VOLUME 11 ISSUE 1 2025

ISSN 2454 – 3055

INTERNATIONAL JOURNAL OF ZOOLOGICAL INVESTIGATIONS

Forum for Biological and Environmental Sciences

Published by Saran Publications, India

International Journal of Zoological Investigations Vol. 11, No. 1, 115-118 (2025)

International Journal of Zoological Investigations

Contents available at Journals Home Page: www.ijzi.net

Editor-in-Chief: Prof. Ajai Kumar Srivastav

Published by: Saran Publications, Gorakhpur, India

ISSN: 2454-3055

Larvicidal Activity of *Psychotria octosulcata* Talbot Extract against Mosquitoes Larvae

Sangeetha M.[1]* and Mahendran C.[2]

[1]Department of Pharmaceutical Chemistry, PSG College of Pharmacy, Coimbatore, Tamil Nadu, India
[2]Deparment of Physics, Sri Ramakrishna Misson Vidyalaya College of Arts and Science, Coimbatore Tamil Nadu, India

**Corresponding Author*

Received: 23rd March, 2024; **Accepted:** 22nd October, 2024; **Published online:** 23rd January, 2025

https://doi.org/10.33745/ijzi.2025.v11i01.011

Abstract: The objective of the present study was to evaluate the larvicidal properties of the whole plant extract of *Psychotria octosulcata*. This plant has higher potential in controlling the larvae of mosquitoes. These larvae are the important ailments which is responsible for the spread of malaria, filariasis, dengue, yellow fever, chikungunya, Japanese encephalitis etc. The initial laboratory trial was conducted to estimate the effectiveness of ethanolic extracts of dried entire plants of *Psychotria octasulcata* (family Rubiaceae) at varied concentrations. Larvicidal bioassay experiments were performed on early third instar larvae of laboratory raised mosquitos in aseptic conditions, in accordance with WHO regulations (WHO, 2005), with minor modifications. Fifty Larvae of the early third instar of *Ae. aegypti* mosquito species (in 500 ml beakers) were exposed to 20, 40, 60, 80 and 100 ppm extracts of dried entire plants of *Psychotria octasulcata*. The findings clearly demonstrated the effectiveness of using plants to control insects as a substitute technique for reducing the harmful effects of pesticide/chemicals to the environment. As a result, the extract of *Psychotria octosulcata* is promoted as a more biodegradable and selective agent. The plant *Psychotria octosulcata* exhibits a realistic mortality outcome for filarial vector larvae, according to this study. This repels mosquitoes while being safe for both individuals and communities.

Keywords: *Psychotria octosulcata*, Mosquito larvae, Larvicidal activity, Biodegradable, Vectors

Citation: Sangeetha M. and Mahendran C.: Larvicidal activity of *Psychotria octosulcata* Talbot extract against mosquitoes larvae. Intern. J. Zool. Invest. 11(1): 115-118, 2025.

https://doi.org/10.33745/ijzi.2025.v11i01.011

Introduction

The presence of mosquitoes is regarded as the most significant component of arthropod diseases. They are known to transmit various diseases to humans and are a major cause of health problems in many countries. A bite from a mosquito can lead to a local skin reaction (Gupta *et al*., 2019). They may also spread dangerous infections and parasites to humans. Some of the most common diseases that are carried by mosquitoes include dengue, yellow fever, chikungunya, and filariasis.

However, there is a high likelihood that these diseases will be reintroduced in the future due to the development of resistance by the insects. Poor drainage, particularly during rainy seasons, fish ponds, irrigation canals, and rice fields all contribute to the prevalence of mosquitoes. This offers mosquitoes a better environment to breed (Bobbarala *et al.,* 2009; Vadnere *et al*., 2011). Research for a larvicidal substance derived from natural sources has aroused significant attention. The continued use of synthetic chemicals, household sprays, and pesticides for mosquito control builds up resistance in mosquito against these pesticides/chemicals (Vijayabhaskar *et al*., 2013). Development of physiologically active natural chemical components that act as larvicidal is essential to overcome risk to humans and harmful accumulated residues (Verma *et al*., 2010; Kumar *et al*., 2012). This has made it necessary to develop indigenous vector control methods that are cost-effective, environmentally safe, and biodegradable (Bhagat *et al*., 2010). The present study evaluated the larvicidal efficacy of whole plant extract of *Psychotria octosulcata* against 3rd instar larvae of *Ae. aegypti.* The findings of the current study will help further research into the creation of novel mosquito-controlling chemicals based on bioactive components of local plant sources.

