

The study of the chemical composition and the hypoglycemic activity of dry extracts from the leaves of bearberry

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Background. One of the important sources of medicines is bearberry (*Arctostaphylos uva-ursi* L.). Due to its unique composition bearberry as part of drugs is widely used at the pharmaceutical market. The market research of medicines of Ukraine has revealed that on the basis of biologically active substances (BAS) of bearberry approximately 15 medicines are manufactured, among them 8 drugs are of domestic production, but the majority of them is presented by herbal teas. Therefore, it is advisable to determine which solvent is better to use to extract BAS from this raw material in order to obtain standardized phytochemicals. The aim of our work was to study the qualitative and quantitative content of the main groups of BAS in dry extracts from the leaves of bearberry and their hypoglycemic activity.

Materials and methods. The objects of the study were alcohol dried extracts obtained with 50% and 96 % ethanol and the aqueous extract from the leaves of bearberry (PEW – water as an extractant, PE50 – 50% ethanol as an extractant, PE90 – water and 96% ethanol as an extractant, respectively). The qualitative composition and the quantitative content of the main groups of BAS were studied by the well-known methods: TLC and spectrophotometry [1, 2]. For screening of the hypoglycemic activity outbred albino male rats (14 weeks age) were used. The blood glucose concentration was determined using a “One Touch Select” glucometer (LifeScan, USA) in 0, 2, 4, 6 and 8 hours after administration of extracts, the samples were collected by a gingival vein puncture [3].

Results. In the extracts arbutin, gallic and ellagic acids, rutin, hyperoside, quercetin and catechin were identified by TLC. The content of the main groups of BAS in extracts from bearberry leaves (PEW, PE50 and PE90) was studied: hydroxycinnamic acids – 1.15 ± 0.02 , 2.88 ± 0.02 and 2.15 ± 0.02 %; flavonoids - 0.15 ± 0.01 , 4.30 ± 0.01 and 3.10 ± 0.01 %; the amount of phenolic - 12.80 ± 0.02 , 17.68 ± 0.01 and 14.33 ± 0.02 %; the amount of hydroquinone derivatives 9.56 ± 0.03 , 6.98 ± 0.02 and 3.64 ± 0.02 % respectively. It was determined that the highest content of hydroquinone derivatives was in the water extract. The content of flavonoids, hydroquinone derivatives and the amount of phenolic compounds prevailed in the extract from bearberry leaves obtained with 50 % ethanol. It was found that the glucose load caused hyperglycemia by 60.3 % in 60 min. The administration of PEW did not have a significant effect on the glycemia dynamics. On the contrary, PE50 administration caused a reliable glycemia in 30 min by 18.7 %, and in 60 min by 26.8 % (Fig.). PE90 reduced the glucose level in animals by 41.1 % in 60 min. Along with Arphasetin as a reference drug Metformin in the dose of 15 mg/kg was used. When determining the ability of extracts from bearberry leaves to reduce hyperglycemia after the glucose load it was found that PE50 provided a significant reduction in glycaemia by 16.8. Thus, it can be considered the most promising for further study of antidiabetic properties.

Conclusions Taking into account the results of studying the qualitative composition and the quantitative content of phenolic compounds in extracts from bearberry leaves it has been found that 50% ethanol is the optimal extractant for obtaining the extract with the highest content of practically all groups of phenolic compounds. The screening and comparative studies have shown that the alcohol extract from bearberry leaves (extractor – 50% ethanol, PE50) in the dose of 100 mg/kg reveals the maximal hypoglycemic activity. PE50 belongs to the class of relatively nontoxic substances in intragastric administration. The results indicate the reasonability of this bearberry leaves extract for further study in the range of medicinal products with the hypoglycemic activity.

References:

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