DF-843
[1-5]

RESEARCH ARTICLE Agricultural Science Digest

Effect of Coriander Seed Extract on Biochemical Against Alloxan-Induced Liver and Kidney Damage of Male Rats

Ammar Jawad Kadhim[1], Zainab Haytham Razooki[2], Maha Mustafa Assim[1]
Assala Arkan Jawad[2], Hiba Mohammed Al-Khuzaay[3], Ahmed Flayyih Hasan[4,5]

10.18805/ag.DF-843

ABSTRACT

Background: Diabetes in rats is a condition used in research,It is typically induced using a chemical toxic to pancreatic cells, such as alloxan, Coriander seeds and leaves are both cooling in nature.They are particularly effective in reducing body heat and aiding digestion.

Methods: Twenty male albino rats were divided into four groups, with five rats each: Group 1 - control; Group 2 - coriander seed extract; Group 3 - diabetic; and Group 4 - diabetic + coriander seed extract.

Result: Our current results showed that diabetic rats in the third group had an increase in Liver Enzymes and Kidney Function levels on the first day after induction of infection when compared to the first group. When treating rats in the fourth group with Coriander Seed Extract we noticed a decrease in Liver Enzymes and Kidney Function on the last day when compared to the third group. We conclude from our current study that with Coriander Seed Extract improves Liver Enzymes and Kidney Function in male rats.

Key words: ALT, AST, Coriander seed extract, Creatinine, Diabetic, Urea.

INTRODUCTION

Diabetes in rats is a condition used in research. It is typically induced using a chemical toxic to pancreatic cells, such as alloxan, leading to symptoms similar to those of human diabetes, such as high blood glucose, increased thirst, frequent urination and weight loss. These studies aim to understand the mechanisms of the disease and test potential treatments. It has been observed that some plant extracts and treatments may improve glycemic and lipid profiles in affected rats (Fajarwati *et al.*, 2023; Hamadjida *et al.*, 2023).

Diabetes in both humans and rats tend to feature similar signs/symptoms, including; high blood glucose, thirst (polydipsia), urination (polyuria), glucose being lost through urine (glucosuria), hunger (polyphagia), stomach problems and fatigue-along with unexplained weight loss. *e.g.* (Edo *et al.*, 2024).

The causes of diabetes vary depending on the type, but generally include insulin resistance or insufficient pancreatic production. Causative factors include genetics, overweight and obesity, physical inactivity, unhealthy diets, aging and psychological stress. The majority of people who have type 2 diabetes develop it from a combination of their genetic predisposition and lifestyle habits (Alhattab *et al.*, 2023; Onyibe *et al.*, 2021), whereas type 1 diabetics have diabetes due to an autoimmune disease where the immune system destroys the beta cells of the pancreas (Al-Masri *et al.*, 2024; Onyibe *et al.*, 2021).

Coriander seeds and leaves are both cooling in nature.They are particularly effective in reducing body heat and aiding digestion. Coriander water: Soak a teaspoon of coriander seeds in water overnight. Strain and drink the water in the morning (Ballı *et al.*, 2024).

[1]Ibn Sina University of Medical and Pharmaceutical Sciences, Baghdad, Iraq.
[2]Department of Biology, College of Science, Al-Nahrain University, Jadiriya, Baghdad, Iraq.
[3]Department of Science, College of Basic Education, Mustansiriyah University, Baghdad, Iraq.
[4]Biotechnology Research Center, Al-Nahrain University, Baghdad, Iraq.
[5]Department of Medical Laboratory Techniques, College of Health and Medical Technology, Al-Farabi University, Baghdad, Iraq.

Corresponding Author: Zainab Haytham Razooki, Department of Biology, College of Science, Al-Nahrain University, Jadiriya, Baghdad, Iraq. Email: zainab.haytham@nahrainuniv.edu.iq

How to cite this article: Kadhim, A.J., Razooki, Z.H., Assim, M.M., Jawad, A.A., Al-Khuzaay, H.M., Hasan, A.F. (2026). Effect of Coriander Seed Extract on Biochemical Against Alloxan-Induced Liver and Kidney Damage of Male Rats. *Agricultural Science Digest.* 1-5. doi: 10.18805/ag.DF-843.

