EAS Journal of Pharmacy and Pharmacology
Abbreviated Key Title: EAS J Pharm Pharmacol
ISSN: 2663-0990 (Print) & ISSN: 2663-6719 (Online)
Published By East African Scholars Publisher, Kenya

Volume-5 | Issue-4 | Jul-Aug- 2023 | DOI: 10.36349/easjpp.2023.v05i04.002

OPEN ACCESS

Review Article

Phytochemical and Pharmacological Studies of *Rhaphidophora pinnata* (L.f.) Schott.: A Review

M. Rizky Firdaus[1], Ifora[1], Sri Oktavia[1*]

[1]Department of Pharmacology and Clinical Pharmacy, School of Pharmaceutical Science Padang (STIFARM Padang), West Sumatera, Indonesia, 25147

Article History
Received: 26.06.2023
Accepted: 30.07.2023
Published: 08.08.2023

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Background/ Objective:*** plants that function primarily to maintain individual health and improve the quality of life throughout the year. a traditional plant as traditional medicine is dragon tail leaves *(R. pinnata* (L.f.) Schott.*)*. Therefore, this review aims to share reports and provide a comprehensive explanation of the phytochemical and pharmacological activities of *(R. pinnata* (L.f.) Schott.). ***Methods:*** evaluation shared facts in the literature on phytochemical activity and pharmacological activity (*R. pinnata* (L.f.) Schott.) through 2012-2022. Three bibliographical databases were used to obtain the main report (Pubmed, Science Direct, and Google Scholar). The keywords in this search were "Pharmacology", "Phytochemicals", "(R. pinnata (L.f.) Schott.)" and "Bioactive compounds". ***Results:*** a total of 17 studies classified as this evaluation fulfilled the criteria, 8 included and 9 included pharmacological.*R. pinnata* (L.f.) Schott contains phenolics, alkaloids, flavonoids, tannins, triterpenoids/steroids, and saponins. A series of pharmacological studies have reported on the plant *R. pinnata* (L.f.) Schott has the effect of Anticancer, Anticancer breast, Antibacterial, Antimutagenic, burns, Analgesic, anti hyperuricemia, and antihyperglycemia. ***Conclusions:*** Recent interest in traditional medicine from plants *R. pinnata* (L.f.) Schott exhibits potential activity against pharmacological effects associated with the presence of pure bioactive compounds.

Keywords: *Phytochemical, Pharmacology, Bioactive compounds*, dan *R. pinnata* (L.f.) Schott.

INTRODUCTION

Indonesia is a tropical country with quite high rainfall, so the land is overgrown with plants that can be used for traditional medicines, it's just that people's knowledge about plants and their properties is very lacking. Tropical forests which are rich in various types of plants are biological resources and at the same time a storehouse of chemical compounds in the form of chemical compounds resulting from primary metabolism which are also known as primary metabolites such as proteins, carbohydrates, and fats which are used by these plants themselves for their growth, as well as the acquisition of secondary metabolites as steroids, triterpenoids, flavonoids, and alkaloids.

Plants have a major function to maintain human health and improve the quality of individual life throughout the year (Elfahmi *et al.,* 2014; Mollik *et al.,* 2010). Many people in Indonesia use concoctions or herbs derived from medicinal plants. There are more than 1000 types of plants in the medicinal plant group, one of the traditional plants used in traditional medicine is dragon tail leaves. *(R. pinnata* (L.f.) Schott.).

This plant has a widespread habitat in southern Asia to Australia. The classification of the dragon's tail plant is as follows, namely: Division*: Spermatophyta*, Kingdom: *Plantae, Monocotyledoneae:* Class, Nation: *Arales*, Family: *Araceae*, Genus: *Rhaphidophora*, Species: *R. pinnata* (L.f.) Schott (Heyne, 1987; Lemmens and Bunyapraphatsara, 2003).

Dragon's tail leaves have been used to heal burns traditionally in Indonesian society (Rahman *et al.,* 2019). but there is no complete literature on the levels

***Corresponding Author:** Sri Oktavia
Department of Pharmacology and Clinical Pharmacy, School of Pharmaceutical Science Padang (STIFARM Padang), West Sumatera, Indonesia, 25147

of phytochemicals as well as pharmacological effects of the leaves *R. pinnata* (L.f.) Schott. it is important to increase knowledge about drugs that are sourced through pure ingredients that are useful for future drug discovery efforts. This elaboration aims to share reports and share a comprehensive discussion of the pharmacological effects of *R. pinnata* (L.f.) Schott leaves and their phytochemical properties.

