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# Exploring the Potential of Orthosiphon Stamineus: A Literature Review

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**Abstract**
The objective of this study is to investigate the potential health benefits of Orthosiphon stamineus, with a particular focus on the kumis kucing plant (Orthosiphon stamineus). This study employs a literature review as its research methodology. The findings of the research were used to gather information on the benefits of Orthosiphon stamineus, also known as kumis kucing. These benefits include its use as a therapeutic agent for gout, a treatment for dental caries, an immunomodulator, an anticancer agent, a neuroprotective agent, and a diuretic for urinary stones. It has been demonstrated to possess antibacterial properties against both Pseudomonas aeruginosa and Aeromonas hydrophylla, as well as antibiotic properties against gonorrhea. Additionally, it has been shown to act as an anthelmintic against Ascaris suum worms, a antiviral against herpes simplex type I, an antidiabetic, an anti-obesity agent, a treatment for rheumatism, a heart health enhancer, and a gastroprotective agent. It is anticipated that these findings will inform the development of novel products that harness the medicinal properties of the Orthosiphon stamineus plant.
**Keywords:** *health benefits, herbal plants, and Orthosiphon stamineus*

**Abstrak**
Penelitian ini bertujuan untuk mengetahui potensi tanaman *Orthoshippon stamineus*, yakni berbagai manfaat kesehatan dari tanaman kumis kucing (*Orthoshippon stamineus*). Jenis penelitian ini merupakan penelitian studi literatur. Berdasarkan hasil penelitian, diperoleh informasi mengenai manfaat-manfaat dari tanaman Orthoshippon stamineus atau kumis kucing, diantaranya yakni sebagai agen terapi untuk asam urat, obat karies gigi, sebagai immunomodulator, antikanker, neuroprotektif, melancarkan air seni dan kencing batu, anti bakteri *Pseudomonas aerunginosa* dan *Aeromoas hydrophyta*, antibiotik untuk penyakit gonore, antihelmintik cacing *Ascaris suum*, antivirus herpes simpleks tipe I, antidiabetes, antiobesitas, mengobati reumatik, menyehatkan jantung serta sebagai gastroprotektif. Hasil temuan ini diharapkan dapat menjadi referensi untuk menghasilkan produk inovatif yang memanfaatkan tanaman obat kumis kucing.
**Kata Kunci:** *manfaat kesehatan, tanaman herba, dan Orthoshippon stamineus*

## 1. Introduction

Indonesia is a "megabiodiversity" country due to its large number of plant species that thrive in the region [1]. These plants are diverse and widespread. One of the commonly found plants in Indonesia is the ‘kumis kucing’ plant. The ‘kumis kucing’ plant, known by its Latin name Orthosiphon stamineus, is an herbal plant that has long been used in traditional medicine. This plant belongs to the Lamiaceae family [2]. The ‘kumis kucing’ plant is widely found in Southeast Asia, including in Indonesia. In recent decades, various studies have been conducted regarding the benefits and effectiveness of Orthosiphon stamineus for human health.

Orthosiphon stamineus is a traditional medicinal plant that has been widely utilized in Southeast Asia as an herbal remedy for treating various diseases such as rheumatism, hepatitis, cancer, hyperlipidemia, psoriasis, digestive disorders, kidney stones, and diabetes [3]. The flavonoid content in the ‘kumis kucing’ plant is believed to suppress angiogenesis activity, thereby inhibiting the growth of tumor and cancer cells [4]. The research by Movahedi et al. [5] indicates that the infusion of Orthosiphon stamineus can prevent and reduce the growth of liver cancer.

The Orthosiphon stamineus plant offers a wide range of health benefits, making it a popular choice in herbal medicine. Its benefits include reducing menstrual pain, detoxifying the body from fungal infections, and enhancing heart health. Additionally, this plant is effective in addressing kidney disorders and rheumatism, as well as combating free radicals that can cause cellular damage. Moreover, kumis kucing can alleviate coughs, treat swollen gums, and maintain bone health, all contributing to overall well-being [6]. Beyond these benefits, kumis kucing also helps regulate blood sugar levels and reduce allergy-related

itching. Its ability to lower high blood pressure and relieve stress and anxiety further enhances its therapeutic value. With these various positive effects, kumis kucing proves to be a valuable option for managing various health conditions and improving overall quality of life.

