THE STUDY OF THE BIOLOGICAL EFFECTS OF SOME NANOPARTICLES USED IN WATER TREATMENT

Submitted By

Samah Farouk Hassan

B.Sc., (Chemistry- Zoology), Women College for Arts, Science and Education,

Ain Shams University, 2005

Diploma of Analytical and Biochemistry El-Menofia University, 2008

A thesis submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
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Department of Environmental Basic Sciences
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2016

Acknowledgement

First of all, I thank Allah who gave me the strength to fulfill this work.

My thanks and deep appreciation to **Prof. Dr. Mostafa M.H. Khalil** Prof. of Inorganic Chemistry, Faculty of Science, Ain Shams University, for his guidance, motivation, and support throughout my master thesis. His insight helped me to finish this research in such a good form. I am very thankful that I become one of his students.

Special and great thanks to **Dr. Hanaa Hussein El-Sayed** Assistant Professor of Environmental Sciences - Department of Nutrition Chemistry and Metabolism- National Nutrition Institute, for her great help, guidance, fruitful assistance, encouragement and precious advice given throughout this study

Finally, I would like to express my special thanks to my parents, brother, sisters and friends for their kind help, continuous encouragement, understanding and support that helped me to finish my research in this form.

2016

ABSTRACT

Nanomaterial and nanoparticles have characteristics which are totally different in comparison to similar elements in bulk with dimension. Size, shape and surface area are criteria causing these differences. This study evaluated the effect of silver nanoparticles (Ag NPs) and Titanium dioxide (TiO_2 NPs) on the health of rats. Forty five adult male albino rats Sprague Dawley Strain weighing (120± 20 g) were divided into five groups each containing "nine" rats. Group (1) fed standard diet without addition of either silver nanoparticles (Ag NPs) or (TiO_2 NPs) as a normal or negative control. Group (2) fed standard diet and orally injected with 100ppm (TiO_2 NPs) <100 nm as a small size. Group (3) fed standard diet and orally injected with 100 ppm (TiO_2 NPs) ≥100 nm as a large size. Group (4) fed standard diet and orally injected with 100 ppm (Ag NPs) <100 nm as a small size. Group (5) fed standard diet and orally injected with 100ppm (Ag NPs) ≥100 nm as a large size. Each rat was housed in individual wire cage, food and water were provided regularly for "four" weeks. At the end of the experiment animals were sacrificed under ether anesthesia and blood samples were taken from hepatic portal vein. Biochemical analysis for blood and tissues (brain and liver) was done and histopathological changes in (brain, liver, lung, testis and stomach) organs exanimated. Results illustrated increase in serum liver function parameters for all investigated groups. Ag NPs were more toxic than TiO_2 , and generally, small size (<100) of the two nanoparticles had more toxic effect on liver than large size (≥ 100). Results of antioxidant screening (GSH & MDA) of liver tissue matched with serum liver function

which proved the harmful effect of nanomaterials on liver. Antioxidants of brain showed also effect on brain's morphology for all investigated groups. Pathological examination showed (tissue damages, bloodshed, cell necrosis and apoptosis) for all groups received the two sizes of Ag and TiO_2 NPs compared with control group. Based on these results, it was concluded that Ag and TiO_2 NPs have toxic effect on animal's health.

Keywords: Silver nanoparticles –Titanium dioxide nanoparticles - Biological effect – biochemical analysis - Rats

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