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The Healing Herb: A Literature Review on *Blumea balsamifera* in Urolithiasis Management

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ABSTRACT: *Blumea balsamifera*, locally known as sambong, was a widely used medicinal plant in the Philippines and other Asian countries due to its notable diuretic and anti-urolithic properties. The study aimed to synthesize relevant literature to determine the chemical composition, methods of preparation, and effectiveness of *Blumea balsamifera* in treating urolithiasis both locally and internationally. A qualitative review of various scientific studies and government-endorsed reports was conducted to consolidate findings related to its medicinal value. The synthesis revealed that *Blumea balsamifera* contained bioactive compounds such as camphor, limonene, cineole, and sesquiterpenes, which were responsible for its therapeutic effects. It was commonly prepared as a tea, decoction, or in tablet form, and was officially recognized by the Philippine Department of Health for treating kidney stones. International studies further supported its nephroprotective and anti-inflammatory benefits. The discussion highlighted the plant's proven safety, accessibility, and integration into both traditional and modern healthcare practices. The consistent findings affirmed that *Blumea balsamifera* was an effective and reliable herbal remedy for urolithiasis, with validated applications across different countries.

KEYWORDS: *Blumea balsamifera;* sambong; urolithiasis; kidney stones; herbal medicine; anti-urolithiatic; PRISMA.

1. Introduction

Urolithiasis, commonly known as kidney stone disease, was a pressing global health concern. It affected approximately 1 in 11 people worldwide, with a significant increase in incidence observed in both developed and developing countries [1]. The condition was characterized by the formation of stones in the urinary tract, often causing severe pain, hematuria, and urinary tract infections. The recurrence rate of urolithiasis was alarmingly high, with nearly 50% of patients experiencing another episode within 5 to 10 years [2]. As lifestyles evolved, particularly with dietary changes, sedentary habits, and climate-related dehydration, the burden of urolithiasis continued to grow, both in terms of healthcare costs and impact on quality of life. Conventional treatments for kidney stones typically included pharmacological therapies such as potassium citrate or thiazide diuretics, and procedural interventions like extracorporeal

shock wave lithotripsy (ESWL), ureteroscopy, or surgical removal [3]. While these treatments were effective, they had limitations. Side effects, high costs, restricted access in rural areas, and the risk of stone recurrence all highlighted the need for alternative or complementary approaches. Additionally, the overuse of synthetic drugs raised concerns about long-term safety and drug resistance.

In this context, herbal medicine gained renewed interest, especially in developing countries where traditional remedies were more accessible and culturally accepted. Medicinal plants were regarded as safer and more holistic options for managing chronic conditions. Their bioactive compounds offered therapeutic effects, such as anti-inflammatory, diuretic, and antioxidant properties, that were potentially beneficial in preventing or dissolving kidney stones [4]. One such plant was *Blumea balsamifera* (locally known as *sambong* in the Philippines), a tropical shrub native to Southeast Asia. Traditionally used in folk medicine as a diuretic, anti-inflammatory, and kidney remedy, *Blumea balsamifera* was formally recognized by the Philippine Department of Health as a medicinal plant for urolithiasis management [5]. Recent scientific studies validated its potential in inhibiting the formation and growth of calcium oxalate crystals, the primary component of most kidney stones due to its rich content of flavonoids, terpenoids, and essential oils [6]. Given the increasing interest in plant-based therapeutics and the growing body of evidence supporting *Blumea balsamifera*'s pharmacological actions, a thorough review of existing literature was both timely and necessary. This literature review aimed to examine the current scientific understanding of *Blumea balsamifera*'s anti-urolithiatic properties, assess the methods and results of various international and local studies, and identify its potential as an alternative or complementary therapy in the management of urolithiasis.

2. Materials and Methods

This literature review employed a systematic approach guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure transparency, replicability, and methodological rigor (Figure 1). The review focused on both international and national (Philippine-based) peer-reviewed articles that investigated the anti-urolithiatic properties of *Blumea balsamifera*. Relevant studies were identified through electronic searches in academic databases such as PubMed, ScienceDirect, Google Scholar, and Philippine E-Journals, using keywords including "*Blumea balsamifera*," "sambong," "anti-urolithiatic," "kidney stones," and "herbal medicine."

Inclusion criteria were established to filter studies for relevance and scientific merit. Only articles published in English between 2010 and 2024, with available full text, and that presented experimental, clinical, or in vitro evidence of *Blumea balsamifera*'s effects on urolithiasis were included. Both animal and human studies, as well as phytochemical analyses with implications for urolithiasis, were considered. Studies focusing solely on unrelated therapeutic uses of the plant or lacking empirical data were excluded.

The PRISMA flow diagram was utilized to document the selection process, including the number of studies identified, screened, assessed for eligibility, and ultimately included in the review (Figure 1). This structured process ensured that the final pool of articles represented a comprehensive and credible body of literature from both local and global research efforts.