Submitted: 08-01-2026 **Accepted:** 13-02-2026 **Online:** 11-03-2026

One benefit of coriander is that it reduces skin inflammation. both cineole and linoleic acid are found in coriander, which also has diuretic qualities, lowers blood pressure, is a rich source of calcium, controls diabetes, and heals wounds and mouth ulcers.promotes digestion and treats osteoporosis (Elbatawy *et al.*, 2025).

In addition to being an ingredient in Indian food, coriander is also good for helping maintain the health of the liver since it has been used for centuries in traditional Ayurvedic medicine for the treatment of liver disorders and improving digestion (Boujbiha *et al.,* 2025; Gurram *et al.,* 2022).

MATERIAL AND METHODS

Induction of alloxan in male rats

After 24 hours of fasting, 10 male rats received an intraperitoneal injection of alloxan at a dose of 150 mg/kg BW. This chemical can cause hypoglycemia due to insulin leakage into the pancreas and beta cell damage according to Kim, 2024. The successful completion of the induction process was confirmed the next day after measuring the glucose levels of the 10 rats using a blood glucose meter (PreciChek Autocode, AC-302, Germany).

Animals

Twenty adult male albino rats (200-225 g) were used in an experimental and were obtained from the Biotechnology Research Center, Al-Nahrain University. The rats were kept at 50% (±10%) relative humidity, temperature 20-25°C and 12 hours darkness, then the animals were divided into 4 groups of 5 animals each. Water and food were provided ad libitum throughout the experiment. The rats were separated into special cages and divided into four cages.

Experimental design

Twenty male rats were divided into four groups, each containing five rats.

Gp 1:. A healthy, non-diabetic group that received only saline.

Gp 2:. A group of non-diabetic animals that received Coriander Seed Extract @ 250 mg/kg according to (Dewi *et al.*, 2025).

Gp 3:. A group of diabetic animals that did not receive treatment dose (150 mg/kg body weight) according to (Kim, 2024).

Gp 4:. A group of rats with diabetes that received Coriander Seed Extract.

A 4-week experimental period followed by euthanasia and dissection of animals, collection of samples (tissue and blood), centrifugation of blood for evaluation of biochemical indices and histological fixation of lung and kidney tissues in formalin-containing glass containers were performed.

Biochemical assays

The colorimetric assay kits for liver and kidney function and lipid profiles were acquired from Spectrum-diagnostics in Cairo, Egypt According to (Alyasiri *et al.*, 2025; Alankooshi *et al.,* 2023; Abd El-Rahmana *et al.,* 2024).

Ethical approval

The experiment that will be performed included ethical approval obtained through the Biotechnology Research Center - University of Nahrain for November 2024.

Statistical analysis

The statistical software package called Statistical Package for Social Sciences (SPSS) (R) (Version 26 for Windows) was used to conduct one-way analysis of variance (ANOVA) on the data collected.

RESULTS AND DISCUSSION

Effect of coriander seed extract on body weight levels

Through Fig 1 the statistical analysis shows the effect of sugar levels on the first and last day of the experiment, The weight of the animals that were infected with diabetes decreased on the last day when compared to the first day, while for the animals that were infected with diabetes and treated with Coriander Seed Extract, we notice an increase in weight compared to the weight on the first day.

The effect of coriander seed extract on liver function

As illustrated in Fig 2, there was statistically significant elevation in ALT and AST levels within the diabetic (Gp3) laboratory animals compared to the normal control. Conversely, ALT and AST activity in the diabetic(s) treated with the

