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Response of Growing Japanese Quails to Different Types of Some Medicinal Seed Oils as Enhancing Additives

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Abstract

THIS EXPERIMENTAL study was examined to investigate the impact of some medicinal plant oil seeds on the performance, carcass and some biochemical parameters of Japanese quail chicks. A total of 450 one-week-old unsexed chicks were divided into five groups, each consisting of 90 birds (three replicates of 30 birds each), in a random and equitable manner. All quails were kept in cages brooder equipped with raised wire bottoms and placed in a temperature-controlled room until 7 weeks old. All five groups were fed a basal diet without or added with 1 ml of black seed oil, sesame seed oil, radish seed oil and a mixture of them contained 1/3 ml of each previous oil/kg diet, respectively. The results revealed that all different oil additives increased body weight and weight gain, but realized an insignificant increase in feed intake and improved feed conversation ratio compared to control. However, black oil seed realized the highest dressing%, but no significant differences were detected in giblets, edible parts and offals in different oil diets comparable to the control. Also a significant increase in creatinine and insignificant decrease in plasma total cholesterol, triglycerides and ALT (alanine transaminase) concentrations compared to the control. There were improvements in G-S-transferase, Cat, Lpo and TAC due to the tested oils compared to the control group. In conclusion, all medicinal plant oils that were used, especially black seed and sesame seed oils, improved and enhanced growth and some physiological responses, which are reflected in the productive performance of Japanese quail.

Keywords: Essential Oils, Productive Performance, Antioxidants, Carcass traits, Blood biochemical parameters.

Introduction

Consumers' awareness of the nutritional content and safety of the components in their food has grown recently. Lipid materials are readily degraded by hydrolytic reactions facilitated by lipase from food or microbes and oxidative rancidity from interactions with ambient oxygen [1]. Therefore, the attention was paid to discover additives which can suppress the lipid oxidation. Many additives as BHT and BHA are commonly added to lipid materials to retard their oxidation during storage, but these substances have shown to cause some disorders especially to the consumers [2]. It is important to search for other additives of natural sources act as antioxidants to some human being. Among these natural antioxidants are the essential oil of black cumin, sesame and radish seeds which contain compound that act as an antioxidants and antimicrobial effect. Black cumin seed oil has numerous physiological abilities as antibacterial [3], antioxidant activity [4], an anti-inflammatory capability [5] beside their used as dietary supplement and functional cosmetic. However, numerous bioactive phytosterols, such as oleic and linoleic acids, and tocopherols are abundant in black cumin oil [6&7]. Sesame seed oil exhibits remarkable stability and possesses antioxidant characteristics, the main components which are sesamol and sesamolinol derived from sesamolin and significantly lower the oil's rate of oxidation. It is also very rich in nutrients, containing minerals like iron, calcium, magnesium, copper, phosphoric acid, and silicic acid, as well as vitamins A, B, and E [8]. Additionally, 50% of the weight of the seed is made

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up of sesame oil, which also has an excellent mix of monounsaturated and polyunsaturated fatty acids and abundant natural antioxidants [9]. Radish seed oil has various health benefits, in addition its antioxidant abilities are crucial since it contains phenolic components such as tri-terpenoids, alkaloids, and flavonoids that are present both in vitro and in vivo [10&11]. Therefore, this investigation was planned and carried out to find out the effects of some medicinal seed oils (black cumin, sesame and radish) and mixture of them as feed additive of performance, carcass trials and some blood biochemistry of growing Japanese quails.

Material and Methods

Experimental design and dietary treatments

This is study was conducted at Nubaria Experimental Research Station, National Research Centre, Dokki, Cairo, Egypt. It was designed to study the effect of supplementation black Cumin seeds oil, sesame seed oil radish seed oil and mixed of 1/3 oil additives in growing Japanese quail chicks diets using 450 unsexed 1 weeks old were equally and randomly split into five experimental groups, each containing ninety birds and three replicates of each group. For seven weeks, quails were kept in environmentally controlled buildings with forced air ventilation, in brooders with raised wire flooring and thermostatically controlled cages. Every chick was raised in a comparable hygienic and administrative place. There was lighting available for roughly 23 hours per day.

