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Evaluation of antiproliferative activity and mechanism of action of a polyherbal drug formulation used in traditional medicine for cancer therapy

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The Pana Guliya (LPG) is a polyherbal formulation which is used to treat different types of cancers in traditional medicine. In this study, we describe *in vitro* efficacy and mechanism of action of LPG on four cancer cell lines (HepG2, HeLa, MCF-7 and RD) compared with a normal cell line CC1. The MTT, LDH assays and protein synthesis were used to study antiproliferative activity of LPG while NO synthesis and GSH content were assayed to determine the oxidative stress exerted by LPG. Rhodamine 123 staining, caspase 3 activity, DNA fragmentation and microscopic examination of cells stained with ethidium bromide/acridine orange were used to identify the apoptosis mechanisms associated with LPG. The LPG showed the potent antiproliferative effect against all tested cancer cells with an EC50 value of 2.72±0.36, 19.03±2.63, 24.90±2.03 and 17.57±2.8 µg/mL for HepG2, HeLa, MCF-7 and RD cells respectively for MTT assay after 24 h treatment. In contrast, CC1 cells showed an EC50 value of 213.07±7.71 µg/mL. Similar results were observed for LDH release. A dose dependent decrease in protein synthesis was shown in both cancer cell types compared to CC1 cells. The reduction of GSH content and elevation of cell survival with exogenous GSH prove that the LPG act via induction of oxidative stress. LPG also stimulates the production of NO and mediates oxidative stress. Rhodamine 123 assay shows the mitochondrial involvement in cell death by depletion of $\Delta\psi$ inducing downstream events in apoptosis. This results in increase in caspase-3 activity and eventually DNA fragmentation and LPG induced apoptotic cell death. In conclusion, the present study suggested that the LPG exerted an anticancer activity via oxidative stress dependent apoptosis. Therefore present study provides the scientific proof of the traditional knowledge in using LPG as an anticancer agent.

Biography

Wageesha N D A received his Undergraduate Education from the Institute of Chemistry Ceylon, Sri Lanka, and his MPhil in Biochemistry from University of Sri Jayawardenapura, Sri Lanka. He is currently a Senior Lecturer in Biochemistry and Chemistry at Department of Biochemistry and Chemistry, the Faculty of Medicine, South Asian Institute of Technology and Medicine, Sri Lanka. His current research interests involve the cancer research and currently working towards his PhD in the field of development of novel anti-cancer drug based on traditional medicinal knowledge. His work has been presented at scientific conferences and published in journals. He received "Kandiah Memorial Graduateship Award" for Post Graduate research from the Institute of Chemistry, Ceylon in 2010 for his research work.

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