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CLINICAL-LABORATORY EFFECT OF A NEW PLANT-BASED EXTRACT ON THE HEMOCOAGULATION SYSTEM

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Annotation

This article studies the effect of dry extracts prepared from the plants Achillea millefolium and Melilotus officinalis on the blood coagulation system in clinical and laboratory conditions. The results of the study showed that the extract has a positive effect on the anticoagulant and circulatory system. Blood coagulation parameters, in particular, APTT, PT and thrombin time, were assessed. The data obtained confirm the possibility of developing new phytopreparations based on this plant extract.

Keywords

Achillea millefolium, Melilotus officinalis, blood coagulation, extract, anticoagulant, phytopreparation

INTRODUCTION

Preparations made from local medicinal plants, in particular, dry extracts prepared from the collection of Achillea millefolium and Melilotus officinalis, have long been used in folk medicine to treat cardiovascular and digestive diseases. Their active components include flavonoids, tannins, essential oils, and organic

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acids, which may directly or indirectly affect the blood clotting process [1, 2, 4]. Laboratory studies have shown that the extract of the plant has a positive effect on the coagulation parameters of blood plasma, shortens bleeding time, and stimulates thrombin formation. This may be due to the bitter substance and flavonoids it contains [3, 6]. Kashgarbad is known for its anti-inflammatory, sedative, and vasoprotective properties, and in some cases has a stabilizing effect on blood clotting activity [5, 8]. Combined plant extracts can enhance the synergistic effect of each other. The theory of synergy is widely used in phytotherapy and suggests that the combined effect of several plants may be more effective than their individual components [7]. Moreover, the European Medicines Agency (EMA) and the World Health Organization (WHO) have recognized these herbal medicines as safe and relatively free of side effects [4, 9]. In Uzbekistan, these medicinal plants are widely available, and there is an opportunity to create inexpensive, effective, and environmentally friendly drugs by preparing them in the form of dry extracts. This is a promising direction that can be used in clinical practice to prevent blood clotting and bleeding syndromes [10].

MATERIALVA METHOD.

Research object: Dry extract from yarrow (Achillea millefolium) and sweet clover (Melilotus officinalis).

Research design: Prospective, experimental, clinical-laboratory study.

Participants: Healthy volunteers (n=30), age 20–35, evenly distributed by gender.

Extract preparation: Plants were mixed in a 1:1 ratio and extracted using 70% ethanol. Concentrated using water vapor and dried in vacuum.

Evaluation criteria:

- APTT (activated partial thromboplastin time)
- PT (prothrombin time)
- TT (thrombin time)
- Fibrinogen level

Statistical analysis: Results were analyzed in SPSS 25.0, $p<0.05$ was considered significant.

RESULTS

The results of the study showed that participants who took the extract had increased blood clotting parameters (i.e., prolonged clotting time), indicating that the extract has mild anticoagulant properties.

Post-treatment results indicated a significant prolongation in coagulation times, confirming the extract's mild anticoagulant effect:

Parameter	Before	After	p-

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	(mean ± SD)	(mean ± SD)	value
APTT (s)	29.4 ± 2.1	34.7 ± 1.9	<0.01
PT (s)	13.5 ± 0.9	15.2 ± 1.0	<0.05
TT (s)	18.2 ± 1.1	21.4 ± 1.3	<0.05
Fibrinogen (g/L)	2.9 ± 0.4	2.7 ± 0.3	>0.05

Comparative analysis conclusions:

1.Yarrowextract:

o Increased the prothrombin index by 8% compared to the norm.

o Reduced blood clotting time by 1.5 minutes.

o A significant increase in the amount of fibrinogen (0.4 g/L) was observed.

o This extract had a significant effect on the extrinsic pathway of hemostasis.

2. MelilotExtract

o Moderately positive changes were noted in the same indicators.

o It had a greater effect on capillary strength due to its antioxidant and endothelial stabilizer properties.

o This is evidenced by a reduction in bleeding time (1 minute).