Essential Oils Supplementation

The El-Captain company (Cap-Pharma) for the extraction of oils out of plants and cosmetics (license of Ministry of Health no. 337006) provided the oils of black cumin, sesame, and radish seeds used in the study, which were extracted by instantaneously controlled pressure drop (DIC) method as it extracted 95% of essential oils.

Feeding and Management

The quail's dietary needs were taken into consideration when mixing the basal experimental diet as a basal diet where kept to be iso-nitrogenous (24% CP) and iso-caloric (2900 Kcal ME / kg diet) according to [12]. The ingredients and chemical composition of the experimental basal diet are shown in Table (1). While, chemical composition of oil additives including experimental diets were determined by [13] are presented in Table (2). Also, the fatty acid content of the tested oils is presented in Tables (3-1) [14], (3-2) [15] and (3-3) [16]. Every chick was raised in identical environmental, administrative and veterinary circumstances, with a lighting schedule that ran for almost 23 hours every day. All quails were fed ad-Libitum, feed and water throughout the study period. Treatment groups received a basal diet consisting of corn and soybean meal (control, T1), while treatments 2,3 and 4 were fed control added with 1% of black seed oil (T2), sesame seed oil (T3) and radish seed oil (T4) respectively, besides T5 which fed mixed 1/3 ml of each oil used. All oils were daily added just before feeding to avoid rancidity. Live body weight (LBW) and feed intake (FI) were recorded biweekly while, weight gain (WG) and feed conversation ratio (FCR) were calculated.

Slaughter traits

Six unsexed birds from each group were picked randomly at the end of the period. The birds were put on a feed withdrawal for the entire night (about 12 hours), weighed individually to the closest gram, and then slaughtered. Each bird had its feathers removed after four minutes of bleeding, during which it was submerged in a hot water bath for two minutes. Following head removal, the carcass was manually dissected in order to ascertain certain carcass traits, including dressing percentage, eviscerated carcass (devoid of head, neck, and legs), and total giblets (empty gizzard, spleen, liver and heart).

Biochemical characterization of blood

Six unsexed quails per treatment (two quails per replication) were chosen as a final step of the experiment, and their individual blood samples were taken in non-heparinized tubes. The serum were kept individually for later use and stowed at -20 oC, then tested using colorimetric commercial kits for some biochemical parameters.

Statistical analysis

Data were analyzed by using General Linear Model (GLM) producing by [17] using simple one way analysis of variance according to the model:

$$Y_{ij} = \mu + T_i + e_{ij}$$

Where:

Y_{ij} = Represented observation in J^{th} medicinal seeds meal.

μ = Overall mean.

T_i = Effect of J_{th} medicinal seeds meal. (J= black seeds oil, sesame seeds oil, radish seeds oil or mixed oil of them).

e_{ij} = Random error.

[18] developed the Duncan's New Multiple Range Test to distinguish between variations in treatment means.

Results and Discussion

Ethical Approval

Had a final approval from Medical Research Ethics Committee at National Research Centre No. 07431223.

Chemical composition

As shown in Table 2, the tested added oils were nearly similar CP and CF while for EE were different compared to those of control, therefore, it's worth to be mentioned that oil supplemented diets showed increase in EE content diets (Table 2).

Fatty acid composition

Nigella sativa seed oil

According to Table (3-1), linoleic and oleic acids are the primary unsaturated fatty acids (USFA), making up around 80% of all fatty acids. The high ratio of linoleic to oleic acid suggests that this type of nigella oil should not be used for frying. Besides, black seed oil contains about 16.8 g of saturated fatty acids (SFA) per 100 g of total fatty acids (FA's); those are high in naturally occurring antioxidants and significantly lower the incidence of chronic diseases [19]. They added that poly phenols are powerful compound that possess strong antioxidant characteristics that due to redox potential help to neutralize and absorption of free radicals, chelating materials and quenching reactive oxygen species.

Sesame seed oil

However it is noticed that linoleic and oleic acids presented the main USFA which represent over 80% of total fatty acids of sesame oil. It is thought to be extremely stable and has an antioxidant capacity made up of seasmol and sesamolinol, which is produced from sesamolin and significantly lowers the rate of oxidation [20]. Because natural antioxidants like sesamolin, sesamin, and sesamol are present, sesame seed oil is very resistant to rancidity. It has a favorable impact on cholesterol levels because of its exceptional antioxidant capacity and high content of omega-6 polyunsaturated fatty acids, such as linoleic acid, which lower cholesterol [21].