METHODS

This review is based on searches from scientific literature database data, namely Google Scholar and Pubmed. This literature search was carried out to obtain literature facts about phytochemicals as well pharmacological activities of *R. pinnata* (L.f) Schott. In this study, an article search was conducted using online media with the keywords "Phytochemicals", "Phytochemicals", "Pharmacological", "Bioactive Compounds", "Pharmacology" and "*R.pinnata* (L.f.) Schott". Inclusion requirements include research articles and pure publications from 2012-2022 which can be accessed digitally, and articles using Indonesian and English. but the exclusion conditions include systematic assumptions, articles, brief communications, meta-analyses, editorials, newspapers, conflict information, and expert assumptions that are raised. All articles and abstracts are collected, checked, summarized, and conclusions drawn. Highly aligned articles are specified to be summarized in this evaluation guide.

RESULT AND DISCUSSION

Education literature on phytochemistry *R. pinnata* (L.f.) Schott. used as many as 17 literature of which there are 8 literature on phytochemistry *R. pinnata* (L.f.) Schott. and 9 literature regarding the pharmacological activity.

Phytochemical

Phytochemical activity in plants *R. pinnata* (L.f.) Sc*ott has been confirmed in several studies. A total of 8 studies have been carried out and the results of the assessment can be summarized in table 1 in the form.*

Phytochemical screening of *R. pinnata* leaves has been carried out in several studies. This screening aims to analyze plants and determine the content of secondary metabolites using color reagents. The secondary metabolite content of *R. pinnata* was determined using leaf samples. *R. Pinnata* leaves were extracted using water and ethanol solvents.

The phytochemical ingredients in the ethanolic extract of R. pinnata leaves include triterpenoids, steroids, alkaloids, flavonoids, saponins, and tannins (Masfria *et al*., 2013). Another study conducted a phytochemical screening test on R. Pinnata leaves extracted with water and showed similar results. The results of the phytochemical screening of R. pinnata water extract showed the presence of flavonoids, alkaloids, saponins, tannins, and glycosides. However, the powder of R. pinnata shows different results. The result showed the presence of flavonoids, saponins, tannins, alkaloids, glycosides, and steroids/triterpenoids (Masfria & Marianne, 2019). In the powder, leaves contain glycosides but were not found in the ethanol extract. In addition, the phenolic compound was also found in the phytochemical test in the ethanolic extract of R.pinnata by Hertian, 2021 and Lestari, 2021.

Table 1: *Summary on Bioactive Compounds of Rhaphidophora pinnata* (L.f.) Schott.

Compounds	Parts	Extract	References
Triterpenoids/steroids, alkaloids, flavonoids, tannins, saponins	Leaves	Ethanol	(Masfria *et al*., 2013)
Alkaloids, Flavonoids, Saponins, Tannins, Triterpenoids/Steroids	Leaves	Ethanol and Ethyl Acetate	(Masfria *et al*., 2017)
Alkaloids, Flavonoids, Saponins, Tannins, Glycoside, Triterpenoids, and Steroids	Leaves	Water and powder	(Masfria & Marianne, 2019)
Alkaloids, Flavonoids, Saponins, Tannins, Steroids	Leaves	Ethanol	(Oktavia *et al*., 2020)
Fenolik, alkaloids, flavonoids, tannins, saponins, steroids	Leaves	Ethanol	(Pascila *et al*., 2020)
Alkaloids, Flavonoids, Saponins, Tannins, Steroids, Phenols	Leaves	Ethanol	(Hertian *et al*., 2021)
Alkaloids, Flavonoids, Steroids, Tannins, Phenols, Saponins	Leaves	Ethanol	(Lestari *et al*., 2021)

Pharmacological Activities

Pharmacological activity in plants *R. pinnata* (L.f.) Schott. has been confirmed in other studies. A total of 9 studies were carried out and their results are summarized in table 2 in the form.

1. Anticancer

Study on the pharmacological activity of R. pinnata has been widely carried out. Several pharmacological activities that have been confirmed are anticancer, cytotoxic, antimutagenic, antibacterial, analgesic, burns, anti-hyperuricemia, anti-inflammatory, and antihyperglycemic. Cytotoxic study of R. pinnata (L.f.) Schott leaf activity on MCF-7 cells by MTT technique (3-(4,5-dimethylthiazole-2-yl)-2,5-

diphenyl tetrazolium bromide) on sample extracts of the chloroform fraction, ethanol, n-hexane fraction, ethyl acetate fraction and water. The IC_{50} values of ethanol extract results were IC_{50} value of 112.240 mcg/ml for the chloroform fraction, ethanol extract, 59.082 mcg/ml, and 812.663 mcg/ml for the ethyl acetate fraction. However, the fraction of n-hexane and water did not inhibit the growth of MCF-7 cells. (Masfria *et al.*, 2013).

