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Review

EVALUATION OF IN-VITRO ANTI-UROLITHIATIC ACTIVITY OF A COMBINATION OF HORSEGRAM AND TAMARIND SEEDS

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Abstract

Urolithiasis is a prevalent urinary disorder characterized by the formation of crystalline stones, primarily composed of calcium oxalate. The present study aims to evaluate the *in vitro* anti-urolithiatic activity of a combination of Tamarindus indica Linn. and Macrotyloma uniflorum seed extracts. Both seeds have a long history of traditional use in the management of kidney stones.

The powdered seeds were extracted using suitable aqueous/ethanolic solvent systems and evaluated using *in vitro* calcium oxalate nucleation, crystal growth inhibition, and aggregation assays. The inhibitory activity of the combined extract was compared with a standard anti-urolithiatic drug.

Results revealed a dose-dependent inhibition of calcium oxalate crystal formation. The combination extract showed significant reduction in nucleation, growth, and aggregation of calcium oxalate crystals, indicating a synergistic effect of phytoconstituents present in both seeds. The findings support the traditional use of these plant seeds and suggest their potential role in the prevention and management of urolithiasis.

Keywords: Urolithiasis; Calcium oxalate; Tamarindus indica; Macrotyloma uniflorum; In vitro anti-urolithiatic activity

1. INTRODUCTION

Urolithiasis is a common urinary tract disorder marked by the formation, growth, and aggregation of crystalline substances within the kidneys or urinary tract. Among various types of stones, **calcium oxalate stones** are the most prevalent worldwide, accounting for the majority of kidney stone cases. Stone formation occurs due to supersaturation of urine with stone-forming constituents, leading to nucleation, crystal growth, and aggregation.

Types of Urinary Stones

1. **Calcium Stones**
    - Calcium oxalate and calcium phosphate
    - Associated with dietary factors and metabolic disorders
2. **Struvite Stones**
    - Caused by urinary tract infections
3. **Uric Acid Stones**
    - Linked to high-protein diets, dehydration, and diabetes
4. **Cystine Stones**
    - Rare, caused by genetic disorder (cystinuria)

Current pharmacological therapies may cause side effects, leading to increased interest in **plant-based alternatives**. Traditional Indian medicine suggests that **tamarind seeds and horse gram seeds** possess anti-urolithiatic properties. Hence, the present study evaluates the *in vitro* anti-urolithiatic potential of their combined extracts

2. PLANT PROFILE

2.1 Tamarindus indica Linn(Tamarind)

Botanical Name: Tamarindus indica Linn.
Family: Leguminosae
Common Names:

- English: Tamarind
- Hindi: Imli
- Telugu: Chinta
- Assamese: Tetali

Origin and Distribution

Native to tropical Africa and widely cultivated in India, Southeast Asia, and tropical regions.

Botanical Description

- Height: 25–30 m
- Leaves: Pinnate, 10–20 pairs
- Flowers: Yellow, small clusters
- Seeds: Hard, brown, tangy

Phytochemical Constituents

Polyphenols, flavonoids, tannins, alkaloids, saponins, organic acids (tartaric, malic), vitamins, minerals, fats, proteins, and fibers.

Pharmacological Activities

- Antioxidant
- Anti-inflammatory
- Antidiabetic
- Hepatoprotective
- Nephroprotective

2.2 Macrotyloma uniflorum (Horse Gram)

BotanicalName: Macrotyloma uniflorum
Family: Fabaceae
Common Names:

- English: Horse gram
- Tamil: Kollu
- Telugu: Ulavalu

Origin and Distribution

Widely cultivated in India and other parts of South Asia and tropical Africa.

Botanical Description

- Plant: Twining annual herb
- Seeds: Hard, brown to black
- Leaves: Trifoliate
- Flowers: Yellow with violet blot

Phytochemical Constituents

Phenolic acids, flavonoids, tannins, alkaloids, saponins, sterols, glycosides, phytic acid, proteins, fibers, vitamins, and minerals.

Pharmacological Activities

- Antioxidant
- Antidiabetic
- Anti-inflammatory
- Inhibition of calcium oxalate crystal formation

3. AIM AND OBJECTIVES

Aim

To evaluate the *in vitro* anti-urolithiatic activity of a combination of horse gram and tamarind seed extracts.

Objectives

- To prepare extracts of horse gram and tamarind seeds
- To formulate a combined extract
- To evaluate calcium oxalate crystal inhibition
- To compare activity with a standard anti-urolithiatic drug

4. REVIEW OF LITERATURE

- Macrotyloma uniflorum reduces urinary oxalate levels and inhibits stone formation.
- Tamarind seed extracts exhibit antioxidant and metal-chelating properties.
- *In vitro* assays are reliable preliminary screening methods for anti-urolithiatic activity.

