

Synthesis, Characterization and toxicity Analysis of Novel Silver Nanoparticles from *Brassica oleracea var italica* (Broccoli) †

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Abstract: Epidemiologic studies demonstrate that vegetable consumption decreases the risk of various types of cancers. Crucifers were found to have anti-cancer and antioxidant activities due to their enriched content of glycosylates. Nanotechnology is the design, characterization, production & application of structures, devices, and systems by controlling shape and size at the nanoscale. This work describes a novel combinatorial synthesis approach, which is rapid and simple for the synthesis of metallic nanostructures of novel metals such as silver (Ag) by using a “comparison study of Conventional method (CM) and Microwave (MW) synthesis” method of silver nanoparticles. By the current study, we describe a cost-effective and environment-friendly technique for green synthesis of silver nanoparticles through the extract of Broccoli. AgNPs characterized using UV–Vis absorption spectroscopy was used to monitor the quantitative formation of silver nanoparticles. The characteristics features of the obtained silver nanoparticles were studied using a Scanning electron microscope (SEM), Transmission electron microscope (TEM), Fourier-transform infrared spectroscopy (FTIR). Here, we have reported a simple biological and low-cost approach for the preparation of stable silver nanoparticles by bioreduction of silver nitrate solution using *Brassica oleracea* (Broccoli) aqueous extract. The *in-vitro* analysis was performed in HEP 2 cell lines against which anti-cancer activity was recorded. Additionally, the antioxidant activity was also found by estimating the antioxidant enzymes. The *in vivo* toxicity was performed using chick embryos. The important outcome of the study will be the development of value-added products from cruciferous plants like *B. oleracea* for nanotechnology-based industries.

Keywords: Broccoli; TEM; SEM; UV-Visible spectroscopy; FTIR; Microwave-assisted method.

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Conflicts of Interest

The authors declare no conflict of interest.