PROCEEDING UNICOPPS

UNJAYA International Conference on Pharmacy and Pharmaceutical Science

Vol. 1, November, 2025, page 61-69

Article Review: Potential of Javanese Chili (*Piper Retrofractum*) as an Aphrodisiac

Nazhipah Isnani[1], Samsul Hadi [2], Putri Helena Junjung Buih[3*], Anna Khumaira Sari [4]

[1,2] *Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat*

[3,4] *Apothecary Education Program, Faculty of Mathematics and Natural Sciences, Universitas Lambung Mangkurat,, South Kalimantan, Indonesia*

* *Corresponding author*. Email: putri.helena@ulm.ac.id

ABSTRACT

Background: Javanese chili (*Piper retrofractum* Vahl) is a plant that is widely found in Southeast Asia and is empirically used to treat various diseases. The phytochemical content of Javanese chilies is one of the factors responsible for the pharmacological activity of Javanese chilies, where the herbal properties of Javanese chilies can help both preclinically and clinically.

Objective: This research aims to determine the pharmacological activity of Javanese chili plants.

Research Methods: This research uses the literature study method. The objects used in this research were taken from research results in National and International Journals. Articles taken from Google Scholar with the keywords Aphrodisiac *Piper retrofractum*. There are 11 articles from Science Direct and 64 from Google Scholar. The selection results obtained 5 articles that met the exclusion and inclusion criteria.

Results: Javanese long pepper (Piper retrofractum Vahl) has potential as an aphrodisiac. The active compound piperine contained in Javanese long pepper is thought to play an important role in increasing libido and treating erectile dysfunction.

Conclusion: This research concludes that research related to Javanese chilies as an aphrodisiac is still very limited. Based on the results of a literature review, showed that giving Javanese chili extract has properties as an aphrodisiac with its piperine content.

Keywords*: Pharmacological ; Javanese chili ; piperine; Aphrodisiac*

INTRODUCTION

Javanese long pepper (Piper retrofractum Vahl) is a plant that is widely found in Southeast Asia. Javanese long pepper is used as a mixture of ingredients in traditional Southeast Asian medicines. The parts of the plant that are often used are the immature fruit and the ripe fruit, utilized as a spice and medicine (Lim, 2012). An essential compound in Javanese long pepper is piperine, an alkaloid compound with important uses for health/herbs. This alkaloid is used as an alternative in medicine for various disorders, which has a pharmacological impact on the nervous and neuromuscular systems, pain relief, and helps in digestion (Andrade, *et al.*, 2017). Other sources mention that Javanese long pepper is helpful as an Aphrodisiac (Rahardjo, 2010; Muslichah, 2011; Wahjoedi *et al.*, 2004). Nanoparticles, including piperine, are believed to possess pharmacological properties as aphrodisiacs. The investigation revealed active components found in Javanese long pepper, especially piperine, which exhibits aphrodisiac properties, as confirmed by the study's findings (Muslichah, 2011; Usia, 2012; Evacuasiany & Puradisastra, 2011; Himayani, 2012; Moeloek, *et al.*, 2010; Mutiara *et al.*, 2010; Rahmawati & I, 2011).

RESEARCH METHODS

This research uses a narrative review literature study method using secondary data obtained from various scientific publications (National and International Journals), which can be accessed via search engines with the keywords Aphrodisiac; *Piper retrofractum*. There are 11 articles from Science Direct and 64 from Google Scholar. Next, selection is carried out based on exclusion and inclusion criteria. Inclusion criteria include original articles and review articles published in the period 2019 – 2024, and research data was obtained using the correct method as seen from the research methods sub-chapter. Exclusion criteria include publications published outside the 2019 – 2024 range, incomplete article components, and incomplete research data. The selection results obtained from 4 articles that met the exclusion and inclusion criteria were presented in table form and discussed in narrative form.

RESULTS AND DISCUSSION

Erectile dysfunction is experienced by 40% of men over the age of 40 years with various levels of complexity. Erectile dysfunction in men causes a decrease in quality of life resulting