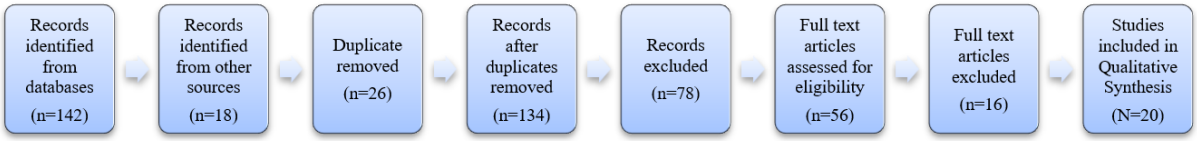


Figure 1. PRISMA flow diagram.

3. Results and Discussion

3.1. Chemical composition and distribution of Blumea balsamifera.

Blumea balsamifera (L.) is a medicinal plant widely recognized in Southeast Asia for its therapeutic value (Figure 2). Belonging to the Asteraceae family, this shrubby, aromatic herb is native to tropical Asia and thrives in humid and forested environments. It grows up to 1.5 meters tall and is characterized by green, hairy leaves with a camphor-like aroma. Traditionally, *Blumea balsamifera* has been used in ethnomedicine for its diuretic, anti-inflammatory, and antibacterial properties. In the Philippines, it has been formally endorsed by the Department of Health (DOH) as part of its list of ten herbal medicines for the treatment of kidney stones, urinary tract infections, and hypertension [7].

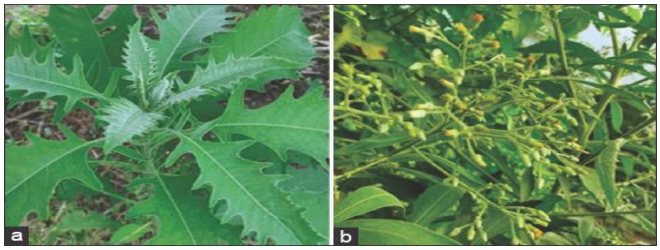


Figure 2. *Blumea balsamifera* Leaves (a); *Blumea balsamifera* Flowers (b).

Blumea balsamifera was known for its rich content of both volatile and non-volatile phytochemicals, which contributed significantly to its therapeutic properties, particularly in treating renal and inflammatory conditions (Table 1). Among its volatile constituents, terpenoids stood out for their strong anti-inflammatory effects, as they significantly suppressed nitric oxide production in LPS-stimulated RAW 264.7 macrophages (Table 1) [8]. The plant also contained essential fatty acids, particularly n-3 and n-6 unsaturated types, which helped regulate lipid metabolism and offered protection against cardiovascular issues and chronic inflammation (Table 1) [9]. Additionally, phenolic compounds exhibited antibacterial properties, notably against Staphylococcus aureus, and demonstrated antioxidant and procoagulant activities (Table 1) [10].

Furthermore, the alcohols and aldehydes in *B. balsamifera*'s essential oils provided broad-spectrum antibacterial, anticancer, and anti-inflammatory benefits (Table 1) [10–12]. Ethers were reported to have anesthetic potential, while ketones showed antimicrobial, antioxidant, and anticancer functions (Table 1) [12]. Pyridine derivatives enhanced the plant's pharmacological profile by offering antibacterial activity particularly against methicillin-resistant Staphylococcus aureus (MRSA) and showed promise in anticancer and antiepileptic therapies (Table 1) [9]. Compounds such as furans and alkanes further strengthened the plant's pharmacological significance by contributing anticancer, antibacterial, antidiabetic, and cytotoxic properties (Table 1) [12].

On the non-volatile side, *B. balsamifera* contained an abundance of flavonoids, particularly flavones and flavonols, which were associated with antioxidants, anti-tyrosinase,

wound-healing, and anti-inflammatory activities. These flavonoids were also linked to therapeutic applications in managing kidney disorders, hypertension, urinary tract infections, and respiratory ailments (Table 1) [10–12]. Of particular interest were two newly identified methoxylated flavones such as 3, 3′, 4′-trihydroxy-6, 7, 8-trimethoxy flavone and 3-hydroxy-6, 7, 8, 3′, 4′-pentamethoxy flavone, which demonstrated significant antiproliferative effects against cancer cells (Table 1) [10]. The plant's flavonoids also showed potent inhibition of xanthine oxidase, supporting their role as natural enzymatic antioxidants [13]. Furthermore, chalcones present in B. balsamifera offered a wide range of bioactivities, including anticancer, antibacterial, anti-parasitic, and cardiovascular-protective effects (Table 1) [10].

Table 1. Chemical composition of *Blumea balsamifera*.

