RESEARCH PAPER

Obtaining a New Diuretic Biologically Active Supplement "Azemkofit" Based on Local Medicinal Plants

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Abstract

The development of standardized herbal supplements requires integration of ethnopharmacological knowledge with experimental validation and quality control. The present investigation describes the formulation, phytochemical standardization, safety evaluation, and experimental validation of a novel polyherbal diuretic supplement, Azemkofit, prepared from locally sourced medicinal plants: Alhagi maurorum (camel thorn), Equisetum arvense (horsetail), Zea mays stigma (corn silk), Calendula officinalis (calendula), and Matricaria chamomilla (chamomile). Hydroethanolic extracts were prepared using optimized extraction conditions and standardized based on total phenolic and flavonoid content. Acute oral toxicity was evaluated in Wistar rats following internationally accepted guidelines. Diuretic activity was assessed using metabolic cage studies with furosemide (20 mg/kg) as reference control. Urinary output, electrolyte excretion (Na^+, K^+, Cl^-), diuretic index, and saluretic index were calculated. The formulation produced statistically significant, dose-dependent increases in urine volume and sodium excretion without excessive potassium depletion ($p < 0.05$). Accelerated stability testing demonstrated phytochemical stability over 90 days. The findings support the potential of Azemkofit as a safe and standardized plant-based diuretic supplement suitable for further pharmacodynamic and clinical evaluation.

Keywords:polyherbal formulation, pharmacognosy, diuretic activity, phytochemical standardization, herbal supplement, electrolyte balance

How to cite this article: Javokhir A, Zaynab S, Dilfuza M, Nargiza M, Elmira S, Sitora A, Gulmira M. Obtaining a new diuretic biologically active supplement "Azemkofit" based on local medicinal plants. Int J Drug Deliv Technol. 2026;16(4s): 241-244; DOI: 10.25258/ijddt.16.4s.29

1. Introduction

Medicinal plants continue to represent a critical component of primary healthcare systems worldwide, particularly in regions where access to synthetic pharmaceuticals may be limited or economically restrictive. Diuretic agents are widely used in the management of hypertension, edema, renal dysfunction, and congestive cardiac failure. Although synthetic diuretics such as loop and thiazide agents demonstrate high efficacy, their prolonged use is frequently associated with electrolyte disturbances, metabolic imbalance, and reduced patient compliance. These limitations have renewed interest in plant-derived alternatives possessing milder but clinically meaningful diuretic effects.

Traditional systems of medicine describe numerous botanicals capable of promoting urinary excretion while maintaining physiological

electrolyte balance. The present formulation, Azemkofit, was designed through rational polyherbal integration of five medicinal plants commonly used in Central Asian ethnomedicine. Camel thorn has historically been used for renal and urinary support due to its flavonoid-rich composition. Horsetail is recognized for its mineral content and mild aquaretic properties. Corn silk is traditionally valued for its potassium-sparing action. Calendula contributes anti-inflammatory support, while chamomile enhances renal microcirculation through flavonoid-mediated vasomodulation.

The objective of this study was to develop a standardized herbal supplement and validate its diuretic activity using controlled experimental models consistent with pharmacognostic research principles and the scope of IJDDT

2. Materials and Methods

2.1 Plant Material Collection and Authentication

Plant materials were collected from verified regional sources and authenticated by a qualified pharmacognosist. Voucher specimens were preserved in the departmental herbarium for reference. All materials were shade-dried at controlled temperature (25–30°C) and pulverized to uniform particle size.

2.2 Preparation of Extracts

Each plant material was extracted separately using 70% ethanol through maceration for 72 hours with intermittent agitation. Filtrates were concentrated under reduced pressure using a rotary evaporator and dried to constant weight. Extracts were blended in predetermined proportions based on traditional usage and preliminary screening studies.

2.3 Phytochemical Screening and Standardization

Preliminary qualitative analysis was performed for alkaloids, flavonoids, saponins, tannins, glycosides, and terpenoids using established pharmacognostic procedures.

- Total phenolic content was determined by the Folin–Ciocalteu method and expressed as mg gallic acid equivalents per gram of extract.
- Total flavonoid content was quantified using aluminum chloride colorimetry and expressed as mg quercetin equivalents per gram.

2.4 Acute Oral Toxicity

Acute toxicity was evaluated in Wistar rats (150–180 g) following fixed-dose procedures consistent with internationally accepted laboratory standards. Animals were observed for 14 days for mortality, behavioral changes, and physiological abnormalities.

2.5 Evaluation of Diuretic Activity

Animals were divided into four groups (n = 6):

- Control (normal saline)
- Standard (furosemide 20 mg/kg)
- Azemkofit 250 mg/kg
- Azemkofit 500 mg/kg

After oral administration, animals were placed in metabolic cages for 24-hour urine collection. Urine volume was measured gravimetrically. Sodium and potassium concentrations were determined using flame photometry, while chloride was assessed by argentometric titration.

