Published: March 20, 2023 | Pages: 89-92

INFLUENCE OF EMODIN ON COAGULATION HEMOSTASIS

Khoshimov N.N.

Institute Of Biophysics And Biochemistry At The National University Of Uzbekistan Named After Mirzo Ulugbek, Tashkent, Uzbekistan

Nasirov K.E.

Institute Of Biophysics And Biochemistry At The National University Of Uzbekistan Named After Mirzo Ulugbek, Tashkent, Uzbekistan

Ortikov M.M.

Institute Of Biophysics And Biochemistry At The National University Of Uzbekistan Named After Mirzo Ulugbek, Tashkent, Uzbekistan

Dedaboev J.I.

Institute Of Biophysics And Biochemistry At The National University Of Uzbekistan Named After Mirzo Ulugbek, Tashkent, Uzbekistan

Akhtamov M.A.

National University Of Uzbekistan, Tashkent, Uzbekistan

Khodjiev S.S.

National University Of Uzbekistan, Tashkent, Uzbekistan

Kozokov I.B.

National University Of Uzbekistan, Tashkent, Uzbekistan

Abdurakhmonov Zh.A

Institute Of Bioorganic Chemistry Named After Academician A.S.Sadikov, Tashkent, Uzbekistan

Mukhtorov A.A.

Namangan State University, Uzbekistan

Mamadaminov R.R.

Namangan State University, Uzbekistan

Eshbakova K.A.

Institute Of Chemistry Of Plant Substances. Tashkent, Uzbekistan

ABSTRACT: The alkaloid emodin was studied in coagulation hemostasis of blood in rats in vitro. The results show that Emodin prolongs prothrombin time and aPTT more effectively, but does not affect thrombin time. At the same time, prothrombin time and APTT were prolonged up to a

Published: March 20, 2023 | Pages: 89-92

certain dose (50 µg/ml). These results may indicate the inhibition of one of the factors II, V, VII, and X of coagulation hemostasis.

KEYWORDS: Alkaloid, activated partial thromboplastin time (APTT), prothrombin time, anticoagulant, thrombin time.

INTRODUCTION

It is known that platelets take an active part in the process of hemostasis. Platelets are involved in the formation of blood clots, the regulation of inflammation and immune processes. By effecting on platelets, it is possible to delay the formation of blood clots and the development of coronary heart disease [1,2].

At present, due to the increase in the number of thromboembolic complications, which are often the direct cause of death in cardiovascular pathology, surgical interventions, injuries, burns, etc., the relevance of research aimed at developing drugs that actively affect the hemostasis system. Anticoagulants have a pronounced effect on all phases of blood coagulation, therefore the study of their activity in coagulation disorders is very important. In this regard, sulfated polysaccharides are unique compounds acting on individual units of the hemostasis system [3].

Some alkaloids, which are used to treat thrombosis, can cause unwanted side effects by suppressing normal platelet function. In this regard, it is important to evaluate the effect of sulfated polysaccharides not only on the coagulation, but also on the platelet link. Therefore, the aim of this work was to study the effect of alkaloid Emodin on coagulation-platelet hemostasis.

MATERIAL AND METHODS

For evaluation of changes in the coagulation and aggregation activity of platelets, platelet-rich plasma obtained from the blood of human donors was used. Plasma was isolated by centrifugation at 1150 rpm for 5 min to precipitate erythrocytes. Platelet-rich plasma was centrifuged again for 10 min at 3,000 rpm. The platelet pellet was suspended in 5 ml of medium containing 150 mM NaCl, 2.7 mMKCl, 0.37 mM NaH_2PO_4, 1 mM $MgCl_2$, 1 mM $CaCl_2$, 5 mM glucose, 10 mM HEPES-NaOH, pH 6.55, 50 units/ml heparin, 0.35% serum albumin and 0.15 mg/ml apyrase. All operations were carried out in plastic containers at room temperature. Coagulation activity was assessed using APTT (CYANCoag, Belgium), APTT (CYANCoag, Belgium), prothrombin time (CYANCoag, Belgium), and other tests. All coagulation tests were performed on a single channel coagulometer (CYANCoag, Belgium.CY003, SN:5400439).

Statistical data processing and illustrations were performed using the Origin 6.1 computer program (Microsoft, USA).

RESULTS

The preliminary experiments showed that the alkaloid Emodin in activated partial thromboplastin time (aPTT) and prothrombin time (PT) tests of blood clotting, to varying degrees, depending on the dose, lengthened the clotting time. In these studies, the following results were obtained: Emodin led to a dose-dependent increase in prothrombin time and prolongation of APTT

Published: March 20, 2023 | Pages: 89-92

effectively, but did not affect thrombin time (TT). It should be noted that the dose-dependent prothrombin time and aPTT prolongation occurred up to a certain dose (50 μg/ml), further increase in doses did not lead to an increase in clotting parameters [4].