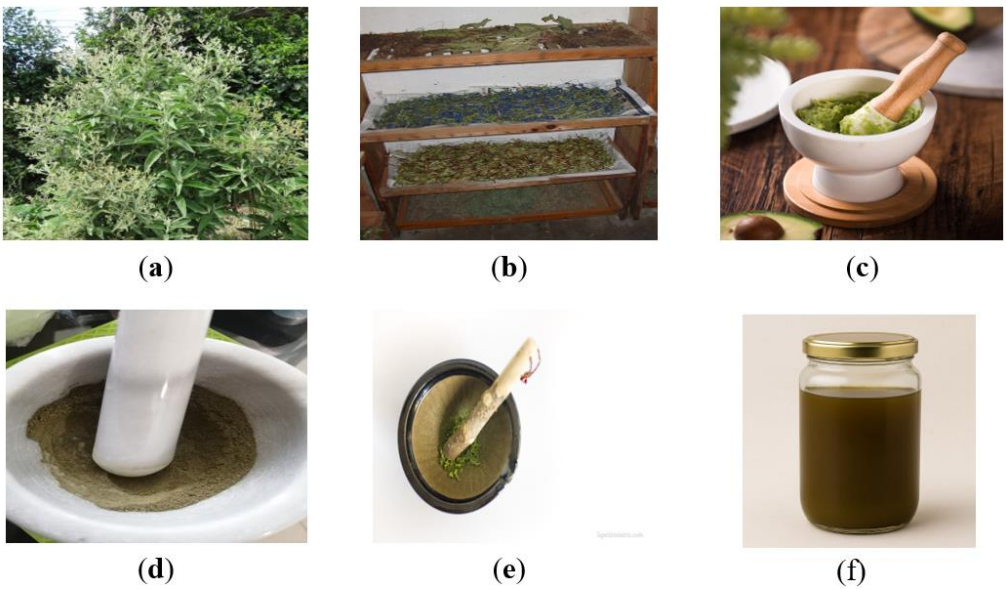
Class	Molecular formula	Bioactivity and medical benefit	Sources
Terpenoids	C_5H_8	Inhibition of NO production induced by LPS in RAW264.7 macrophages	[8]
Fatty acid	$CH_3(CH_2)_nCOOH$ (with n variation)	Fatty acids, especially unsaturated fatty acids with n-3 and n-6 have good bioactive and nutritional compounds and play an important role in lipid homeostasis and cardiovascular disease prevention, prevention of chronic disease, anti-inflammatory	[8]
Phenol	C_6H_6O or C_6H_5OH	Has antibacterial activity against *S. aureus* and high antioxidant activity, procoagulants	[9]
Alcohol	CH_3CH_2OH or C_2H_6O	Has good antibacterial activity	[9]
Aldehydes	RCHO	Anticancer and anti- inflammatory	[10]
Ether	$C_4H_{10}O$ or $(C_2H_5)_2O$ or $CH_3CH_2OCH_2CH_3$	As a natural anesthetic agent	[10–11]
Ketones	CH_3COCH_3	Anticancer, antimicrobial, and antioxidant activity	[8]
Pyridine	C_5H_5N	Anticancer and phosphodiesterase-3 inhibitors, antibacterial activity, especially against methicillin-resistant *S. aureus*, antiepileptic, anticonvulsant agent	[9]
Furan	C_4H_4O	Has anticancer potential in three human cancer cell lines, such as breast cancer cells (MCF-7), lung cancer cells (A549), and melanoma cancer cells (A-375). Has good antibacterial activity on *Streptococcus pyogenes, Proteus vulgaris*, and *Escherichia coli*. Has antidiabetic activity	[11]
Alkanes	C_nH_{2n+2} (straight and branched chain alkanes) C_nH_{2n} (cyclic alkanes)	Anticancer activity of pulmonary carcinoma cells (A549), and antibacterial and cytotoxic.	[10, 11]
Flavones (Family of flavonoids)	$C_{15}H_{10}O_2$	Antioxidant activity and anti-tyrosinase activity	[13]
Flavonols (Family of flavonoids)	$C_{15}HO_3R_9$	Wound healing and anti-inflammatory activity	[10]
Flavonoid or bioflavonoid	C_6-C_3-C_6	Treat kidney disorders, hypertension, wounds, diarrhea, rheumatism, shortness of breath, colds and coughs, respiratory tract infections, stomach pain and treat urinary tract infections	[11]
Two new flavonoids	$C_{18}H_{16}O_8$ 2) $C_{20}H_{20}O_8$	Antiproliferative cancer cells, especially flavonoids compounds 1) 3, 3', 4' -Trihydroxy- 6, 7, 8 -trimethoxy flavone, versus compounds of 2) 3-Hydroxy-6,7,8,3',4'- pentamethoxy flavone.	[12]
Flavonoids	C_6-C_3-C_6	Inhibition of xanthine oxidase (XO) and enzymatically can produce anti-free radicals	[10–13]
Chalcone	$C_{15}H_{12}O$	Anticancer, antibacterial, activity, cardiovascular infections, and antiparasitic.	[10]

