



EFFECT OF USE OF DIFFERENT LEVELS OF CARAWAY SEED (*CARUM CARVI* L.) POWDER ON SOME PHYSIOLOGICAL CHARACTERISTICS OF JAPANESE QUAIL

¹D.K. Seger, ²Khalid C.K Al-Salhie and ³Hatim A.J. AL-Shwilly

^{1,3}Department Animal production, College of Agriculture, Sumer University, Iraq

²Department Animal production, College of Agriculture, University of Basrah, Iraq.

Email: knnz1977@yahoo.com

Abstract

The present study was investigated the effect of adding different levels of *Carum carvi* L. seed powder to diet in some physiological characteristics of Japanese quail birds. One hindered and eight birds of Japanese quail were used (40 days old) randomly distributed to four experimental groups with 27 birds per group each one with three replicates of 9 bird and sex ratio 1: 2. The first group was fed on an experimental diet and considered as control, while the second, third and fourth groups were fed on the experimental diet plus 4, 6 and 8 g/kg of *Carum carvi* L. seed powder, respectively. The results showed no significant differences in the relative weights of the testes, ovaries and oviduct, as well as LDL levels, while significant differences were found among the groups in the cholesterol concentration as the third group was the highest difference of significance compared to the first group which was recorded the lowest significant difference. The fourth group was the highest difference in the concentration of triglycerides compared to the first group which recorded the lowest significant difference, the third group showed the highest difference in HDL concentration compared to the second and first group. The third group showed the highest difference of VLDL concentration compared to the other experimental groups. Also, males blood cholesterol level was higher than that of females. We conclude from the present study that the addition of *Carum carvi* L. seed powder at a levels of 4, 6 and 8 g/kg to the diet was not affect the growth and development of gonads, as will as, led to high level of blood lipids.

Key words: *Carum carvi* L. seeds, physiological characteristics, Japanese quail, lipid profile.

Introduction

The use of antimicrobials for therapeutic purposes in bird diets causes many problems such as bacterial resistance which lead to loss of antibacterial effectiveness and thus causing a decrease in the microbial balance of the intestines (Awad *et al.*, 2009). The researchers, therefore, focused on finding viable alternatives instead of antibiotics such as medicinal plants which contain effective substances that have very few side effects on human health when compared with chemically manufactured medicines. Therefore, the addition of medicinal plants to poultry diets is one of the important ways to improve their physical and production performance (AlKassie, 2010). *Carum carvi* L. is one of the medicinal plants widely spread in Western Asia, Europe and North America and it is cultivated for its high nutritional value. It contains several essential oils (Sedlakova *et al.*, 2003). *Carum carvi* L. consider a modern medicinal plant (Deepak, 2013; El-Soud *et al.*, 2014). They are often used as veterinary and human supplements to stimulate appetite, increase digestive enzymes and improve immunity (Hassan and Abdel-Raheem, 2013). The results of Khajeali *et al.*, (2013) showed that the addition of 2% of the *Carum carvi* L. seeds to broiler diets reduced the level of triglycerides in serum as well as decreased abdominal fat compared with control group. The

addition of 1.5% and 2% of *Carum carvi* L. seeds to the Japanese quail diets at the age of 7 days resulted in a significant decrease in the level of cholesterol and triglycerides in the serum of the birds compared to control group (Jafari, 2011). Many studies indicate that the main important function of the active substances in *Carum carvi* L. is act as an antioxidant. Thus, it acts as an inhibitor of free radicals and protect tissues from damage (Alhaidar *et al.*, 2006; Crowell, 1999).

The present study aimed to investigate the effect of adding different levels of *Carum carvi* L. seeds to the diet in some physiological characteristics of Japanese quail birds.

