

EXPLORATION OF ANTIBACTERIAL PROPERTIES IN THE COMBINATION OF *Artocarpus heterophyllus* WITH A BOTANICAL SOURCE AND A CHEMICAL SOURCE: A STUDY ON ENHANCED ANTIMICROBIAL PERFORMANCES

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Antibiotic resistance, a medically significant occurrence accelerated by the misuse of antibiotics, has led to an increasing demand for the exploration of novel antibacterial compounds, particularly those sourced from botanical origins. This study aims to explore the antibacterial potential of phytochemicals obtained from *Artocarpus heterophyllus* and *Mikania micrantha*, two indigenous Sri Lankan botanical sources. Synergistic and antagonistic effects were examined by combining *A. heterophyllus* with a botanical source and a chemical source. This study was conducted to assess the combined effects of these phytochemicals with sodium salt of metatitanic acid (MTA) against certain bacterial strains. The sodium salt of metatitanic acid, a chemical that possesses superior antibacterial properties in previous studies, was used as the chemical source in this study. Additionally, *M. micrantha*, a plant commonly known as 'wathupalu' and utilised in traditional medicinal practices, was used as the botanical source. The *A. heterophyllus* plant parts (leaves, seeds, stripes and peels) were cleaned, dried and pulverised, and then the aqueous extract was obtained. Similarly, *M. micrantha* leaves were cleaned, dried and crushed in order to obtain an aqueous extract. The crude extracts were individually assessed for antibacterial activity against *Staphylococcus aureus* (ATCC 25923) and *Pseudomonas aeruginosa* (ATCC 27853) using antibiotic sensitivity test (ABST), by well diffusion method employed using Muller-Hinton agar as the growth medium. The plates were incubated for 24 hours at 37°C. The positive control used was Gentamicin and the negative control used was sterile water. The crude extract of *A. heterophyllus* was combined with *M. micrantha* extract in 1:1 ratio and was tested against the same species for enhanced antibacterial properties. Similarly, the crude extract of *A. heterophyllus* was mixed with the sodium salt of MTA and ABST assay was conducted to analyse and compare the antibacterial properties. ANOVA and Post hoc analysis performed using SPSS 27th version revealed that MTA exhibits stronger antibacterial property (23.5±0.4 mm), while the combination of MTA and *A. heterophyllus* also showed a synergistic effect (24±1.7 mm) against *S. aureus*. Moreover, the analysis against *P. aeruginosa* shows that *M. micrantha* exhibits notable antibacterial properties against this species (27.4±3.6 mm). The statistical significance for all comparisons was established at the p<0.05 level. In conclusion, the sodium salt of MTA, *M. micrantha*, and their combination with *A. heterophyllus* exhibit potential antibacterial properties.

Further studies can be carried out to explore other properties of the bioactive compounds present in *M. micrantha* and the sodium salt of MTA.

Keywords: *Artocarpus heterophyllus*, *Mikania micrantha*, *Metatitanic acid*, *Antibacterial properties*.