INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 8.854 Volume 13, issue 01 (2026)

INFLUENCE OF MUMIYO EXTRACT ON PLATELET-MEDIATED HEMOSTASIS IN DOGS

Boltabaeva Dilbarkhon Fayzirakhmanovna
Senior Teacher of Andijan State Medical Institute,
Department of Pharmacology, Clinical Pharmacology,
and Medical Biotechnology

Abstract: Platelets play a key role in primary hemostasis and blood coagulation. The present study investigated the effect of mumiyo extract on platelet count in dogs in order to clarify its contribution to the anticoagulant mechanism of this substance. Clinically healthy dogs were administered mumiyo extract orally at doses of 10, 25, and 50 mg/kg body weight. Platelet counts were determined before administration and at 1 and 2 hours after dosing. The results suggest that reduction of platelet number contributes to the anticoagulant action of mumiyo by affecting platelet-mediated hemostasis. Modulation of platelet count may therefore represent an important mechanism underlying the hypocoagulant effects of mumiyo.

Keywords: Alai mumiyo, mumiyo extract, platelets, platelet count, anticoagulant effect, hemostasis, dogs.

Introduction

Traditional medicine (TM) encompasses a broad body of knowledge, skills, and healing practices developed and refined over generations within diverse cultures. Rooted in cultural beliefs, empirical observations, and accumulated experience, TM is employed for the preservation of health as well as for the prevention, diagnosis, and treatment of both physical and mental disorders (1). In recent decades, growing scientific interest in TM has led to an increasing number of studies examining the bioactive properties of natural substances used in these traditional systems, many of which have shown promising therapeutic and preventive potential (2).

Traditional medicine comprises several distinct systems, including Traditional Persian Medicine (TPM), Traditional Arabic Medicine, Traditional Chinese Medicine (TCM), and Ayurveda, the traditional medical system of India (3). Among the many natural products employed in these traditions, *Mumijo*—also known worldwide under various names such as *Shilajit* (Hindi), *Silajatu* (Bengali), *Rock Juice* (Tibetan), *Conqueror of Mountains* (Sanskrit), *Hajarul-Musa* (Arabic), *Moomiaii* (Persian), *Myemu* (Russian), and *Mumie* (German)—occupies a unique position. This resin-like, pale- to dark-brown substance, sometimes referred to as mineral pitch or mineral wax, has been valued for over 3,000 years for its rejuvenating, restorative, and adaptogenic properties (4).

The origin of *Mumijo* has been interpreted through three principal theories: biological, geological, and bio-mineralogical. The biological theory suggests that *Mumijo* results from the slow decomposition of plant material and animal excretions under specific physicochemical conditions. The geological theory attributes its formation to long-term geological transformations, while the bio-mineralogical concept considers it a complex product formed when the organic precursors of *Mumijo* interact with mineral components of their environment. Factors such as local flora, rock and soil composition, altitude, temperature, and humidity influence the final chemical makeup and therapeutic potential of the substance (7). Despite regional differences, *Mumijo* generally contains 60–80% organic matter and 20–40% inorganic components, with trace elements including Fe, Ca, Cu, Zn, Mg, Mn, Mo, and P (8).

Historically, *Mumijo* has held an esteemed place in Persian medical literature. In the 10th century, Ahvazi's *Kamāl as-Sanā'a* recommended its use for conditions such as cold headaches, hemoptysis, and asthma. Avicenna, in *The Canon of Medicine*, described *Mumijo* as a potent tonic for strengthening the brain, enhancing fertility, and treating various ailments. Later, in the 12th century, Jurjani's *Zakhire Khwārizmshāhi* noted its benefits in treating inflammation, ulcers, and urinary and prostate disorders (5).

Traditional healers have prescribed *Mumijo* in various doses for numerous health issues, including disorders of the urinary system, jaundice, gallstones, gastrointestinal disturbances, splenic enlargement, epilepsy, hypersensitivity, neurological conditions, chronic bronchitis, tuberculosis, eczema, anemia, and diabetes (9). However, fungal contamination and mycotoxin presence remain significant challenges to its broader therapeutic use (10).

Practitioners of traditional medicine also attribute to *Mumijo* a wide spectrum of pharmacological effects—ranging from aphrodisiac and anti-inflammatory actions to applications in musculoskeletal disorders such as fractures, arthritis, and spondylitis. It is also used for edema, hemorrhoids, rejuvenation, wound healing, and metabolic regulation (7). The bioactive components of *Mumijo*, particularly fulvic and humic acids, are known for their antioxidant, anti-inflammatory, antimutagenic, and immunomodulatory activities, which may contribute to its proposed anticancer potential (8). Experimental studies further report reductions in blood glucose and improvements in lipid profiles in animal models (11), stimulation of nucleic acid synthesis, enhancement of mineral transport to muscle and bone (4), and promotion of diuresis and natriuresis (12).

