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ORIGINAL ARTICLE **OPEN ACCESS**

Larvicidal Activity of *Sesamum prostratum Retz.* Aerial Parts Extracts against *Aedes aegypti*

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ABSTRACT

Numerous diseases, including schistosomiasis, dengue fever, yellow fever, filariasis, and Japanese encephalitis are mostly spread by mosquitoes (JE). Malaria is one of the main causes of direct or indirect newborn, child, and adult mortality in India, with two to three million new cases arising each year. There are many synthetic pesticides on the market for controlling mosquitoes, including pyrethroids, carbamates, and organophosphates. However, the majority of them are contaminants that harm non-target species as well as the environment. In addition to using synthetic pesticides, biological pest management strategies such as the use of fungal diseases, predators, traps, and plant-based remedies are also employed. A choice among biological mosquito control methods is the use of plant-based pesticides because of its affordability, accessibility, and environmental friendliness. Plants can serve as substitute sources of mosquito preventative measures. The current work investigated at extracts from Sesamum prostratum aerial parts' preliminary phytochemical screening and larvicidal activity. The larvicidal potential of Sesamum prostratum aerial parts (leaves, stem, and flower) hydroalcoholic and aqueous extracts was evaluated against the third and fourth instar larvae at concentrations of 100, 250, 500, 750, and 1000 g/ml (Aedesaegypti). The percentage mortality was recorded after five hours of larvicidal potential assessment at various intervals. It was shown that both extracts exhibited potent larvicidal properties. Extracts from the aerial parts of Sesamum prostratum Retz. are a good candidate for crude drugs with larvicidal activities.

Keywords: *Sesamum prostratum, Aedesaegypti, larvicidal, instar, mortality, hydroalcoholic & Aqueous extracts.*

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INTRODUCTION

Malaria, filariasis, dengue, chikungunya, zika, and other parasite- and pathogen-borne diseases that have affected people worldwide, particularly those living in tropical areas are spread by mosquitoes [1]. *Aedes aegypti* (Diptera: Culicidae) is a vector for various viruses that pose serious health risks worldwide, including dengue, chikungunya, zika, and yellow fever [2-6]. 2020 million people, or 36% of the world's population, suffer from malaria in 107 tropical and subtropical nations and territories. 1.2 billion people(85,7%) in the South East Asian region are at risk for malaria, the majority of whom live in India [7]. These viral illnesses are economically significant, yet there are no effective treatments or prevention measures available. Programs aimed at eradicating these illnesses have targeted their vectors [8]. The only treatments for malaria are drug prophylaxis and vector control, however there is no medication for dengue, therefore prevention through vector control measures remains the only choice. It significantly lowers the prevalence of filariasis, dengue, zika virus, and malaria [9]. Because mosquito embryonic and larval stages are common in restricted spaces (small pools and puddles), researchers exploring for mosquito-control drugs have focused on them [10-12]. Many mosquito larvae control programs use synthetic larvicides like organophosphates (such temephos, fenthion, and others) and insect growth

regulators (e.g. diflubenzuron, methoprene, etc.). The negative effects on people and the environment of employing artificial insecticides to control the vector population. Therefore, it is crucial for the welfare of public health to develop environmentally friendly control tools [13–15].

In this case, natural insecticides made from plants can provide mosquito control that is both efficient and safe for the environment. According to reports, green insecticides are affordable, biodegradable, and harmless to pests other than the ones they are intended to kill [16]. Plant extracts and essential oils have been shown to have effective mosquito larvicidal action, making them a more sustainable, inexpensive, and environmentally friendly alternative to synthetic pesticides [17]. The appearance, physiology, metabolic processes, and behavior of many mosquito life stages are altered by a variety of chemicals obtained from plant extracts, demonstrating their importance in controlling the mosquito population [18–21]. Natural remedies made from plants, animals, and minerals are one of nature's gifts to humans and can help treat a variety of ailments [22]. Plants have always been the foundation of traditional medicine, and they have been helping people for thousands of years [23]. According to the WFO plant list, the pedaliacae (pedalium family or sesame family) is a family of flowering plants with 204 species and around 25 genera that are native to tropical and southern Africa, South East Asia, and tropical Australia [24]. Most of the plants in this family are herbs that live for one year or more, and shrubs are rare. It was said that this family had medicinal properties, such as antimicrobial, antioxidant, anticancer, demulcent, emollient, and laxative etc. [25]. Sesamum is a member of pedaliaceae family. This genus of plants is used to treat a wide range of illness. In this respect, the current study was carried out to assess the larvicidal efficacy of Sesamumprosratum aerial part extracts against Aedesaegypti larval stages in the early third and fourth instars.

