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EFFECT OF CORIANDER SEEDS EXTRACT ON SOME BIOCHEMICAL PARAMETERS AND BODY WEIGHT GAIN OF JAPANESE QUAILS

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ABSTRACT

This study was designed to evaluate the effects of administering coriander seed extract to Japanese quails at various concentrations on weight gain, liver enzymes such as ALT and AST, and male sex hormones. Forty male quails randomly divided into four groups. The groups were distributed as follows: control group received regular feed and water without any addition, the second group received a 10% concentration of the seed extract with drinking water, the third group received a 20% concentration of the seed extract with drinking water, and the fourth group received a 40% concentration of the seed extract with drinking water. The experimental period extended for four weeks duration. The results showed a significant increase in weight in the 10%, 20%, and 40% treated groups compared to the control one. ALT levels significantly decreased in the 10% and 20% treated groups compared to the control group, while the 40% coriander seed extract-treated group showed a significant increase in ALT and AST levels compared to the other treated groups. The levels of SSH, ICSH, and testosterone hormones didn't show a significant difference in the 10% extract-treated group, while their levels decreased significantly at the 20% and 40% doses compared to the control group and the 10% supplemented group. The study concluded that a 10% concentration of coriander seed extract was the best in terms of inducing weight gain while maintaining liver health and sex hormone levels, whereas higher concentrations had negative effects on liver function and sex hormone levels.

Keywords: Body weight, Biochemical properties, Coriander seed powder, Hormones, Quail.

INTRODUCTION

One of the ancient plants used in the medicine is coriander which has therapeutic characteristics and Cooking uses for that it scouted in the various studies (Ali and Malik, 2021). The 80% of plants medicinal benefits consolded to the plant extracts or their constituent components, which act as antioxidants, antibiotics, antifungal agents and growth promoters (Bashir and Safdar, 2020; Asghar, 2024; Mahleyuddin *et al.*, 2021; Al-Abdaly *et al.*, 2023).

Additionally, these plants stimulate the digestive system by increasing digestive enzyme production, enhancing liver function, promoting bile formation, and activating its secretion (Sun *et al.*, 2020; Murti *et al.*, 2023). Medicinal plants and

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essential oil extracts have proven effective in scientific applications (Abdallah *et al.,* 2019; Pan *et al.,* 2022). Consequently, there is an increasing trend towards incorporating medicinal plants into animal diets in the form of oil or water extracts and food additives to enhance human nutrition patterns and improve animal productivity and health status (Pan *et al.,* 2022; Al-Hayani, 2023).

Coriander, primarily known for its role as a flavoring agent and antimicrobial in human nutrition (Kačániová *et al.,* 2020; Hajlaoui *et al.,* 2021). The importance of coriander seeds lies in their beneficial substances and diverse chemical components, making them a valuable source of volatile oils with natural and aromatic compounds. Additionally, their high nutritional value and content of essential elements such as minerals, vitamins, and antioxidants make them suitable for nutritional studies several studies present findings, on the effects of giving coriander to animals (Hajlaoui *et al.,* 2021; Pan *et al.,* 2022).

The present work was conducted to study the effects of administering coriander seed extract at different concentrations impacts weight gain liver enzymes like ALT and AST and male sex hormones of Japanese quails.

MATERIALS AND METHODS

Preparation of Coriander Seed Powder Extract

We obtained coriander seeds from markets of Mosul ensuring they were dried before grinding them with an electric grinder. We used 100 grams of ground coriander powder mixed with 500 ml of water (20%). After soaking for 24 hours at room temperature (37°C) the mixture was heated for 30 minutes in a water bath set at 65°C. The resulting extract was filtered, concentrated as per (Nehme *et al.,* 2021). Stored at 4°C for use during the experiment Quantities have been doubled depending on the quantity required.

Experimental birds:

40 male Coturnix quails divided into four groups, aged between 55 to 65 days with weights ranging from 150, to 200 grams. Birds were purchased from local markets and housed in custom made wooden cages.

The birds were kept in conditions with temperatures ranging, between 25 and 28°C. The lighting setup involved 15 hours of light and 9 hours of darkness. Over a one week acclimation period the birds got accustomed to their surroundings. Clean water was offered via designed drinkers for easy reach.

Regarding the diet used in the research the quails were fed a diet tailored specifically for quail nutrition. The Poultry Company Limited in Mosul supplied this diet. Was consistently provided according to set schedules for all categories. Throughout the study duration the birds had access to both feed and water. The feed composition adhered to components, protein content and energy levels following guidelines set by the (National Research Council, 1994).