Materials and Methods

This study was carried out at the animal house of the College of Agriculture, University of Sumer, One hindered and eight birds of Japanese quail were used (40 days old) randomly distributed to four experimental groups with 27 birds per group each one with three replicates of 9 bird and sex ratio 1: 2. housed in a homemade cage space 71 x 71 x 50 cm. the bird were fed stander diet with 19% crude protein and 2900 kcal/kg (NRC, 1994). Feed and water were supplied *ad-libitum* throughout the experimental period. The first group was fed on an experimental diet and considered as control, while the second, third and fourth groups were

fed on the experimental diet plus 4, 6 and 8 g/kg of *Carum carvi* L. seed powder, respectively.

At the end of the experiment (50 days), six birds from each group were slaughtered and the weight of testes, ovaries and oviduct were measured directly by using sensitive balance. The weights were calculated relative to the live weight of the birds, blood collected for serum preparation.

Cholesterol, triglyceride, HDL, and VLDL concentrations were measured using a ready kit (Human Co., Germany) and spectrometer. Data were analyzed using complete randomized design (CRD), using the SPSS (2012). Cholesterol, triglyceride, HDL, LDL, and VLDL data were analyzed by a two-way ANOVA (groups \times gender) the LSD was used to test the differences between the means at a significant level ($p \leq 0.05$).

Table 1 : Chemical composition of diet.

S.No.	Food component ratio	%
1	Crud protein	19
2	Calcium	2.5
3	Energy(kcal / kg)	2900
4	Phosphorus	0.35
5	Lysine	1.00
6	Methionine	0.45
7	Systeine + methionine	0.70

Results and Discussion

The results of Table 2 showed the effect of adding different levels of *Carum carvi* L. seed powder to the Japanese quail diet in the relative weights of testes, ovaries and oviduct after 50 days of experiment. The results showed no significant differences among the experimental groups in the relative weights of testes in males and ovaries and oviduct in female. The findings of the present study were consistent with the findings of Thakur *et al.* (2009), which showed that the drenching of female albino rats with the alcohol extract of *Carum carvi* L. at a dose of 150 or 200 mg / kg BW did not significantly affect the weight of the ovaries compared to control group, this results may be due to that the active substances found in the seeds of *Carum carvi* L. did not increase the levels of FSH and LH significantly (Thakur *et al.*, 2009). These hormones responsible for the stimulation of growth and development of testes in males and ovaries in females (Sturkie, 1986; Al-Salhi *et al.*, 2017).

Table 2 : Effect of the addition of *Carum carvi* L. seed powder on the relative weights of the testicles, ovaries and oviduct.

Parameters	Groups					
	T1	T2	T3	T4	SEM	P
Relative weight of ovaries	0.830	0.156	2.766	2.320	2.593	2.643
Relative weight of oviducts	0.978	0.269	3.203	3.270	3.500	3.510
Relative weight of testes	0.320	0.112	3.503	3.223	2.953	3.453

P: level of significant < 0.05, SEM: Standard error of the mean

The results of Table (3) showed the effect of adding different levels of *Carum carvi* L. seed powder to the Japanese quail diet on the concentration of cholesterol, triglycerides, HDL, LDL and VLDL in the blood of males and females of Japanese quail after 50 days of treatment. The results showed no significant ($p \leq 0.05$) difference in the LDL (low density lipoproteins) concentration among the experimental groups. The significant ($p \leq 0.05$) difference was recorded in the cholesterol concentration when the third group was recorded the highest concentration (171.96 mg/dl) compared with that of first group which recorded the lowest concentration (93.10 mg/dl).

On the other hand, group four was recorded the highest concentration of triglycerides (119.45 mg/dl), which was significantly ($p \leq 0.05$) higher when compared with that of first group (71.66 mg/dl), also, HDL concentration in the serum of third group 40.98 mg/dl which was significantly ($p \leq 0.05$) higher than of first and second groups (23.48 and 26.66 mg/dl respectively). Also, the results clarify significant ($p \leq 0.05$) differences among the experimental groups in the VLDL concentration. The third group recorded the highest concentration (20.43 mg/dl) compared to the other experimental groups. The high concentration of Cholesterol, triglycerides and lipoprotein in serum of second, third and fourth groups treated birds, maybe due to the increased levels of *Carum carvi* L. seed powder in their diet. The results of the current study were agreed with that of Behnamifar *et al.* (2015), which recorded a high level of cholesterol and triglycerides in serum of Japanese quail treated with *Carum carvi* L. seed extract in the drinking water compared to the control group, and our results were disagreed with the results of Khajeali *et al.* (2013) who found that adding 1, 1.5 and 2% of *Carum carvi* L. to broiler diets led to decreased triglyceride levels in the serum of these birds compared to control group.

