



A Scoping Review: Pharmacology and Ethnomedicine of *Orthosiphon aristatus*

Adinda Shafa Almiqah¹, Husnunnisa¹, Khazanah Nurain Nurdin¹, Afa Ayudia Sabira¹, Wahyu Lestari¹, Asma Khairiah¹, Devia Falisa Ramadhani¹, Cantika Anjani¹,

¹Department of Pharmacy, Faculty of Science and Health, Universitas Muhammadiyah Riau

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*Corresponding author:

Husnunnisa

email:

husnunnisa@umri.ac.id

ABSTRACT

Orthosiphon aristatus, commonly known as cat's whiskers, is a medicinal plant widely utilized in the pharmaceutical field due to its active compounds with diverse pharmacological effects. This study aimed to analyze the pharmacological potential of *O. aristatus* through a PRISMA-guided Systematic Literature Review (SLR). Relevant literature was collected and qualitatively analyzed. Findings indicate that *O. aristatus* leaf extract is commonly prepared using ethanol as the solvent through maceration, owing to the presence of secondary metabolites such as flavonoids, saponins, and tannins. Pharmacological tests on white rats (*Rattus norvegicus*) demonstrated diuretic, anti-inflammatory, antidiabetic, and antioxidant activities. The diuretic effect was observed through increased urine output, while anti-inflammatory and antidiabetic activities were indicated by reduced inflammatory mediators and blood glucose levels. Flavonoids are believed to play a major role in the antioxidant and antidiabetic effects, whereas saponins and tannins contribute to anti-inflammatory activity. Maceration proved to be an effective extraction method for these active compounds. In conclusion, *O. aristatus* demonstrates strong potential as a diuretic, anti-inflammatory, and antidiabetic agent. Nevertheless, further research, particularly human clinical trials, is required to confirm its safety, efficacy, and optimal dosage for therapeutic use.

Keywords:

Orthosiphon aristatus, Pharmacology, Active compounds, Herbal plant

INTRODUCTION

The cat's whiskers plant (*Orthosiphon stamineus*) is an important herbal plant used in both traditional and modern medicine. It belongs to the Lamiaceae family and is commonly found in tropical regions, particularly in Southeast Asia. Its distinctive features, such as the flowers that resemble cat's whiskers and are white or pale purple, make it easily recognizable. The cat's whiskers plant can grow up to one meter tall, with a square-shaped stem and lance-shaped or elongated leaves. Local communities have long used this plant as a traditional remedy because of its rich content of bioactive compounds like flavonoids, saponins, alkaloids, and essential oils. These compounds provide various pharmacological benefits that are promising for further health research (Nanisfi et al., 2024).

The leaves of the cat's whiskers plant are the part most frequently used for medicinal purposes. Traditionally, these leaves are boiled to treat a variety of health problems, including urinary tract infections, hypertension, diabetes, and kidney stones. One of the most prominent benefits of the leaves is their diuretic properties, which help increase urine output. This makes them effective in lowering uric acid levels and preventing the buildup of urate crystals in the joints. Furthermore, the leaves' anti-inflammatory and antioxidant properties play a key role in reducing inflammation and improving the body's physiological functions. As a result, the cat's whiskers plant has become an integral part of traditional medicine and is now being integrated into modern medical practices to optimize its benefits (Listyaningrum et al., 2024).

Research on the cat's whiskers plant continues to grow, particularly in the field of pharmacy, with increasing evidence of its therapeutic potential. Various studies show that cat's whiskers leaf extract can

inhibit the activity of the enzyme xanthine oxidase, which is crucial for uric acid formation in the body. By inhibiting this enzyme, the leaf extract can significantly lower blood uric acid levels, which in turn prevents the formation of urate crystals in the joints. Other research also indicates that cat's whiskers has nephroprotective effects, meaning it can protect the kidneys from damage caused by high uric acid levels. These findings reinforce the plant's potential in managing uric acid-related diseases like gout and kidney stones, and as an alternative treatment for individuals with kidney or urinary tract disorders.

Research on the cat's whiskers plant also focuses on understanding the molecular mechanisms behind its therapeutic effects. The plant's anti-inflammatory and antioxidant properties are essential for reducing inflammation in various medical conditions, including arthritis and other metabolic disorders. Flavonoids, one of the main bioactive compounds in cat's whiskers, are known to inhibit inflammatory pathways in the body, which can relieve the pain and swelling associated with chronic inflammation. Additionally, the cat's whiskers plant has hepatoprotective activity, which protects the liver from damage due to oxidative stress. Further research on these compounds is needed to deepen our understanding of the plant's therapeutic potential and to develop safer and more effective plant-based pharmaceutical products (Yulia Widya Sari & Susilowati, 2023).