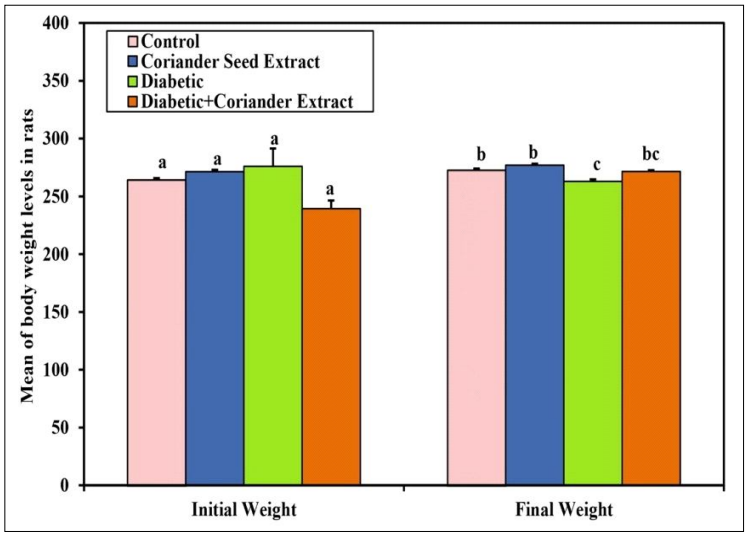


Fig 1: The effect of coriander seed extract on Body weight levels in rats on different days.

coriander seed extract (Gp4) decreased as compared to Gp3.

The effect of coriander seed extract on kidney function tests

The study results recorded on a Fig 3 demonstrate an overall improvement in kidney function among all tested groups. The diabetic group (Gp3) of animals exhibited a significant elevation in urea and creatinine levels compared to animals from both the control groups (Gp1 and Gp2). Additionally, when comparing the diabetic animals (Gp3) to the animals treated with coriander seed extract (Gp5), there was a significant drop in both urea and creatinine levels for the animals receiving coriander seed extract.

Diabetes is a major health issue, with an estimated 366 million people globally predicted to have the disease by 2030, up from 171 million in 2000 (Wild *et al.*, 2004; Guzman-Vilca *et al.*, 2025; Al-Saeedi *et al.*, 2026: Al-Obaidi *et al.*, 2022).

Important organs for regulating blood glucose levels include the kidney and liver. Diabetes results in significant changes to the liver and pancreas, which compromise glucose metabolism and homeostasis (Lema-Pérez *et al.*, 2021; Gerich *et al.*, 2010).

Diabetes induced chronic and permanent hyperglycemia leading to excessive oxidative stress compromising the antioxidant defense mechanism and increasing the production of additional free radicals in preclinical models (González *et al.*, 2023; Al-Obaidi *et al.,* 2022; Al-Dulimi *et al.*, 2025).

Because of oxidative stress, alloxan has strong toxic effects on islet β cells, which leads to pancreatic β cell failure. Alloxan caused hyperglycemia in this study along with significant pathological alterations in the islets of

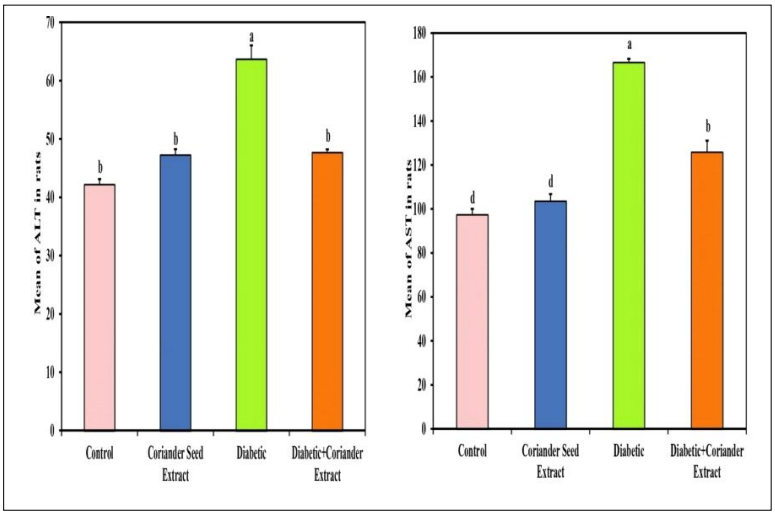


Fig 2: The effect of coriander seed extract on Liver Function tests in rats of different groups.