It was shown that the Emodin at concentrations of 10-50 μg/ml lengthened the PT from 21 to 120 sec. In the APTT test, the Emodin lengthened the clotting time from 33 to 98 seconds.

As is commonly known, a violation of aPTT in normal PT and TT is observed only with a deficiency or inhibition of factors VIII, IX, XI, XII, as well as prekallikrein and high molecular weight kininogen. In this case, slowing down the clotting of both aPTT and PT with normal PT is observed when exposed to indirect anticoagulants on factors II, V, X.

The reason for the increase in both APTT and PT with normal TT when exposed to Emodin compound may be inhibition of one of the factors II, V, VII, X. Since the cause of an increase in PT when exposed to anticoagulants may be reasoned by a deficiency of factors II, V, VII, X.

Extension of PTT with normal indications of aPTT and TT can be observed only when exposed to indirect anticoagulants on factor VII.

It is known that, unlike PT, the clotting time in the Lebetox test (LET) is not disturbed in factor VII deficiency [5,6]. LET is based on one of the differences between viper venom and tissue thromboplastin: the venom does not contain phospholipid analogues of PF-3. Therefore, the Lebetox test changes when there is a deficiency of platelets and insufficient release of PF-3 from them.

In this test, viper venom is used to determine the plasma clotting time, which activates factor X in the presence of Ca2+ and factor V. The effect of the poison is enhanced by phospholipids (cephalin or platelets).

CONCLUSION

In LET, an increase in clotting time (more than 3 seconds compared to control) is the result of an isolated or combined deficiency of factors X, V, II, or I. Unlike PT, the clotting time in LET is not disturbed when there is factor VII deficiency. This research on the effect of the Emodin on the Lebetox test showed that this compound prolongs the LET time more effectively platelet-rich plasma is used. Perhaps, the effect of the Emodin is associated with an effect on platelets and insufficient release of PF-3 from them.

The obtained results showed that: Emodin prolongs the prothrombin time and aPTT more effectively, but does not affect the thrombin time. Meanwhile, prothrombin time and aPTT were prolonged up to a certain dose (50 μg/ml). These results may indicate inhibition of one of the factors II, V, VII, X, since the cause of the increase in PT when exposed to anticoagulants may be a deficiency of them. Thus, the Emodin can be attributed to direct-acting anticoagulants, as it lengthens the aPTT and PT with normal TT.

REFERENCES

1. Nozim N. Khoshimov, Alisher A. Mukhtorov, Kabil E. Nasirov, Rakhmatillo N. Rakhimov, & Rahmatjon R. Mamadaminov. (2022). Effects of Polyphenols on Changes in the Transport of Ca2+ NMDA-receptors Under the Influence of L-glutamate against the Background of Alzheimer's Disease. Journal of Pharmaceutical Negative Results, 1322–1332. (Q4)

Published: March 20, 2023 | Pages: 89-92

CiteScore (1). Retrieved from https://www.pnrjournal.com/index.php/home/article/view/1203

2. Alisher A. Mukhtorov, Rahmatjon R. Mamadaminov, Nozim N. Khoshimov, Kabil E. Nasirov, Rakhmatilla N. Rakhimov, Lutpillaev X. Gaybullo. Regulation of transport of Ca2+ NMDA-receptors in rat brain synaptosomes under the influence of polyphenols. European Journal of Medicine. 2022. 10(1): 3-11.
3. Khoshimov N.N., Ortikov M.M., Dedaboev J.I., Nasirov K.E., Ashirmatova N.M., Khasanova Kh.I., Eshbakova K.A. Influence of emodin on plasma hemostasis. Инфекция иммунитет и фармакология. Спец. Вып. Ташкент. №3.2022.С.275-283.
4. Khoshimov N.N., Mamatova M.Sh., Ortiqov M. M., Mukhtorov A.A., Mamadaminov R.R., Eshonov M.A. Changes in thrombin time in the blood plasma of rats under the influence of Acuzun. XXV Anniversary International Biomedical Conference of Young Researchers «Fundamental Science and Clinical Medicine - Homo and Health». St. Petersburg State University. 2022. P.408-409.
5. Khoshimov N.N., Mamatova M.Sh., Ortiqov M. M., Eshonov M.A. Study of the effect of alkaloid acuzun on the platelet aggregation of the blood plasma of patients with coronary heart disease. XXV Anniversary International Biomedical Conference of Young Researchers «Fundamental Science and Clinical Medicine - Homo and Health». St. Petersburg State University. 2022. P.412-413.
6. Ortiqov M. M., Khoshimov N.N., Rakhmonova N. Sh., Musaeva M.K., Nasirov K.E. Study of the influence of biologically active compounds on the coagulation of the blood plasma of rats with the help of venom vipera lebetina. XXV Anniversary International Biomedical Conference of Young Researchers «Fundamental Science and Clinical Medicine - Homo and Health». St. Petersburg State University. 2022.P. 414-415.