The *Orthosiphon stamineus* plant contains various active compounds that are beneficial for human health. According to phytochemical screening results, the leaves of kumis kucing contain important compounds such as carbohydrates, quinine, alkaloids, flavonoids, triterpenoids, terpenoids, coumarins, and phenols [7]. These compounds have a range of therapeutic effects, including antioxidant, anti-inflammatory, and antimicrobial activities, which contribute to the numerous health benefits of this plant.

In addition to the primary phytochemical compounds, Orthosiphon stamineus leaves also contain essential oil compounds with distinctive characteristics [8]. This essential oil not only imparts a unique aroma to the plant but also contributes to various therapeutic benefits. These compounds are frequently used in herbal medicine due to their antimicrobial properties, which help combat bacterial and fungal infections, as well as their anti-inflammatory effects that can reduce inflammation in the body. The presence of essential oils in ‘kumis kucing’ enhances the plant's therapeutic value, making it more valuable in herbal medicine. With a combination of phytochemical compounds and essential oils, kumis kucing offers a broad range of potential benefits, including health improvement and treatment of various medical conditions. Thus, kumis kucing is considered a plant with significant and diverse health benefits.

The leaf extract of kumis kucing contains several important chemical compounds that provide significant biological benefits. Among these compounds are tritriacontadiene, phytol, alpha trans-sesquicyclogeraniol, alpha tocopherol, and secocholest [9]. Tritriacontadiene is a hydrocarbon with potential antioxidant activity. Phytol, a component of essential oil, also has antioxidant and anti-inflammatory properties that help protect cells from oxidative damage. Alpha trans-sesquicyclogeraniol and alpha tocopherol, forms of vitamin E, play crucial roles in maintaining cell health. Alpha tocopherol is renowned for its antioxidant ability to protect cell membranes from damage caused by free radicals. On the other hand, alpha trans-sesquicyclogeraniol contributes to the antimicrobial and anti-inflammatory properties of kumis kucing. Secocholest, a sterol, helps stabilize cell membranes and supports metabolic functions.

The diverse active compounds found in kumis kucing leaf extract offer various potential benefits for treatment and health care. The strong antioxidant activity of these compounds can protect the body from oxidative stress and cellular damage, while their anti-inflammatory and antimicrobial effects can aid in managing inflammation and infections. Therefore, kumis kucing is highly valued in herbal medicine and natural health care.

Based on previous studies on the effectiveness of Orthosiphon stamineus in treating various diseases, the researcher is interested in conducting a study titled "Benefits of Orthosiphon Stamineus: A Systematic Literature Review." This study aims to provide information the benefits of Orthosiphon stamineus based on recent scientific literature. Through this literature review, it is expected to enhance readers' understanding, particularly the public's, about the health benefits of this plant, which may not be widely known.

## 2. Material and Methods

The research method applied is Systematic Literature Review (SLR) or literature study. This method relies on descriptive analysis to present, describe, and analyze findings from various previous studies. Through this approach, existing research results can be explained more comprehensively and understood more easily, thereby facilitating a better understanding of the researched topic (Muliana, 2024). SLR aims to provide a clear and structured overview of relevant findings from various literature sources.

The literature sources used in this method include national and international journals published online, primarily from Google Scholar. Literature searches are conducted using specific keywords such as “kumis kucing,” “Orthosiphon stamineus,” “benefits of kumis kucing,” “properties of kumis kucing,” and “active compounds in kumis kucing.” These keywords help in identifying articles relevant to the research topic, ensuring that the collected data aligns with the research focus.

The articles reviewed in this study are research articles published between 2014 and 2024. The main focus is on articles that discuss the utilization and use of kumis kucing for human health. This selection process aims to gather up-to-date and relevant information on the benefits of kumis kucing, so the analysis can reflect the latest developments in the field.