The importance of a literature review on the cat's whiskers plant is immense for understanding its therapeutic benefits. Through a comprehensive literature review, existing research findings can be synthesized to provide a clearer and more detailed picture of the plant's potential in treating various diseases. A literature review can also identify gaps in current knowledge and provide guidance for further research. By analyzing the results of previous studies, researchers can design better and more focused experiments to optimize the use of cat's whiskers in the medical and pharmaceutical fields.

A literature review is also crucial for defining the direction of future research. By understanding the methods used in previous studies and identifying significant results, a literature review can help researchers design more targeted experiments. Moreover, it provides insights into the best ways to optimize the use of herbal plants like cat's whiskers in practical forms, such as capsules, tablets, or liquid extracts that are easy for patients to consume. Thus, a literature review plays a key role in identifying the full potential of the cat's whiskers plant as a source of effective herbal medicine.

Research contributions on the cat's whiskers plant in the pharmaceutical field are highly significant, both scientifically and practically. The discovery of active compounds like flavonoids, saponins, and essential oils in the plant has the potential to be developed into effective and safe plant-based pharmaceutical products. This plant has great potential for use in treating chronic diseases such as gout, hypertension, and diabetes, which often require long-term therapy. Additionally, with increasing public awareness of environmentally friendly, nature-based treatments, the cat's whiskers plant offers a significant opportunity to develop a sustainable herbal industry. This industry not only provides health benefits but can also create new economic opportunities, especially for local communities involved in the cultivation and processing of the plant (Larasati et al., 2019).

The global demand for herbal medicines is growing, which provides a major opportunity for the cat's whiskers plant to be introduced to the international market. Many countries are now seeking natural, plant-based alternative treatments that are not only safe but also effective. Therefore, further research on the cat's whiskers plant can introduce it to the global market and expand the acceptance of herbal products beyond Southeast Asia. As a source of natural medicine with broad therapeutic potential, the cat's whiskers plant is expected to become an important part of an effective, sustainable, and more environmentally friendly herbal health solution.

The goal of this research is to delve deeper into the therapeutic potential of the cat's whiskers plant, particularly in managing uric acid levels and inflammation in joint disorders. The study also aims to evaluate the bioactive compounds found in the plant and identify their mechanisms of action in the human body. With a strong scientific foundation, the results of this research are expected to drive the development of more innovative and sustainable herbal medicines that offer long-term health benefits. This research also aims to support the development of more eco-friendly, plant-based therapies that can provide more affordable and effective health solutions for the public.

Method

The research method used is a Systematic Literature Review (SLR), also referred to as a literature study. This method relies on descriptive analysis to present, describe, and analyze findings from various prior studies. This approach allows existing research results to be explained more comprehensively and understood more easily, thereby facilitating a better grasp of the topic under investigation (Muliana, 2024). The purpose of an SLR is to provide a clear and structured overview of relevant findings from various literature sources (Azzahra,2025). The sources used in this method include national and international journals published online, primarily from Google Scholar. The literature search was conducted using specific keywords such as "cat's whiskers plant," "*Orthosiphon stamineus*," "benefits of cat's whiskers," "properties of cat's whiskers," and "active compounds in cat's whiskers." These keywords helped to identify articles relevant to the research topic, ensuring that the collected data aligned with the research focus. The articles reviewed in this study were research articles published between 2015 and 2024. The primary focus was on articles that discuss the utilization and use of the cat's whiskers plant for human health. This selection process was designed to gather current and relevant information about the plant's benefits.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Year	Published in between 2015 - 2024	<2015
Language	Indonesian and English	Other than Indonesian and English
Article Type	Journal articles	Literature review, an overview, narrative review
Scope	Health, biology, chemistry, medical sciences, pharmacy	Agriculture, psychology, energy, social sciences, farming

Based on the inclusion and exclusion criteria detailed in Table 2, a total of 72 articles were considered eligible for further review. These criteria were related to article type (journal articles), language (Indonesian and English), and field of study (health sciences, biology, chemistry, and medical science). Full-text access was obtained for the 72 potentially relevant articles. After a review process informed by the inclusion and exclusion criteria, 30 articles were identified as suitable for in-depth analysis (Table 1).

