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M.Phil Thesis Summary

Green Matrix Based Synthesis and Characterization of Nanoparticles of *Ficus religiosa* Plant

Iqra Ayub*,
Shazia Anwar Bukhari,
Aneeza Iqbal and
M. Mubbsher Hussain

Department of Biochemistry,
Government College University Faisalabad,
Pakistan

*Corresponding Author

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*Ficus religiosa*is a holy tree in India, also known as "peepal plant" and it is present in Pakistan, India, and Bangladesh. It has a place in the kingdom Plantae, Class Magnoliopsida, Family Moraceae, Genus Ficus, and species *F. religiosa*[1]. It is a long branch shaped tree with long tipped heart-shaped leaves and purple fruits (about ½ inch in distance across) developing in the paired[2]. Different parts of the plant, for example, leaves, root, fruit, and bark have been used in pharmaceutical in the tradition system[3]. Its fruits contain asparagine, tyrosine, aspartic acid, glycine, threonine, flavonoids, quinine, and phenolic components. Its leaves contain L-cystine, L-lysine, L-aspartic acid, L-proline, L-tyrosine, monosaccharide, and minerals[4]. *Ficus religiosa* is used for beneficial activities such as treatment of cancer, diarrhea, vomiting, diabetes, central nervous system, and respiratory disorders[5].

Ficus religiosa leaves and fruits extract provides simple, eco-friendly, low cost, and efficient method for the synthesis of silver nanoparticles. These nanoparticles are obtained by the use of green synthesized method[6]. This method is very efficient and pocket friendly as compared to the chemical and biological method because those methods are used in the presence of different chemicals. When the silver nitrate is added in the extract of fruit and leaves then the color of an extract of fruit and leaves are changed yellow into brownish yellow color. The synthesized nanoparticles were cubic and sheet shape, approximately the size of leave nanoparticles were 98.7 nm and the size of the fruit nanoparticles was estimated at 58.45 nm. The size was bigger as the nanoparticles were surrounded by a thin layer and metabolites such as flavonoids, quinine having functional groups of amine, alcohol, ketone, carboxylic acid etc., which have found from the characterization by using UV-visible spectrophotometer, Fourier transforms infrared spectroscopy (FTIR), Zeta sizer potential analyzer and X-ray Diffraction spectroscopy (XRD) techniques.

All these techniques were proved that the concentration of plant extract to metal ion ratio plays an important role to determine the size and shape of the nanoparticles. The sizes of the nanoparticles in different concentrations were also different which depends on the reduction of metal ions. From the data of zeta sizer analyzer nanoparticles of around 50 to 100 nm and they had the potential of 58.45 and 98.7 nm. From the technological point of view, these obtained silver nanoparticles have potential applications in the biomedical field and this simple procedure has various advantages such as cost-effectiveness, less time-consuming. The Fourier Transform Infrared Spectroscopy (FTIR) spectrum shows at 400 to 4000 cm^{-1}. Different ranges of the spectrum show different functional groups are present such as carbonyl group, ester group, aldehyde group, C-C bond, C=O bonds and flavonoids, quinines are present in the fruit and leave nanoparticles of *Ficus religiosa*. The XRD spectrum analysis shows the crystalline size of the nanoparticles and size of leave and fruit nanoparticles are approximately 51.74 and 37.56 nm. These sizes are obtained to the different values of the 2 theta.

The UV-Visible absorption bands are shown on the peak of 423, 220 and 260 nm. The different peaks are shown in the fruits and leave nanoparticles because the presence of surface Plasmon resonance and shows the silver nanoparticles are present in it. The different groups are present in the fruits and leaves so, it shows different peaks.

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