Title of the Book : *A TREATISE ON RECENT ADVANCES IN BIO-INORGANIC AND MEDICINAL CHEMISTRY*

Editors: Dr.N.Raman, Dr.A.Sarathi, Dr.A.Sakthivel, Dr.A.Vijayakumar and Dr.K.Arunsunai Kumar

First Impression 2017

Price: Rs. 600/-

ISBN: 978-93-81723-63-0

Printed at: Laser Point, Madurai-625 003

Publisher

Virudhunagar Hindu Nadars' Senthikumara Nadar College (Autonomous)
College Road
Virudhunagar-626 001
Tamil Nadu, India
E-mail: support@vhnsnc.edu.in
Web: www.vhnsnc.edu.in

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Conclusion

In the present study, biotemplated synthesis of ZnONP's has been carried out and finds application as an anticancer agent for breast cancer. The anticancer activity of ZnONP's against MCF-7 cell lines in breast cancer cell at 100µg/mL revealed 71% cell inhibition. ZnONP's, due to their good biocompatibility and low cost, have shown promising potential in bioimaging and drug delivery. The present research work affords an economical, eco-friendly method of synthesis of zinc oxide nanoparticles, which finds applications in varied fields of science and technology.

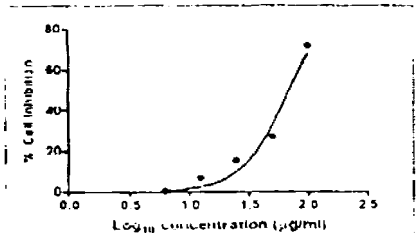

Fig. 1. Dose dependent cytotoxicity of synthesized zinc oxide nanoparticles against MCF-7 cell lines

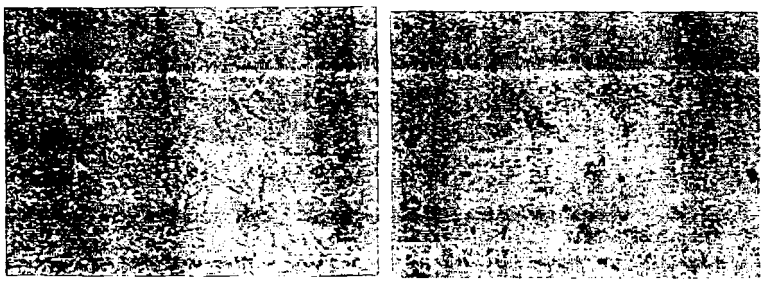

Fig.2. Effect of ZnONPs on proliferation of MCF-7 cell lines at concentration (a) 6.25 and (b) 100 µg/ml

Acknowledgments

The authors sincerely thank the Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, for providing research facilities.

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hepatocytes) rat cells (astrocytes and hepatocytes) are reported [3]. *Eichhornia crassipes* (mart) solms is an aquatic perennial herb that belongs to the family Pontederiacea. It contains phytochemicals with significant antimicrobial activity, antioxidant studies, wound healing activity, anti-inflammatory activity [4]. This study therefore is aimed to evaluate the antiproliferative effect of biogenically synthesized ZnONP's using MCF-7 Human breast cancer cell lines by MTT assay.

Materials and Methods

The preparation of ZnONPs using aqueous water hyacinth (WH) extracts was carried out as per the procedure reported previously [5] and characterized. The anticancer activity for the different concentrations (6.25, 12.5, 25, 50 and 100 µg/ml) of ZnONP's biosynthesized using the aqueous extract of water hyacinth on MCF-7 cell lines were examined by MTT assay [6].

Results and discussion

The cytotoxic activity of the biogenically synthesized zinc oxide nanoparticles against breast cancer cells was carried out at different concentrations of the ZnONP's. MTT assay method was used. The enzyme in living cells, succinate-dehydrogenase, cleaves the tetrazolium ring and converts the MTT to an insoluble purple formazan. The quantity of formazan formed is directly proportional to the number of viable cells.

The results revealed increase in cytotoxicity with increase in the concentration of ZnONP's from 6.25, 12.5, 25, 50 and 100 µg/mL. The IC_{50}, which is considered as the optimal dose for the various assays was calculated and found to be 69.68µg/ml (Fig.1). It's seen that the zinc oxide nanoparticles possess cytotoxicity at lower concentration. From graph (Fig. 1), it could be concluded that the cytotoxicity was observed both in dose- and duration-dependent manner.

Fig. 2 shows the cell inhibition for the different concentration of ZnONP's. Based on MTT assay results, the changes in cell structures and morphological alterations were confirmed *via* inverted microscope. After 24 h of incubation with various concentrations of zinc oxide nanoparticles many of the cells showed cytoplasmic shrinkage and loss of normal nuclear architecture, became detached and found floating in the medium. As a result, the number of cytotoxic cells increased with concentration, with the highest having the most pronounced inhibitory effect on cell proliferation than the control. For the highest used concentration (100µg/ml) 71% survival of normal cells was observed. It is thus obvious that the biogenically synthesized ZnONP's possess anticancer properties against MCF-7 breast cancer cell line. Further experimental analysis on the mechanism of action would definitely reveal the important mode of action of these nanoparticles responsible for cancer cell death. The inherent toxicity of ZnO nanoparticles against cancerous cells, their ability to induce intracellular ROS generation leading to death via an apoptotic mechanism are reported [7]. The present study on breast cancer cell lines and on an eco-friendly method of zinc oxide nanoparticles offers promising outcome in nanoscience.