from a decrease in the level of confidence in having sexual relations (Vlachopolulos et al., 2013). Erectile dysfunction is caused by a decrease in aphrodisiac activity. Aphrodisiacs are described as substances that can increase sexual desire, which work by inhibiting the phosphodiesterase (PDE) enzyme and have a role in increasing cAMP and cGMP hydrolases (Hadi et al., 2020). Javanese chili fruit is reported to contain the compounds piperine, methyl piperate, N-isobutyl-2E,4E,14Z-eicosa trienamide (Salleh et al., 2020). Piperine has activity as an inhibitor of phosphodiesterase type 5 (PDE5) with binding energy values and inhibition constants of -8.62 kcal/mol and 0.485 uM. The piperine compound in Javanese chilies reached 41.71% of all compounds that were successfully extracted using 96% ethanol solvent (Junairiah et al., 2020). Piperine is a compound that can improve mood and has a vasodilator effect so that it can increase libido (Fajar et al, 2011). The piperine compound plays a non-hormonal role in improving sexual behavior by increasing blood flow to the male reproductive organs and the antidepressant properties of piperine can reduce anxiety and stress thereby reducing the factors that cause sexual dysfunction (Muslichah, 2011). Data from research on the effects of Javanese chilies as an aphrodisiac are presented in Table 1.

Table 1. Aphrodisiac Effects of Javanese Chili

Author, Years	Tittle	Results
Antonius Budiawan, 2020	Efek Afrodisiaka dari Perbedaan Waktu Pemberian Sediaan Infusa Campuran Akar Purwoceng (*Pimpinella pruatjan* Molkenb.), Rimpang Jahe Merah (*Zingiber officinale* Rosc.), dan Buah Cabe Jawa (*Piper retrofractum* Vahl.) terhadap Tikus Putih Jantan	Twenty-five male white Wistar rats were divided into 5 groups and given infusion preparations for 5 days. The results of the study showed that an infusion of a mixture of purwoceng (Pimpinella pruatjan Molkenb.), red ginger rhizome (Zingiber officinale Rosc.), and Javanese chili (Piper retrofractum Vahl.) had an aphrodisiac effect. Giving one dose (2.4 grams) in the afternoon of the infusion showed the highest aphrodisiac effect. The duration of the infusion that showed

		the highest aphrodisiac effect was the fourth day.
Taufikurrahman, Retno Widyowati, dan Sukardiman, 2024	Senyawa Metabolit Sekunder dan Aktifitas Afrodisiak Ekstrak Etanol Cabe Jawa (*Piper retrofractum* Vahl) secara In Silico	The results of in silico tests using molecular docking techniques showed piperine has activity as an inhibitor of phosphodiesterase type 5 (PDE5) with binding energy values and inhibition constants of -8.62 kcal/mol and 0.485 uM, which is the best activity of the ten secondary metabolites contained in Javanese chilies, the aphrodisiac activity of the piperine compound is still lower than that of the sildenafil compound. To obtain more effective aphrodisiac activity, a combination of test compound ligands and testing of other PDE5 inhibitor proteins is needed.
Fahrauk Faramayuda, Jaka Permana, Akhirul Kahfi Syam, Elfahmi, 2021	Identification of Secondary Metabolites From Callus *Piper Retrofractum* Vahl	TLC methods using the mobile phase ethyl acetate: n-hexane (7: 3) showed a terpenoid compound indicated by purple spots on the visual appearance after spraying 10% spotting vanillin. Identification using infrared spectrophotometry shows functional groups -CH, C = O, C = C, -CH2, and CH3, characteristic of terpenoid compounds. Based on data and spectrophotometry, callus *Piper retrofractum* is thought to contain terpenoid compounds.

Askur Rahman, Sumardi Hadi Sumarlan, Sukardi, Dodyk Pranowo, 2024	Optimization of Javanese Long Pepper (*Piper retrofractum* Vahl) extract nanoparticles as an aphrodisiac preparation	Potential to enhance bioavailability and absorption piperine compounds in Long Pepper extract nanoparticle as an aphrodisiac with chitosan:STTP (3,241 :1), stirring speed of 826,133 rpm, optimal particle size of 33,884 nm, an optimal Polydispersity Index (PDI) of 0.675, and an optimal piperine content of 26,936%.

Antonius (2020) researched the aphrodisiac properties of a mixed infusion of purwoceng (*Pimpinella pruatjan* Molkenb.), red ginger (Zingiber officinale Rosc.), and Javanese chili (*Piper retrofractum* Vahl.) to determine the highest aphrodisiac effect during testing. A total of twenty-five male white Wistar rats were grouped into five groups, each consisting of five rats. Group I: positive control (PASAKBUWONOCENG®), group II: negative control (water), group III: dosing once (2.4 grams) in the morning, group IV: dosing once (2.4 grams) in the afternoon, and group V: administering half the dose (1.2 grams) in the morning and half the dose (1.2 grams) in the afternoon. The research was conducted for seven days. The infusion preparation was given every day for five days, starting on the second day of the study. The frequency of mice climbing was observed and recorded on days 0, 2, 4, and 6. The results of the study showed that an infusion of a mixture of purwoceng (*Pimpinella pruatjan* Molkenb.), red ginger rhizome (Zingiber officinale Rosc.), and Javanese chili (*Piper retrofractum* Vahl.) had an aphrodisiac effect. Giving one dose (2.4 grams) in the afternoon of the infusion showed the highest aphrodisiac effect. The length of the day of infusion that showed the highest aphrodisiac effect was the fourth day. The duration of the infusion that showed the highest aphrodisiac effect was the fourth day. Oral administration of Javanese chili extract also made a significant difference in the number of spermatozoa in male mice (Rahmawati & Bachri, 2012). An infusion of Javanese chilies, gotu kola and ginger has an aphrodisiac effect on the libido of male *Spregue Dawley* rats. Giving low doses of Javanese chili extract, namely 50, 100 and 200 mg/kgbb, can significantly increase the libido of male mice (Santoso & Suharno, 2023)