Administration of Coriander Seeds Powder Extract

Coriander seeds powder extract were given to quails as an aqueous solution in drinking water at concentrations of 10%, 20% and 40% respectively. This water was refreshed daily over a four week period.

Experimental Design

The birds were divided into four groups randomly including 10 birds for each. The random allocation ensured a distribution of birds, across all groups.

This study aimed to investigate how different concentrations of coriander seed powder extract affected the birds over a four-week period. All groups of birds were given a diet during the experiment.

1. Group 1 (Control); Birds received feed and water without any supplements.
2. Group 2; Birds were provided with drinking water containing a 10% of coriander seeds extract.
3. Group 3; Birds were given drinking water with a 20% of coriander seeds extract.
4. Group 4; Birds received drinking water with a 40% of coriander seeds extract.

Following the trial the animals were weighed based on their groups and their average weights were recorded. Subsequently the birds were humanely euthanized by severing the vein to collect blood samples, for biochemical analysis.

Biochemical Analyses;Measurement of Alanine Aminotransferase (ALT);
The ALT enzyme activity in serum was assessed using measurement strips from the Reflotron device produced by Roche, a company. The ALT enzyme activity was quantified in units, per liter (IU/L).

This method assesses the levels of ALT in the blood, which helps in understanding the functioning and condition of the liver.

Evaluation of Aspartate Aminotransferase (AST):
The level of activity of Aspartate Aminotransferase (AST) was measured using test strips, from the Reflotron device, made by Roche. The results appeared on the screen of the device. The enzyme activity was quantified in units, per liter (IU/L).

Hormones determination;
The levels of hormones were tested in the blood serum of quails.
- Sperm-Stimulating Hormone (SSH)
- Interstitial Cell-Stimulating Hormone (ICSH)
- Testosterone

Quail serum was analyzed for hormone levels using the VIDAS system developed by Nassa in the United States. The Enzyme Linked ImmunoFluorescent Assay (ELIFA) method, recognized for its accuracy and contemporary approach, to measuring hormone concentrations was employed for this purpose. The tests were performed in a qualified laboratory, ensuring the reliability and accuracy of hormone concentration measurements in quail serum.

Statistical Analysis:
The results of the biochemical measurements were subjected to statistical analysis using a completely randomized design in a simple experimental process. Duncan's test was used at a specific level ($P<0.05$). Additionally, the Analysis of Variance (ANOVA) was performed to extract the Least Significant Difference (LSD).

RESULTS

Table 1 showed a significant increase in weight of 10%, 20%, and 40% treated groups compared to the control one.

Table 1: The influence of coriander extract on the weight gain (g) of male quail.

Groups	Bw (g)
Control	187.81± 10.43
10% Coriander extract	247.51±12.39*
20% Coriander extract	260.52±20.31*
40% Coriander extract	255.89±0.24*

Each group consists of 10 birds and is presented as mean ± standard error, * differs from the control group at$P\leq0.05$.

Table 2 indicated that the concentration of ALT enzyme significantly decreased in the groups treated with 10% and 20% compared to the control group, while the group treated with 40% coriander seed extract showed a significant increase in ALT and AST levels compared to the other groups.

Table 2: The ALT, AST Level in the serum of Japanese quails.

Groups	ALT U/L	AST U/L
Control	49.81± 0.43	86.64 ±0 ± 0.45
10% Coriander extract	45.51±0.39*	88.30± 0.24
20% Coriander extract	40.52±0.31*	85.69 ± 0.36
40% Coriander extract	60.89±0.24*ab	98.44 ± 0.40*ab

Each group consists of 10 animals and is presented as mean ± standard error, * differs from the control group. The letters ab express the significant differences from the 10% and 20% groups, at P≤0.05.

The results indicated that the levels of SSH and ICSH hormones did not show a significant difference in the group treated with 10% extract. However, the levels of these hormones significantly decreased at the 20% and 40% doses compared to the control group and the 10% group, while dose of 40% different from all other groups (table 3).

Table 3: The impact of coriander extract on the concentrations of sex hormones in the blood serum of male quails.

