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Antimalarial Activity of *Psidium guajava* Leaf Extracts

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ABSTRACT

Malaria is a major global public health problem, and the alarming spread of drug resistance and limited number of effective drugs now available underline how important it is to discover new antimalarial compounds. In the present study, Psidium guajava extracts tested for their antimalarial activity. The search for new plant-derived drugs has gained renewed interest among researchers worldwide in the hunt for new drugs that have the potential to combat the threat of drug-resistant pathogenic microorganisms, antitumor and anticancer agents. By performing antimalarial activity it was found that methanolic extract has significant antimalarial activity.

Keywords: Psidium guajava, Malaria, Antimalarial activity.

I. INTRODUCTION

Malaria is the world's most important tropical disease. It is prevalent in about 100 countries and around 2,400 million people are at risk[1]. In South East Asia alone, 100 million malaria cases occur every year and 70% of these are reported from India[2]. The resistance has at the same time increasingly extended to other available antimalarial drugs[3-4]. Psidiumguajavais a small evergreen tree (Myrtaceae), commonly known as guava in English, an important food crop and medicinal plant native to South America, grown in tropical and subtropical lands and also found in India[5-7]. Microwave extraction has proved to be more effective and efficient than its conventional counterpart, the soxhlet extraction method. The Soxhlet extraction, which is a standard technique, is a continuous solvent extraction method. Extraction systems are used to conduct routine solvent extractions of soils, sediments, sludge, polymers and plastics, pulp and paper, biological tissues, textiles and food samples[8-13]. Experiments have proved that microwaves, in comparison with the soxhlet extraction, use a lesser volume of solvent and sample

and perform extraction at a much faster rate[14-27]. In the discovery of effective medicines for prevention and treatment, an outbreak of coronavirus disease (COVID-19) caused by the novel extreme acute respiratory syndrome coronavirus-2 (SARS-CoV-2) poses an unprecedented obstacle[28-46]. The proximity to the patient during dental care, high generation of aerosols, and the identification of SARS-CoV-2 in saliva have suggested the oral cavity as a potential reservoir for COVID-19 transmission. Soon, someday, you might be making your own drugs at home. That is because researchers have adapted a 3D printer from basic, readily available medicinal active agents fed into a drug delivery system[47-54].

II. METHODS AND MATERIAL

Plant Material

Psidium guajava has been collected from Karad, Maharashtra, India. Department of Botony, Yashwantrao Chavan College of Science, Karad has identified the plant and authenticated it.

Preparation of Psidium guajava Leaf Powder

Fresh guava leaves were collected and air dried for 10 days. The dried leaves were then crushed into a blender to form a coarse powder. The powder was collected in an air-tight jar, and stored away from sunlight in a cool and dry place.

Preparation of Plant Extract

Extraction of Psidium guajava was done by microwave assisted extraction further filtered and excess solvent present was evaporated and dried extract were collected and subjected for activity studies.

In-vitro Antimalarial assay

Psidium guajava extracts were screened for their antimalarial activity against the P. falciparum strain. The P. falciparum strain was cultivated by a modified method described by Trager and Jensen. The extracts were dissolved in DMSO. The final concentration of DMSO used was not toxic and did not interfere with the assay. The antiparasitic effect of the compounds was measured by growth inhibition percentage as described by Carvalho and Krettli. For experimental purposes, the cultures were synchronized with 5% D-sorbitol when the parasites were at the ring stage. The parasitic suspension, consisting of predominately the ring stage parasites, was adjusted to a 1–2% parasitaemia and 2.5% haematocrit in hypoxanthine-free RPMI-1640 culture medium with 10% human plasma and was exposed to 7 concentrations of each compound for a single cycle of parasite growth for 48 hrs at 37 °C.Positive controls containing the standard antimalarial drugschloroquine and quinine, in standard concentrations, wereused in each experiment. The stock solutions were additionallydiluted in whole medium (RPMI 1640 plus 10% human serum)to each of the used concentrations. The concentration thatinhibited 50% of the parasite growth (IC_{50} value) was determined by interpolation using Microcal Origin software. The blood smears used were read blind and each duplicate experimentwas repeated three times[55-61].

III. RESULTS AND DISCUSSION

Psidium guajava extract were screened for their *in-vitro* antimalarial activity against the P. falciparum strain using chloroquine and quinine as the reference compounds. All experiments were performed in duplicate and mean values of IC_{50} are reported in Table 1. Methanolic and ethanolic extract were found to have IC_{50} values in the range of 0.048 to 0.965μM against the P. falciparum strain. These compounds displayed excellent activity against the P. falciparum strain compared to Chloroquine (IC_{50} = 0.065 μM) and quinine (IC_{50} = 0.832μM).

Table 1. Results of *In-vitro* antimalarial activity of Psidium guajava extracts

Sr. no	Test subs.	IC_{50} (µM)
1	Methanolic extract	0.048
2	Ethyl acetate extract	3.312
3	Ethanolic extract	0.905
4	Aqueous extract	2.011
5	Chloroquine	0.065
6	Quinine	0.832

IV. CONCLUSION

Psidium guajava leaf extracts possessed promising antimalarial activity. The antimalarial action of ethanolic and methanolic extract has been attributed to the presence of bioactive secondary metabolites in the plant material. This supports the acclaimed traditional use of this plant to treat malaria. More studies are needed to isolate and characterize active antiplasmodial constituents in the solvent fractions of this plant. The concentration of a substance is the main deciding factor because it may have harmful effects when the sensitive biological system reaches a sufficiently high concentration.

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VI. REFERENCES

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