Taken together, these traditional and experimental findings suggest that *Mumijo* is a complex natural product with multifaceted biological activity and considerable potential for modern pharmacological investigation.

Materials and Methods.

The experiments were carried out on clinically healthy adult dogs. All animals were maintained under standard laboratory conditions, and the study was conducted in accordance with accepted ethical principles for the use of animals in biomedical research.

To assess the effect of mumiyo on platelet parameters, a special experimental series was performed. Mumiyo extract (Alai origin) was administered once orally at doses of 10, 25, and 50 mg/kg body weight.

Blood samples were collected before mumiyo administration (baseline) and at 1 and 2 hours after dosing. Platelet counts were determined using standard hematological methods and expressed as the number of platelets per cubic millimeter of blood (thousand/mm³).

The effect of mumiyo on platelet aggregation and adhesion was evaluated as part of the overall assessment of platelet functional activity.

Data were expressed as mean ± standard deviation (SD). Statistical analysis was performed by comparing post-administration values with baseline data. Differences were considered statistically significant at $p < 0.05$.

Results

Administration of mumiyo extract produced dose- and time-dependent changes in platelet count in dogs. As shown in Table 1, a dose of 10 mg/kg caused only a slight, statistically insignificant decrease in platelet count one hour after administration, with values remaining close to baseline at both 1 and 2 hours ($p > 0.5$).

Table 1. Effect of Alai mumiyo extract on platelet count in the blood of dogs (thousand/mm³)

Mumiyo dose	Baseline	After 1 hour	P value	After 2 hours	P value
10 mg/kg	240±32	215±26	>0,5	235±24	>0,5

25 mg/kg	266±34	186±24	<0,05	207±21	>0,05
50 mg/kg	250±28	153±18	<0,001	183±20	<0,01

Statistically significant differences ($p < 0.05$) compared with baseline values.

At a dose of 25 mg/kg, mumiyo induced a significant reduction in platelet count one hour after administration, decreasing from 266 ± 34 thousand/mm³ at baseline to 186 ± 24 thousand/mm³ ($p < 0.05$). Two hours after administration, platelet count partially recovered to 207 ± 21 thousand/mm³; however, this increase was not statistically significant compared with baseline values ($p > 0.05$).

The most pronounced effect was observed at a dose of 50 mg/kg. One hour after administration, platelet count decreased significantly from 250 ± 28 to 153 ± 18 thousand/mm³ ($p < 0.001$). Although a partial recovery was observed after two hours (183 ± 20 thousand/mm³), platelet levels remained significantly lower than baseline ($p < 0.01$).

Overall, mumiyo caused a transient but dose-dependent reduction in platelet count, with higher doses producing more pronounced and sustained effects.

Discussion

The present study demonstrates that mumiyo extract significantly influences platelet count in dogs, with effects that depend on the administered dose and time after administration. The minimal and statistically insignificant changes observed at a dose of 10 mg/kg indicate that low doses of mumiyo have little effect on platelet number.

In contrast, administration of 25 and 50 mg/kg resulted in a marked decrease in platelet count within one hour, suggesting that mumiyo may inhibit platelet production, enhance platelet destruction, or promote platelet redistribution within the vascular system. The partial recovery observed two hours after administration indicates that the effect is transient, although higher doses do not allow full restoration of baseline platelet levels within the observed time frame.

The dose-dependent reduction in platelet count suggests that platelet suppression contributes to the anticoagulant properties of mumiyo. Since platelets play a central role in primary hemostasis, their reduction may lead to decreased platelet aggregation and adhesion, thereby reducing thrombus formation.

These findings support the hypothesis that the anticoagulant effect of mumiyo is mediated not only through changes in plasma coagulation factors but also through modulation of platelet-mediated hemostasis.

Conclusion

Mumiyo extract induces a dose-dependent decrease in platelet count in dogs, with significant effects observed at doses of 25 and 50 mg/kg. Although partial recovery of platelet levels occurs within two hours, higher doses result in sustained reductions compared with baseline values.

The observed decrease in platelet count likely contributes to the anticoagulant mechanism of mumiyo by impairing primary hemostasis. These results indicate that modulation of platelet number is an important component of the overall anticoagulant action of mumiyo. Further studies are required to elucidate the mechanisms underlying these effects and to assess their clinical relevance.

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