Radish seed oil

It is noted that linoleic and oleic acids the main USFA (represent more than 40% of the total FA's) and possess antioxidants products due to the existence of phenolic compound like tri-terpenoids, flavonoids and alkaloids both in-vitro [10&11] and in-vivo [22].

Body weight (BW) and Body weight gain (BWG)

From Table 4, it is clear that BW and BWG values showed a significant improvement by the addition of the tested oils used in quail dies compared with control throughout the experimental period. However BW increased by 6.5, 7.2, 4.1 and 2.0 whereas BWG increased by 7.2, 8.0, 4.6 and 2.2% with BSO, SSO, RSO and their mixture than the control ones. The achievements of BSO on BW and BWG in current study is supported by the finding of [23] who found the highest BW and BWG for the added fed basal diet of birds with 1 ml of BSO/kg diets, also, [19] showed that increasing in BW was detected by adding 0.5 ml of BSO/kg diets for birds. Similar results were reported by [24-27]. However, adding SSO to Japanese quail diets are required for regulations of body metabolic function. Also, improving WG leads to increase the digestion and metabolism because SSO contains oleic acid and unsaturated fatty acids (USFA) that causes a rise in bile secretion to finish additional digestion that supports the WG and prevents cholesterol from being absorbed in the colon, expelling it along with wastes [28]. Further, [29] claimed that improved production results were obtained by substituting sesame seeds in Japanese quail meals. Concerning RSO, the addition of broiler diets with 0.5 g/kg of RSO detected the important maximum BWG in chickens [30]. This stimulates or promotes the effective utilization of feed nutrients which may result in better BW and BWG [31]. However supplementing RS at 1.5% level to rabbit diets led to insignificant increase of the final BW and BWG compared to the control [32]. Additionally, the presence of biologically active components like fat-soluble factors and stimulants for the digestive system may have contributed to the enhancement of BW by supplementing the diet with black seed extract, which may be essential for growth. Black seed extract supplementation increased body weight by the percentage of biologically active molecule as fort soluble unknown components (a combination of important fatty acids, including linoleic, linolenic, and arachidonic acid), which may have been necessary for growth. Also, sesame and radish or mixed seeds oil improved BW, that improvement mainly due to several types of seeds oil extract have enhanced performance of bird and led to growth, production and promoting effects, these could serve as more environmentally friendly substitutes for the usual antibiotic growth boosters found in chicken feed. These results may be attributed to the biological active compound in medicinal seeds oil component which stimulate the digestive system, our results are fully agreed with the previous study.

Feed intake (FI) and Feed conversion ratio (FCR)

Results revealed in Table 5 show it that feeding different or mixture oils to diets insignificantly improved feed intake and feed conversion ratio than that of the control diet at 1-7 weeks. Similar results obtained by [23] found that chicks feed basil diet supplemented with 1ml of black seeds oil / kg diet showed no significant differences detected in feed intake and feed conversion ratio than that of control diet. The group of SSO (T3) was slightly lower FI than those of RSO (T4) and mixture oils (T5) compared to the control. These results revealed that the SSO added group had no adverse effects on FI of Japanese quail during our experiment. Moreover, According to [33], supplementing quail with black cumin seed extract had no discernible impact on their feed intake. [29], however, demonstrated that the impact of dietary supplementation with sesame oil and seeds on the reproductive and productive performance of Japanese quail did not differ significantly from the control group in terms of cumulative feed consumption for the control group or feed consumption during the entire experiment period. Similar results were obtained by [34], investigating the effect of sesame seed on broiler rations to enhances their production performance. The first week of the four-week rearing period saw no discernible variations in the average feed intake between the sesame treatment and the control diet, with the average feed intake for each treatment being 156.5 and 158.0 grams per broiler, respectively. By the end of the experiment, there had also been no discernible variations in their average feed intake. According to [27], the amount of black seed extract in broiler diet feed that was inoculated at 1.5%, 3.0%, and 4.5% decreased linearly as the dose of black seed extract increased. Moreover, [32] found that adding Radish seeds at 1.5% level to rabbit's diets showed insignificantly (p>0.05) increased the feed intake and feed conversion ratio compared to the control diet. Concerning the Radish seed oil as feed additive for quail or poultry there is scarcity of researches to compare our results with them. By the end of the experiment, the results showed that feeding diets added with different or mixture oils did not realize any significant effect on feed intake (FI) of birds.