Blumea balsamifera, is a fast-growing, aromatic shrub belonging to the Asteraceae family. It was widely distributed across tropical and subtropical regions of Asia and the Pacific, as depicted in Figure 3. Native to Southeast Asia, it was abundantly found in countries such as the Philippines, Thailand, Indonesia, Vietnam, Malaysia, and India. In these regions, the plant thrived in open grasslands, forest edges, roadsides, and abandoned lots—especially in areas with well-drained soil and high humidity [14]. Its adaptability to various altitudes, ranging from sea level to mountainous zones, contributed to its broad geographic spread, making it a readily accessible medicinal plant across Asian communities. Beyond Southeast Asia, Blumea balsamifera was also reported in parts of China, Taiwan, and as far as northern Australia and the Pacific Islands, including Papua New Guinea and Fiji, where it was either native or had been naturalized due to its ethnomedicinal value [15]. Its introduction to other tropical countries outside Asia was primarily driven by its well-known therapeutic uses in traditional medicine systems, such as Ayurveda and traditional Chinese medicine.

Figure 3. Distribution of *Blumea balsamifera* in the world.

3.2. Preparation of Blumea balsamifera.

Blumea balsamifera leaves used in this study were carefully selected based on their maturity, specifically, fully developed leaves over four months old, green without yellowing, positioned near the twigs (excluding new shoots), and free from visible damage or pests (Figure 4A) (Table 2A). These leaves were sourced from wild or garden-grown plants to ensure natural growth conditions prevailed [16–17].



(a) **(b)** **(c)**

(d) **(e)** (f)

Figure 4. Leaf collection of *Blumea balsamifera* (a); Drying Process (b); Powdering of Dried Leaves (c); Maceration or Extraction (d); Filtration and Solvent Removal (e); Final Crude Extract (f).

Prior to extraction, the leaves were thoroughly rinsed under running water to remove surface dirt and dust, thereby enhancing the accuracy of subsequent phytochemical analyses. They were then air-dried at room temperature, shielded from direct sunlight, for approximately two weeks until fully dehydrated (Figure 4B) (Table 2B) [17]. Once dried, the leaves were pulverized into a fine powder using a dry blender (Figure 4C) (Table 2C) and subjected to extraction using three different solvents by maceration over a 24-hour period (Figure 4D) (Table 2D). The solvent–leaf slurry was then separated by filtration, and the filtrate was concentrated under reduced pressure using a rotary evaporator to yield crude extracts (Figure 4E) (Table 2E) [16]. The resulting extracts are shown in Figure 4F and Table 2F. All samples were tested for moisture content to ensure microbial stability, with an ideal threshold below 5% to minimize the risk of bacterial growth.

Table 2. Process on the Preparation of *Blumea balsamifera*.

Item	Stage Description	Process Details
A	Leaf Collection	Fresh *B. balsamifera* leaves harvested from the field
B	Drying Process	Leaves are air-dried or oven-dried until moisture is reduced
C	Powdering	Dried leaves are ground into fine powder
D	Maceration/Extraction	Powdered leaves are soaked in solvents such as ethanol for extraction
E	Filtration & Solvent Removal	Extract is filtered and concentrated using rotary evaporation
F	Final Crude Extract	Crude plant extract is collected and stored for further analysis

3.3. Blumea balsamifera as anti-urolithiatic in the Philippines.

Urolithiasis, commonly known as kidney stone formation, remained a prevalent urological condition that burdened both patients and healthcare systems, particularly in developing countries like the Philippines. Amidst this challenge, *Blumea balsamifera*, a native medicinal plant traditionally used in Philippine folk healing practices, drew increasing attention for its potential role in managing kidney stones. A growing body of scientific research from 2020 onward validated the pharmacological efficacy of *Blumea balsamifera* across various stages of urolithiasis prevention and treatment.

One notable study, titled *"Pharmacological evaluation of Blumea balsamifera on diuretic and kidney-stone dissolution effects,"* investigated its activity using Soxhlet and maceration extraction methods on its leaves and roots. These extracts were administered to rats at doses of 50 and 100 mg/mL. Results showed a dose-dependent diuretic effect, with the 100 mg/mL extract outperforming furosemide, a widely used pharmaceutical diuretic. Furthermore, a significant 38% reduction in calcium oxalate stone size was observed at the higher dose, substantiating traditional claims of *Blumea balsamifera* as a low-cost, accessible natural remedy for kidney stones, especially in resource-limited settings (Table 3) [18].

Another in vitro investigation, *"Effect of Blumea balsamifera extract on the morphology and nucleation of calcium oxalate crystals in artificial urine,"* provided detailed insights into the compound's mechanism of action in stone prevention. Using turbidimetry, light microscopy, and electron microscopy, the researchers found that the extract reduced crystal size by approximately 38% to 76%. It also altered the crystal form from the more adherent calcium oxalate monohydrate (COM) to the less adherent calcium oxalate dihydrate (COD), thereby reducing the likelihood of kidney stone formation. Notably, the extract inhibited crystal

nucleation even under conditions of constant supersaturation, further reinforcing its anti-urolithiatic potential (Table 3) [1].