Table 2: Activity pharmacological of *Rhaphidophora pinnata* (L.f.) Schott.

Pharmacological	Animal/Test Cell	Samples	References
Cytotoxic	Cell MCF-7	Chloroform, ethanolic, ethyl acetate, n-hexane, and water	(Masfria *et al.*, 2013)
Anti Cancer	Cell MCF-7	Indonesian	(Masfria *et al.*, 2014)
Antibacterial	Bakteri Streptococcus muttans, Pseudomonas aeruginosa, Salmonella typhi dan e	Indonesian	(Sumaiyah *et al.*, 2020)
Antimutagenic	Male rat	Indonesian	(Sumaiyah *et al*., 2020)
Analgesic	White rat	Indonesian	(Sumaiyah *et al*., 2018)
Burn	Rat	Indonesian	(Rahman & Kamri., 2019)
Antihyperuricemia	White male rat	Indonesian	(Pascila *et al*., 2020)
Anti-Inflammatory	Male rat	Indonesian	(Sumaiyah *et al*., 2020)
Antihyperglycemic	White male rat	Indonesian	(Lestari *et al*., 2021)

Masfria *et al*., 2014 continue the research using a sample of the chloroform fraction *R. pinnata* (L.f.) Schott. by grouping into 9 isolates using column chromatography separation. The fraction was tested for cytotoxicity using the MTT technique (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide) and monitoring apoptosis using reagent acridine orange-ethidium bromide against MCF-7 cancer cells. The IC50 value of 9 isolates (A-I) 190,550 µg/mL, 134,014 µg/mL, 204,474 µg/mL, 87,831 µg/mL, 96,016 µg/mL, 34,161 µg/mL, 9,621 µg/mL, 758,572 µg/m L, 245.446 µg/mL. Four isolates (D-G) had IC_{50} values $\leq$ 100 µg/mL which has good activity against breast cancer. The characteristic results from FTIR indicate the presence of O-H groups; C=O; C-O and C=C which indicate activity as anticancer.

Research on anticancer activity was developed (Masfria et al, 2017) the micronucleus method in rat bone cells by giving doses of 500, 750, and 1000 mg/kg/day by oral administration. Obtained ethanol extract *R. pinnata* (L.f.) Schott significantly reduced micronucleus formation in mouse bone cells than cyclophosphamide groups. Leaf ethanol extract *R. pinnata* (L.f.) Schott. has antimutagenic properties that can fight cyclophosphamide-induced gene mutations.

2. Antibacterial

The ethyl acetate extract and ethanol extract of the leaves *R. pinnata* (L.f.) Schott. as an antibacterial. The test was carried out using the agar diffusion method and its functional groups were determined using the FTIR method using *Streptococcus mutants, Pseudomonas aeruginosa, Salmonella typhi,* and *Shigella dysenteriae*. The results obtained were the antibacterial activity of the ethyl acetate extract *R. pinnata* (L.f.) Schott. The ethyl acetate extract showed positive results for the four bacteria with different concentrations. The ethanolic extract *R. pinnata* (L.f.) Schott. against a focus of 500 mg/mL with a barrier diameter of 14.15 mm showed positive activity on the bacterium *Pseudomonas aeruginosa*. Both are mixed with aromatic groups OH, C=O, and CO, and share antibacterial activity (Masfria., 2015).

3. Analgesic

Another study by Sumaiyah *et al*., 2019 tested leaf ethanol extract *R. pinnata* (L.f.) Schott. as an analgesic. Testing using the *hot plate* method with 25 rats, grouped into five groups. The initial set is the initial administration of 0.5% CMC-Na, the second set is divided into 200 mg/kg of acetylsalicylate so that it can be optimally managed. The third, fourth, and fifth sets were action sets for the levels of ethanol extract of *R. pinnata* (L.f.) Schott leaves. 50, 100, 200 mg/kgBW orally. Obtained through the ethanol extract of dragon tail leaves (*R. pinnata* (L.f.) Schott.) has analgesic activity with a statistically significant comparison when differentiated in the negative control ($p<0.05$). The result of this experiment hypothesized that the mechanism of *Rhaphidophora pinnata* as an analgesic was mediated by the peripheral process (Sumaiyah *et al*., 2019).

