Waste Vs Cancer: An innovative biomedical approach

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Vermitechology involves vermiculture and vermicomposting process which emerged as a comprehensible and lucrative technology for management of organic wastes. During vermicomposting, waste materials while passing through the earthworms gut are homogenized in a highly bacterial rich environment into a highly mineralized chemical forms. The present study reflects compost as an incubator of different beneficial bacteria which opens up a new vista not only in vermitechnology but also its biomedical significance. A significant turnover of different enzymes such as leucine arylamidase, β-Glucosidase, Urease and α-celulase supported further by FT-IR analysis represents a changeover in compost. The bacterial metabolic products allied with earthworms have an exclusive physicochemical pre-eminence as a facilitator of apoptosis (programmed cell death in a MCF-7 cell line). Five strains of bacteria were isolated and identified using 16srrRNA sequencing. The ethyl acetate extract of one of the bacteria Bacillus anthracis have been undertaken which show a significant anticancer and antioxidant activity. Antioxidant activity revealed through DPPH radical scavenging assay show a maximum effect of (75.79 ± 5.41%) at 900μg/ml concentration of the extract. Furthermore, a significant decrease in SOD and LDH activity were noticed upon application of extract. MTT assay showed a potent cytotoxic activity against MCF-7 cell line with an IC50 value of 46.64 ± 0.79μg/ml. Apoptosis was further confirmed through the nuclear fragmentation and DNA fragmentation analysis. Western blot analysis represents a down regulation of Akt protein, phosphorylated FOXO proteins. Increase of SOD activity along with decrease of Akt level reflects that the mode of action is entirely PI-3K dependent. It indicates that B. anthracis isolated from vermicompost could be potentially explored for the development of new therapeutic agents, especially against cancer. It will definitely open up a new vista in the area of waste management and bio-medical innovations.

Biography

Ganguly R.K. has completed Master of Science from Banaras Hindu University, India and had qualified several fellowship programs like CSIR-JRF, ICMR-JRF, GATE-JRF and SET JRF. He is now conducting the research work from Vidyasagar University and published a couple of international journals in different fields of biotechnology.

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