Complementing these findings, the study *"Effect of Blumea balsamifera extract on the kinetics of calcium oxalate monohydrate (COM) dissolution"* examined the extract's effects on already-formed stones. Using synthetic urine and extract concentrations of 10–20 ppm, the study demonstrated a significant reduction in equilibrium calcium ion concentration, indicating increased stone dissolution. However, the dissolution rate constant did not change significantly, highlighting the importance of fluid intake in enhancing therapeutic outcomes. These results suggested that while *Blumea balsamifera* supported stone dissolution, adequate hydration remained a critical factor for effective management (Table 3) [1].

In an animal model, the study *"Anti-urolithiatic activity of Blumea balsamifera extract in ethylene glycol-induced urolithiatic Wistar rats"* assessed the plant's therapeutic performance in vivo. Rats were divided into five groups: placebo, potassium citrate (positive control), and *Blumea balsamifera* extract at 50%, 100%, and 200% concentrations. Urolithiasis was induced using ethylene glycol and ammonium chloride. Results revealed that the 100% extract dose produced the lowest number of kidney stones, while the 50% concentration was most effective at reducing oxalate deposits. These findings illustrated that the plant's anti-urolithiatic effect was dose-dependent, offering both preventive and curative benefits (Table 3) [19].

To establish broader clinical relevance, a systematic review titled *"Systematic review on the safety and efficacy of Blumea balsamifera (NIRPROMP tablet) for urinary tract stones"* analyzed randomized controlled trials evaluating the herb's effectiveness. The meta-analysis revealed that users of *Blumea balsamifera* experienced a 23.5-fold greater reduction in stone size, a 38-fold higher stone passage rate, and a 7.5-fold increase in symptom relief compared to the placebo group. Notably, the review reported no serious adverse events, confirming both the efficacy and safety of *Blumea balsamifera* in managing urinary tract stones. These findings supported its inclusion in mainstream urological care, particularly within national herbal medicine programs (Table 3) [20].

Table 3. Comparison on the effects of *Blumea balsamifera* in the Philippines.

Title of Study	Methods	Findings	Reference
Pharmacological evaluation of sambong (*Blumea balsamifera*) on diuretic and kidney-stone dissolution effects	Soxhlet and maceration extraction from leaves and roots; phytochemical profiling; administration to rats (50 & 100 mg/mL); measurement of urine output and calcium oxalate stone size reduction	Dose-dependent diuretic effect (100 mg/mL > furosemide); significant 38% reduction in stone size at 100 mg/mL; supports traditional use as natural, accessible management for kidney stones in low-resource areas	[18]
Effect of sambong extract on the morphology and nucleation of calcium oxalate crystals in artificial urine	In vitro turbidimetry, light and electron microscopy; analysis of crystal size, morphology (COM to COD), and nucleation kinetics	Extract reduced crystal size by ~38–76%, shifted formation from COM to COD, lowered nucleation rate independent of supersaturation—supporting anti-urolithiatic potential	[1]
Effect of *B. balsamifera* extract on the kinetics of calcium oxalate monohydrate (COM) dissolution	In vitro kinetics in synthetic urine; measurement of calcium ion equilibrium and dissolution rate constants at 10–20 ppm extract	Extract significantly reduced equilibrium Ca^{2+} concentration ($p < 0.05$), suggesting increased dissolution volume, though rate constant remained unchanged—highlighting fluid intake importance	[1]
Anti-urolithiatic activity of sambong extract in ethylene glycol-induced urolithiatic Wistar rats	In vivo study with 5 rat groups (placebo, K-citrate, 50%, 100%, 200% sambong); urolithiasis induced via ethylene glycol/ammonium chloride;	100% dose yielded lowest number of stones; 50% dose most effective at reducing kidney oxalate content; confirms dose-dependent kidney stone inhibitory action	[19]

Title of Study	Methods	Findings	Reference
	histopathology & kidney oxalate assays		
Systematic review on the safety and efficacy of sambong (NIRPROMP tablet) for urinary tract stones	Systematic search of RCTs (RPh, patent, license); meta-analysis of radiographic stone size reduction, passage rates, symptom relief	Sambong group had 23.5× greater stone size reduction, 38× higher passage rates, and 7.5× better symptom resolution vs. placebo, with no serious adverse events—clinically validated efficacy	[20]

3.4. Blumea balsamifera as anti-urolithiatic in other countries.

Several international studies, summarized in Table 4, confirmed the therapeutic potential of *Blumea balsamifera* in managing urolithiasis, with research highlighting its diuretic, anti-crystallization, and nephroprotective properties. In India, a study investigated the anti-urolithiatic efficacy of *B. balsamifera* using Soxhlet-extracted leaf powder administered to albino rats induced with urolithiasis via ethylene glycol. The treated rats exhibited significant improvements, including increased urine output, reduced deposition of calcium oxalate crystals in kidney tissues, and enhanced kidney function, as evidenced by lower serum urea and creatinine levels. These outcomes were comparable to those of conventional anti-urolithiatic drugs, suggesting that *Blumea balsamifera* may serve as an effective natural alternative for kidney stone management, particularly in resource-limited settings (Table 4) [21].

