Assessment of Hepatotoxicity Induced by Silver Nanoparticles and Possible Therapeutic Effect of Silymarin and Vitamin E in Adult Male Albino Rat:Histological, immunohistochemical and Biochemical study.

Thesis

Submitted in Partial Fulfillment
Of Master Degree in Anatomy and Embryology

Presented By

Abdullah Mahmoud Samy Abdel Kader
M.B., B.Ch.

Under Supervision of

Prof.Dr.Maha Khaled Abdel Wahed

Professor of Anatomy and Embryology
Faculty of Medicine
Fayoum University

Dr. Asmaa Wageh Tahef Tawfik

Lecturer of Anatomy and Embryology
Faculty of Medicine
Fayoum University

Dr. Shimaa Aly Rouby Mostafa

Lecturer of Anatomy and Embryology
Faculty of Medicine
Fayoum University

Faculty of Medicine
Fayoum University

2025

Summary

The present work was designed to clarify the histopathological, immunological and biochemical changes that occur in the liver following AgNPs injection in adult male albino rat and investigate the possible therapeutic role of Silymarin and Vitamin E supplementation .after AgNPs induced hepatotoxicity

Sixty adult male albino rats of Sprague Dawley strain weighing 150-200 g. were divided into six groups: GI(Normal control) received no medications. GII(Sham control) further subdivided into subgroup II-A (Normal saline treated) was given normal saline orally daily for 30 days and subgroup II-B (Olive oil treated) was given 4 ml olive oil /kg/day orally for 30 days. GIII(Silver nano particles treated) was injected I.P with 0.5 mg AgNPs/kg/day for 30 days. GIV(Silymarin treated group) was injected I.P the calculated dose of AgNPs for 30 days, then starting from the 31st day in 100 mg Silymarin /kg/day was given orally for 30 days. GV (Vitamin E treated) was injected I.P the calculated dose of AgNPs for 30 days, then, starting from the 31st day, 400mg Vitamin E /kg/day was given orally for 30 days. GVI (Silymarin and Vitamin E treated) was injected the calculated dose of AgNPs for 30 days, then, starting from the 31st day, the calculated doses of Silymarin and .Vitamin E was given concomitantly orally

By the end of each experimental period, the rats were sacrificed by cervical dislocation. The rat's liver were extracted and prepared for light .microscopic and immunhistochemical examination

AgNPs injection in GIII showed various pathological changes with hepatic architecture distortion, dilated congested CV, PV and sinusoids, .mononuclear infiltration and areas of extracellular hemorrhage

Monotherapy with either Silymarin in GIV or Vitamin E in GV showed partial improvement of pathological changes, while, Silymarin and vitamin E co-treatment in GVI lead to retrieving almost the normal

histological architecture. These observations were validated by high .statistically significant between GIII and control, IV, V and VI groups

The histological findings were confirmed biochemically via ALT, AST, ALP and MDA, which were statistically significantly higher in G-III compared with those of the control groups. Administration of Silymarin alone in G IV or Vitamin E alone in GV reduced liver enzymes significantly compared with G III. While, combination of both in GVI .almost normalized liver enzymes levels as compared with G III

Immuno-histochemical examination for (BCL-2) showed strong expression in the hepatocytes of the control groups, which was significantly reduced following AgNPs injection in G-III. On the other hand, therapeutic groups G-IV, G-V and GVI reigned Bcl-2 expression .within the hepatocytes with near normal results found in GVI

It could be concluded that combined Silymarin and Vitamin E therapy can notable enhance antioxidant function and reduced inflammatory processes to counter AgNPs induced hepatotoxicity more than

- monotherapy by Silymarin or Vitamin E