بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Ain Shams University
Faculty of Women for Arts, Science and Education,
Biochemistry and Nutrition Department

A Comparative Study of Antidiabetic Effect of Zinc,Chromium and Selenium Nanoparticles in Rats

Thesis

Submitted for Faculty of Women for arts, Science and Education,Ain Shams University, In Partial Fulfillment For the Requirement of Ph.D. Degree of Biochemistry and Nutrition

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Approval of Chemistry Department Council / / 2021

Approval of Faculty Council / / 2021

Approval of University Council / / 2021

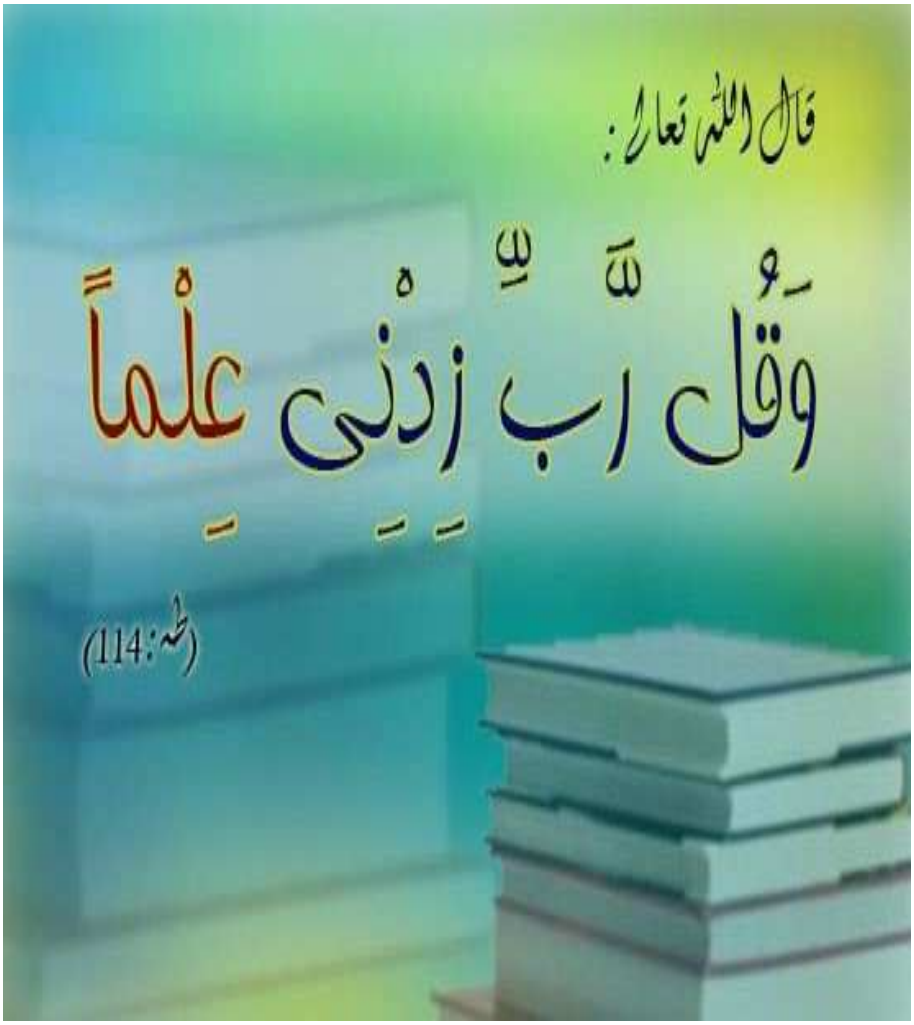
بسم الله الرحمن الرحيم

﴿وَمَا أُوتِيتُم مِّنَ الْعِلْمِ إِلَّا قَلِيلًا﴾

صدق الله العظيم

الإسراء (آيه ٨٥)

“Allah”
The most Gracious
The most Merciful



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X

Rasha Mustafa

Dedication

This thesis is dedicated to my ‘‘Father’’ who passed away but his soul is present by his advices and support, giving with no limits ,what gives me patience is that i believe that Allah willing he will be in a better place due to his good deeds and actions. I wished that he would have been with us today to reep the fruits of his efforts and suffering with us to be eminent and successful characters in society. I assume that he is now proud of me in this special moment. May Allah have mercy on him and bless him with heaven.

I would extend my gratitude and thanks to my dear ‘‘Mother’’ a source of motivation and strength during all the difficult moments who devoted het time and life to make us happy and successful.may god bless her life with good health and happiness

Also ,I dedicate this work to my sisters ‘‘Asmaa & Ayat’’ and my brothers, ‘‘Mohamed & Ahmed’’ who helped me and support me through the work.

Last but not least, this thesis is dedicated to my little heart, my twin sons, ‘‘Mohamed and Yasmine’’, who were my great source of motivation and inspirationfor me.

Abstract

A Comparative Study of Antidiabetic effect of Zinc, Chromium and Selenium Nanoparticles in Rats. Rasha Mustafa Hassan Amin, Ph.D. degree, Biochemistry and Nutrition Department, Faculty of Women for Art, Science and Education, Ain Shams University.

This study was intended to evaluate the antidiabetic effect of single or combined administration of zinc oxide nanoparticles (ZnONPs), chromium oxide nanoparticles (Cr_2O_3NPs), and selenium nanoparticles (SeNPs), on genetic and metabolic insult in fructose/streptozotocin diabetic rat model. Type 2 diabetes mellitus was induced by feeding adult male albino rats with a high fructose diet accompanied by a single *i.p.* injection of streptozotocin (STZ). The rats were divided into 6 groups (10 rats/each): healthy (G1), diabetic control (G2), ZnONPs treated (G3, 10 mg/kg b.wt), for Cr_2O_3NPs treated (G4, 1 mg/kg b.wt), SeNPs treated (G5, 0.4 mg/kg b.wt) and nanoparticles mixture treated (G6). The results displayed that diabetes significantly decreased body weight, serum insulin, C-peptide, adiponectin levels, erythrocyte glutathione peroxidase and serum superoxide dismutase activities, as well as high-density lipoprotein cholesterol, and total antioxidant capacity levels. While, it caused a substantial increase in serum glucose, glycosylated Hb, C-reactive protein, atherogenic index, HOMA–IR, malondialdehyde, lipid profile, interleukin-6 levels, liver and kidney functions parameters. Furthermore, the findings showed a decrease in hepatic insulin receptor substrate-1 (IRS-1) mRNA expression level and adipocyte peroxisome proliferator-activated receptor (PPAR-γ) mRNA expression level in type 2 diabetic rats. DNA damage was confirmed by performing the comet assay. Moreover, histological observation and measuring the lesion score of pancreatic and hepatic tissues were performed, which were consistent with the biochemical results. The present study confirmed that oral administration of ZnONPs, Cr_2O_3NPs, SeNPs, and their mixture improved all the biochemical and genetic parameters toward normal levels and ameliorated the diabetic consequences that were manifested by restricting cellular DNA damage which maintaining pancreatic and hepatic tissues from oxidative damage. These nanoparticles showed antidiabetic, anti-inflammatory, antioxidant, hypolipidemic, and antiapoptotic agents. The best mitigated antidiabetic effect was observed in the mixture administered group as it combined all previous synergetic mechanisms of each single compound.

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