## 3. Results and Discussion

*Orthosiphon stamineus* has long been used in traditional medicine in regions such as East India, Indochina, Southeast Asia, and the tropical areas of Australia where this plant typically grows [10]. Based on the color of its flowers and calyces, Orthosiphon stamineus is classified into two varieties: the white-flowered variety and the purple-flowered variety. Traditionally, *Orthosiphon stamineus* is used to treat hypertension, diabetes, bladder and kidney issues, gallstones, gout, and rheumatism. To further understand Orthosiphon stamineus, here is the taxonomy of this plant:

Kingdom : Plantae
Division : Tracheophyta
Class : Magnoliopsida
Order : Lamiales
Family : Lamiaceae
Genus : Orthosiphon
Species : Orthosiphon stamineus [11]

**Fig. 1**. Image of *Orthosiphon stamineus*
Source: Kartini et al., 2024

Based on the analysis of the literature review on the potential health benefits of Orthosiphon stamineus, information was obtained regarding the health benefits of using the cat's whiskers plant, as shown in **Table 1** below:

**Table 1**. Benefits of Orthosiphon stamineus

| No. | Benefits | Reference |
|---|---|---|
| 1 | Therapeutic Agent for Gout | Agatta & Putra, 2024 |
| 2 | Dental Caries Treatment | Aulia *et al*, 2022 |
| 3 | Imunomodulator | Hermanto *et al*, 2022 |
| 4 | Anticanker | Layly *et al*, 2023 |
| 5 | Neuroprotectif | Tandi *et al*, 2017 |
| 6 | Diuretic and Treatment for Kidney Stones | Syarif *et al*, 2015 |
| 7 | Antibacterial against Pseudomonas aeruginosa and Aeromonas hydrophila | Nair *et al*, 2014 |
| 8 | Antibiotic for Gonorrhea | Ruzaini & Rikardo, 2021 |
| 9 | Antihelmintic against *Ascaris suum* | Ulya et al, 2014 |
| 10 | Antivirus against Herpes simpleks type 1 | Jaheel *et al*, 2020 |
| 11 | Antidiabetic | Maulana *et al*, 2022 |
| 12 | Antiobesity | Yuniarto *et al*, 2015 |
| 13 | Treatment for Rheumatism | Rafi *et al*, 2021 |
| 14 | Heart Health | Nashran *et al*, 2023 |
| 15 | Gastroprotective | Ashraf *et al*, 2018 |

The plant Orthosiphon stamineus, commonly known as ‘kumis kucing’, has significant potential in reducing uric acid levels in the blood due to its flavonoid content. Gout is a metabolic disorder caused by high levels of uric acid in the blood, resulting from purine metabolism. Excess uric acid can crystallize and

accumulate in the joints, causing pain and inflammation known as gout [13]. The use of 'kumis kucing' as a therapeutic agent focuses on its ability to reduce uric acid formation and enhance its elimination from the body.

One of the primary mechanisms by which 'kumis kucing' helps lower uric acid levels is through the anti-inflammatory and antioxidant activities of its flavonoid compounds. Flavonoids work by inhibiting the enzymes xanthine oxidase and adenosine deaminase, which are crucial in the formation of uric acid. By inhibiting these enzymes, the production of uric acid can be significantly reduced, thereby helping to lower blood uric acid levels [3]. Inhibition of these enzymes not only reduces uric acid production but also helps prevent inflammation commonly associated with gout attacks.

Additionally, the flavonoids in 'kumis kucing' have a diuretic effect that helps eliminate purines from the body by increasing urine production [14]. Poorly excreted purines can contribute to elevated uric acid levels in the blood. Therefore, the diuretic effect of flavonoids plays a crucial role in aiding the body in excreting excess purines and uric acid, thereby preventing the accumulation that can lead to gout attacks.

Other constituents in 'kumis kucing', such as polyphenols and saponins, also contribute to the diuretic activity of the plant [15]. Polyphenols and saponins function similarly to flavonoids, enhancing the volume and frequency of urination, which aids in the excretion of uric acid and purines from the body. This diuretic activity supports kidney function in managing blood uric acid levels and preventing the formation of uric acid crystals that can cause joint inflammation.

