Green Synthesis- A study of its applications in Medical Field

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Abstract - The present study is focussed on the synthesis of few AO (Zinc, Silver, Cerium, ...) compounds which has multipurpose anticancer and antimicrobial activities. These compounds have shown promising approaches as treatment agents in biology and medical science. Leaf extracts were used as reducing agents for synthesis as a cost effective, eco-friendly process compared to that of chemical synthesis. The Physiochemical properties such as size, agglomeration state in liquids and surface charge has an important part in the final interaction with target cells. Wound healing studies revealed that AO compounds form thin films which have potential applications as an antimicrobial dressing in wound management process. From a biomedical perspective peroxides act as oxygen supplies and thus can be exploited in treatment of a wide variety of diseases induced by anaerobic and even cancerous cells. Using these compounds did not cause toxicity and non mutagenic to normal human body. Thus the study shows that the nanocomposite produced through green synthesis has great potential to be developed into effective therapeutic agents. It can pave the way for sustainable synthesis of monodispersed particles.

Key words - Green Synthesis, agglomeration, antimicrobial, mutagenic, therapeutic agents.

I. INTRODUCTION

Now-a-days Nanotechnology offers a new approach to natural source usage inorder to improve treatment during drug delivery and bioactivity. The synthesis of nanoparticles is usually conducted using various physical and chemical procedures. In recent years scientists in this field are mostly concentrating on synthesis of metal nanoparticles in the field of medicine, catalysis, water treatment and solar energy conversion by ecofriendly methods inorder to minimize high energy inputs and production of chemical toxins at high temperature and pressures. The present study is focussed on the synthesis of few AO (Zinc, Silver, Cerium,...) compounds which has multipurpose anticancer and antimicrobial activities. These compounds have shown promising approaches as treatment agents in biology and medical science

Phytosynthesis of metal and metal oxides is a new emerging issue of nanoscience and technology. The plant extracts acts as stabilizing and capping agents during the process. Investigations revealed that during biological effects of phytosynthesis antibacterial activity was observed. On further study about it results showed that smaller crystal sizes with higher surface area led to higher bacterial activity. The Physiochemical properties such as size, agglomeration state in liquids and surface charge has an important part in the final interaction with target cells.

II. METHODS

At present these nanoparticles have been synthesised through several bio-directed methods. Applying natural and organic matrices as stabilizing agents in order to prepare biocompatible compounds thereby reducing challenges regarding safety and providing appropriate situation for their affective use in biomedicine. The methods of green synthesis were easy, rapid and cost effective.

The optical property will be analysed by ultra violet spectroscopic studies at room temperature operated at a resolution of 1 nm bet 200 and 800nm ranges. The size distribution can be measured using dynamic light scattering instruments. An X-ray diffractometer may be used for analysis of sample at room temperature at a scanning rate of 2.0^{o} min^{-1} over a range of $2\Theta = 10\text{-}80^{o}$ For elemental compositions , energy dispersive x-ray analysis can be used. The sample can be spin coated onto a freshly peeled off mica sheet and cured for atomic force microscopic studies. Resonance frequency may be used for imaging the sample. Images can also be analysed by software. Transmission electron microscopy analysis was carried out to analyse the size and morphology of synthesised nanoparticles.

III. APPLICATIONS

It can pave the way for sustainable synthesis of monodispersed particles. From a medical perspective peroxides act as an oxygen supplier and thus can be exploited in treatment of a wide variety of diseases induced by anaerobic and even cancerous cells.Having synthesised the monodispersed ZnO_2 particles the researches performed a series of initial experiments to determine the impact of these nanoparticles on the cancer and normal healthy cells. According to the study ZnO_2 have the potential to kill tumor cells by apoptotic and non-apoptotic mechanism. In the cytotoxity study cancer cells, pancreatic adenocarcinoma,ovarian adenocarcinoma, colonic adenocarcinoma, and acute promyelocytic leukemia cells were treated with hyal auronan/ zinc oxide nano composites. Wound healing studies revealed that AO compounds form thin films which have potential applications as an antimicrobial dressing in wound management process. They are also applicable for antibacterial products, laundry, water purification and industrial cleaning. Various kinds of CeO2 NPs nave been synthesised to target the Achilles heel.

IV. ADVANTAGES AND DISADVANTAGES

By using plant-medicated synthesis researches are capable of generating spherical shaped NPs (nanoparticles) that possessed reduced cytotoxicity. They undergo easy process, cost effective energy and time consuming technique. They are also capable of producing stable, water dispersible and highly fluorescent NPs .Another method Nutrient –medicated synthesis is capable of controlled growth and subsequent isotropic formation of small and stable NPs. They are capable of providing narrow distribution range of particle size which produce non-toxic effects on human cell lines at physiological concentration. When Biopolymer-mediated synthesis is used along with the above advantages it is capable of controlled diameter with high final purity.
Disadvantages are that there is possibility of providing nonuniform morphology in some case which could be attributed to agglomeration of individual nanoparticles. Sometimes the size of obtained nanoparticles exhibited wide distribution range from 5 to 63.6nm using different bio-organisms for synthesis. Significant difference at maximum concentration was observed which was safe for cells as stabilizing agents.

V. CONCLUSION

Thus the study from literature shows that the nano composite produced through green synthesis has great potential to be developed into an efficacious therapeutic agent. Along with efficient anticancer activity, nonmutagenic attributes were demonstrated. The green synthesis is an effective and ecofriendly process for producing nanodrugs for pharmacological applications. Using green synthesis some compounds were observed to have a unique property that makes them distinct from other antioxidants in their ability to self regenerate their surface. Thus a small dosage can work for a long time before being cleared from the body.

VI. REFERENCES

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