Volume 3, Issue 2, February - 2025 **ISSN(E):** 2938-3773

Web of Discoveries: Journal of Analysis and Inventions
webofjournals.com/index.php/3

DIURETIC POTENTIAL OF MUMIJO: EXPERIMENTAL EVALUATION AND MECHANISTIC INSIGHTS

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

Abstract
Mumijo, also known as Shilajit, is a natural substance with a rich history in traditional medicine. Recently, scientific investigations have focused on its potential therapeutic effects, particularly its impact on fluid balance and kidney function. This article examines the diuretic effect of Mumijo, assessing its influence on water intake, urinary output, and the excretion of key electrolytes such as sodium, potassium, and creatinine. Our study presents experimental data showing that Mumijo supplementation increases both water consumption and urine output significantly compared to the control group. Furthermore, it enhances the excretion of sodium and potassium, while having a minimal effect on creatinine levels. The results suggest that Mumijo may have significant diuretic properties, with potential applications in the management of fluid balance disorders.

Keywords: Mumijo, diuretic effect, renal function, fluid balance, natriuresis, Wistar rats, traditional medicine, electrolyte excretion, pharmacological properties.

Introduction

Mumijo, commonly known as Shilajit, is a naturally occurring organic-mineral complex that has been used for centuries in traditional medicine systems such as Ayurveda and Siddha (1). Found in high-altitude regions such as the Himalayas, Mumijo contains a diverse range of bioactive compounds, including fulvic acids, minerals, and antioxidants, which contribute to its pharmacological properties (2). Historically, it has been employed to enhance vitality, improve cognitive function, and support overall well-being (3).

One of Mumijo's lesser-known but clinically relevant properties is its potential diuretic effect. Diuretics, substances that increase the excretion of water and electrolytes, are commonly used in the management of conditions such as hypertension, edema, and renal dysfunction (4). While synthetic diuretics are widely available, they can cause side effects such as electrolyte imbalances and dehydration. Natural alternatives like Mumijo are gaining attention for their ability to achieve similar effects with potentially fewer adverse outcomes (5).

The origin of mumiyo is explained by three main theories: biological, geological, and bio-mineralogical. According to the biological theory, it is suggested that mumiyo forms from decomposed plant remains or animal excreta under specific physicochemical conditions. The geological theory asserts that mumiyo is the result of prolonged geological processes. Additionally, the bio-mineralogical concept proposes that this compound is a product of mechanical contamination of the liquid precursor of mumiyo with mineral factors. Factors such as the region of production, plant species, geological characteristics of rocks and soil, local

temperature, humidity, and altitude above sea level, among others, influence the composition and therapeutic properties of mumiyo (9).

Despite similar physical characteristics in various regions of the world, these factors affect the composition and proportion of components in mumiyo. Generally, mumiyo consists of organic compounds (60–80%), inorganic compounds (20–40%), and trace elements such as Fe, Ca, Cu, Zn, Mg, Mn, Mo, and P (10).

Recent studies have suggested that Mumijo promotes fluid balance by influencing renal function and electrolyte excretion (6). This is thought to be mediated by its ability to modulate kidney processes, leading to increased sodium and potassium excretion without adversely affecting creatinine clearance. These findings highlight the need for further investigation into Mumijo's diuretic properties, particularly its mechanism of action and potential clinical applications (7).

It was observed that mumiyo had an effect on prolonged bleeding time, suggesting its potential impact on blood coagulation processes. This effect was carefully monitored alongside other physiological parameters during the study (8).

Materials and Methods

Experiments on rats and dogs were conducted under conditions of a chronic experiment, which excluded the influence of general anesthesia and surgical trauma. During the study, the animals were kept in individual metabolic cages designed to collect urine and monitor water intake. They were provided with standard feed and tap water for drinking. Necessary indicators were collected daily at the same time. After a three-to-four-day control period, the animals were administered mumiyo in the form of a 5% solution at a dose of 50 mg/kg through a gastric probe. Subsequent administration of the substance was carried out only after all studied indicators returned to their baseline levels.

Measurements:

The following parameters were measured:

1. **Water intake (ml)** – The volume of water consumed by participants during the study period.
2. **Daily urine output (ml)** – The volume of urine excreted within 24 hours.
3. **Creatinine excretion (mg)** – The amount of creatinine excreted in urine, a marker of kidney function.
4. **Sodium excretion (µmol)** – The amount of sodium excreted in urine.
5. **Potassium excretion (µmol)** – The amount of potassium excreted in urine.

Urine samples were collected over a 24-hour period for analysis, and all measurements were recorded and analyzed statistically.

Statistical Analysis:

The data was analyzed using a paired t-test to compare the control group and the Mumijo-treated group. A p-value of < 0.05 was considered statistically significant.

Results

The table below summarizes the key findings of the study, comparing the control group with the Mumijo-treated group:

Parameter	Control group	Mumijo effect group	t-Value (p)
Water intake (ml)	12.8 ± 0.71	14.6 ± 0.60	1.94 (< 0.05)
Daily urine output (ml)	4.0 ± 0.25	5.2 ± 0.23	3.53 (< 0.001)
Creatinine excretion (mg)	2.3 ± 0.11	2.4 ± 0.5	0.83 (> 0.5)
Sodium excretion (µmol)	11.2 ± 0.62	16.7 ± 1.25	3.94 (< 0.001)
Potassium excretion (µmol)	576.5 ± 29.81	921.8 ± 40.24	6.90 (< 0.001)

Discussion

The results of this study provide compelling evidence for the diuretic effects of Mumijo. Specifically, supplementation with Mumijo significantly increased both water intake and urine output, indicating a clear diuretic effect. The observed increase in daily urine output (from 4.0 ± 0.25 ml in the control group to 5.2 ± 0.23 ml in the Mumijo group, $p < 0.001$) is particularly noteworthy, suggesting that Mumijo may promote fluid elimination, which could be beneficial in conditions such as edema or hypertension.

Furthermore, Mumijo supplementation led to a significant increase in the excretion of sodium (from 11.2 ± 0.62 µmol to 16.7 ± 1.25 µmol, $p < 0.001$) and potassium (from 576.5 ± 29.81 µmol to 921.8 ± 40.24 µmol, $p < 0.001$). Both of these electrolytes play vital roles in maintaining fluid balance and regulating blood pressure. The enhancement of sodium and potassium excretion could be indicative of an improved renal function, further supporting Mumijo's potential as a therapeutic agent for fluid-related disorders.

However, the excretion of creatinine, a marker for kidney filtration capacity, showed no significant difference between the groups, suggesting that Mumijo does not adversely affect kidney function. The slight increase in creatinine excretion in the Mumijo group (from 2.3 ± 0.11 mg to 2.4 ± 0.5 mg) was not statistically significant ($p > 0.5$), indicating that Mumijo's diuretic effect is unlikely to compromise renal filtration.

The statistical significance of the findings supports the notion that Mumijo has a robust diuretic effect, potentially offering a natural alternative or adjunct to conventional diuretics. However, further studies, particularly those involving larger sample sizes and longer duration, are necessary to confirm these findings and explore the long-term safety and efficacy of Mumijo as a diuretic.

Conclusion

This study provides solid evidence for the diuretic effects of Mumijo, demonstrating its ability to increase water intake, daily urine output, and the excretion of important electrolytes like sodium and potassium. While the data supports the potential use of Mumijo in managing fluid balance, additional research is needed to fully understand its mechanisms and therapeutic

applications. Given its promising results, Mumijo may serve as a valuable natural remedy for individuals dealing with fluid retention and related conditions

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