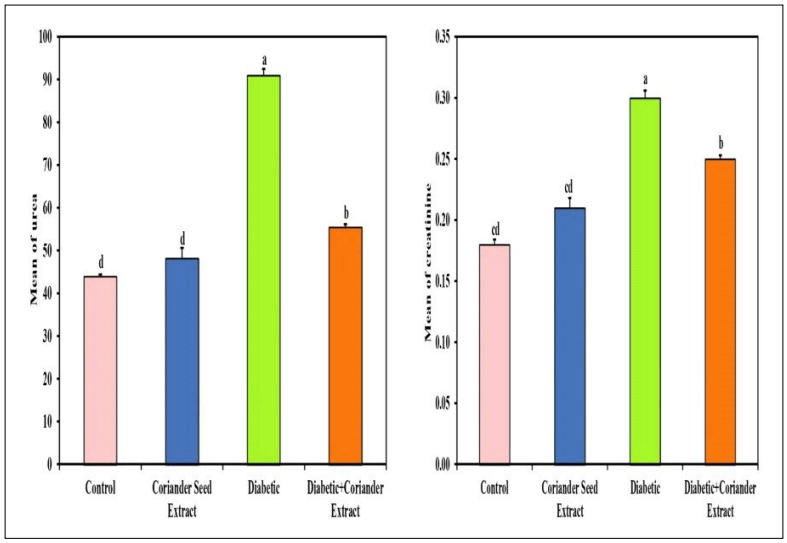


Fig 3: The effect of coriander seed extract on Kidney Function tests.

Langerhans, such as necrosis, degeneration and hypocellularity (Robertson *et al.*, 2006).

Our study agrees with those who conducted numerous experiments on the role of medicinal plants in treating or preventing diabetes in laboratory animals. Among their recommendations was that further experiments be conducted on the role of plants in influencing diabetes (Ighodaro *et al.*, 2017).

Alloxan-injected rats have been shown to lose weight after thirty (30) days of being diabetic (Fig 1). The weight loss observed in these rats is consistent with the results obtained from studies by Maithili *et al.* (2011) and Solikhah *et al.* (2021), as diabetes is known to cause weight loss in rats. The values of ALT and AST activities and urea and creatinine concentrations (Fig 2 and 3) all significantly increased in the diabetic (alloxan-treated) groups of rats, confirming the greater risk for rats with diabetes to have abnormalities in liver and kidney function tests, as shown in El Batran *et al.* (2006) and Adesokan *et al.,* (2009).

When treating diabetic laboratory animals in the fourth group with coriander seed extract, we noted in (Fig 1) a clear improvement in the weight levels of laboratory animals on the final day when compared to the third group. In addition, the results reported here support the findings of both El-Hennamy *et al.* (2025) and Elbatawy *et al.* (2025).

We noted in (Fig 2 and 3), the fourth group that was treated with coriander seed extract, a high significantly $p \leq 0.05$ improvement in liver and kidney functions in laboratory animals when compared to the third group. The findings of this presented data correspond with the results obtained from two studies by Hassan *et al.* (2022) and Nisa *et al.* (2025) documenting the nutritional effectiveness associated with coriander seeds and suggest the need for continued experimental evaluation of this plant.

CONCLUSION

We conclude from our study that coriander seed extract improves biochemical indicators in the liver and kidneys of diabetic rats and we suggest further research on coriander seed extract in the future.

Conflict of interest

All authors have no conflicts of interest.

REFERENCES

Abd El-Rahmana, H.A., Hasanb, A.F., Alyasiric, T., El-Wahshd, H. M., Althubyanie, S.A., Basyonyf, M.A. and Mahmodf, D. H. (2024). Co-treatment with cranberry and vitamin-C mitigates reproductive toxicities induced by phenobarbital in male rats. *Cell Physiol Biochem*. **58:** 722-738.

Adesokan, A.A., Oyewole, O.I. and Turay, B.M.S. (2009). Kidney and liver function parameters in alloxan-induced diabetic rats treated with aloe barbadensis juice extract. *Sierra Leone Journal of Biomedical Research*. **1(1):** 33-37.

Alankooshi, A.A., Alankooshi, A.A., Hasan, A.F., Tousson, E., El-Atrsh, A. and Mohamed, T.M. (2023). Impact of coriander seeds extract against thyroidectomy induced testicular damage and DNA replication in male rats. *OnLine J Biol Sci.* **23(2):** 193-201.

Al-Dulimi, A.G., Ali Al Lateef, S., Hadi, M., FH Al-Obaidi, Z., Flayyih Hasan, A. and M El-Wahsh, H. (2025). Modification of gold nanoparticles provides antioxidant and anti-tumor properties. *Asian Pacific Journal of Cancer Prevention*. **26(11):** 4219-4225.