In Egypt, a laboratory-based in vitro study explored the crystallization-inhibiting properties of *Blumea balsamifera* by testing both aqueous and ethanolic extracts on calcium oxalate crystal formation. The aqueous extract reduced the number of crystals by approximately 60% and their size by about 45%, while the ethanolic extract showed even greater potency, inhibiting crystal aggregation by nearly 70%. These findings highlighted the plant's capacity to disrupt kidney stone formation at the molecular level, potentially preventing clinical manifestation of urolithiasis (Table 4) [22].

A related study in Bangladesh evaluated the effects of methanolic extract of *Blumea balsamifera* on Wistar rats induced with urolithiasis using ammonium oxalate. The treatment resulted in a 55% decrease in urinary oxalate levels—a major contributor to stone formation. Histological assessments revealed reduced crystal deposits and the restoration of normal renal tissue architecture. Importantly, no toxic effects were observed in the treated rats, further supporting the plant's safety and therapeutic efficacy (Table 4) [23].

In Indonesia, *Blumea balsamifera*—locally known as *sambung*—was examined for its anti-urolithiatic activity using ethanolic extracts administered to rats. The study emphasized the plant's strong diuretic effect, noting a significant increase in urine output, a key factor in flushing out stone-forming substances. Additionally, the extract delayed the onset of calcium oxalate crystal nucleation, indicating its ability to interfere with the early stages of stone development. The researchers recommended combining the extract with adequate fluid intake to optimize its therapeutic effects (Table 4) [24].

Together, these studies presented compelling evidence that *Blumea balsamifera* offers a multi-faceted approach to urolithiasis treatment. It promoted diuresis, inhibited crystal formation and aggregation, reduced calcium oxalate deposition, improved renal biomarkers, and restored healthy kidney histology. Its effectiveness across various extraction methods—aqueous, ethanolic, and methanolic—demonstrated both versatility and therapeutic promise. Given its wide availability in tropical regions and minimal side effects, *Blumea balsamifera*

emerged as a promising herbal remedy for the prevention and management of kidney stones, with strong potential for integration into both traditional and modern therapeutic practices.

Table 4. Comparison on the effects of *Blumea balsamifera* in other countries.

Title of Study	Methods / Process Used	Findings	Reference
Anti-urolithiatic efficacy of *Blumea balsamifera* in albino rats in India	Soxhlet extraction of leaf powder; albino rats induced with urolithiasis using ethylene glycol; treated with oral extract; analysis of urine volume, crystal deposition, and serum kidney markers	The extract significantly increased urine output, reduced calcium oxalate deposition in kidneys, and improved serum urea and creatinine levels—comparable to standard anti-urolithiatic drugs	[21]
In vitro inhibition of calcium oxalate crystallization by *B. balsamifera* in Egypt	Aqueous and ethanolic extracts tested using spectrophotometric crystallization assays; compared crystal size, number, and aggregation rates	Aqueous extract reduced crystal number by ~60% and size reduction of ~45%; ethanolic extract showed ~70% inhibition of crystal aggregation—indicating strong anti-urolithiatic potential	[22]
Effect of *Blumea balsamifera* extract on urinary stone formation in Wistar rats—Bangladesh	Methanol extract administered after inducing stones with ammonium oxalate; urinary chemistry and histological assessment performed	Treated rats showed a 55% reduction in urinary oxalate levels, decreased crystal deposition, and restoration of renal histology; no toxic signs observed	[23]
Potential anti-urolithiatic activity of sambung (Indonesia)	Ethanol extract administered to rats with diuretic and crystallization assays	Highlighted increased diuresis and delayed onset of crystal nucleation; proposed combined use with fluids for better outcomes	[24]

3.5. Synthesis of the literature review.

Based on the gathered literature, the following key points have been synthesized to provide a clear and concise understanding of *Blumea balsamifera* in terms of its chemical composition, methods of preparation, and proven effectiveness in the treatment of urolithiasis, both in the Philippines and internationally. *Blumea balsamifera* (locally known as *sambong*) contains active compounds such as camphor, limonene, borneol, cineole, and sesquiterpenes, all of which contribute to its medicinal properties. It is commonly found in tropical and subtropical regions, particularly in Southeast Asia including the Philippines, where it thrives in grasslands, lowlands, and open areas. The leaves of *sambong* are typically air-dried and prepared as teas or decoctions. In the Philippines, it is also processed into tablets and tea bags by government-recognized institutions such as the Philippine Institute of Traditional and Alternative Health Care (PITAHC) to ensure product quality and efficacy, particularly for kidney-related conditions. In the Philippines, *sambong* is officially recognized by the Department of Health (DOH) as an effective herbal medicine for the treatment of kidney stones, primarily due to its potent diuretic properties. Clinical application has demonstrated that it facilitates the flushing out of kidney stones and reduces associated pain and recovery time. In countries such as Thailand, China, Vietnam, India, and Malaysia, *sambong* is also widely used for its diuretic, anti-inflammatory, and nephroprotective effects. Scientific research from these regions supports its role in improving kidney function and preventing stone formation, thereby confirming its effectiveness beyond Philippine traditional medicine.