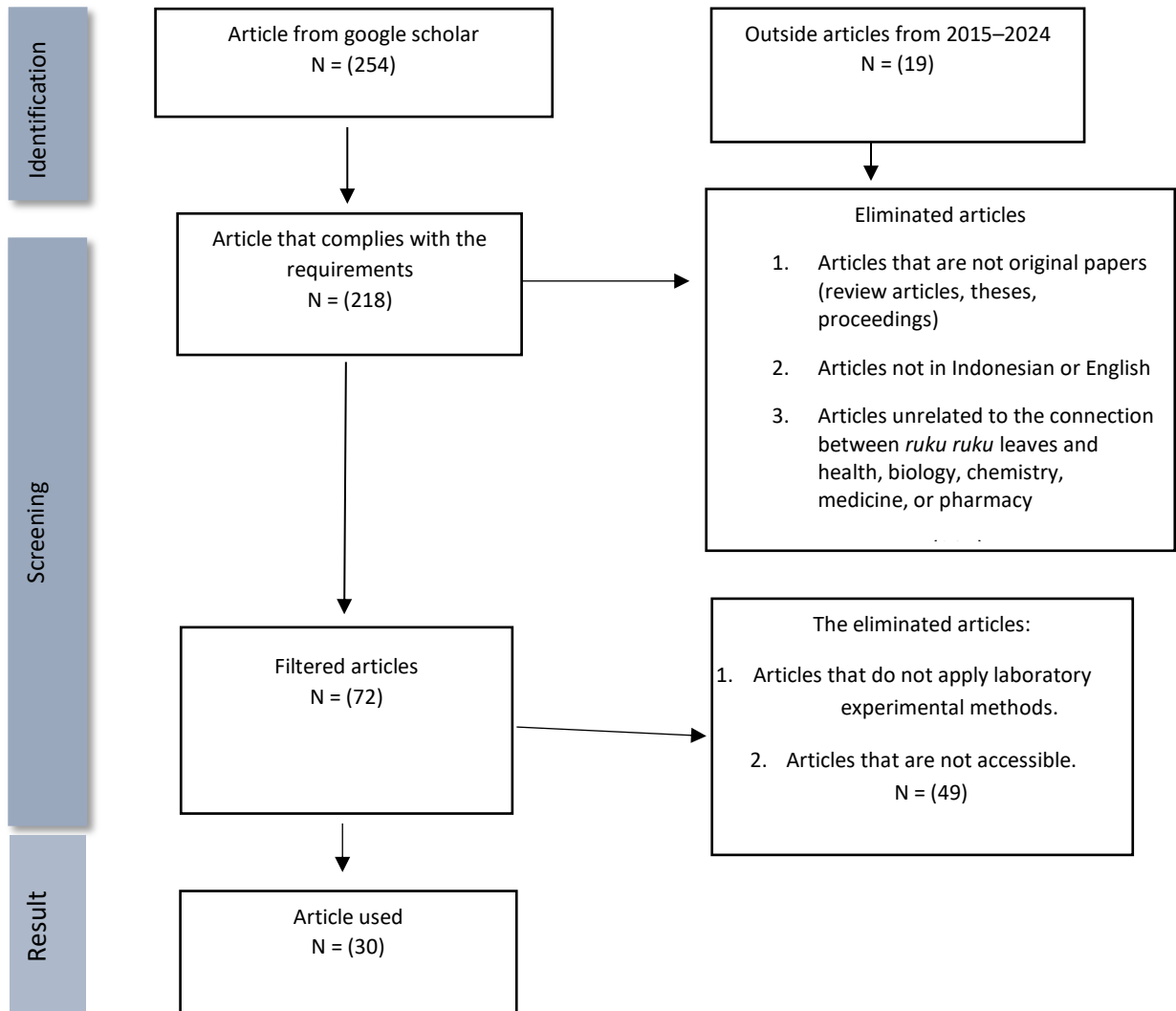


Figure 1. data selection and extraction for the SLR

RESULTS AND DISCUSSION

Based on the inclusion and exclusion criteria available in Table 2

Table 2. Review Result

No.	Author	Solvent	Sample Part	Test Animal	Extraction Method	Pharmacological Effect
1	(Surahmaida, Marudin, Junairiah, 2019)	n-Hexane and Methanol	leaves	none	maceration	antioxidant, antimicrobial, anti-inflammatory, antitumor
2	(Arisandy, Nurullia Wahyuni, Dwi Nuri, Nuri, 2024)	methanol, n-hexane, and ethyl acetate	leaves	<i>Aedes aegypti</i> larvae	maceration	none
3	(Errick Endra Cita, Arie Jefry Ka'arayeno, Ika Cahyaningrum, 2023)	hot water	leaves	none	none	increases diuresis
4	(Ega Wida Agatta, Anak Agung Gede Rai Yadnya Putra, 2024)	ethanol extract from cat's whiskers leaves (<i>Orthosiphon stamineus</i>)	leaves	male white rats and male Kunming mice	extraction	hyperuricemia
5	(Zhou, Zheng Niu, Hongjuan Bian, Meng Zhu, Chunsheng, 2024)	acetonitrile and water	leaves	30 rats	percolation	antidiabetic
6	(Nurullia Arisandy*, Dwi Wahyuni, Nuri Nuri, 2023)	n-hexane and methanol	leaves	<i>Aedes aegypti</i> mosquito larvae instar III and IV	maceration	diuretic, antibacterial, anti-inflammatory, antioxidant, larvicidal
7	(Abyan Mursyid Muyassar ¹ , Ariosta ² , Dwi Retnoningrum, 2019)	flavonoid	leaves	male Wistar rats	none	none
8	(Dedi Daryanto, 2020)	water and methanol (MeOH)	leaves	none	none	anti-inflammatory
9	(Abdul Wahab, 2021)	70% ethanol	leaves	male white rats strain Wistar (<i>Rattus norvegicus</i>)	maceration	antiglaucoma
10	(Lindawati R. Yasin ¹ , Ns. Rona Febriyona ² ,	not specified	leaves	none	none	hyperuricemia