Groups	SSH IU/ml	ICSH IU/ml	U\ML estosterone
Control	1.16 ± 0.03	1.07 ± 0.06	2.16 ± 0.11
10% Coriander extract	1.13±0.04	0.9±0.14	2.13±0.04
20% Coriander extract	0.50 ± 0.09*a	0.06 ±0.09 *	0.5 ±0.09*a
40% Coriander extract	0.41±0.10 *ab	0.21 ± 0.06 *ab	0.31± 0.09 *ab

Each group consists of 10 birds and is presented as mean ± standard error, * differs from the control group, The letters ab express the significant differences from the 10% and 20% groups, at P≤0.05.

DISCUSSION

The ability of coriander seeds to enhance the weight of bird groups treated with concentrations of 10%, 20%, and 40% of coriander seed powder extract, compared to the control group, can be imputed to various agents supported by scientific studies. The research suggests that the active components found in coriander seeds have an effect, on improving body weight. These components trigger the release of juices, which aids in digestion boosts appetite and enhances feed conversion efficiency ultimately leading to weight gain. Additionally coriander seeds possess antioxidant properties that help prevent the proliferation of bacteria and microorganisms in the body (Ciocarlan and Zarboc, 2015).

Moreover the nutritional makeup of coriander seeds, including carbohydrates, fats and linalool compounds has been found to enhance the processes in animals. This leads to feed conversion efficiency. Subsequently influences body weight (Latha *et al.,* 2015, Alabdaly, 2021). The aromatic oils present, in coriander seeds are thought to boost appetite aid digestion. Improve absorption in the digestive system promoting fat storage (Sriti *et al.,* 2012). Coriander seeds also contain fatty acids like linoleic acid that are crucial for stimulating hormone secretion from glands like the pituitary gland (Latha *et al.,* 2015). These substances help trigger the production of growth hormone for cell growth and division. Additionally elements found in coriander seeds can boost

metabolism and insulin secretion from beta cells impacting how carbohydrates, proteins and fats are metabolized potentially leading to weight gain or glycogen storage (Kansal *et al.,* 2011)

Overall the diverse effects of coriander seeds, on digestion appetite regulation, metabolism and hormone secretion contribute to weight gain observed in birds fed with coriander seed powder. These findings underscore the benefits of incorporating coriander seeds into animal diets at levels.

Additionally it seems that incorporating 10% or 20% coriander seed powder extract may have an impact on reducing ALT levels compared to a control group. This suggests that these doses could offer liver protection effects or, at least not harm liver function.

One possible explanation is that coriander seeds contain polyphenols, glycosides, and vitamin C, which collectively act as potent antioxidants. These compounds play a role in protecting liver cells from damage caused by oxidative stress. By enhancing antioxidant activity, coriander seeds contribute to improved liver function and increased activity of antioxidant enzymes. This, in turn, prevents free radicals from depleting the oxygen content associated with unsaturated fatty acids in cell membranes. Consequently, intracellular enzymes are preserved, preventing their release into the bloodstream and maintaining normal levels of liver enzymes in blood serum. This aligns with previous research findings (Seghatoleslam *et al.,* 2016).

**Another potential mechanism regarding the role of coriander seeds in controlling blood glucose concentrations within normal limits. Insulin influenced by coriander seeds helps to lower blood glucose levels by enhancing the liver's sugar absorption and reducing sugar secretion from the liver into the blood. Additionally, insulin promotes fat synthesis and the utilization of energy from fats. As a result, potential damage from elevated blood sugar levels to the liver is reduced, leading to a decrease in ALT enzyme levels in the blood. This explanation aligns with the regulation of blood glucose levels and its effect on liver enzyme levels, as observed in previous research (Shavandi *et al.,* 2012).

In contrast, when the dose is increased to 40%, ALT and AST levels rise significantly. This elevation suggests that the high dose may have adverse effects on the liver, leading to increased ALT, AST enzyme levels in the blood, indicative of liver damage (Seghatoleslam *et al.,* 2016).

It can be concluded that low doses of coriander seeds powder extract (10% and 20%) may be beneficial or non-harmful to the liver. Conversely, the high dose (40%) results in a significant increase in AST, ALT levels, indicating potential adverse effects on the liver at this high dose.
Increasing the dose to 40% of coriander seed extract may lead to adverse effects on the liver through several mechanisms, including direct toxicity, oxidative stress, negative metabolic reactions, inflammatory response, effects on cell membranes, and inhibition of protective enzymes. These effects collectively contribute to elevated AST, ALT levels, indicating liver damage. (Shavandi *et al.,* 2012)

A significant decrease in concentrations of male sex hormones, including and luteinizing hormone, follicle-stimulating hormone and testosterone, in male broiler chickens treated with coriander seed powder at concentrations of 20 and 40%, can be attributed to several factors. Firstly, coriander seeds are known to contain several unsaturated fatty acids (these fatty acids may play a role in hormonal regulation and contribute to significant changes in hormone levels (Sreelatha and Inbavailli, 2012).