5. MATERIALS AND METHODS

5.1 Materials

- Horse gram seeds
- Tamarind seeds
- Calcium chloride
- Sodium oxalate
- Tris buffer
- Distilled water
- Standard drug (Cystone)

5.2 Preparation of Plant Extracts

Seeds were cleaned, dried, powdered, and extracted using aqueous/ethanolic solvents. Extracts were filtered and concentrated.

5.3 Preparation of Combination Extract

Equal proportions of horse gram and tamarind seed extracts were mixed.

6. IN-VITRO ANTI-UROLITHIATIC ASSAYS

6.1 Calcium Oxalate Nucleation Assay

Turbidity changes were measured to assess inhibition of crystal formation.

6.2 Crystal Growth Inhibition Assay

Reduction in free oxalate ions was measured spectrophotometrically.

6.3 Aggregation Assay

Crystal aggregation was observed microscopically.

7. RESULTS AND DISCUSSION

The combination extract showed significant inhibition of calcium oxalate nucleation, growth, and aggregation compared to individual extracts. The activity was comparable to the standard drug, indicating synergistic action of phytochemicals

8. CONCLUSION

The *in vitro* study confirms that the combination of horse gram and tamarind seed extracts exhibits promising anti-urolithiatic activity. These findings validate their traditional use and warrant further *in vivo* and clinical investigations.

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REFERENCES

1 Sudha S, Saral AM. Studies on phytochemical, mineral content, in vitro anti-urolithiatic and anti-diabetic activities of horse gram flour extracts and its biosynthesized Ag nanoparticles. Heliyon. 2023 Jun 1;9(6).

2 Kirtikumar pm. studies on renoprotective effect of aqueous and alcoholic biherbal extracts of vigna unguiculata and hordeum vulgare in wistar rats.

3 Mani RR, Lynn AK, Ranganathan V, Panneerselvam J, Chinnappan S. In vitro Pharmacological Evaluation of Herbal Tea for the Treatment of Urolithiasis. Tropical Journal of Natural Product Research. 2025 Feb 1;9(2).

4 Beldar VG, Sidat PS, Jadhao MM. Ethnomedicinal plants used for treatment of urolithiasis in India: a review. Current Traditional Medicine. 2022 Jun 1;8(3):46-82.

5 Talageri A. *Anti Urolithiatic and Antioxidant Activity of Extracts of Amaranthus Viridis Linn. In Rats* (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).

6 Talageri A. *Anti Urolithiatic and Antioxidant Activity of Extracts of Amaranthus Viridis Linn. In Rats* (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).

7 Shukla AK, Shukla S, Garg A, Garg S. A review on anti-urolithiatic activity of herbal folk plants. Asian Journal of Biomaterial Research. 2017;3(2):1-1.

8 Vinciya T. *Evaluation of antiurolithiatic activity of ethanolic and aqueous extract of phaseolus vulgaris linn seeds* (Doctoral dissertation, Ultra College of Pharmacy, Madurai).

9 Ahmad F, Anwar F, Hira S. Review on medicinal importance of Fabaceae family. Pharmacologyonline. 2016 Dec 30;3:151-7.

10 Devi DN. Urolithiasis: Lithiasis, Prevention and Management by Herbal Plants.

11 Saranya S, Sudheer KP. *Development and quality evaluation of microencapsulated banana pseudostem juice powder* (Doctoral dissertation, Department of Post-Harvest Technology and Agricultural Processing).

12 Misra A, kant Chaudhary M, Rawat P, Khan H, Srivastava V, Singh D, Barik SK, Srivastava S. Evaluation of invivo anti-lithiatic activity of polyherbal formulation in ameliorating calcium oxalate kidney stones and integrated invitro-insilico studies. Fitoterapia. 2025 Jul 15:106739.

13 Raj S, Rajan MS, Ramasamy S, Goldy RI, Ariyamuthu R, Sudhagar M, Gandhi S, Shoba P, Gurusamy M. An in vitro Anti-Urolithiasis activity of a herbal formulation: Spinacia oleracea L. and Coriandrum sativum L. Clinical Complementary Medicine and Pharmacology. 2024 Mar 1;4(1):100124.

14 Chaudhary MK, Misra A, Tripathi D, Srivastava S. In-vitro anti-urolithiatic activity and simultaneous HPTLC quantification of berberine and palmatine in standardized extract of Thalictrum foliolosum DC. South African Journal of Botany. 2022 Dec 1;151:445-53.

15 Swarnalatha D. Evaluation of in-vitro anti-urolithiatic activity of ethanolic extract of sterculia urens. International Journal of Indigenous Herbs and Drugs. 2022 Dec 30:114-20.