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GREEN BIOSYNTHESIS OF SILVER NANOPARTICLES FROM *TARAXACUM OFFICINALE* ROOTS PLANT AND STUDYING ITS ANTIVIRAL PROPERTIES TO CORONAVIRUS (SARS-COV-2) INFECTED LUNG CELLS

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Abstract

Plants, especially medicinal plants, took up the most space during the production of silver nanoparticles and have shown significant promise for use in biotechnology. So the goal of this research was to focus on a type of lung cell line, the WI-38 cell line, infected with the Corona virus. The study also included the isolation of the active compounds from the roots of the *Taraxacum officinale* plant, their extraction, and the study of their biological effects.

Used in this study were: *Taraxacum officinale* extract, silver nitrate, (Dulbecco's Modified Eagle Medium (DMEM), fetal bovine serum (FBS) L-glutamine, penicillin, streptomycin, and dimethyl sulfoxide (DMSO) from Sigma Aldrich, USA), and XTT (2,3-bis-(2-methoxy-4-nitro-5-sulfo phenyl) -2H-tetrazolium-5-carboxamide) from RIbobio - China. WI-38 CCL-75 cell lines were purchased from American Type Culture Collection (ATCC) identification. Source was the lung tissue for female-3 month gestation and the SARS-CoV-2 virus. Oils, flavonoids, glycosides, and tannins from *Taraxacum officinale* were extracted in the extraction device (Soxhlet) in successive stages using several solvents. Silver nanoparticles Ag NPs were synthesized using the green method from these extracts and diagnosed by X-Ray diffraction analysis XRD, Fourier transform infrared spectroscopy (FTIR), and field emission scanning electron microscopy (FESEM). Cell cultures were used to study the effect of nanoparticles on lung cells infected with the Coronavirus (SARS-CoV-2) using lung cell lines (wi-38) . The activity of these particles as antivirals was evaluated due to their antiviral activity where pure cultures of cell lines were planted on DMEM where DEME was used as a positive control and the cell line with DMEM was a negative control. For each experiment, the diameter of the inhibition area was measured in millimeters. Finally, the XTT test was used to test the extracted and the nanoparticle solution to ensure its suitability for inhibition of the virus coronavirus (SARS-COV-2).

The results showed that nanoparticles have strong antiviral efficacy against the coronavirus. 50 mg/L of the Ag NPs extract was found to have the greatest inhibition. The potent bioactivity of the synthetic green silver nanoparticles derived from medicinal plants supports their biological use as an antiviral. The study also showed the effects of different concentrations of silver nanoparticle solutions on cell growth. The presence of phenolics and flavonoids was found in the alcoholic and aqueous extracts of the *T. officinale* roots. The mechanism of action of Ag NPs was investigated. As noted, the Ag NPs alcoholic extract outperformed the Ag NPs aqueous extract in terms of growth because of its small size.

From this study, we conclude that the method of green biosynthesis of metal nanoparticles is considered safe and inexpensive, and the materials produced are not contaminated. Nanoparticles can be applied in many applications depending on their physical properties, such as the size and shape of the particle. They were also tested in vitro against coronavirus (SARS-COV-2) utilizing the cell line. Interestingly, the antiviral activities of Ag NPs alcoholic and aqueous extracts against SARS-CoV-2 were noteworthy, with IC50 values of 32.50 and 29.03, respectively. The findings might be a suitable starting point for future optimization and more sophisticated preclinical and clinical research of molecules on single components, particularly alcoholic extract, for inhibiting and lowering the activity of the Coronavirus in infected cells.

***Key words**: Silver nanoparticles, Antiviral, Coronavirus, Taraxacum officinale, medicinal plants, Cell line.*