In Taufikurrahman *et al* (2024) research, Javanese chili extract was made using the maceration method using 96% ethanol solvent, then concentrated using a rotary evaporator. The yield obtained was 5.34% with a thick and oily colored extract. Testing for phytochemical compounds in Javanese chilies was detected using liquid chromatography coupled with tandem mass spectrophotometry (LC-MS). From the results of in silico tests, it was known that piperine had activity as a phosphodiesterase type 5 (PDE5) inhibitor with binding energy and inhibition constant values of -8.62 kcal/mol and 0.485 uM.

The piperine compound is shown at the peak with a retention time (Rt) at 10.56. Other compounds found in the extract were salsolinol (Rt 1.717); Quercetin (Rt 4,705); Caffeoyl putrescin (Rt. 5,718); Diferuloyl putrescine (Rt 6.421); Feruloyl tyramine (Rt 7.827); Hydroxychloroquine (Rt 8,086); Tetrahydropapaveroline (Rt 10,267); N-Oleyl-Leucine (Rt 13,451) and Capsaicin (Rt 15,778). The results of the in silico docking test for the compound with the highest docking score were piperine as a PDE5 inhibitor with a value of ΔG= -8.62 kcal/mol. However, the bond energy value is still higher than the positive control, namely sildenafil, with a value of -9.12 kcal/mol.

Phytochemical screening on the crude drug, ethanol extract, ethyl acetate and n-hexane of *Piper retrofractum* leaves identified polyphenol alkaloid compounds, flavonoids, tannins, quinones, saponins, monoterpene-sesquiterpenes steroid-triterpenoids. In the ethyl acetate and n-hexane extracts, there were no detected alkaloids, polyphenols, tannins, quinones, and saponins. The ethanol extract did not identify any tannin compounds (Fahrauk *et al.,* 2021) Aphrodisiacs which increasing sexual desire are mostly found in several groups of flavonoids, alkaloids, steroid saponins and tannins. Javanese chili (Piper retrofractum Vahl) is a traditional medicinal plant originating from Indonesia and has many pharmacological activities, one of which is often used as a base for aphrodisiac herbal medicine . This compound has a role in several indicators for testing aphrodisiac substances, starting from increasing libido, improving erectile dysfunction and increasing testosterone hormone levels (Zulkarnain et al., 2022). Flavonoids play a role in increasing dehydro-epiandrosterone levels which can increase testosterone hormone concentrations and increase sexual behavior in men (Wardani & Santoso, 2017).

The results of Askur *et al* (2023) study indicate that using a stirring speed of 826.133 rpm and chitosan:STTP ratio of 3.241:1 can generate nanoparticles with a particle size of 33.884 ± 2.300 nm, a Polydispersity Index (PDI) of 0.675 ± 0.068, and a piperine content of 26.936 ± 1.247%. Particle size is an essential element that affects the characteristics of nanoparticles

(Shafqat *et al.,* 2022). The size of nanoparticles is affected by the stirring speed (Ningsih *et al.*, 2017). Increasing the stirring speed will produce smaller particle sizes (Dangi & Shakya, 2013). It happens because the stirring speed increases the intensity of solvent molecules that come into contact with chitosan (Taurina *et al.,* 2017). The greater the stirring speed, the more particles will be split into nano-sized particles (Budastra *et al.,* 2022). The increase in particle size in Javanese long pepper extract nanoparticles is influenced by the chitosan : STTP ratio. Increasing chitosan concentration with the same amount of STPP causes an increase in particle size (Neves *et al.*, 2014).

CONCLUSION

Javanese long pepper (Piper retrofractum Vahl) has potential as an aphrodisiac. The active compound piperine contained in Javanese long pepper is thought to play an important role in increasing libido and treating erectile dysfunction.