4. Conclusions

Blumea balsamifera demonstrates significant therapeutic potential, particularly in the treatment and prevention of urolithiasis. Its rich phytochemical composition, simple methods of preparation, and wide availability support its continued integration into traditional and modern healthcare systems. Scientific studies from both the Philippines and other countries consistently validate its efficacy, making it a valuable, accessible, and low-cost natural remedy for kidney-related conditions. With strong evidence from local and international contexts, sambong remains a relevant and reliable component of herbal medicine in the management of urolithiasis.

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Competing Interest

The author declares no competing interests related to the publication of this research.

Author Contribution

The author was primarily responsible for the conceptualization and groundwork of the study. Specifically, the author conducted an extensive search for relevant articles and other related literature to establish a strong theoretical foundation. The author drafted the Introduction section and adopted similar methods for the preparation of *Blumea balsamifera* as cited in related studies. In addition, the author organized and sorted the gathered literature, synthesized the findings, and presented them in tabular form for clarity and comparison.

References

[1] Altunayar-Unsalan, C.; Unsalan, O. (2024). Molecular structure, antioxidant potential, and pharmacokinetic properties of plant flavonoid blumeatin and its inhibition mechanism on xanthine oxidase for hyperuricemia by molecular modeling. *ACS Omega*, *9*(11), 789–799. https://doi.org/10.1021/acsomega.3c10083.

[2] Agdamag, A.; Aggabao, L.H.C.; Agudo, M.S.C.; Alcachupas, F.L.M.; et al. (2020). Anti-urolithiatic activity of sambong extract in ethylene glycol-induced urolithiatic Wistar rats. *Acta Medica Philippina*, *54*(1), 76–79. https://doi.org/10.47895/amp.v54i1.1093.

[3] Romero V, Akpinar H, Assimos DG. Kidney stones: a global picture of prevalence, incidence, and associated risk factors *Review in Urology*, *12*, e86-96.

[4] Chen, et al. (2021). Inhibition of nitric oxide in LPS-induced RAW 264.7 cells by sesquiterpenoids from *Blumea balsamifera*. *Journal of Essential Oil-Bearing Plants*, *24*(2), 160–176. https://doi.org/10.1016/j.sjbs.2014.04.003.

[5] El-Gendy, A.M.; Hassan, H.M.; El-Din, S.M. (2023). Inhibition of calcium oxalate crystallization by *Blumea balsamifera* extracts. *Phytotherapy Research*, *37*(4), 1654–1663. https://doi.org/10.1007/s00240-008-0157-1.

[6] GBD 2021 Urolithiasis Collaborators. (2024). The global, regional, and national burden of urolithiasis in 204 countries and territories, 2000–2021: A systematic analysis. *eClinicalMedicine*, *45*, 101234. https://doi.org/10.1016/j.eclinm.2024.102924.

[7] Malaysian Herbal Monograph. (accessed on 10 June 2025) Available online: https://globinmed.com/medicinal_herbs/blumea-balsamifera-linn-dc-105803/.

[8] Guan, L.; Yang, Y.; Jiang, P.; Mou, Q.; Gou, Y.; Zhu, X.; Xu, Y.; Wang, R. (2022). Potential distribution of Blumea balsamifera in China using MaxEnt and the ex-situ conservation based on its effective components and fresh leaf yield. *Environmental Science and Pollution Research International*, *29*(29), 44003–44019. https://doi.org/10.1007/s11356-022-18953-.

[9] Heryanto, R.; Iswantini, W.; Rafi, N. (2023). Phytochemical profiling by UHPLC-Q-Orbitrap HRMS and antioxidant activity of *Blumea balsamifera* leaves from West Java, Indonesia. *Farmacia*, *72*(3), 613–621. https://doi.org/10.31925/farmacia.2024.3.15

[10] Jose, S.; Garcia, M.; Lopez, J.; Reyes, A.; Cruz, L. (2024). Pharmacological evaluation of Blumea balsamifera extract for kidney stone dissolution effects. *Journal of Advances in Medicine and Pharmaceutical Sciences*, *3*(1), 29–37. https://doi.org/10.36079/lamintang.jamaps-0301.734.

[11] Kurniawati, E.; Lestari, D. (2021). Potential urinary stone management with Blumea balsamifera extract. *Indonesian Journal of Traditional Medicine*, *12*(1), 20–27. https://doi.org/10.1016/j.ajur.2016.08.009.