Alhattab, D.M., Isaioglou, I., Alshehri, S., Khan, Z.N., Susapto, H.H., Li, Y., Hauser, C.A. *et al.* (2023). Fabrication of a three-dimensional bone marrow niche-like acute myeloid Leukemia disease model by an automated and controlled process using a robotic multicellular bioprinting system. *Biomaterials Research*. **27(1):** 111.

Al-Masri, A. A., Ameen, F., Davella, R. and Mamidala, E. (2024). Antidiabetic effect of flavonoid from Rumex vesicarius on alloxan induced diabetes in male albino Wistar rats and its validation through in silico molecular docking and dynamic simulation studies. *Biotechnology and Genetic Engineering Reviews*. **40(4):** 4479-4494.

Al-Obaidi, Z.F. and Okhti, Z.A. (2022). Histological effect of Plantago lanceolata on different Mice Organs. *Research Journal of Pharmacy and Technology*. **15(7):** 3241-3244.

Al-Obaidi, Z.F., Samawi, F.T., Hashem, R., Al-Musawi, B.J., Al-Dujaily, S.S. and Baher, H. (2022). Monocyte chemotactic protein-1 concentrations and expression of women with endometriosis undergoing IVF cycles. *Materials Today: Proceedings*. **49:** 2648-2653.

Al-Saeedi Hussein Faris Rawa, Mwafaq Khalid Raghad, Jasim Adel Noor, Al-Obaidi F.H. Zina, Hasan Flayyih Ahmed, El-Wahsh M. Hany (2026). Nephrotoxicity of Iron Oxide Nanoparticles in Male Mice. *Agricultural Science Digest*. **46(1):** 38-43. doi: 10.18805/ag.DF-751.

Alyasiri, T., Hameed, H.M. and Hasan, A.F. (2025). The Effects of bisphenol a of polycarbonate plastics on various blood and fertility parameters, along with histological changes in male albino rats. *Asian Journal of Dairy and Food Research*. **44(2):** 313-319. doi: 10.18805/ajdfr.DRF-435.

Ballı, U., Bozkurt Doğan, Ş., Öngöz Dede, F., Gülle, K., Çölgeçen, H., Avcı, B. and Kurtiş, M.B. (2024). Effects of coriander on the repair process of experimentally-induced periodontitis in rats. *Journal of Veterinary Dentistry*. **41(6):** 602-613.

Boujbiha, M.A., Chahdoura, H., Ziani, B.E.C., Hsouna, A.B., Snoussi, M., M'hadheb, M.B. and Mosbah, H. (2025). Chemical profiling of coriander, garlic and their combination to highlight the synergistic effect of the profiled compounds through *in vitro* and *in vivo* bioassays. *Food Science and Nutrition*. **13(2):** e4384.þ

Dewi, S., Handayani, S.O. and Hardiany, N.S. (2025). The effect of coriander seed extract on reducing triacylglycerol synthesis and lipid droplets in the liver of obese rats induced by high-fat diet. *Food Research*. **9(2):** 275-283.

Edo, G.I., Jikah, A.N., Onoharigho, F.O., Akpoghelie, P.O., Agbo, J.J., Ekokotu, H.A. and Owheruo, J.O. (2024). The ameliorative effects of Vernonia amygdalina extract on superoxide dismutase and glutathione s-transferase on alloxan induced diabetes on male Wistar rats. *Food Chemistry Advances*. **4:** 100620.

El Batran, S.A.E.S., El-Gengaihi, S.E. and El Shabrawy, O. A. (2006). Some toxicological studies of *Momordica charantia* L. on albino rats in normal and alloxan diabetic rats. *Journal of Ethnopharmacology*. **108(2):** 236-242.

Elbatawy, R.M., El-Mashad, A.B.E., Amin, A.A., Mostafa, S.A. and Tantawy, A.A. (2025). Comparative study of the antidiabetic and hepatoprotective effects of coriander seed extract and garlic extract in an experimental diabetic rat model. *Egyptian Journal of Veterinary Sciences*. **56(13):** 175-188.