4. Burn

R. pinnata has potential as an alternative treatment for burns. The results showed that ethanol extract has an epithelializing effect in mice. *R. pinnata* leaf ethanol extract doses of 100mg/KgBB and 125 mg/KgBB respectively have a significant effect on the epithelialization process of burn. The results show a decreasing diameter of the wound that occurred is thought to occur due to the mechanism response against cell damage (Rahman & Kamri., 2019).

5. Antihyperuricemia

Pacilla *et al*., 2020 tested the anti-hyperuricemia activity of ethanol extract from dragon tail leaves using 35 adult male white mice. Measurement of uric acid levels using the POCT

method with dripping blood from a vein mice tail lateral 0.1-0.3 cm long on the test strip and blood will be direct seeps to the end of the strip within 20 seconds. Obtained the results of ethanol extract of dragon tail leaves(*R. pinnata* (L.f.) Schott.) had activity as anti hyperuricemia which was statistically significantly different when compared to the negative control ($p<0.05$). The best dose treatment for anti-hyperuricemia was the treatment of 2 doses of 250 mg/kgBW with the highest percentage reduction value of 45.22%, followed by treatment of 3 doses of 375 mg/kgBW of 44.66% and treatment of 1 dose of 125 mg/kgBW of 39. 60%, which has no significant difference ($p>0.05$).

Ingredients that have antihyperuricemia activity are alkaloids and triterpenoids where these compounds can inhibit xanthine oxidase, inhibit uric acid synthesis, and are also anti-inflammatory. One type of alkaloid compound that can reduce uric acid levels is colchicine. Apart from alkaloids and triterpenoids, compounds that have activity in reducing blood uric acid levels by working to inhibit the xanthine oxidase enzyme which converts purines into uric acid so that it can reduce uric acid production are flavonoid compounds (Pascila *et al*., 2020).

6. Anti-inflammatory

Anti-inflammatory activity of *R. pinnata* (L.f.) Schott leaf extract was carried out by paw edema method, induced by carrageenan. Paw edema is a method used for search and development for assessing inflammatory responses until 6 h after carrageenan 0.2 mL of 1% induction. Leg thickness is measured using a plethysmometer before yeast injection and after 1 to 6 hours. Its assets include leaf extract of *R. pinnata* (L.f.) Schott. can make the legs swollen from 1 to 6 hours after injection. levels of 35 to 280 mg/kgBW each share several obstacles of 56.18%; 56.56%: 49.30% and 62.77%. The level that acts as an antidote to inflammation is 140 mg/kgBB (Sumaiyah *et al*., 2020).

7. Antihyperglycemic activity

Hyperglycemia is a condition where blood sugar levels increase beyond normal limits. Hyperglycemia condition was induced by sucrose. Acarbose is a comparator drug because it can inhibit the action of the α-glucosidase enzyme and inhibit pancreatic α-amylase, so that not all sucrose can be hydrolyzed into glucose and fructose which can result in decreased glucose absorption. The ethanolic extract of *R.pinnata* leaves has an effect as an antihyperglycemic agent on male white mice induced by sucrose statistically having a significant difference when compared to negative controls ($p <0.05$). The optimum dose of 375 mg/kg BW which reduced blood glucose levels in mice induced by sucrose was comparable to the acarbose as positive control (Lestari *et al*., 2021).

CONCLUSIONS

Plant *R. pinnata* (L.f.) Schott. medicine has an important role in society. *Plant R. pinnata* (L.f.) Schott. those containing phytochemicals can be used for individual life. his evaluation shared the main vision plants *R. pinnata* (L.f.) Schott. as anticancer, breast cancer, antibacterial, antimutagenic, analgesic, burns, anti-hyperuricemia, anti-inflammatory, anti-hyperglycemic.

Chemical content of *R. pinnata* (L.f.) Schott *has a large number of uses because it has natural phytochemical compounds that play a role, especially in plants in the form of leaves. Phytochemical elements that have been obtained include alkaloids, phenolics, tannins, flavonoids, steroids, triterpenoids, and saponins.*

ACKNOWLEDGMENTS

The reviewers thanked all relatives in the Department of Pharmacology and Clinical Pharmacy, Padang College of Pharmacy (STIFARM Padang).