The piperine content in Javanese chilies is known to have an aphrodisiac effect that works non-hormonally. Other compounds such as flavonoids, alkaloids, steroids, saponins, and tannins also play a role in providing an aphrodisiac effect by increasing the concentration of the testosterone hormone. Based on the results of the literature review, it was found that articles regarding Javanese chilies are still very limited.

ACKNOWLEDGEMENT

Department of Pharmacy, Faculty of Mathematics and Natural Science, Universitas Lambung Mangkurat for supporting the publication at the 1st UNICoPPS 2024.

BIBLIOGRAPHY

Andrade, K.S., G. Trivellin, and S. R. S. Ferreira. (2017). Piperine-rich extracts obtained by high-pressure methods, *J. Supercrit. Fluids*, (128), pp. 370 – 377.

Antonius, Budiawan. (2020). Efek Afrodisiaka dari Perbedaan Waktu Pemberian Sediaan Infusa Campuran Akar Purwoceng (*Pimpinella pruatjan* Molkenb.), Rimpang Jahe Merah (*Zingiber officinale* Rosc.), dan Buah Cabe Jawa (*Piper retrofractum* Vahl.) terhadap Tikus Putih Jantan. *Jurnal Ilmiah Widya Warta,* 2.

Askur Rahman, Sumardi Hadi Sumarlan, Sukardi, and Dosyk Pranowo. (2023). Optimization of Javanese Long Pepper (*Piper retrofractum* Vahl) extract nanoparticles as an aphrodisiac preparation. *Web of Conferences 1st TMIC,* 1-10.

Budastra, W.C.G., W. Hajrin, and D. G. Wirasisya. (2022). Pengaruh Kecepatan Pengadukan Terhadap Karakteristik Nanopartikel Sari Buah Juwet (Syzygium cumini L.), *Jurnal Kedokteran Unram*, 11(3), pp. 1000–1006.

Dangi, R.S. and S. Shakya, "Preparation, optimization and characterization of PLGA nanoparticle," Int. J. Pharm. Life Sci., vol. 4, no. 7, pp. 2810–2818.

Evacuasiany, E. and S. Puradisastra. (2011). Ekstrak Biji Pala (Myristica fragans Houtt) dan Cabe Jawa (Piper retrofractum Vahl) sebagai Afrodisiak pada Tikus dan Mencit, *Jurnal Kesehatan Masyarakat*, 10(2), pp. 158–166.

Fahrauk, Faramayuda, Jaka Perman, Akhirul Kahfi Syam, Elfahmi. (2021). F, 7(1), 197-214.

Fajar Prasetya, Onny Z. Fricillia, Zulhaerana Bahar, and Niken Indriyanti. (2024). Potential Indonesian Medicinal Plants on Aphrodisiac Activity. *Indonesian Journal of Pharmaceutical Science and Technology*, 6(1), 89-105.

Hadi KA, Samsul A, Khairunnisa, Komari N. (2020). Penambatan molekul kandungan Eurycoma longi folia Jack (pasak bumi) terhadap human phospho diesterase 5. *Pharmascience.* 7(2):36–47.

Himayani, R. (2012). Hubungan pemberian ekstrak cabe jawa (Piper retrofractum Vahl) terhadap jumlah spermatozoa mencit jantan dewasa. *Jurnal Kedokteran dan Kesehatan Universitas Lampung.* 2(2), pp. 73–76.

Junairiah, Amalia SE, Ni'matuzahroh, Nurhariyati T. (2020). Identification of phytochemical compounds in ethanol and n-hexane leaf extracts of Piper retro fractum Vahl. by gas chromatography mass spectrometry. *Moroccan J. Chem*, 8(S1), 32–37.

Lim, T.K. (2012). Edible Medicinal and Non-Medicinal Plants, Volume 4., vol. 10. New York: *Springer Science+Business Media B.V.*

Moeloek, N., S. W. Lestari, Yurnadi, and B. Wahyjoedi. (2010). Uji Klinik Ekstrak Cabe Jawa (Piperis retrofractum) sebagai Fitofarmaka Androgenik pada Pria Hipogonad, *Majalah Kedokteran Indonesia*, 60(6), pp. 255–262.

Muslichah, S. (2011). Potensi afrodisiak kandungan aktif buah cabe jawa (Piper retrofractum Vahl) pada tikus jantan galur wistar. J Agrotek, 5(2), 11–20.

Mutiara, U.G., Sutyarso, and S. Mustofa. (2013). Pengaruh Pemberian Ekstrak Cabe Jawa (Piper retrofractum Vahl) dan Zinc (Zn) Terhadap Jumlah Sel Germinal Testis Tikus Putih Jantan (rattus norvegicus). *Major (Medical Journal. Lampung University)*, 2(5), pp. 147–155.