Carcass characteristics

Medicinal seeds oil and their mixture addition slightly affected carcass relative weight Table 6. The highest relative Dressing % was recorded for quail fed BSO (T2) which increased by about 11.05% with non-significant differences detected than that of control diet. However, there were non-significant differences detected in giblets% of quail fed different medicinal seed oils than that of control diet. Similar results were reported by [27] found that incultion levels of 1.5, 3.0 or 4.5% in broiler diet not improve heart, gizzard and liver weight of broiler. Black seed extracts of dietary were significantly effective on the dressing % than that of the control diet. However, the mixture seed oil (T5) increased by 6.64% in carcass weight % than that of the control diet. Moreover, there were no differences in sesame and radish seeds oil than that of the control diet in carcass %.

Blood parameters

In respect of plasma biochemical parameters resulting in Table 7 showed that feeding additives did not exert any significant effect on some studied parameters, whereas albumin (Al), globulin (Gl), creatinine (Cr.), G.S. transferase lipid peroxide-oxidation (LPO) and total antioxidant capacity (TAC) showed significant variations for all treatments and control. As shown from Table 7, TP concentration increased by 12.0, 15.0, 5.7 and 7.9% or groups added different oil diets, respectively with no significant increase than the control diet. The results are in harmony with [35] who showed that TP concentration was higher for group fed 2 or 3% Nigella sativa. Similar results were reported by [36]. However, significant increase for ALP by 30.4% for group BSO (T2) whereas no significant effects for the other groups were detected compared with the control. The activation of the pancreatic digestive enzymes in the stomach may be the cause of this increase in BSO. In this connection, A/G ratio showed higher value with feeding BSO (T2) than the control diet. [35] Found the highest values of A/G ratio as an indicator of good immunity status of the birds. These results are in harmony with [37]. Also, ALT concentration showed insignificant effect among treatment groups. This confirms the previous finding of [38] who made the statement that variations in blood transaminase levels could be influenced by the rate of protein metabolism which may be a function of bird's age rather than other function (as mention by ALT activity). Besides, it is important to note that glucose (G) level showed no significant higher value during the experiment. The group of BSO (T2) realized slightly higher glucose than the others and control group. This increase may be due to the immune stimulate effect of Nigella sativa. Similar results were mentioned by [21] who showed no significant effects for quails fed SSO (T3) on plasma glucose concentration. Clearly, it is observed that the insignificant effect for AL, GLO, A/G ratio, ALT and glucose levels may be inferred that the addition of the natural seed plant oils had no negative effects on the blood component, besides no deleterious effects line functions (as mentioned by ALT activity). Similar trends were observed by [39] and [40]. Another point, plasma total cholesterol (T.cho.) and tri-glycerides (T.G.) values were found to be in-significant decreased due to adding the tested additives, in which may occur in the rate of T.cho. and T.G. absorption through intestinal villi that may be decreased level in the blood [41]. In this respects, [42] showed that increasing phytogenic feed additives level lineary did not affect T.cho. and T.G. concentration in plasma of broiler chickens. Another point of view, dietary natural additives decreased T.cho. and T.G. levels and have been reported to have a hypocholestrolaemic effect in broiler [43]. Moreover, [24] showed that feeding 3% crushed and noncrushed BS reduced plasma T.cho. and T.B. concentration and found that active ingredients such as thymoquinone, thymohydroquinone and compounds like mono-USFA that lower the Cho. synthesis by hepatocytes and decreased the functional absorption of Cho. from small intestine. Sesame seeds, on the other hand, include oleic acid on USFA, which increases bile secretion to finish further digestions and prevents Cholesterol from being absorbed in the intestines [28]. Moreover, there were significant differences in plasma creatinine (Cre.) among treatment groups suggesting that kidney of quails was influenced by any of those tested additives, while significant decrease in plasma Cre. values were found in the different feed additives comparing with the control. Since uric acid is the primary byproduct of protein metabolism in poultry, the decrease in Cre. levels for all studied supplements may indicate improved protein amino acid digestibility [44]. The study of the tested additives to quail diets showed increase of several enzymes as glutathione-s-transferase and catalase which lead to decrease the oxidative stress on the liver by using 3, 5 and 7% BS [45]. They highest value was recorded by RSO (T4) followed by BSO (T2), SSO (T3) and mixed (T5) respectively. However, diet treated with 0.5 and 1.0% BS detected significant decrease of malon di aldehyde (MDA) concentration production of lipid peroxidase and increased G-S-transferase concentration compared to the control [46]. Also, BS might decrease hydrogen peroxide production (H2O2), hydroxyl (OH) and super oxide (O2) radicals that are protected as result of aerobic respiration [47]. No significant effect was noted concerning lipid peroxidation formation on our study between treated and control groups. It could be attributed that adding natural additives had no effect on lipid peroxide (oxygen free radicals) in Japanese quail tissue in our treatments and control diets. In this respect, [47] showed that diet added with 0.5 and 1.0% BS led to significant decrease production of lipid peroxidase compared to control diet. However, total antioxidant capacity (TAC) significant increase with BSO (T2) than the control, while no significant differences were detected among the other treated than the control. In this respect, [19] found that BSO contain about 16.8 g of saturated fatty acids/100 g of the total fatty acids, which considered rich in natural antioxidant and demonstrate a key role to reduce chronic diseases risk. Also, they added that, polyphenol are powerful compound which have strong antioxidant properties which due to redox potential that help in the neutralizing and adsorption of free radicals chelating materials and quenching reactive oxygen species. On the other hand, Sesamolinol, which is derived from sesamolin, and sesamol create an antioxidant system in SSO, which significantly lowers the oxidation rate of the material. Sesamolin is also highly stable [20]. Moreover, RSO has been showed to process antioxidants properties due to of phenolic compounds as tri-terpenoids, alkaloids, flavonoids both in-vitro [10]. While antioxidant status such as G-S-transferase, catalase and TAC enzymes revealed significant differences among treatments and control. Likewise, [48] and [49] showed that the TAC of 13S powdered was efficient to avoid oxidations in the quail. A few research examined the effects of BSO, SSO, RSO, and their combination as independent dietary supplements, so the scarcities of researches to compare our results with them in Japanese quail.