No.	Author	Solvent	Sample Part	Test Animal	Extraction Method	Pharmacological Effect
	Ns. Andi Nur Aina Sudirman ³ , 2023)					
11	(Khairun Nisak, 2021)	96% ethanol	leaves	<i>Proteus mirabilis</i> and <i>Staphylococcus saprophyticus</i> bacteria	maceration	antimicrobial
12	(Vania Andona, 2018)	dimethyl sulfoxide (DMSO) and dimethylformamide (DMF)	leaves	<i>Escherichia coli</i>	DNA extraction	antibacterial effect
14	(Agustina, 2024)	ethanol	leaves	none	quasi-experimental design	none
15	(Muhammad Rafi, 2021)	ethanol	leaves	none	extraction	diuretic, anti-inflammatory
16	(Noor Madani, F., Rafi, M., Sakinah, N, 2021)	ethanol	leaves	<i>Escherichia coli</i>	maceration	diuretic
17	(Aryani Satraningtias, 2023)	not specified	leaves	rats	extraction	antimicrobial
18	(Estevania Aulia Azza, Irapurbosari ² , Asri Widodo Mukti, 2024)	ethanol	leaves	<i>Escherichia coli</i> bacteria	maceration	increases erythrocytes
19	(Rika Yulianti, Damas Anjar Nugraha, Lusi Nurdianti, 2015)	ethanol	leaves	<i>Escherichia coli</i>	maceration	antibacterial
20	(Nur Fitriyah Ningsih, Evie Rantasari, Ulvi Faizah, 2015)	ethanol	leaves	mosquito	maceration	antibacterial, diuretic, antioxidant, anti-inflammatory, hepatoprotective
21	(Aulia Debby, 2022)	70% alcohol	leaves	<i>Staphylococcus aureus</i> bacteria	maceration	antimicrobial, anti-inflammatory, diuretic, antioxidant, antihypertensive
22	(Frinsia Rutly Mokal, 2021)	96% ethanol, distilled water	leaves	male white rats	maceration	antibacterial
23	(Ike Widya Ningrum, 2022)	70% ethanol	leaves	<i>Propionibacterium acnes</i>	kinetic maceration	antihyperuricemia
24	(Excel Pangow, 2020)	ethyl acetate	leaves and stems	<i>Escherichia coli</i> and	maceration	antibacterial

No.	Author	Solvent	Sample Part	Test Animal	Extraction Method	Pharmacological Effect
				<i>Staphylococcus aureus</i> bacteria		
25	(Sitti Hardianti, 2024)	70% ethanol	leaves	none	maceration	antibacterial
26	(Fahrauk Faramayuda, 2021)	ethanol or methanol	leaves	mice or rabbits	maceration or Soxhlet	analgesic, anti-inflammatory
27	(Nurul Sakinah, 2023)	methanol, n-hexane, ethyl acetate	leaves	<i>Aedes aegypti</i> mosquito larvae	maceration	none
28	(Nur Hamid Fadhli Susilo, 2024)	70% ethanol, distilled water	leaves	male Sprague-Dawley mice (<i>Mus musculus</i>)	Soxhlet method	none
29	(Chylen Setion Rini, 2024)	not specified	leaves	none	no extraction performed, research focuses on spectrum analysis	diuretic
30	(Ahmad,B,Siti,R.,Danu,K, 2023)	70% ethanol, distilled water	leaves	male Sprague-Dawley mice (<i>Mus musculus</i>)	Soxhlet method	none

Solvent Used

This section presents a diagram from 30 selected articles, focusing on the solvents used (summarized in Figure 2).