El-Hennamy, R. E., El-Yamany, N.A., Moneim, A. A., Mahmoud, S. E., El Adawy, H. A. and Elmasry, H. A. (2025). Coriander seed oil extract abrogates hepatic biochemical and histopathological alterations associated with acrylamide intoxication in rats. *Journal of Agriculture and Food Research*. 102218.þ

Fajarwati, I., Solihin, D. D., Wresdiyati, T. and Batubara, I. (2023). Self-recovery in diabetic Sprague Dawley rats induced by intraperitoneal alloxan and streptozotocin. *Heliyon*. **9(5)**.

Gerich, J. E. (2010). Role of the kidney in normal glucose homeostasis and in the hyperglycaemia of diabetes mellitus: Therapeutic implications. *Diabetic Medicine*. **27(2):** 136-142.

González, P., Lozano, P., Ros, G. and Solano, F. (2023). Hyperglycemia and oxidative stress: An integral, updated and critical overview of their metabolic interconnections. *International Journal of Molecular Sciences*. **24(11):** 9352.

Gurram, S., Chinni Preetam, V., Vijaya Lakshmi, K., Raju, M.V.L.N., Venkateswarlu, M. and Bora, S. (2022). Synergistic effect of probiotic, chicory root powder and coriander seed powder on growth performance, antioxidant activity and gut health of broiler chickens. *PLoS One*. **17(6):** e0270231.

Guzman-Vilca, W. C. and Carrillo-Larco, R. M. (2025). Number of people with type 2 diabetes mellitus in 2035 and 2050: A modelling study in 188 countries. *Current Diabetes Reviews*. **21(1):** E120124225603.

Hamadjida, A., Metechie, L.C., Tchiengang, F.D.T., Otto, G.L.N., Eteme, O.N., Njintang, N.Y. and Mingoas, J.P.K. (2023). Antidiabetic potential of Hibiscus sabdariffa extract in alloxan-induced diabetic rats. *GSC Biological and Pharmaceutical Sciences*. **23(1):** 193-203.

Hassan, Z.M., Afify, A.A., Elsayed, F.I. and El-Mahmoudy, A.M. (2022). Lipid profile improving effect of Coriandrum sativum seed extract in rats. *International Journal of Basic and Clinical Pharmacology*. **11(5):** 356.

Ighodaro, O. M., Adeosun, A. M. and Akinloye, O. A. (2017). Alloxan-induced diabetes, a common model for evaluating the glycemic-control potential of therapeutic compounds and plants extracts in experimental studies. *Medicina*. **53(6):** 365-374.

Kim, J.M. (2024). Induction of diabetes mellitus using Alloxan in Sprague Dawley rats. *Cureu.* **16(6).**

Lema-Pérez, L. (2021). Main Organs Involved in Glucose. Sugar Intake: Risks and Benefits and the Global Diabetes Epidemic. 121.

Maithili, V., Dhanabal, S.P., Mahendran, S. and Vadivelan, R. (2011). Antidiabetic activity of ethanolic extract of tubers of Dioscorea alata in alloxan induced diabetic rats. *Indian Journal of Pharmacology*. **43(4):** 455-459.

Nisa, M.U., Umer, M., Hamza, M., Umbreen, H., Khalid, N., Raza, M. Q. and Khan, O.A. (2025). Investigating coriander leaf phenolics with HPLC UV and their role in modulating nitrogen metabolism. *Food Science and Nutrition.* **13(3):** e70029.

Onyibe, P.N., Edo, G. I., Nwosu, L.C. and Ozgor, E. (2021). Effects of vernonia amygdalina fractionate on glutathione reductase and glutathione-S-transferase on alloxan induced diabetes wistar rat. *Biocatalysis and Agricultural Biotechnology*. **36:** 102118.

Robertson, R.P. and Harmon, J.S. (2006). Diabetes, glucose toxicity and oxidative stress: A case of double jeopardy for the pancreatic islet β cell. *Free Radical Biology and Medicine*. **41(2):** 177-184.

Solikhah, T.I. and Solikhah, G.P. (2021). Effect of *Muntingia calabura* L. leaf extract on blood glucose levels and body weight of alloxan-induced diabetic mice. *Pharmacognosy Journal*. **13(6).**

Wild, S., Roglic, G., Green, A., Sicree, R. and King, H. (2004). Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care*. **27(5):** 1047-1053.