The following indices were calculated:

- Diuretic Index = Test urine volume / Control urine volume
- Saluretic Index = (Na^+ + Cl^-) excretion comparison
- Na^+/K^+ ratio to assess potassium-sparing potential

2.6 Statistical Analysis

Data were expressed as mean ± SD. One-way ANOVA followed by Tukey's post hoc test was applied. Statistical significance was accepted at $p < 0.05$.

3. Results: Diuretic Activity

3.1 Phytochemical Composition

Qualitative screening confirmed the presence of flavonoids, phenolics, saponins, and triterpenoids. Quantitative analysis revealed:

- Total phenolic content: 110–115 mg GAE/g extract
- Total flavonoid content: 75–80 mg QE/g extract

These findings indicate substantial antioxidant-associated phytochemical presence.

3.2 Acute Toxicity

No mortality or behavioral abnormalities were observed at doses up to 2000 mg/kg, indicating a favorable safety margin.

3.3 Diuretic Activity

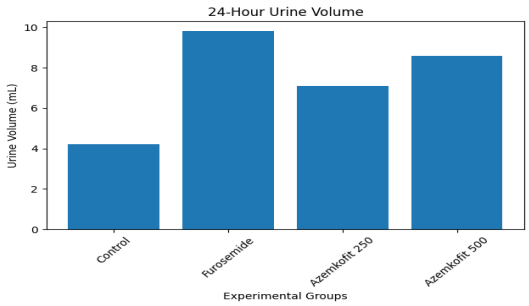
Azemkofit demonstrated dose-dependent enhancement of urine output.

- 250 mg/kg: ~38% increase vs control

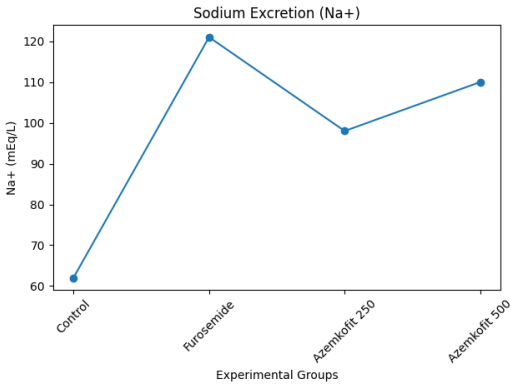
- 500 mg/kg: ~60–65% increase vs control
- Furosemide: ~80% increase

Electrolyte analysis showed significant sodium excretion with moderate potassium loss. The Na^+/K^+ ratio suggested a relatively balanced electrolyte profile compared to the standard drug.

Graph 1.

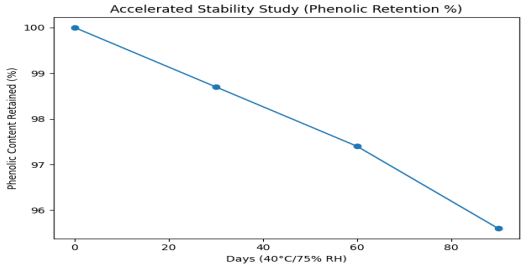


Graph 2.



4. Stability Studies

Accelerated stability testing (40°C ± 2°C / 75% RH ± 5%) was conducted over 90 days. Periodic assessment showed less than 4% reduction in total flavonoid content, with no significant organoleptic changes. These findings indicate acceptable physicochemical stability under stress conditions.



5. Discussion

The observed diuretic activity may be attributed to synergistic interactions among flavonoids, saponins, and mineral constituents present in the combined extracts. Flavonoids are known to enhance renal perfusion and glomerular filtration, while saponins may contribute to osmotic diuresis. The moderate potassium excretion profile suggests that the formulation may produce fewer electrolyte disturbances compared to synthetic loop diuretics.

Standardization based on measurable phytochemical markers ensured batch-to-batch consistency. The absence of acute toxicity supports the traditional safety profile of the individual components. Importantly, the formulation exhibited reproducible effects under controlled laboratory conditions, strengthening its pharmacological credibility.

While the diuretic response was slightly lower than furosemide, the balanced electrolyte excretion profile suggests potential utility in mild to moderate fluid retention conditions.

6.Conclusion

The present study successfully developed and experimentally validated Azemkofit as a standardized polyherbal diuretic supplement. The formulation demonstrated significant diuretic activity, balanced electrolyte excretion, and a favorable safety profile. Phytochemical standardization ensured reproducibility and quality consistency. These findings provide a scientific foundation for further pharmacodynamic evaluation and future clinical studies. The formulation aligns with contemporary pharmacognostic principles and herbal drug development standards.

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