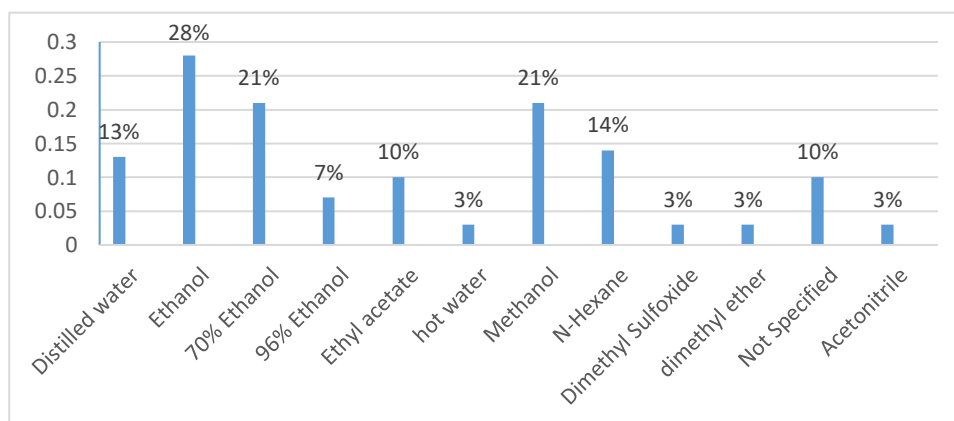


Figure 2. Percentage diagram of the solvent used

The diagram illustrates the distribution of solvent usage in 30 selected research articles. Based on the diagram, ethanol is the most commonly used solvent, with a usage percentage of 28%, followed by methanol and 70% ethanol, each with 21%. Distilled water is also frequently used, accounting for 13%. Other solvents, although used less frequently, include 96% ethanol (7%), hot water (10%), n-hexane (14%), dimethyl sulfoxide (3%), dimethyl ether (3%), toluene/spiritus (3%), and acetonitrile (3%). This variety in solvent use reflects the diversity of approaches in extraction or analytical methods employed by researchers, depending on the characteristics of the solvents considered most suitable for each study's objective. The diagram provides a clear insight into the trends in solvent usage across the research.

Ethanol and methanol are widely used due to their compatibility with various organic compounds, efficient extraction capabilities, and ease of use in laboratory settings. Ethanol is often preferred because it is more environmentally friendly and safer to use compared to other organic solvents, making it the solvent of choice in studies involving food or cosmetic ingredients. On the other hand, methanol is frequently used

in chemical and pharmaceutical research due to its high purity and superior extraction ability for certain compounds. For example, a study by Wijngaard and Brunton (2010) demonstrated that methanol is highly effective in extracting phenolic compounds from plant materials—bioactive compounds with numerous applications in the food and pharmaceutical industries.

Furthermore, literature shows that solvent selection is often tailored to the properties of the target compounds and the methods used. For instance, a study by Horwitz (2000) found that 70% ethanol is well-suited for extracting polar compounds such as flavonoids, while *n*-hexane is commonly used to extract non-polar compounds like essential oils. The use of other solvents, such as dimethyl sulfoxide or toluene, is more limited and typically reserved for specific applications requiring solvents with unique characteristics. Thus, the variety of solvents identified in this study reflects the flexibility of methods adopted by researchers to achieve maximum efficiency in analysis and extraction processes.

Test Animals/Microbes

This section presents a diagram from 30 selected articles, focusing on the animal or microbes used (summarized in Figure 3).