In addition to its diuretic effects and enzyme inhibition, 'kumis kucing' also possesses nephroprotective properties, meaning it can protect and repair kidney function. Healthy kidneys are crucial for regulating uric acid levels, as they efficiently filter and eliminate uric acid from the body. 'kumis kucing' has been shown to reduce serum creatinine and Blood Urea Nitrogen (BUN) levels, which are key indicators of healthy kidney function. By improving kidney function, 'kumis kucing' helps optimize uric acid excretion, making it an effective therapeutic agent for gout sufferers.

'Kumis kucing' is also an effective antibacterial agent. The plant contains alkaloids, tannins, saponins, and flavonoids, which have the ability to combat bacterial growth, making 'kumis kucing' a promising option for bacterial infection treatment. Alkaloids and tannins are known for their strong antimicrobial properties, while saponins and flavonoids can damage bacterial cell walls, inhibit essential enzymes, and prevent bacterial proliferation. Research by Aulia et al. [16] indicates that extracts of 'kumis kucing' leaves at concentrations of 65%, 70%, and 75% are effective in inhibiting the growth of the gram-positive bacterium Staphylococcus aureus, a cause of dental caries. These findings suggest that 'kumis kucing' extract can be used as a natural alternative for preventing and treating bacterial infections in the mouth, particularly those related to dental health. With its antibacterial potential, 'kumis kucing' could serve as a base for developing safer and more effective oral care products.

The aqueous extract of 'kumis kucing'leaves (Orthosiphon stamineus) exhibits immunomodulatory activity [17]. This extract has the ability to modulate, or regulate, the immune system. This immunomodulatory activity can enhance the body's immune response to pathogens and reduce excessive immune responses that can lead to inflammation.

The aqueous extract of 'kumis kucing'leaves shows immunomodulatory activity, meaning it has the capability to modulate the immune system. This ability allows the plant extract to balance the immune response, both by strengthening the response to pathogen infections and by reducing excessive immune responses. This balance is crucial for effectively combating infections without causing damage to healthy tissues. The immunomodulatory activity of 'kumis kucing'extract also plays a role in controlling excessive inflammation, which often leads to autoimmune diseases or chronic inflammatory conditions. By regulating the immune system, this extract can help prevent tissue damage caused by excessive immune reactions and support more effective body recovery. This potential makes 'kumis kucing'extract an intriguing candidate for developing natural therapies to manage immune and inflammatory disorders.

'Kumis kucing'contains active compounds that may serve as anticancer agents. The natural antioxidants found in the flavonoids of 'kumis kucing'leaves help capture free radicals and have anti-aging properties, which can reduce cancer risk [7]. Methanol extracts of this plant can enhance tamoxifen compounds, which play a role in the proliferation of breast cancer cells.

*Orthosiphon stamineus* contains active compounds with potential as anticancer agents. One of its primary components is flavonoids, which are natural antioxidants. Flavonoids in 'kumis kucing'leaves help capture free radicals that can damage body cells, thereby protecting cells from oxidative stress that can lead to premature aging and cancer development. This antioxidant activity contributes to reducing cancer risk by maintaining cellular integrity and preventing DNA damage that could result in the transformation of cells into cancerous ones.

Methanol extracts of 'kumis kucing'have been shown to enhance the effectiveness of tamoxifen, a drug used in breast cancer treatment. Tamoxifen works by inhibiting the proliferation of breast cancer cells, and when combined with 'kumis kucing'methanol extract, its anticancer activity can be amplified. Research indicates that this combination is more effective in suppressing cancer cell growth, opening opportunities for developing safer and more effective natural-based therapies for breast cancer.

