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Abstract

The Effects of Green Synthesized Silver Nano-Particles on Mesenchymal Stem Cells Apoptosis

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Abstract

Background and Aim: Our study focuses on evaluating the impact of green-synthesized silver nanoparticles (AgCl NPs) on mesenchymal stem cells (MSCs) *in vitro*. Silver nanoparticles have raised questions about their cytotoxicity towards stem cells, but the findings remain controversial. Our objectives include assessing potential cytotoxic effects, exploring underlying mechanisms, and contributing to resolving existing debates in the field. This research holds significance for both the safety of biomedical applications and our understanding of nanomaterial interactions with crucial cellular components.

Method: In our study, silver chloride nanoparticles were synthesized using an environmentally friendly approach, utilizing *Onopordum acanthium* extract. We isolated and purified mesenchymal stem cells from human Wharton's jelly and exposed them to varying concentrations of these AgCl NPs. To assess the impact, we employed flow cytometry to evaluate apoptosis in the mesenchymal stem cells. This research approach highlights the eco-friendly synthesis of AgCl NPs and its subsequent examination on MSCs, providing valuable insights into their effects on cellular behavior.

Results: The flow cytometry results from our study provided compelling evidence of the impact of green-synthesized silver nanoparticles on mesenchymal stem cells. Notably, these findings revealed a dose-dependent induction of apoptosis, shedding light on the nuanced relationship between AgCl NPs and these vital cellular components.

Conclusion: The induction of apoptosis in mesenchymal stem cells by green-synthesized nanoparticles presents a significant challenge for their potential application in human subjects. This finding underscores the importance of comprehensive safety assessments and further research to understand the underlying mechanisms, essential steps before considering their use in biomedical contexts.

Keywords: *Green synthesis, AgCl, Mesenchymal stem cell, Apoptosis*

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