Investigating metabolites of selected macrofungi for anticancer activity; induction of apoptosis and isolation of active compounds

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ABSTRACT

Macrofungi have been valued as edible and medicinal provisions for humankind. Molecules derived from macrofungi have provided drug leads for cancer due to their promising anticancer properties. Interestingly, mushrooms have played a leading role in the development of more effective anticancer drugs with minimal side effects. However, a large proportion of macro fungi species worldwide remain chemically unexplored for their potential bioactive properties. Specifically, Sri Lankan macrofungi are still not scientifically screened for their medicinal values. Hence, the current study was primarily aimed at investigating the anticancer properties of selected macrofungi harvested from the dry zone forest reserves in Sri Lanka. Further, induction of apoptosis, modulation of apoptosis related metabolites, cellular alterations of apoptosed cells were investigated and potential anticancer compounds were isolated followed by structural characterization of the anticancer principles.

The antioxidant activity of crude extracts of macrofungi (n=107) was screened using DPPH (1,1-diphenyl-2-picrylhydrazyl) assay. Among the analyzed species, *Fulviformes fastuosus, Phellinus repandus* and *Anthracophyllum lateritium* exhibited promising antioxidant activity. Hence, above species were selected for extended cytotoxicity experiments and isolating anticancer compounds based on the literature that reveals the positive relationship between antioxidant activity and anticancer activity. *In vitro* cytotoxicity of selected species were determined using MTT cell viability assay against Hep-2, RD, HepG-2 cancer cell lines and CC-1 normal cell line.

Fulviformes fastuosus, Phellinus repandus and *Anthracophyllum lateritium* showed potent cytotoxicity against cancer cell lines with minimal toxicity for normal CC-1 cells. Bioactivity guided isolation of active principles from *F. fastuosus* and *P. repandus* were performed using different chromatographic techniques, 1D, 2D NMR spectrometric methods and mass spectrometry. The active compounds isolated from *F. fastuosus* and *P. repandus* were identified as inoscavin A and ergone. Both compounds exhibited potent anticancer activity against cancer cell lines with less toxicity for normal CC-1 cells.

The compelling cytotoxic effect observed in the present study implies the ethnopharmacological potential of these fungi and their active metabolites in the remedy of cancer. Moreover, this study provides a scientific proof of the traditional awareness in using medicinal mushrooms as potent antioxidant and anticancer agents.