

UDC: 582.711.712:581.43:615.375:577.114.7

IMMUNOMODULATING EFFECT OF POLYSACCHARIDES AND WATER EXTRACTS OF *GEUM URBANUM* L.

Kozyra S.A., Gontova T.N., Stepanova S.I., Romanova S.V., Taranenko L.Y.

National University of Pharmacy, Kharkov, Ukraine

Introduction. Recently, there is the emergence of a wide range of immunomodulators, both of natural and synthetic origin. There is growing interest in immunotherapy of different diseases with various etiologies associated with deviations in the functioning of the immune system. Plant polysaccharides in compositions with flavonoids have a potentiating effect on the immune system. It is believed that this is due to the effect of polymeric substances on the solubility of polyphenols in water solutions [3].

Aim. It is known that plants of the genus *Geum* L., growing in Ukraine [1], contain tannins, flavonoids, coumarins, triterpenoids, organic acids, polysaccharides and many other substances [Chem. composition]. In this regard, there is the particular interest of the search and study of biologically active substances of plant origin with the specific action to the immune system or its components, which provide the desired effects with minimal side effects.

Research materials. Grass, rhizomes with roots of *Geum urbanum* L., water-soluble polysaccharides (WSHP), and water (dried) extracts.

The main results. It was studied the immunomodulatory effect of water-soluble polysaccharide fractions in water (dried) extracts from grass and rhizomes with roots of *Geum urbanum* L., because according to the literature, it possess immunomodulatory activity [3,4].

The immunocorrecting properties were studied by several indicators of the activity of phagocytic cells such as determining the percentage; studying the functional indices of T-lymphocytes in the reaction of rosette formation; determining a decrease or an increase in the formation of antibodies in the reaction for determining antileukocytic cytotoxic antibodies.

Studies on the immunomodulating properties of water-soluble fractions of polysaccharides of *Geum urbanum* L. have shown certain effect in vitro experiments. The results of the study are presented in table 1.

Table 1

Immunomodulating effect of polysaccharides of *Geum urbanum* L.

Objects	Phagocytosis,%	Rosette formation of T-lymphocytes, %	Antibodies, %	Heterophilic hemolysins
WSHP of herbs	88±2,2	47±1,9	10±1,8	0,4±1,4
WSHP of rhizomes with roots	83±1,8	45±1,7	13±1,8	0,6±1,5
The control	73±1,5	37±1,8	23±1,6	0,86±1,7

Compared with the control, phagocytic activity is enhanced by exposure of all studied polysaccharide fractions. The percentage of phagocytic macrophages was higher compared to the control and amounted in general 88% for grass, 83% for rhizomes with roots, while in the control of 73%.

Herb and root polysaccharides enhance the process of rosette formation (enhance the immunotropy of T-lymphocytes) by 47% and 45%, compared with the control - 37%.

All studied polysaccharides have a protective effect in the lymphotoxic test. The percentage of antibody formation is significantly reduced (by 10% for WSHP and 13% for WSHP of grass and rhizomes with roots) - compared with the control of 23%.

One of the methods for determining immunomodulatory activity is calculating the percentage of heterophilic hemolysins in blood serum when it interacts with the test substance. 3 ml of 2.5% suspension of sheep erythrocytes was added to 0.05 ml of test serum. Then it was incubated for 40 minutes in a thermostat, the reaction was stopped in the refrigerator for 10 minutes, centrifuged for 10 minutes at 1.5 rpm. The result was taken into account on the photocolormeter (light filter 440 nm, N up to 0.6 units of optical density) [2]. 10 serums of patients with impaired immunity indicators with a high percentage of antibodies (heterophilic hemolysins) were taken for the experiment.

According to the data in table 1, all polysaccharide complexes have a pronounced immunomodulating effect (reduce the percentage of antibodies).

Table 2

Immunomodulatory effect of water extracts of *Geum urbanum* L.

Source of water extracts	Phagocytosis, %	Rosette formation of T-lymphocytes, %	Antibodies, %	Heterophilic hemolysins
Herbs	94±21,5	48±1,2	16±1,7	0,5±1,5
Rhizomes with roots	90±1,2	46±1,5	15±1,4	0,4±1,8
The control	90±1,3	38±1,7	28±1,4	0,92±1,8

Analyzing the data presented in Table 2, it can be said that generally all extracts have a certain immunomodulatory effect. Moreover, the water extract obtained from the herb is distinguished by a large effect from the studied water extracts.

Conclusions. Thus, studies of the immunomodulating properties of water-soluble polysaccharides and water extracts of herbs and roots of *Geum urbanum* L. have shown that in vitro they exhibit an immunomodulatory effect. The obtained results suggest that the polysaccharides and extracts of *Geum urbanum* L. are of interest for further in-depth pharmacological studies.

Bibliography

1. Волкова Р.С., Леонтьев Д.В. Сучасне систематичне положення покритонасінних рослин флори України. Довідник. – Харків: ХНПУ, 2019. – 44 с.
2. Иммунология : Практикум/ Е.У. Пастер, В.В. Овод, В.К. Позур, Н.Е. Вихоть. – К.: Вищашк. / Изд-во при Киев.ун-те, 2009 – 304 с.
3. Соколов С.Я. Фитотерапия и фармакология: Руководство для врачей. – М.: Мед. Информ агенство, 2012. – 976 с.
4. Козира С.А., Кулагіна М.А., Сербін А.Г. Хімічний склад та використання в медицині рослин роду *Geum* L. (Огляд літератури) // Запорожский мед. журн. – 2008. – № 2. – С. 80-82.
5. Якісний та кількісний вуглеводний склад вегетативних органів гравілату міського (*Geum urbanum* L.) С.А. Козира, М.А. Кулагіна, О.В. Радько, Ю.Ю. Малиновский // Проблеми екологічної та медичної генетики і клінічної імунології: зб. наукових праць. – К.; Луганськ 2011. - Вип. 1 (103). – С. 324-331.