Neuroprotective compounds play a crucial role in protecting the kidneys from damage caused by free radicals. Free radicals can cause oxidative stress that damages kidney cells, potentially leading to various kidney disorders. Research by Tandi et al. [18] demonstrates that combining 'kumis kucing'leaf extract with red hibiscus leaf extract (*Abelmoschus manihot* L) is effective in inhibiting increases in urea and creatinine levels in male white rats. Urea and creatinine are important indicators of kidney function, and elevated levels often indicate kidney dysfunction.

In addition to its neuroprotective effects, 'kumis kucing'leaf extract also benefits kidney stone treatment. The plant aids in urine flow and helps in the expulsion of kidney stones, thanks to its diuretic properties and ability to increase urine flow [19]. This effect is crucial in managing kidney stones, where increased urination can help reduce stone size and prevent further formation.

The commonly used part of 'kumis kucing'in herbal medicine for kidney stones is the dried leaves. Traditional methods involve making infusions or decoctions from these dried leaves, which are then consumed for therapeutic benefits [20]. Using dried leaves in herbal drinks is a common way to utilize their diuretic properties and support overall kidney health.

'Kumis kucing'(Orthosiphon stamineus) also has potential as a natural antibiotic for treating gonorrhea, caused by the bacterial infection Neisseria gonorrhoeae. Gonorrhea is a sexually transmitted infection affecting the reproductive system and can cause severe symptoms if not properly treated. Research shows that active compounds in 'kumis kucing'leaves, such as flavonoids, saponins, and alkaloids, have effective antibacterial activity against gonorrhea-causing bacteria [21]. Flavonoids and saponins can damage bacterial cell walls and disrupt bacterial metabolism, while alkaloids contribute by inhibiting essential bacterial enzymes. With its antibacterial activity, 'kumis kucing'could serve as a natural alternative in treating gonorrhea, providing an additional option alongside conventional antibiotic therapies.

Research by Ulya et al. [22] demonstrated that 'kumis kucing'leaf extract, specifically the ethanol extract from this plant, possesses anthelmintic activity against Ascaris suum, which causes ascariasis. The active compounds in this extract are capable of inhibiting the growth and development of the worm, suggesting its potential as an herbal treatment alternative for parasitic diseases. This effectiveness indicates that Orthosiphon stamineus could be a promising option for treating worm infections, particularly in the context of traditional medicine.

*Orthosiphon stamineus* leaves also contain chemical compounds with antiviral properties against Herpes Simplex Virus type 1 (HSV-1). Jaheel et al. [23] found that methanol leaf extract (MLE) of 'kumis kucing'exhibited the most significant antiviral effect compared to water extract (ALE) and ethanol extract (ELE). MLE contains alkaloids, saponins, flavonoids, tannins, anthraquinones, terpenoids, and steroids, while ALE contains only tannins and flavonoids, and ELE includes all phytochemicals except anthraquinones and tannins. The antiviral activity of MLE against HSV-1 is attributed to its higher content of phytochemicals, especially compounds with antiviral activity such as flavonoids and anthraquinones. This extract disrupts various stages of the virus life cycle, including attachment, penetration, and replication.

'Kumis kucing'leaves also serve as an antidiabetic agent. Research by Maulana et al. [24] shows that 'kumis kucing'plant effectively inhibits the activity of the enzyme α-glucosidase. The active compound responsible for this antidiabetic activity is rosmarinic acid. Orthosiphon stamineus leaf extract can be used to manage diabetes through mechanisms such as inhibition of α-amylase and α-glucosidase activities, antioxidant and anti-inflammatory effects, lipid metabolism regulation, insulin secretion enhancement, insulin resistance improvement, insulin sensitivity increase, glucose absorption improvement, glycolysis promotion, gluconeogenesis inhibition, GLP-1 secretion enhancement, and antiglycation effects [25].

The ethanol extract of 'kumis kucing'leaves contains chemical compounds that exhibit anti-obesity effects by inhibiting pancreatic lipase activity. Ethanol extracts of 'kumis kucing'leaves at doses of 100 mg/kg and 200 mg/kg demonstrate anti-obesity effects by preventing the accumulation of visceral fat [26]. Pancreatic lipase is an enzyme produced by the pancreas that breaks down triglycerides (fats) in food into free fatty acids and monoglycerides, which are then absorbed by the body. By inhibiting pancreatic lipase activity, the ethanol extract of 'kumis kucing'leaves reduces the amount of fat that can be absorbed by the body. This inhibition of pancreatic lipase means that undigested fat is excreted in the feces, thereby reducing the amount of fat stored in the body. This directly contributes to weight loss and obesity prevention.