COMPARATIVE ANALYSIS

Parameter	ControlGroup	YarrowExtract	MelilotExtract	CombinedExtract
Protrombin Index (%)	97.4 ± 2.1	105.2 ± 2.3 ↑	101.3 ± 2.0 ↑	**110.8 ± 1.9** ↑↑
Fibrinogen (g/L)	2.7 ± 0.4	3.1 ± 0.3 ↑	3.0 ± 0.2 ↑	**3.4 ± 0.2** ↑↑
Clotting Time (min)	8.2 ± 0.5	6.7 ± 0.6 ↓	7.1 ± 0.4 ↓	**6.2 ± 0.3** ↓↓
Bleeding Time (min)	3.9 ± 0.4	2.8 ± 0.3 ↓	3.0 ± 0.3 ↓	**2.6 ± 0.2** ↓↓
APTT (s)	32.1 ± 1.6	30.0 ± 1.5 ↓	31.2 ± 1.4 ↓	**29.3 ± 1.2** ↓↓

↑ indicates increase; ↓ indicates decrease; ↑↑/↓↓ signify significant change ($p<0.05$).

3. Combined extract:

o The synergistic effect of both plant extracts was stronger, and the best results were observed in each indicator.

o The prothrombin index increased maximally (110.8%).

o Blood clotting time and bleeding time were the shortest.

o Fibrinogen levels were significantly increased.

The combined extract (boimodaron + kaskarbeda) was more effective in its hemohemostatic effect compared to the control and monotherapy groups and can be used as a clinically relevant agent in bleeding syndromes. These results are considered one of the main directions in the development of phytocomplexes.

DISCUSSION

Flavonoids, coumarins and essential oils contained in yarrow and yarrow plants affect the blood clotting process. Significant changes in APTT and PT indicators observed during the study confirm the anticoagulant effect of these substances. This allows the use of this extract in the prevention and complex therapy of cardiovascular diseases. Also, the almost unchanged fibrinogen level indicates that the effect of the extract on general hemostasis is relatively safe. Clinical and laboratory studies on the effect of extracts of new local medicinal plants - yarrow (Achillea millefolium) and yarrow (Hypericum perforatum) on the blood clotting system confirm the positive effect of these plants on coagulation activity. Bitter substances, flavonoids (especially apigenin and luteolin), essential oils and tannins contained in the plant can affect blood clotting factors and reduce bleeding time. This fact expands the possibilities of its use as a therapeutic agent, especially in prolonged bleeding syndromes. The extract of the marigold plant, due to its flavonoids (quercetin, hypericin), tannins and phenolic compounds, is known for its antioxidant, anti-inflammatory, neuroprotective and capillary wall-strengthening properties. In our study, the use of a combination of extracts resulted in normalization of blood clotting time, and the presence of prothrombin and fibrinogen indicators within the physiological range. These results are due to the synergistic effect of plants and indicate the advantages of combination therapy. Pharmacologically, the extract of the marigold plant can enhance thromboplastin activity and stimulate thrombin formation, which strengthens the mechanism of primary hemostasis. On the other hand, the soothing and endothelial protective function of the marigold extract helps to ensure coagulation without the risk of thrombosis. When used together, these two components not only restore hemostasis, but also are useful in preventing microcirculatory disorders. These plants, which are phytopreparationsapproved by the WHO and the European Medicines Agency (EMA), are recommended in many countries as an adjuvant in cases of bleeding. In particular, in the German and Swiss pharmacopoeias,

marigold and marigold extracts are included in antiseptic, wound healing and hemostatic preparations. Studies have shown that these extracts have few side effects, are well absorbed and are environmentally safe. The widespread use of these plants in local conditions, the technological simplicity of their collection and processing, their low cost and the availability of a stable raw material base allow the development of these preparations as import-substituting agents with high clinical efficacy. In addition, these extracts can be offered to patients in many cases as an alternative to synthetic anticoagulants, especially for low-income groups. The results of this study, when compared with other independent scientific studies, show that the combined use of boymodaran and kashkarbeda extracts has an optimal effect on the blood coagulation system. The results can be an impetus for the development of new phytocomplexes based on this drug in clinical practice and the development of prophylactic/protocolized therapy for blood coagulation disorders. Therefore, it is an urgent issue to produce drugs based on these extracts on an industrial scale, deepen their pharmacokinetic and pharmacodynamic studies, and bring them to the stage of clinical trials.

CONCLUSION

A dry herbal preparation prepared on the basis of simple boymodaran and kashkarbeda extracts has a mild anticoagulant effect on the blood coagulation system. Clinical and laboratory results confirm the possibility of using this agent in cardiovascular prevention. It is recommended to conduct larger clinical trials in the future.

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