Materials and Methods

Collection and Authentication of the Plant

The healthy plants of *Psychotria octosulcata* Talbot they had been collected from the Kolli Hills region of Western Ghats, Tamil Nadu, India. The plant was identified and authenticated by the Botanical survey of India, Tamil Nadu Agricultural University, Coimbatore 641003 (Plant Authenticate certificate No. BSI SRC/5/23/2021/Tech.-300).

Preparation of Extract

Psychotria octosulcata plant was thoroughly washed with double-distilled water and then whole plant parts were properly dried in shade for 2-3weeks. 20 g of the whole *Psychotria octosulcata* plant was sliced into little pieces. The coarsely chopped parts were then mixed with 100 ml of ethanol. After 24 h the extract was filtered using Whatman Filter Paper No. 1.

Mosquito rearing

Ae. aegypti mosquito were procured from National Institute of Communicable Disease Centre (Mettupalayam, India) and maintained at Research Laboratory **.** Mosquito larvae were grown in the laboratory (29±3°C, RH 75-85%) in plastic bowls with enough larval feeding (1:1) of yeast powder and dog biscuit. Additional conditions for mosquito larvae development were maintained in accordance with the WHO (2014) standard procedure. The WHO guideline advised using third instar larvae for the larvicidal bioassay.

Larvicidal bioassay

Larvicidal bioassay experiments were carried out on early third instar larvae of laboratory grown mosquitos in aseptic conditions according to WHO regulations (WHO, 2005), with minor modifications**.** Fifty *Aedes aegypti* mosquito larvae (in 500 ml beakers) were exposed to 20, 40, 60, 80, and 100 ppm of *Psychotria octosulcata* extract. Each test was replicated three times. Control mosquitoes were exposed to the solvent for 24 h. The larvae were not fed during the experiment, and all other growth parameters were maintained constant. The larval mortality was recorded for 24 h after exposure to *Psychotria octosulcata* extract. All nonresponsive mosquito larvae were deemed dead. Mortality per cent was calculated using the following formula:

Larval mortality (%)= (Number of dead larvae/ Number of test larvae) × 100

Statistical analysis

The Probit analysis calculated the lethal concentration (LC_{50} and LC_{90}), 95% confidence limits (CL) for the ethanolic extract of *Psychotria Octosulcata*. All the experimental data are expressed as mean ± SE (standard error) and were assessed using one-way ANOVA, followed by Tukey's multiple range tests. All investigations were achieved with SPSS 18.0 software.

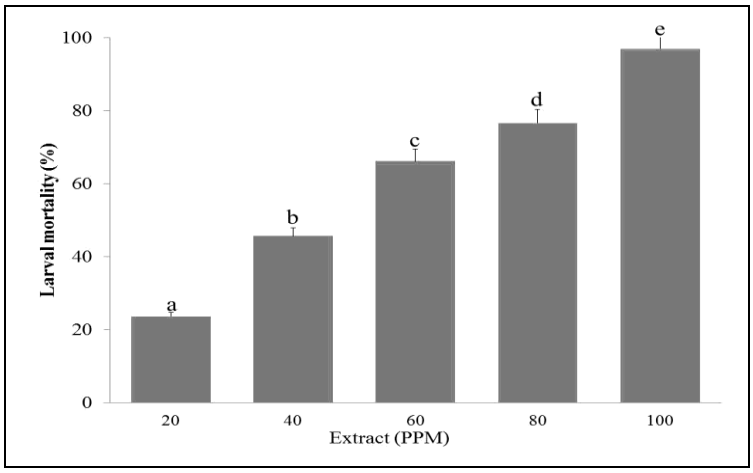

Fig. 1*:* Per cent larval mortality of *Ae. aegypti* against ethanolic extract of *Psychotria octosulcata*. Significant differences between treatments were indicated by different letters above each column (one-way ANOVA, Tukey's HSD test, P0.05).

