

Antibacterial activities of peptaibols, trichocellin A-I and B-II, isolated from the endophytic fungus *Trichoderma reesei*

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Antibiotics are highly used in chemotherapy for bacterial infections worldwide. However, due to misuse and overuse of antibiotics pathogenic bacteria have developed and continue to develop resistance to the existing antibiotics rendering them ineffective. Thus there is an urgent need to develop new types of antibiotics to counter the spread of these lethal, drug resistant infections. Endophytic fungi of Cyperaceae plants are a relatively unexplored but a significant resource for the discovery of new biologically active natural products. Therefore, the main objective of this study was to isolate bioactive secondary metabolites of the endophytic *Trichoderma reesei* (GenBank accession number MT476871) fungus isolated from *Cyperus iria* in Sri Lanka. Initial screening of *T. reesei* showed antibacterial activity against the Gram positive *Bacillus cereus* and *Staphylococcus aureus* at 400 µg/mL. *T. reesei* was grown in large scale and extracted into ethyl acetate following an incubation period of 13 days. Solvent-solvent partitioning of the crude extract (1005 mg) led to an active chloroform fraction (580 mg), which was chromatographed on Sephadex LH20 size exclusion column chromatography. The active fraction B (143 mg) from the six fractions (A-F) obtained from size exclusion chromatography was further purified via C18 reversed-phase high performance liquid chromatography (HPLC) to yield two peptaibols. The structures of the peptaibols were determined as trichocellin A-I and B-II by nuclear magnetic resonance (NMR) and mass spectral data. Both peptaibols A-I and B-II were active against the two Gram positive bacteria tested with minimum inhibitory concentrations (MICs) of 64 and 8 µg/mL for *B. cereus* and 32 and 16 µg/mL for *S. aureus* respectively. The positive control Gentamycin gave a MIC of 2 µg/mL for both bacteria. To the best of our knowledge this is the first study to isolate trichocellins from an endophytic *T. reesei* fungus. The study revealed that the isolated trichocellins from *T. reesei* are potent antibacterial compounds.

Keywords: *Trichoderma reesei*, Trichocellins, Peptaibols, Antibacterial, Endophytic fungi

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