Additionally, variation in results may be influenced by factors such as dose and administration method, type of animals studied, and duration of the experiment. In

this study, daily treatment of broiler chickens with coriander seed powder for 30 days led to a decrease in levels of testosterone, ICSH, and SSH hormones in the blood at concentrations of 20 and 40% of the extract.

Another potential explanation for the significant hormonal changes is the effect of coriander seed powder on cholesterol reduction (Cristian *et al.,* 2013). Cholesterol plays a role, in producing steroid hormones like testosterone. The potential cholesterol lowering effects of coriander seeds might affect the availability of cholesterol for testosterone production leading to a decrease in testosterone levels (Rahimi *et al.,* 2013)

These research findings emphasize the importance of considering factors that can influence outcomes. The ways in which coriander seeds affect hormone levels in male broiler chickens could be influenced by factors related to their composition and physiological effects.

The noticeable changes observed in Leydig cells suggest a decline in their ability to produce testosterone after being treated with coriander seed powder. Leydig cells are essential for testosterone production, a hormone vital for testes development, growth and proper functioning (Venkatesh *et al.,* 2002;Rajeshwari and Andallu, 2011).

The reasons behind the changes in Leydig cells may be complexed and linked to how coriander seeds affect structures and functions that impact testosterone synthesis (Peethambaran *et al.,* 2012; Kuszak *et al.,* 2016). Additionally the presence of camphor oil in coriander seeds might also play a role, in these changes. Camphor oil is known for its effects.

Studying the alterations, in Leydig cells and how they could affect testosterone production highlights the significance of exploring the mechanisms influenced by coriander seeds in relation to reproductive functions (Venkatesh *et al.,* 2002). This study emphasizes the need to comprehend these processes revealing both the advantages and disadvantages of utilizing coriander seed concentrations as a treatment method and their impact on equilibrium, in broiler chickens.

CONCLUSION

The overall results from the present study showed that administering coriander seeds extract at level 10% and 20% concentrations resulted in weight gain among quails, the higher concentration of 40% had effects on liver health and male sex hormones.

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REFERENCES

Abdallah A.; Zhang, P.; Zhong, Q. and Sun, Z. (2019): Application of traditional Chinese herbal medicine by-products as dietary feed supplements and antibiotic replacements in animal production. Current Drug Metabolism. 2019 Jan 1; 20(1): 54-64.

Al-Abdaly, Y.; Alfathi, M. and Al-Mahmood, S. (2023): Comparison of azithromycin toxicity in chickens and quails. Iranian Journal of Veterinary Medicine. 2023 Oct 1;17(4):321-32.

Alabdaly, YZ. (2021): Effect of diclofenac on the pharmacokinetics of ciprofloxacin in quail. Iraqi Journal of Veterinary Sciences. 2021 Aug 21;35(4): 777-81.Jang JP. Effect of different levels of coriander oil on performance and blood parameters of broiler chickens. Annals of Biological research. 2011; 2(5): 578-583.

Al- Hayani, A.J.M. (2023): Role of Exosomes in Tumor Development:Current Knowledge and Future Directions. E3S Web of Conferences 391, 01133 (2023) ICMED-ICMPC 2023.

Ali, SA. and Malik, A. (2021): Antimicrobial activity of Coriander sativum. Journal of Pharmaceutical Research International. 2021 Feb 5;32(47): 74-81.

Asghar, Z. (2024): Nutritional and Therapeutic Potential of Corianderum Sativum. InEthnobotanical Insights Into Medicinal Plants 2024 (pp. 214-240). IGI Global.

Bashir, S. and Safdar, A. (2020): Coriander seeds: ethno-medicinal, phytochemical and pharmacological profile. Science of Spices and Culinary Herbs-Latest Laboratory, Pre-clinical, and Clinical Studies. 2020 Aug 8;2: 39-64.

Ciocarlan, N. and Zarboc, US. (2015): Contributions to the studies on the essential oils isolated from *Coriandrum sativum* L. and *Foeniculum vulgare* Mill. Journal of Academy of Sciences of Moldova Life Sciences.2015; 2(326): 55-60.