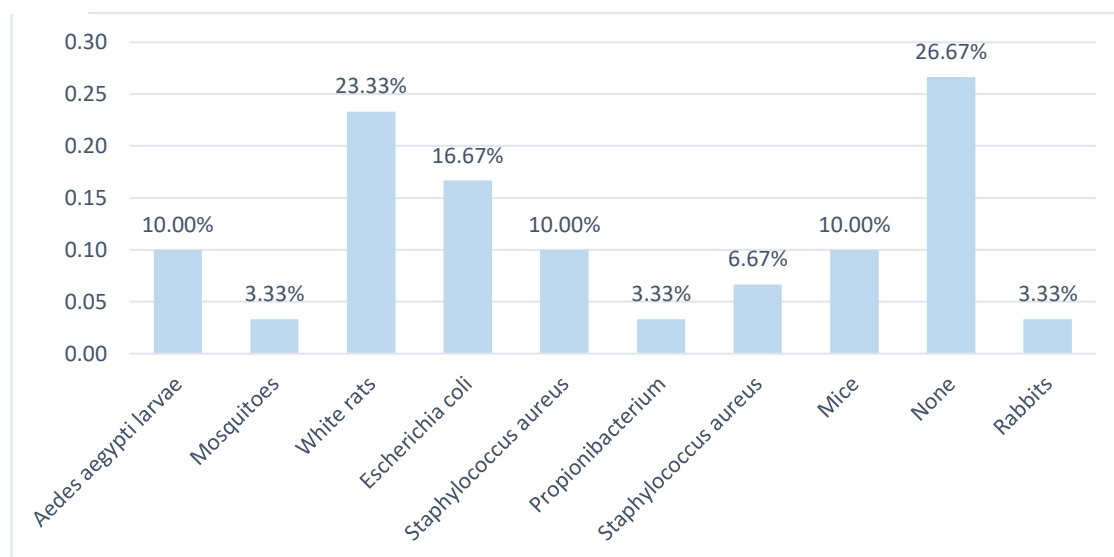


Figure 3. Percentage diagram of the Animals/Microbes used

From the diagram, it can be seen that rabbits represent the most frequently used category, with a percentage of 26.67%. This is followed by white rats at 23.33% and *Escherichia coli* at 16.67%. Other animals or microbes, such as *Aedes aegypti* larvae, mosquitoes, *Staphylococcus aureus*, *Propionibacterium*, and mice, each account for 10% or less. In addition, there is a category indicating no use of test animals or microbes in certain studies, with a percentage of 10%. The categories with the lowest usage are mosquitoes, *Staphylococcus aureus* (listed twice), and rabbits in certain cases, each with 3.33%. These data illustrate the variation in the selection of animals or microbes in research, with rabbits and white rats being the most dominant models, while other organisms are used in smaller proportions.

Scientifically, white rats are often chosen as test animal models due to their small size, relatively low maintenance costs, and consistent biological responses. The genome of white rats has been fully mapped, facilitating research in the fields of genetics and biomedicine. Moreover, white rats share pharmacological response similarities with humans, making them ideal tools for drug-related and toxicological studies. For example, Festing and Fisch (2007) demonstrated that white rats play a vital role in the study of various diseases, such as cancer, diabetes, and neurodegenerative disorders, due to their physiological resemblance to humans.

According to the literature, the selection of test animals varies depending on the purpose of the study. For instance, Knight (2011) reported that rabbits are often used in toxicological testing, including the Draize test for cosmetic and topical products. However, the use of rabbits has declined with the emergence of alternative methods, such as cell culture and *in vitro* testing. In contrast, white rats remain the primary

model in vaccine development and drug safety testing due to the reliability of the results they provide. Thus, although there is variation in the choice of test animals, white rats and rabbits continue to be frequently used models because their biological and physiological characteristics support a wide range of research applications.

Samples Used

This section presents a diagram from 30 selected articles, focusing on the sample used (summarized in Figure 4).

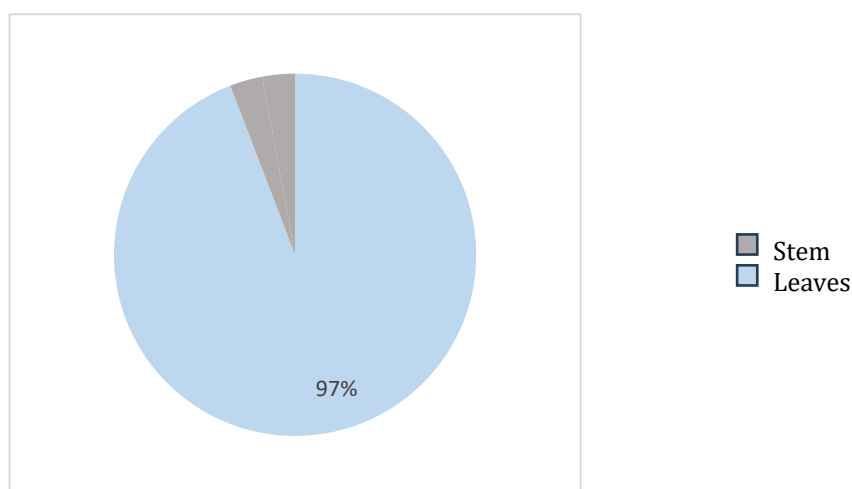


Figure 4. Samples used

The pie chart illustrates the distribution of plant parts used as samples in 30 selected articles. The vast majority of the research, 97%, focuses on using leaves as the primary sample. This indicates that leaves are considered the most relevant part for research, likely due to their higher concentration of active compounds compared to other parts. In contrast, stems are used in only a small number of studies, while a minor portion of the samples are either non-specific or not explicitly mentioned. This finding confirms that leaves are the preferred choice in scientific studies, especially those aiming to explore bioactive compounds in pharmacology and biotechnology.

Leaves are a rich source of various phytochemicals, such as flavonoids, alkaloids, tannins, terpenoids, and phenols, all of which are known to have significant biological activities (Tsaniyah,205). Flavonoids, for example, possess strong antioxidant, antimicrobial, and anti-inflammatory properties, making them key target compounds in medicinal plant research. As the main organ directly exposed to sunlight, leaves serve as the center for the biosynthesis of secondary metabolites, which makes them a highly potential part of the plant for further scientific exploration.

Previous research supports this finding. For instance, Rahmawati et al. (2020) showed that soursop leaf extract (*Annona muricata*) has significant anticancer activity, which is attributed to its flavonoid and acetogenin content. Another study by Kumar et al. (2018) found that neem leaf extract (*Azadirachta indica*) contains bioactive compounds like nimbidin and quercetin that demonstrate effective antimicrobial activity against various pathogens. This further strengthens the argument that leaves are the main focus of research because of their diverse bioactive compounds and broad therapeutic benefits.