MATERIAL AND METHODS

PLANT MATERIAL COLLECTION

Sesamum prostratum Retz. plants were collected in the Tamil Nadu region of Edappadi and authenticated by Dr. S.S.Hameed, Scientist "E" & Office in Charge, Southern Regional Center of the Botanical Survey of India, Coimbatore.

PREPARATION OF EXTRACT

Sesamum prostratum stems, flowers, and leaves were gathered, cleaned, and mechanically grinded. To prepare the crude extracts, maceration is used. Plant materials were coarsely powdered and soaked in hydroalcoholic (ethanol:water (50:50)) and aqueous extraction solvents for seven days, agitated regularly and then filtered. After drying in a hot air oven, the extracts are placed in appropriately labeled vials and stored in the refrigerator. When the dry extract was weighed, the hydroalcoholic and aqueous extracts yielded 17.865 (w/w) and 29.21% (w/w), respectively.

PHYTOCHEMICAL SCREENING

The phytochemical composition of *Sesamum prostratum* aerial parts hydroalcoholic and aqueous extracts was tested to evaluate their qualitative chemical components. As per Trease and Evans [26] and sofowora [27]'s descriptions of the protocol, procedure and reagents used, the components were screened.

LARVICIDAL ASSAY

In the larvicidal experiment, *Aedes aegypti* larvae in their third and fourth instars were utilized. Test concentrations of *Sesamum prostratum* aerial parts hydroalcoholic and aqueous extract of 100, 250, 500, 750, and 1000 g/ml were used to evaluate the study's effectiveness. A beaker of water was filled with one ml of various extract concentrations and the final volume was maintained at 250 ml with water. The study utilized 20 larvae per concentration. The number of dead larvae was counted and the % mortality was recorded at 0 hours, 1, 2, 3, 4, and 5 hours. Water alone was used to maintain a control group. The study was carried out in triplicate, and its average was calculated [28–30].

RESULTS AND DISCUSSION

PHYTOCHEMICAL SCREENING

Flavonoids, carbohydrates, steroids, and proteins were found in hydroalcoholic and aqueous plant extracts after preliminary phytochemical analysis (Table 1).

LARVICIDAL ACTIVITY:

Extracts of *Sesamum prostratum* aerial parts in hydroalcoholic and aqueous preparations were tested for their ability to kill third and fourth instar *Aedes aegypti* larvae at concentration of 100, 250, 500, 750, and 1000 g/ml. The study was conducted for five hours, and several intervals were employed to figure out the mortality rate. Both extracts clearly exhibit good larvicidal properties, according to the evaluation. The study's findings are presented in Table 2.

Table 1: Phytochemical Constituents of Investigated Plant Extracts

S. No	Phytoconstituents	Hydroalcoholic extract	Aqueous extract
01	Alkaloids	-	+
02	Glycosides	+	+
03	Flavonoids	+	+
04	Tannins	+	+
05	Steroids	+	+
06	Carbohydrates	+	+
07	Proteins and Amino acids	+	+
08	Fats and fixed oils	-	+
09	Vitamin C	-	-

'+';Present, '-'; Absent

Table 2: Evaluation of the larvicidal potential of hydroalcoholic and aqueous extracts of *Sesamum prostratum* Retz.

Treatment	Concentration (µg/Ml)	Percentage Mortality				
		0hr	1st hr	2nd hr	3rd hr	5th hr
Control	-	0	0	0	0	0
Sesamum prostratum hydroalcoholic extract	100	0	9	10	12	13
	250	0	7	9	11	14
	500	0	8	10	12	13
	750	0	6	8	10	12
	1000	0	4	7	10	14
Sesamum prostratum aqueous extract	100	0	6	7	9	12
	250	0	8	9	10	14
	500	0	6	8	10	14
	750	0	10	10	13	15
	1000	0	10	12	14	16

*The experiment was carried out three times & average value taken.

CONCLUSION

The larvicidal efficacy of *Sesamum prostratum* aerial parts hydroalcoholic and aqueous extracts against third- and fourth-instar *Aedes aegypti* larvae at concentrations of 100, 250, 500, 750, and 1000 g/ml was investigated in the current study. The study's results indicated that both *Sesamum prostratum* extracts have strong larvicidal properties. Further, isolation and characterization of active phytoconstituents from the *Sesamum prostratum* may leads to novel drug of choice against various mosquitoes borne diseases.

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