'Kumis kucing'is a herbal medicine known for its ability to prevent and treat various diseases, including rheumatism [27]. *Orthosiphon stamineus*, or cat's whiskers, has various pharmacological properties that make it potential in treating rheumatism. Rheumatism, including rheumatoid arthritis, is an autoimmune disease that causes chronic inflammation in the joints. Active compounds in cat's whiskers, such as saponins, have anti-inflammatory and analgesic effects. Saponins can reduce capillary permeability and inhibit the migration of inflammatory cells to the inflamed area, which helps reduce swelling and pain in the affected joints. 'kumis kucing'contains compounds like flavonoids, saponins, and phenolic acids that have anti-inflammatory properties. These compounds can help reduce inflammation in the joints, which is the main cause of pain and damage in rheumatic patients. By preventing fat absorption through the inhibition of pancreatic lipase, the ethanol extract of 'kumis kucing'also helps prevent the accumulation of visceral fat. This is important because visceral fat significantly affects metabolism and overall health. Reducing visceral fat accumulation contributes to lowering the risk of obesity and related health complications.

'Kumis kucing'has benefits for heart health [28]. Flavonoids in 'kumis kucing'leaves can lower blood pressure and improve endothelial function, which is essential for maintaining vascular elasticity and reducing the risk of heart disease. 'kumis kucing'contains flavonoids and phenolic acids with antioxidant properties. Antioxidants help protect body cells from damage caused by free radicals, which can reduce inflammation and prevent damage to blood vessels. This is important for maintaining heart health and reducing the risk of atherosclerosis, which is the buildup of plaque in the arteries that can lead to heart attacks.

*Orthosiphon stamineus* has gastroprotective effects. Traditionally, this plant has been used to address stomach diseases due to its gastroprotective properties [30]. Gastroprotective refers to the ability to protect the gastric mucosa from damage. This gastroprotective effect makes 'kumis kucing'beneficial in traditional medicine for treating various stomach issues, such as gastric ulcers or gastritis. 'kumis kucing'contains flavonoids, such as sinensetin and eupatorin, which have strong antioxidant properties. These antioxidants help protect stomach cells from damage caused by free radicals. Free radicals can damage the gastric mucosa and cause inflammation, which may lead to the formation of gastric ulcers. By combating free radicals, the compounds in 'kumis kucing'can prevent or reduce damage to the stomach lining.

## 4. Conclusion

Based on the findings from the literature review, *Orthosiphon stamineus*, commonly known as 'kumis kucing', offers a wide range of significant health benefits. This plant has been proven effective as a therapeutic agent for various medical conditions, including gout, dental caries, and rheumatism. Other benefits include its activities as an immunomodulator, anticancer agent, and neuroprotective agent, demonstrating the plant's potential in supporting the immune system, combating cancer cells, and protecting the nervous system. Additionally, *Orthosiphon stamineus* has the ability to promote urination, assist in the treatment of kidney stones, and serve as an effective antibacterial and antiviral agent, particularly against pathogens such as Pseudomonas aeruginosa, Aeromonas hydrophylla, and Herpes Simplex Virus Type 1.

Beyond these benefits, *Orthosiphon stamineus* also possesses antidiabetic and anti-obesity properties, making it a potential candidate for the treatment of metabolic diseases. Its use as an antibiotic for gonorrhea and as an anthelmintic against Ascaris suum highlights its versatility in treating infections and parasitic diseases. Additional benefits, such as promoting heart health, suggest that 'kumis kucing' has broad potential in supporting cardiovascular health. This study underscores the importance of Orthosiphon stamineus as an herbal plant with various therapeutic benefits that can be utilized in both traditional and modern medicine.

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