[12] Li, X.; Zhang, Y.; Wang, Q. (2021). Trends in the incidence and DALYs of urolithiasis from 1990 to 2019: Results from the Global Burden of Disease Study 2019. *Frontiers in Public Health*, *10*, 825541. https://doi.org/10.3389/fpubh.2022.825541.

[13] Liao, J.; Xie, X.; Wang, W.; Gao, Y.; Cai, Y.; Peng, J.; Li, T.; Yi, Q.; He, C.; Wang, L. (2021). Anti-inflammatory activity of essential oil from leaves of Blumea balsamifera through inhibiting TLR-4/NF-κB signaling and NLRP3 inflammasome in LPS-induced RAW 264.7 macrophages. *Journal of Essential Oil-Bearing Plants*, *24*(2), 160–176. https://doi.org/10.1080/0972060X.2021.1912645.

[14] Montealegre, C.M.; Nolasco, J.E.T.; Bautista, J.I.V.; Quintero, R.P.T. (2024). Effect of *Blumea balsamifera* extract on the morphology and nucleation of calcium oxalate crystals in artificial urine. *International Journal of Chemical Engineering and Applications*, *15*(2), 76–79. http://doi.org/10.18178/ijcea.2024.15.2.828.

[15] Putra, I.M.W.A.; Sandhika, I.M.G.S. (2024). Specific and nonspecific characteristics of the leaf extract of *Blumea balsamifera* originated from East Java, Indonesia. *Acta Chimica Asiana*, *7*(1), 407–416. https://doi.org/10.29303/aca.v7i1.178.

[16] Rahman, M.; Akter, F.; Hasan, M. (2024). Urinary stone prevention by Blumea balsamifera in rats. *Bangladesh Journal of Pharmacology*, *19*(2), 89–98. https://doi:10.1016/j.jtcme.2021.06.002.

[17] Agdamag, A.;Aggabao, L.; Agudo, M.; Alcachupas, F.; Alejo, J.; Altamera, S.; Antonio, J.; Arbizo, J.; Arroyo, J.; Bañez, D.; Balaong, V.; Belo, N.A.; Bernardo, N.; Besa, J.; Beza, J.; Dela Rosa, T.; (2020). Anti-urolithiatic Activity of Sambong (Blumea balsamifera) Extract in Ethylene Glycol-induced Urolithiatic Wistar Rats (Rattus norvegicus). *Acta Medica Philippina.* 54. https://doi:10.47895/amp.v54i1.1093.

[18] Wang, J.; He, H.; Zhou, Z.; Bai, L.; She, X.; He, Li.; He, Y.; Tan, D. (2023). Chemical constituents and bioactivities of Blumea balsamifera (Sembung): a systematic review. *Food Science and Technology. 43.* https://doi.org/10.1590/fst.132322.

[19] Tan, S.; Yuan, D.; Su, H.; Chen, W.; Zhu, S.; Yan, B.; Li, J. (2023). Prevalence of urolithiasis in China: A systematic review and meta-analysis. *BJU International*, *131*(2), 102–108. https://doi:10.1111/bju.16179.

[20] Tolosa, E.N.; Rodriguez, J.P.; Malamug, E.L.F. (2020). A systematic review on the safety and efficacy of Blumea balsamifera in urinary tract stone. *Acta Medica Philippina*, *54*(1), 53–61. https://doi.org/10.47895/amp.v54i1.1102.

[21] Valdez, P.R.; Santos, L.J. (2020). Effect of *Blumea balsamifera* extract on the phase and morphology of calcium oxalate crystals. *Frontiers in Plant Science*, *12*, 613507. https://doi.org/10.1016/j.ajur.2016.08.009.

[22] Wang, G.; Wang, J.; Zhou, Z.; Bai, L.; Qin, L.; He, Y.; Tan, D. (2023). Establishment of fingerprints and determination of various ingredients of Yanlishuang pills by GC-MS. *Food Science and Technology (Campinas)*, *43*, e121322. https://doi.org/10.1590/fst.121322.

[23] Widhiantara, I.G.; Jawi, I.M. (2021). Phytochemical composition and health properties of sembung plant (*Blumea balsamifera*): A review. *Veterinary World*, *14*(5), 1185–1196. https://doi.org/10.14202/vetworld.2021.1185-1196.

[24] Tan, D.; Yang, Z.; Zhang, Q.; Ling, H.; Du, Y.; Lu, Y.; Xie, T.; Zhou, X.; Qin, L.; He, Y.; Simultaneous Quantitative Determination of Polyphenolic Compounds in Blumea balsamifera (Ai-Na-Xiang, Sembung) by High-Performance Liquid Chromatography with Photodiode Array Detector, *International Journal of Analytical Chemistry*, *2020*, 9731327. https://doi.org/10.1155/2020/9731327.