

Biogenic Zinc Oxide Nanoparticles Synthesized From Swertia Chirayita Leaf Extracts And Their Cytotoxic Effect On Colorectal Cancer Cells

Hadgu Mendefro Berehu

KIIT university, India

The development of cancer therapy is hampered by the adverse side effects of chemotherapy, drug resistance, and tumour metastasis, giving cancer patients a dismal prospect. In the last ten years, nanoparticles (NPs) have become a promising medicine delivery method. Swertia chirayita has been used for a long time to cure a number of diseases. Using an ethanolic and a methanolic extract of the leaves of S. chirayita, zinc oxide nanoparticles (ZnO-NPs) were formulated. X-ray diffraction (XRD), scanning electron microscopy, high-resolution transmission electron microscopy (HRTEM), Fourier transform infrared spectroscopy (FTIR), and UV-visible spectroscopy (UV-Vis) were used to characterise the green synthesised ZnO-NPs. Colorectal cancer (CRC) cells (HCT-116 and Caco-2) and control cells (HEK-293) were used to assess its cytotoxicity effect using the MTT assay, and its anti-cancer effects were determined using quantitative real-time PCR (qRT-PCR) and Acridine orange (AO) staining. The average size of the ZnO-NPs produced from the ethanolic extract of S. chirayita was 24.67 nm, while the average size of the spherical ZnO-NPs produced from the methanolic extract was 22.95 nm. In comparison to control cells, the MTT assay demonstrated the cytotoxic ability of the synthesised ZnO-NPs on cancer cells (HCT-116 and Caco-2). The IC₅₀ values of ethanolic and methanolic extract ZnO-NPs for HCT-116, Caco-2, and HEK 293 were 34.356 2.71 and 32.856 2.99 g/ml, 52.15 8.23 and 63.1 12.09 g/ml, and 582.84 5.26 and 615.35 4.74 g/ml, respectively. The ability of ZnO-NPs to trigger apoptosis was validated by acridine orange staining. The mRNA expression level of E-cadherin was significantly increased upon qRT-PCR analysis, whereas vimentin and CDK-1 mRNA expression level was significantly reduced. These findings collectively reveal that ZnO-NPs have anti-cancer potential in CRC.

Biography

Dr. Hadgu Mendefro Berehu is currently Ph.D. scholar at School of Biotechnology, KIIT university, India. His first degree was in veterinary medicine, from Addis Ababa university

and completed masters in public health from the same university. He has been working as director for identification and traceability system in the Ministry of Livestock and Fisheries, Ethiopia. He Published book chapter and research papers and further other research papers and review papers are in contact to be published in near future.

hadgumendefro19@gmail.com

Received: August 16, 2022; **Accepted:** August 18, 2022; **Published:** September 16, 2022