Table 1**:** Larvicidal activity of the ethanolic extract of *Psychotria octosulcata* against *Ae. aegypti*

Target	**LC_{50} (LC_{90})**	**95% confidence limit LC_{50} (LC_{90})**		**Regression equation**	**$\chi 2$**
		LCL	**UCL**		
3rd instars	45.71(91.75)	40.64 (84.76)	50.23 (101.16)	X=+0.030 Y=−0.516	2.15 n.s.

LC_{50} is a lethal concentration that kills 50% of exposed organisms, whereas LC_{90} kills 90% of exposed organisms, LCL lower confidence limit, UCL upper confidence limit, $\chi 2$ chi-square test, n.s. not significant

Results and Discussion

After 24 h of treatment, the ethanolic extract of *Psychotria octosulcata* demonstrated larvicidal efficacy against *Aedes aegypti* 3rd instar larvae in a dose-dependent manner (Fig. 1). The larvicidal activity of ethanolic extract against *Aedes aegypti* 3rd instar larvae was reported to be significantly effective with LC_{50} and LC_{90} values. The LC_{50} and LC_{90} values for the ethanolic extract were 45.71 and 91.75 ppm, respectively (Table 1).

There is a widespread awareness of the need to employ natural, environmentally acceptable substances for larvicidal activity. Recent years have seen an increase in the risk of mosquito bites, and the annual mortality toll from diseases spread by mosquitoes has led to a loss of socioeconomic prosperity in many nations. Because of pesticide resistance in vectors and environmental imbalance, chemical mosquito control is now not safe. Chemical or synthetic insecticide application has negative long-term impacts, thus it does not produce precise results. Alternative mosquito control techniques are therefore required. This study found that the complete *Psychotria octosulcata* plant's ethanolic extracts had a dose-dependent effect on mosquito larvae, which is consistent with previous research**.** Therefore, the effects of the *Psychotria octosulcata* whole plant extract on the larvae may contribute to the mechanism of action. Other investigations also reported that the phytochemicals flavonoids, phenols, terpenoids, and saponins present in *Psychotria octosulcata* (Mariyammal and Kavimani, 2013). The aforementioned claim may therefore strengthen the possibility that the

flavonoids, phenols, glycosides, and tannins present in the whole plant of *Psychotria octosulcata* are also responsible for the plant's larvicidal effect. This study's findings provided evidence that *Psychotria octosulcata* whole plant extracts have larvicidal properties against mosquito larvae.

Conclusion

In summary, the findings of our investigation demonstrate that *Psychotria octosulcata* leaf extract was effective in suppressing mosquito larvae. Thus, *Psychotria octosulcata* has the potential to be a mosquito larvicide. More researches are needed to determine the plant extract's potential for widespread use in mosquito control and other insecticidal qualities.

Conflict of Interest

The authors declare no conflicts of interest.

References

Bhagat M and Saxena AK. (2010) Evaluation of *Cassia occidentalis* for *in vitro* cytotoxicity against human cancer cell lines and antibacterial activity. Indian J Pharmacol. 42: 234-237.

Bobbarala V, Katikala K, Naidu C and Penumajji S. (2009) Antifungal activity of selected plant extracts against phytopathogenic fungi *Aspergillus niger* F2723. Indian J Sci Technol. 4: 87-90.