Cristian, D.; Liliana, G.; Petru, A. and Stefan, D. (2013): Encapsulation of coriander essential oil in alginate and alginate/chitosan microspheres by emulsification of external gelation method. Inside food symposium. 2013; pp. 9-12.

Hajlaoui, H.; Arraouadi, S.; Noumi, E.; Aouadi, K.; Adnan, M.; Khan, MA.; Kadri, A. and Snoussi M. (2021): Antimicrobial, antioxidant, anti-acetylcholinesterase, antidiabetic, and pharmacokinetic properties of Carum carvi L. and Coriandrum sativum L. essential oils alone and in combination. Molecules. 2021 Jun 13; 26(12): 3625.

Kačániová, M.; Galovičová, L.; Ivanišová, E.; Vukovic, NL, Štefániková, J.; Valková, V.; Borotová, P.; Žiarovská, J; Terentjeva, M.; Felšöciová, S. and Tvrdá, E. (2020): Antioxidant, antimicrobial and antibiofilm activity of coriander (Coriandrum sativum L.) essential oil for its application in foods. Foods. 2020 Mar 4;9(3): 282.

Kansal, L.; Sharma, V.; Sharma, A.; Lodi, S. and Sharma, H. (2011): Protective role of (*Coriandrum sativum*) coriander extracts against lead nitrate induced oxidative stress and tissue damage in the liver and kidney in male mice. International Journal of Applied Biology and Pharmaceutical Technology. 2011; 3(2): 65-83.

Kuszak, AJ.; Hopp, DC.; Williamson, JS.; Betz, JM. and Sorkin, BC. (2016): Approaches by the US National Institutes of Health to support rigorous scientific research on dietary supplements and natural products. Drug Testing and Analysis. 2016;8(3-4):413-417. https://doi.org/10.1002/dta.1931.

Latha, K.; Rammohan, B.; Sunanda, BP.; Maheswai, MS. and Mohan, SK. (2015): Evaluation of anxiolytic activity of aqueous extract of *Coriandrum sativum* Linn in mice. Aprelimimary experimental study. Pharmacognosy Res.2015;7(1):547-51.

Mahleyuddin, NN.; Moshawih, S.; Ming, LC.; Zulkifly, HH.; Kifli, N.; Loy, MJ.; Sarker, MM.; Al-Worafi, YM.; Goh, BH.; Thuraisingam, S. and Goh, HP. (2021): Coriandrum sativum L.: A review on ethnopharmacology, phytochemistry, and cardiovascular benefits. Molecules. 2021 Dec 30; 27(1): 209.

Murti, Y.; Jain, D.; Semwal, BC.; Sıngh, S. and Janmeda, P. (2023): Bhaskar P. Innovative methods for extraction of essential oils from medicinal plants. International Journal of Secondary Metabolite. 2023 Jul 1;10(2): 190-230.

National Research council (1994): Nutrient requirement of poultry. Reriseded National academy press Washington D C. 1994; pp. 2- 220.

Nehme, R.; Andrés, S.; Pereira, RB.; Ben Jemaa, M.; Bouhallab, S.; Ceciliani, F.; López, S.; Rahali, FZ.; Ksouri, R.;

Pereira, DM. and Abdennebi-Najar, L. (2021): Essential oils in livestock: From health to food quality. Antioxidants. 2021 Feb 23;10(2):330.

Pan, S.; Yan, J.; Xu, X.; Chen, Y.; Chen, X.; Li, F. and Xing, H. (2022): Current development and future application prospects of plants-derived polyphenol bioactive substance curcumin as a novel feed additive in livestock and poultry. International Journal of Molecular Sciences. 2022 Oct 7;23(19): 11905.

Peethambaran, D.; Bijesh, P. and Bhagyalakshmi, N. (2012): Carotenoid content, its stability during drying and the antioxidant activity of commercial coriander (Coriandrum sativum L.) varieties. Int. J.Food Res. 2012;45(1): 342-350.

Rahimi, AR.; Babaei, S.; Kambiz, M.; Asad, R. and Sheno, A. (2013): Anthocyanin cotent of coriander leaves as affected by salicylic acid and nutrients application. Int J Biosci. 2013;3(2): 141-145.

Rajeshwari, CU. and Andallu, B. (2011): Oxidative stress in NIDDM patients: influence of coriander (*Coriandrium sativum*) seeds. Research Journal of Pharmaceutical. 2011; 2(1): 31-41.