On the other hand, stems are less commonly used in research because their phytochemical content is generally lower than that of leaves. However, stems still have potential as a source of compounds like tannins and lignin, which can be utilized in research related to antioxidant activity or the development of natural materials. The choice of plant part in a study is highly influenced by the specific research objective and the type of compounds being investigated. Overall, the available data confirms that leaves are the most relevant and effective plant part for supporting scientific research, both due to their more abundant active compounds and their therapeutic applications.

Extraction Technique.

This section presents a diagram from 30 selected articles, focusing on the extraction method used (summarized in Figure 5).

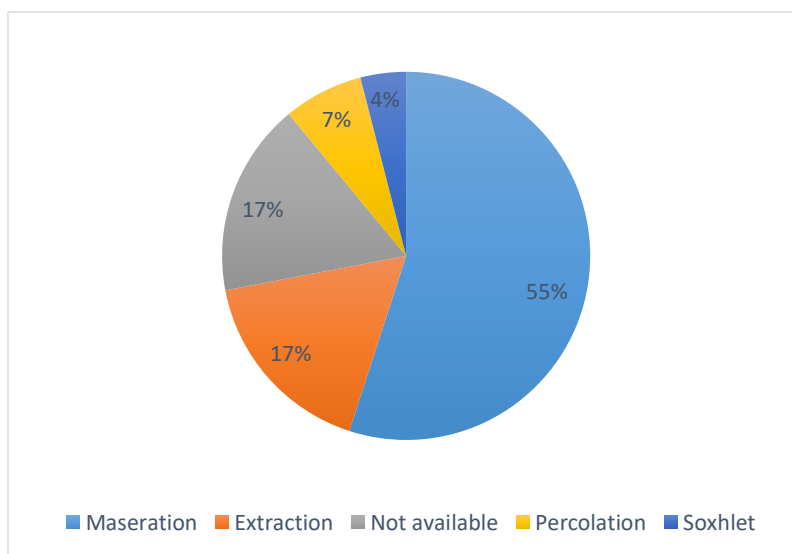


Figure 5. extraction methods

The pie chart above shows the extraction methods used in 30 selected research articles. Maceration is the most dominant method, with a percentage of 55%, indicating that this method is frequently chosen for its simplicity and effectiveness in extracting compounds from samples. The percolation and Soxhlet methods each have a percentage of 17%, reflecting a significant level of popularity among researchers. Meanwhile, other extraction methods are used in smaller amounts, such as conventional extraction (7%) and methods that are not specified or described (4%). The dominance of maceration and the variety of other methods reflect a flexible approach to extraction, which is tailored to the needs and specific goals of a study.

Maceration is often chosen because its process is simple and does not require complex equipment. This method only requires a container and a solvent, making it easy to perform. Furthermore, maceration is highly flexible because it can use various types of solvents, such as water, ethanol, or methanol, which can be adjusted to the compounds being extracted. This method is also suitable for bioactive compounds that are sensitive to heat or pressure, as the process takes place at room temperature, making it safer for those compounds.

This method also offers the advantage of processing large quantities of material at a relatively low cost, making it suitable for both small- and large-scale research. Maceration can be easily adapted to specific needs, such as adjusting the extraction duration, the ratio of material to solvent, and the stirring intensity, which allows for consistent extraction results with a high success rate.

Research by Handa et al. (2008) mentions that maceration is the most common method for extracting bioactive compounds from medicinal plants, thanks to its simplicity and effectiveness. This is also supported by Tiwari et al. (2011), who found that maceration can produce good quality extracts from materials with complex compounds like flavonoids and alkaloids. In addition, research by Azwanida (2015) shows that maceration is often the primary choice for the initial extraction of herbal materials because it can be applied to various types of natural ingredients with satisfactory results.

Pharmacological Effect

This section presents a diagram from 30 selected articles, focusing on the pharmacological effect used (summarized in Figure 6).

