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Marine sponge *Axinella donnani* as a potential drug source

Jayani Gamage[1, 2], L. N. Kosgahakumbura[1, 2], S. Gunasekera[2], P. Cárdenas[2], R. P. P. K. Jayasinghe[3] and C. M. Hettiarachchi[1*]

[1] *Department of Chemistry, University of Colombo, Kumaratunga Munidasa Mawatha, Colombo 03, Sri Lanka*

[2] *Pharmacognosy, Department of Pharmaceutical Biosciences, Biomedicinska centrum BMC, Husarg.3, Sweden*

[3] *National Aquatic Resources Research and Development Agency (NARA), Crow Island, Colombo 15, Sri Lanka*

**Corresponding author: chamarih@chem.cmb.ac.lk*

Axinella donnani is a marine sponge from the Axinellidae family known to have structurally unique and bioactive metabolites. The primary aim of this study was to discover novel chemical compounds, particularly peptides, from *A. donnani* showing potential as drug leads. Both aqueous and organic crude extracts of *A. donnani* collected from coastal waters in Wennappuwa, were subjected to antibacterial activity assays against *E. coli* (ATCC 25922), *S. aureus* (ATCC 29213), and *P. aeruginosa* (ATCC 27853). Aqueous and organic extracts were micro-fractionated in to 48 fractions by Reverse Phase-High Performance Liquid Chromatography (RP-HPLC) and their cytotoxicity was assessed against histiocytic human lymphoma cell line U-937 GTB. Three potentially new peptides of 3-4 kDa size containing cysteines were isolated from the aqueous extract of *A. donnani*. The mass spectroscopic analysis using Ultra Performance Liquid Chromatography (QTof-UPLC) revealed monoisotopic masses 3884.42 Da $[M+H]^+$, 4325.40 Da $[M+H]^+$, and 4883.25 Da $[M+H]^+$ for peptides A, B and C respectively. Number of cysteines were identified as 8, 8 and 10 respectively in peptides A, B and C after reduction and alkylation. Peptide A was subjected to microdilution assay against *E. coli*, *S. aureus*, and *P. aeruginosa*. Peptide A inhibited growth of *E. coli* at a minimum inhibitory concentration (MIC) value 100 μM. Further, fractions 20, 21, 22, 42 and 43 of organic extract of *A. donnani* showed antibacterial activity against *E. coli*, and fraction 9 was active against *S. aureus* which were fractionated using Normal Phase Fast Performance Liquid Chromatography (NP-FPLC). Fraction 33 of organic extract showed cytotoxicity against histiocytic human lymphoma cell line U-937 GTB with 54.078 average %SI value. De novo sequencing by MSMS and structure elucidation by NMR with the support of transcriptomic analysis are currently underway. According to previous studies and this study, *A. donnani* is a very potent marine sponge with various bioactivities. Characterization of secondary metabolites of *A. donnani* and investigating their bioactivities is a promising approach to explore marine natural products in terms of pharmaceutical therapeutics.

Keywords: *Axinella donnani*, peptides, Sri Lankan sponges, antibacterial, cytotoxicity