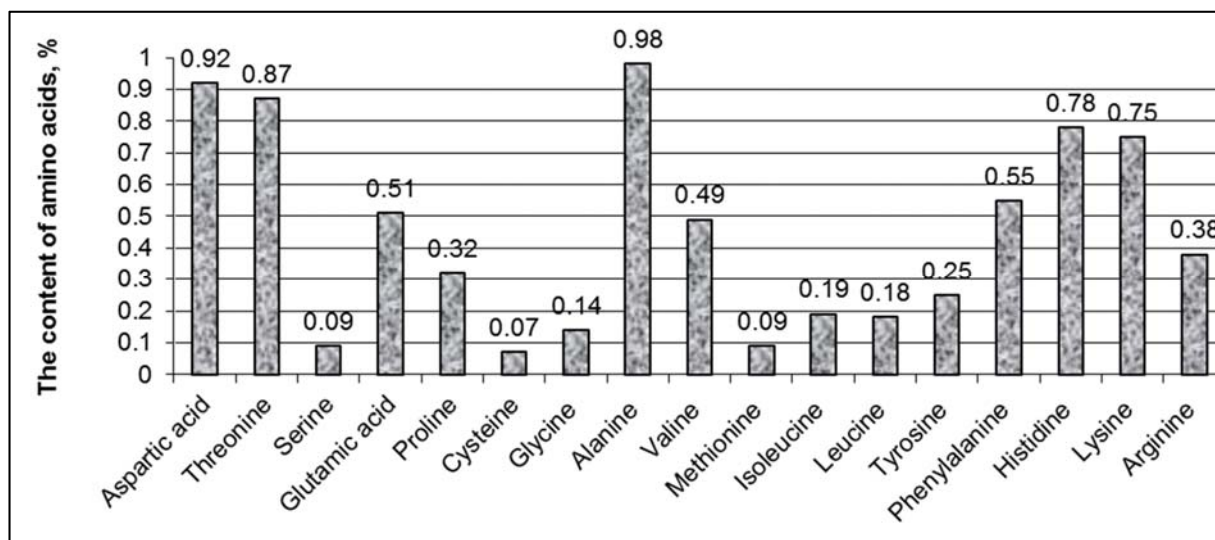


Fig 1: Amino Acid Content of *Calluna vulgaris* L. (Hull.) Herb

4. Conclusions

1. The investigation of quantitative content of essential and non-essential amino acids in *Calluna vulgaris* herb of flora of Ukraine.
2. Was conducted for the first time the presence of 17 amino acids, including 7 essential and 2 essential for children was determined. In over ground plant raw material of *Calluna vulgaris* the following amino acids are dominant: alanine, aspartic acid, threonine, histidine and lysine.
3. The results indicate the perspective of using of *Calluna vulgaris* raw material and will be included in depth phytochemical studying of plant.
4. Development of drugs with pre-specified pharmacological activity, such as anti-inflammatory and anxiolytic is perspective.

5. References

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