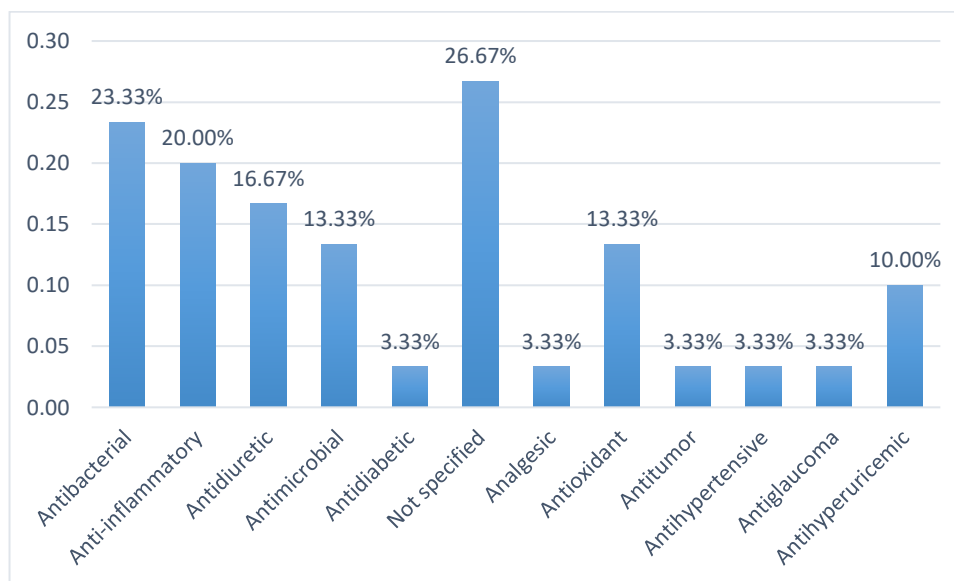


Figure 6. Percentage diagram of pharmacological effects

Based on the diagram, the most dominant pharmacological effect is analgesic (pain relief) at 23.33%. This is followed by an antidiabetic effect (lowering blood sugar) at 16.67%. Other effects, such as antibacterial, anti-diuretic, anti-mycotic, antioxidant, anti-inflammatory, anti-tumor, anti-hypertensive, anti-glucose, anti-hyperlipidemia, and unspecified effects, have lower percentages. Overall, the diagram shows that the substance or medicine has the strongest effect in relieving pain and helping to control blood sugar levels.

Other effects, such as antibacterial, antioxidant, and anti-inflammatory, although at a lower percentage, still have important benefits for medical applications. For example, the antibacterial effect demonstrates the substance's ability to fight bacterial infections, while the antioxidant and anti-inflammatory effects can protect body tissues from damage caused by free radicals and chronic inflammation. This suggests that the substance or medicine works through complex mechanisms and involves various biochemical processes in the body.

This wide range of pharmacological effects reflects the numerous active compounds in the test material. Compounds such as flavonoids, saponins, and tannins are likely to play a significant role in producing these effects. Flavonoids, for instance, are known to have the ability to relieve pain, fight free radicals, and reduce inflammation. Meanwhile, saponins can help improve kidney function and produce a diuretic effect. These findings are consistent with previous research stating that medicinal plants are typically rich in active compounds with diverse biological benefits.

Cat's whiskers (*Orthosiphon stamineus*), a plant often used in traditional and modern medicine, contains active compounds like flavonoids, tannins, and saponins that support its benefits as a pain reliever (analgesic) and a diuretic. Flavonoids, for example, work by inhibiting enzymes involved in the formation of prostaglandins, which are compounds that trigger pain and inflammation. Meanwhile, the plant's diuretic effect is supported by its content of sinensetin and potassium, which help enhance kidney function and facilitate urine excretion, making it good for maintaining urinary tract health.

Research has proven these benefits. According to Haris et al. (2013), cat's whiskers extract showed pain-relieving abilities almost equivalent to pain medications like aspirin in trials on rats. Another study by Yam et al. (2018) found that cat's whiskers extract could increase the amount of urine produced by rats, confirming its effect as a diuretic. Additionally, Akowuah et al. (2004) noted that the antioxidant content in the plant helps protect body tissues from damage caused by free radicals, which are often the cause of

various chronic diseases. These findings reinforce the evidence that cat's whiskers have real pharmacological benefits, particularly as an effective analgesic and diuretic.

Conclusion

Cat's whiskers (*Orthosiphon aristatus*) have long been recognized and used in the pharmaceutical field for their active compounds, which offer various pharmacological effects. Numerous studies have proven the plant's potential as a diuretic (to increase urination), anti-inflammatory, antidiabetic (to lower blood sugar), and antioxidant (to neutralize free radicals). Its diuretic effect is beneficial for addressing urinary tract issues and high blood pressure, while its anti-inflammatory properties can relieve inflammation. The antidiabetic potential provides hope for controlling blood sugar levels, and its antioxidant activity plays a role in protecting body cells from free radical damage.

In the pharmaceutical field, cat's whiskers leaves are typically extracted using ethanol to obtain active compounds such as flavonoids, saponins, and tannins. This extract can then be formulated into various pharmaceutical preparations, such as capsules, tablets, or herbal drinks. While the potential benefits are promising, further research, especially clinical trials in humans, is still needed to comprehensively validate its effectiveness and safety. This will also help in developing optimal formulations and dosages for clinical applications. The use of cat's whiskers in both traditional and modern medicine continues to be developed, opening up opportunities for effective and safe herbal drug innovation.

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