Seghatoleslam, M.; Alipour, F.; Shafieian, R.; Hassanzadeh, Z.; Edalatmanesh, MA. and Sadeghnia, HR. (2016): The effects of Nigella sativa on neural damage after pentylenetetrazole induced serizures in rats. J Tradit Complement Med.2016; 6: 262-268.

Shavandi, MA.; Haddadian, Z. and Ismail, MH. (2012): Eryngium foetidum L. *Coraindrum sativum* and *Persicaria odorata* L. *A review. Journal of Asian Scientific Research*. 2012; 2(8) pp. 410- 426.

Sreelatha, S. and Inbavailli, R. (2012): Antioxidant, antihyperglycemic and antihyperlipidemie effect of *Coriandrum sativum* leaf and stem in Alloxan-induced diabetic rats. *Journal of Food Science*. 2012; 77(7): T119-T123.

Sriti, J.; Msaada K.; Talou T.; Faye M.; kartika A. and Marzouk B. (2012): Extraction of coriander oil by twin-screw extruder: Screw configuration and operating conditions effect. J. Industrial Crops and Products. 2012; 40: 355-360.

Sun, C.; Zhao, C.; Guven, EC.; Paoli, P.; Simal-Gandara, J.; Ramkumar, KM.; Wang, S.; Buleu, F.; Pah, A.; Turi, V. and Damian, G. (2020): Dietary polyphenols as antidiabetic agents: Advances and opportunities. Food Frontiers. 2020 Mar;1(1): 18-44.

Venkatesh, V.; Sharma, JD. and Kamal, RA. (2002): Comparative study of effect of alcoholic extracts of *Sapindusemarginatus*, *Terminaliabelerica*, *Cuminumcyminium*and *Allium cepa*on reproductive organs of male albino rats. *Asian Journal of Experiment Science*. 2002; 16(1-2): 51-63.

تأثير مستخلص مسحوق بذور الكزبرة على بعض القياسات البيوكيميائية والزيادة في وزن الجسم في السمان الياباني

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هدفت الدراسة إلى تحديد تأثيرات إعطاء مستخلص بذور الكزبرة للسمان بتركيزات مختلفة لتحديد التأثيرات البيولوجية والكيميائية المحتملة على زيادة الوزن، وإنزيمات الكبد مثل ALT وAST، والهرمونات الجنسية الذكرية. تم تقسيم أربعين سمان ذكر عشوائيًا إلى أربع مجموعات. تم توزيع المجموعات كما يلي: المجموعة الضابطة تلقت طعاماً وماءً منتظمين بدون أي إضافة، المجموعة الثانية تلقت مستخلص البذور بتركيز ١٠٪ مع ماء الشرب، المجموعة الثالثة تلقت مستخلص البذور بتركيز ٢٠٪ مع ماء الشرب، والمجموعة الرابعة تلقت مستخلص البذور بتركيز ٤٠٪ مع ماء الشرب. استمرت فترة العلاج لمدة ٤ أسابيع .أظهرت النتائج زيادة ملحوظة في الوزن في المجموعات التي تلقت ١٠٪ و٢٠٪ و٤٠٪ مقارنة بالمجموعة الضابطة. كما انخفضت مستويات ALT بشكل كبير في المجموعتين اللتين تلقتا ١٠٪ و٢٠٪ مقارنة بمجموعة السيطرة، بينما أظهرت المجموعة التي تلقت ٤٠٪ من مستخلص بذور الكزبرة زيادة كبيرة في مستويات ALT و AST مقارنة بالمجاميع الأخرى. أما بالنسبة لمستويات هرمونات SSH و ICSHوالتستوستيرون، فلم تظهر اختلافات كبيرة في مجموعة الـ١٠٪، بينما انخفضت مستوياتها بشكل كبير في الجرعات ٢٠٪ و٤٠٪ مقارنة بالمجموعة الضابطة ومجموعة الـ١٠٪. خلصت الدراسة إلى أن تركيز ١٠٪ من مستخلص بذور الكزبرة كان الأفضل من حيث زيادة الوزن مع الحفاظ على صحة الكبد ومستويات الهرمونات الجنسية، في حين أن التركيزات الأعلى كان لها تأثيرات سلبية على وظيفة الكبد ومستويات الهرمونات الجنسية.

الكلمات المفتاحية: وزن الجسم، الخصائص البيوكيميائية، مسحوق بذور الكزبرة، الهرمونات، السمان