Choochote W, Tuetun B, Kanjanapothi D, Rattanachanpichai E, Chaithong U, Chaiwong P, Jitpakdi A, Tippawangkosol P, Riyong D and Pitasawat B. (2004) Potential of crude seed extract of celery, *Apium graveolens* L., against the mosquito *Aedes aegypti* (L.) (Diptera: Culicidae). J Vector Ecol. 29(2): 340-346.

Das NG, Goswami D and Rabha B. (2007) Preliminary evaluation of mosquito larvicidal efficacy of plant extracts. J Vector Borne Dis. 44(2): 145-148.

Govindarajan M, Jebanesan A and Reetha D. (2005) Larvicidal effect of extracellular secondary metabolites of different fungi against the mosquito, *Culex quinquefasciatus* Say. Trop Biomed. 22(1): 1-3.

Gupta J, Gupta R, Kalra V and Wahi N. (2019) Application of medicinal plants in management of endogenous bioactive molecules as potential biomarkers for cardiovascular disease and disorders. Curr Trends Biotechnol Pharm. 33: 350-365.

Hadjiakhoondi A, Vatandoost H, Khanavi M, Abaee MR and Karamia M. (2005) Biochemical investigation of different extracts and larvicidal activity of *Tagetes minuta* L. on *Anopheles stephensi* larvae. Iran J Pharm Res. 1(1): 81-84.

Komalamisra N, Trongtokit Y, Rongsriyam Y and Apiwathnasorn C. (2005) Screening for larvicidal activity in some Thai plants against four mosquito vector species. Southeast Asian J Trop Med Public Health 36(6): 1412-1422.

Kumar D, Dhamodaran P, Nilani P and Balakrishna N. (2012) Larvicidal activity of *Tephrosia purpuria* against of against *Culex quinquefasciatus*. J Appl Pharm Sci. 2: 219 -221.

Maje IM, Anuka JA and Hussaini IM. (2007) Evaluation of the anti-malarial activity of the ethanolic leaves extract of*Paullinia pinnata* (Linn.) (Sapindaceae). Nigerian J Pharm Sci. 6(2): 67-72.

Mariyammal R and Kavimani S. (2013) Anti-inflammatory activity of methanol extract of the whole plant of *Psychotria octosulcata* W. A. Talbot. Int J Pharma Res Rev. 2(11): 1-5

Nikkon F, Habib MR, Saud ZA and Karim MR. (2011) *Tagetes erecta* Linn. and its mosquitocidal potency against *Culex quinquefasciatus*. Asian Pac J Trop Biomed. 3(1): 186-188.

Prabakar K and Jebanesan A. (2004) Larvicidal efficacy of some Cucurbitacious plant leaf extracts against *Culex quinquefasciatus* (Say). Bioresour Technol. 95(1):113-114.

Singh RK, Dhiman RC and Mittal PK. (2006) Mosquito larvicidal properties of *Momordica charantia* Linn (Family:Cucurbitaceae). J Vector Borne Dis. 43(2): 88-91.

Singha S, Banerjee S and Chandra G. (2011) Synergistic effect of *Croton caudatus* (fruits) and *Tiliacora acuminata* (flowers) extracts against filarial vector *Culex quinquefasciatus.* Asian Pac J Trop Biomed. 1(2): S159-S164.

Vadnere GP, Patil AV, Jain SK and Wagh SS. (2011) Investigation on in-vitro antioxidant activity of whole plant of *Cassia occidentalis* Linn. (Caesalpiniaceae). Int J Pharm Tech Res. 3(4): 1985-1991.

Verma L, Khatri A, Kaushik B, Patil UK and Pawar RS. (2010) Antidiabetic activity of *Cassia occidentalis* (Linn.) in normal and alloxan-induced diabetic rats. Indian J Pharmacol. 42(4): 224-228.

Vijayabhaskar K, Chaitanyaprasad K, Srisailam K, Arunadevi NM, Swathi S and Subhashini P. (2013) Analgesic and anti-inflammatory activities of the extract of *Cassia occidentalis* (Linn.) animal model. Int J Res Pharm. 3(4): 759-762.