Neves, A.L. de Pinho C. C. Milioli, L. Müller, H. G. Riella, N. C. Kuhnen, and H. K. Stulzer, "Factorial design as tools in chitosan nanoparticles development by ionic gelation technique," Colloids Surfaces A Physicochem. Eng. Asp., vol. 445, pp. 34–39,

Ningsih, N., S. Yasni, and S. Yuliani. (2017). Sintesis Nanopartikel Ekstrak Kulit Manggis Merah Dan Kajian Sifat Fungsional Produk Enkapsulasinya, *J. Teknologi dan Industri Pangan*, 28(1), pp. 27–35.

Rahardjo, M. (2010). Tanaman Obat Afrodisiak, *War. Penelitian dan Pengembangan Tanaman*, 16(2), pp. 1–35.

Rahmawati, N., & Bachri, M. S. (2012). The aphrodisiac effect and toxicity of a combination *Piper retrofractum* L, Centella asiatica, and Curcuma domestica infusion. *Health Science Journal of Indonesia*, 3(1), 19-22.

Rahmawati N. and I. M.S. (2011). Efek Afrodisiaka Ramuan Cabe Jawa (Piper Retrofractum L), Pegagan (Centella asiatica) dan Temu Lawak (Curcuma domestica) Terhadap Libido Tikus Jantan. *in Seminar Nasional: Reformasi Pertanian Terintegrasi Menuju Kedaulatan Pangan*, pp. 1–3.

Salleh WMNHW, Hashim NA, Fabarani NP, Ahmad F. Antibacterial activity of constituents from Piper retrofractum Vahl. And Piper arborescens Roxb. *Agric. Conspec. Sci*., 85(3), 269–280.

Santoso, H. dan Suharno, Z. (2023). Efek Aprodisiak Larutan Biji Pala (*Myristica fragrans* Houtt.) Mencit Sumber (Mus Belajar Terhadap Perilaku musculus) Biologi. *Bioedukasi,* 14(1):40-48.

Shafqat O., Z. Rehman, M. M. Shah, S. H. B. Ali, Z. Jabeen, and S. Rehman, "Synthesis, structural characterization and in vitro pharmacological properties of betanin-encapsulated chitosan nanoparticles, Chemical Biology Interact., 370, pp. 1–11.

Taufikurrahman, Retno Widyowati, and Sukardiman. (2024). Senyawa Metabolit Sekunder dan Aktivitas Afrodisiak Ekstrak Etanol Cabe Jawa (*Piper retrofractum* Vahl) secara In Silico. *MPI (Media Pharmaceutica Indonesiana*), 6(1), 30-35.

Taurina, W., R. Sari, U. C. Hafinur, S. Wahdaningsih, and I. Isnindar, "Optimization Of Stirring Speed And Stirring Time Toward Nanoparticle Size Of Chitosan-Siam Citrus Peel (Citrus nobilis L.var Microcarpa) 70% Ethanol Extract, *Traditional. Medicine Journal*, 22(1) , pp. 16–20

Usia, T. (2012). Mengenal Cabe Jawa: Tanaman Obat Untuk Stamina Pria, *InfoPOM - Badan Pengawas Obat dan Makanan RI*, 13(2), pp. 4–7.

Vlachopoulos C, Jackson G, Stefanadis C, Montorsi P. (2023). Erectile dysfunction in the cardiovascular patient. Eur. *Heart Journal*. 34(27), 2034–2046.

Wahjoedi, B., Pudjiastuti, Adjirni, B. Nuratmi, and Y. Astuti. (2004). Efek Androgenik Ekstrak Etanol Cabe Jawa (Piper retrofractum Vahl) pada Anak Ayam, *Jurnal Bahan Alam Indonesia*, 3(2), pp. 201–204.

Wardani, I. G. A. A. K., & Santoso, P. (2017). Efektivitas afrodisiaka dari ekstrak etanol jahe merah (Zingiber officinale Roscoe) pada tikus (Rattus norvegicus L.) putih jantan. Jurnal Ilmiah Medicamento, 3(1), 22- 28. https://doi.org/10.36733/medicamento.v3i1.1045.

Zulkarnain, St. Aisyah Sijid, Syarif Hidayat Amrullah & Rusmadi Rukmana. (2022). Keanekaragaman Tanaman Berpotensi Sebagai Afrodisiak Alami. *Teknosains: Media Informasi Sains dan Teknologi*, 16(2) : pp.255-260.