

Antibacterial activity of entomopathogenic fungi isolated from *Vespa affinis* and *Apis dorsata* in Sri Lanka

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Antibiotic resistance of bacteria throughout the world has caused serious health issues. Thus, there is a crucial need for the discovery and development of new antibiotics. Entomopathogenic fungi infect and eventually kill their host insects. However, entomopathogenic fungi are known to be a rich source of bioactive secondary metabolites. The main aim of the current study was to isolate and investigate the antibacterial activities of entomopathogenic fungi of two insect species *Apis dorsata* and *Vespa affinis* collected from Uva Wellassa University library premises, Badulla, Sri Lanka (810 4' E, 60 58'N). Freshly dead insect cadavers were collected, surface sterilized, crushed and spread on antibiotic (Amoxicillin, 10 mg/mL) enriched potato dextrose agar media plates. The emerging fungi were isolated, pure cultures were obtained and extracted into ethyl acetate. The fungal crude extracts were tested for antibacterial activity against *Staphylococcus aureus* (ATCC 25928), *Bacillus cereus* (ATCC 11718), *Escherichia coli* (ATCC 35218) and *Pseudomonas aeruginosa* (ATCC 9027) using agar disc diffusion method (400 µg/disc) and bioautography. The experiments were carried out in triplicate. For the identification of fungi, genomic DNA were isolated, the ITS region of the ribosomal RNA gene was amplified using ITS1 and ITS4 primers, the obtained PCR products were sequenced and BLAST analyzed. Nine morphologically different entomopathogenic fungal strains were isolated from *A. dorsata* while eight were isolated from *V. affinis*. Thirteen fungal extracts showed antibacterial activity against at least one bacterial species tested while four extracts were inactive to all bacteria. Ten, eight and nine fungal extracts showed some activity against *S. aureus*, *B. cereus* and *E. coli* respectively while none of the extracts showed any activity against *P. aeruginosa*. *Talaromyces versatilis* fungal extract from *A. dorsata* showed the best inhibition with a mean diameter of 13.00 ± 1.00 mm against *E. coli* with an activity similar to the positive control (Gentamycin, 1000 ppm). The bioautography assays revealed that *T. versatilis* and an *Aspergillus* extracts were active against *S. aureus* while *A. nomius* extract was active against *B. cereus*. The FTIR analysis and thin layer chromatography studies exhibited the presence of many secondary metabolites in all fungal crude extracts. This study shows that entomopathogenic fungi of *V. affinis* and *A. dorsata* are potential sources for the discovery of novel antibacterial drug leads.

Keywords: Entomopathogenic fungi, *Vespa affinis*, *Apis dorsata*, Secondary metabolites, Antibacterial

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