REFERENCES

- Elfahmi, Woerdenbag, H. J., & Kayser, O. (2014). Jamu: *Indonesian traditional herbal medicine towards rational phytopharmacological use*. *Journal of Herbal Medicine*, *4*(2), 51–73.
- Hertian, R., Muhaimin., & Sani, F. (2021). Uji Efektivitas Ekstrak Daun Ekor Naga (Rhaphidohora pinnata (L.f) Schott) terhadap penyembuhan luka sayatan pada mencit putih jantan, 1(1), 11-20.
- Heyne, K. (1987). Tumbuhan Berguna Indonesia. Jilid I. Cetakan I. Penerjemah : Badan Litbang Kehutanan. Penerbit Yayasan Sarana Wanajaya. Jakarta. 493-494
- Lenny, S. (2006). Senyawa Terpenoida dan Steroida, Departemen Kimia.
- FMIPA. Universitas Sumatera Utara.
- Lemmens, R. H. M. J., & Bunyapraphatsara, N. (2003). Plant Resources of South-East Asia No 12(3): Medicinal and Poisonous Plants 3. *Journal of Ethnopharmacology*, *87*(1),119-119.
- Lestari,D., Intan, L., & Fathnur, K. S. (2021). Uji efektivitas ekstrak etanol daun ekor naga (Rhaphidophora pinnata (L.f) Schott) sebagai antihiperglikemia terhadap mencit putih jantan yang diinduksi sukrosa. *Jurnal Ilmiah Manuntung*, *7*(1), 100–110.
- Masfria., Harahap, U., Nasution, M. P., & Ilyas, S. (2013). The activity of *Rhaphidophora pinnata (L.f) Schott Leaf* on MCF-7 cell line, 3, 397-402.
- Masfria., Hap, U. H., Nasution, M. P., & Syafrudin. (2014). Cytotoxic activity, proliferation inhibitor and apoptosis induction of Rhaphidophora pinnata (L.f.) Schott chloroform Fraction to MCF-7 Cell line, 6(4),1327-1333

- Masfria. (2015). *Antibacterial activity of ethyl acetate and ethanol extract of Rhaphidophora pinnata (L.f) Schott Leaf against four types of Bacteria*, 8(6), 905-914.
- Masfria., Sumaiyah., & Aminah, D. (2017). *Antimutagenic Activity of Ethanol Extract of Rhaphidophora pinnata (L.f) Schott Leaves on Mice*, 5–8.
- Masfria, M., & Marianne, M. (2019). *Organic and Inorganic Analysis of Rhaphidophora pinnata (l . f .) Schott Water Extract*, *7*(22), 3790–3793.
- Mollik, M. A. H., Hossan, M. S. H., Paul, A. K., Taufiq-Ur-Rahman, M., Jahan, R., & Rahmatullah, M. (2010). *A comparative analysis of medicinal plants used by folk medicinal healers in three districts of Bangladesh and inquiry as to the mode of selection of medicinal plants*. *Ethnobotany Research and Applications*, *8*, 195–218.
- Oktavia, S., Ifora., & Aprianto. (2020). Uji efek antifertilitas ekstrak etanol daun ekor naga (*Epipremium pinnatum* (L.) Engl.) pada mencit betina. Jurnal Farmasi Higea, 12 (1).
- Pascila, B., Asra, R., & Samudra, A. G. (2020). Uji Aktivitas Ekstrak Etanol Daun Ekor Naga (Rhaphidophora pinnata (L.f.) Schott.) Sebagai Antihiperurisemia Terhadap Mencit Putih Jantan, 6(2), 299–305.
- Rahman, S., & Kamri, A.M., (2019). Uji Efek Epitelisasi Ekstrak daun ekor naga (*Rhaphidophora pinnata (L.f)* pada tikus, 11(1), 75-81
- Sumaiyah., Masfria., & Dalimunthe, A. (2019). *Analgesic Activity of Ethanol Extract of Rhaphidophora pinnata L.f Schott Leaves in Mice Induced by Acetic Acid*. *Bromo 2018*, 224–226.
- Sumaiyah, S., Masfria, M., & Dalimunthe, A. (2020). Anti-Inflamatory Activity of *Rhaphidophora pinnata* (L.F) Schott Leaf Extract, 8(A), 487-490.

Cite This Article: M. Rizky Firdaus, Ifora, Sri Oktavia (2023). Phytochemical and Pharmacological Studies of *Rhaphidophora pinnata* (L.f.) Schott.: A Review. *EAS J Pharm Pharmacol*, *5*(4), 93-97.