This finding maybe due to the low levels of *Carum carvi* L. seed powder used in the study, as the high levels in the our study may lead to increased the level of fat in the serum.

The effect of sex factor on the results showed that the superiority of males which were recorded significantly ($p \leq 0.05$) high blood cholesterol concentration compared with that of female (136.26 and 124.44 mg/dl respectively), while no significant difference was found between males and females in other blood parameters. The reason for male superiority compared with females in the concentration of

cholesterol may be due to differences in genotypes. On the other hand, cholesterol and other blood lipids profile depend the conditions of breeding, nutrition and sexual activity (Itoh *et al.*, 1998). The results of the present study were agreed with Błaszczyk *et al.* (2006) results, which found that male Japanese quail was recorded high level of cholesterol in the serum from the sixth to tenth week of age. It can be concluded that the addition of *Carum carvi* L. seed powder at a levels of 4, 6 and 8 g/kg to the diet did not affect the growth and development of gonads and the addition led to high lipid profile.

Table 3 : Effect of adding *Carum carvi* L. seed powder on some blood characteristics of Japanese quail birds

Parameters	GROUPS							
	Sex	T1	T2	T3	T4	Mean	SEM	P
Cholesterol(mg/dl)	Males	90.76	127.60	188.66	138.03	136.26A	10.75	<0.001
	Females	95.43	97.30	155.26	149.26	124.44B	9.20	0.001
	Mean	93.10d	112.45c	171.96a	143.90b	130.35	7.03	0.007
Triglycerides(mg/dl)	Males	73.46	115.43	90.00	116.66	98.89	6.38	0.011
	Females	89.86	77.60	101.93	122.23	92.90	6.67	0.001
	Mean	71.66c	96.51b	95.96b	119.45a	95.90	4.55	0.009
HDL(mg/dl)	Males	24.96	26.80	38.20	34.20	31.04	2.02	<0.001
	Females	28.36	20.16	43.76	33.03	31.33	2.69	0.865
	Mean	26.66c	23.48c	40.98a	33.61b	31.18	1.64	0.093
LDL(mg/dl)	Males	96.20	83.86	94.83	85.66	90.14	2.79	0.595
	Females	89.36	96.43	80.56	86.56	88.23	2.71	0.605
	Mean	92.78	90.15	87.70	86.11	89.18	1.91	0.096
VLDL(mg/dl)	Males	18.36	16.13	22.46	19.26	19.05	0.90	0.020
	Females	17.56	16.83	18.40	20.10	18.22	0.54	0.340
	Mean	17.96ab	16.48b	20.43a	19.68a	18.64	0.52	0.186

HDL: high density lipoprotein , LDL: low density lipoprotein, VLDL: very low density lipoprotein, abc Means in the same row with no common superscript are different at $p < 0.05$, AB Means in the same column with no common superscript are different at $p < 0.05$. SEM : Standard error of the mea

References

- Alhaidar, I.A.; Al-Mofleh, I.A.; Mossa, J.S.; Al-Sohaibani, M.O.; Rafatullah, S. and Qureshi, S. (2006). Effect of *Carumcarvi* on experimentally induced gastric mucosal damage in wistar albino rats. *Int. J. Pharma.*, 2(3): 309-315.
- AlKassie, G.A.M. (2010). Effect of feed cumin (*Cuminum cyminum*) on the performance and some blood traits of broiler chicks. *Pakistan Journal of Nutrition*, 1: 72-75.
- Al-Salhi, K.C.K.; Al-Hummod, S.K.M. and Abass, R.J. (2017). Effect of Supplementation Different Levels of Vitamin E and Pumpkin Seed Oil to the Diet on Productive, Physiological and Reproductive Performance of Japanese Quail. *Basrah J. Agric. Sci.*, 30(2): 50-58.
- Awad, W.A.; Ghareeb, K.; Abdel-Raheem, S. and Bohm, J. (2009). Effects of dietary inclusion of probiotic and synbiotic on growth performance, organ weights, and intestinal histomorphology of broiler chickens. *Poult Sci.*, 88: 49-55.
- Behnamifar, A.; Rahimi, S.; KarimiTorshizi, M.A.; Hasanpour, S.; Mohammadzade, Z. (2015). Effect of thyme, garlic and caraway herbal extracts on blood parameters, productivity, egg quality, hatchability and intestinal bacterial population of laying Japanese quail. *Iranian Journal of Veterinary Medicine*, 9(3): 179-187.
- Błaszczyk, B.; Tarasewicz, Z.; Udałał, J.; Gączarzewicz, D.; Stankiewicz, T.; Szczerbińska, D.; Romaniszyn, K. and Jasieniecka, J. (2006). Changes in the blood plasma testosterone and cholesterol concentrations during sexual maturation of Pharaoh quails. *Animal Science Papers and Reports*, 24(3): 259-266.
- Crowell, P.L. (1999). Prevention and therapy of cancer bydietary monoterpenes. *J. Nutr.*, 129: 775-778.

- Deepak, S. (2013). Importance of *Cuminum cyminum* L. and *Carum carvi* L. in traditional medicaments a review. *Indian Journal of Traditional Knowledge*, 12: 300-307.
- El-Soud, A.; El-Lithy, N.; El-Saeed, G.; Wahby, M.; Khalil, M.; Morsy, F. and Shaffie, N. (2014). Renoprotective effects of caraway (*Carum carvi* L.) essential oil in streptozotocin induced dia-betic rats. *Journal of Applied Pharmaceutical Science*, 4: 27-33.
- Itoh, N.; Makita, T. and Koiwa, M. (1998). Characteristics of blood chemical parameters in male and female quails. *Journal of Veterinary Medical Science*, 60: 1035-1037.
- Hassan, E. and Abdel-Raheem, S. (2013). Response of growing buffalo calves to dietary supplementation of caraway and garlic as natural additives. *World Applied Sciences Journal*, 22: 408-414.
- Jafari, B. (2011). Influence of caraway on improved performance and blood parameters of Japanese quails. *Annals of Biological Research*, 2: 474-478.
- Khajeali, Y.; Kheiri, F.; Rahimian, Y. and Faghani, M. (2013). Effect of use different levels of Caraway (*Carum carvi* L.) Powder on Performance, some blood parameters and intestinal morphology on broiler chicks. *World Appl. Sci. J.*, 19: 1202-1207.
- NRC (National Research Council). (1994). *Nutrient Requirements of Poultry*. 9th Rev. Ed. National Academy Press. Washington, DC. 176 Pages.
- Sedlakova, J.; Kocourkova, B.; lojkova, L. and Kuban, V. (2003). The essential oil content in caraway species (*Carum carvi* L.). *J Hort. Sci. (prague)*, 30(2): 73-79.
- SPSS (2012). *SPSS User's Guide Statistics Version 19*. Copyright IBM, SPSS Inc., USA.
- Sturkie, P.D. (1986). *Avian Physiology*. 4th Ed. Springer-Verlag. New York, Berlin Heidelberg Tokyo.
- Thakur, S.; Bawara, B.; Dubey, A.; Nandini, D.; Chauhan, N.S. and Saraf, D.K. (2009). Effect of *Carum carvi* and *Curcuma longa* on hormonal and reproductive parameter of female rats. *International Journal of Phytomedicine*, 1: 31-38