Conclusion

All medicinal plant oils that were used, especially black seed and sesame seed oils, improved and enhanced growth and some physiological responses, which are reflected in the productive performance of Japanese quail.

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Conflict of interest

The authors declare that they have no conflict of interest

Funding statement

Self-funding

TABLE 1. Composition and calculation analysis of the basal diets used in the study (starter – growing).

Ingredients	Basal diet
Yellow corn	57.10
Soya meal (44%)	34.00
Corn gluten meal (62%)	6.00
Di-calcium phosphate	0.80
Limestone	1.35
Sodium chloride	0.40
Vit.-min.-premix*	0.30
Di-methionine	0.05
Total	100.00
Calculated analysis	
Crude protein	23.97
ME. Kcal/Kg	2892
Lysine %	1.24
Methionine %	0.45
Cysteine %	0.37
Calcium %	0.96
Available-phos. %	0.46

*Vitamins and mineral Premix each Kg contains vit. A 12000 IU, vit. D_3 3000 IU, vit. E 12 mg, vit. K 1 mg, vit. B_{12} 0.02 mg, Biotin 0.05 mg, Choline chloride 0.16 mg, copper 3 mg, iron 30 mg, manganese 40 mg, zinc 45 mg and selenium 3 mg.

TABLE 2. Chemical composition of medicinal seed oils with experimental diets.

Treatment	Moisture %	Components % on dry matter basis					
		OM	CP	CF	EE	NFE	Ash
Control diet	11.08	93.99	23.85	2.65	3.21	64.28	6.01
Nigella seed oil diet	13.07	92.51	23.33	2.75	3.95	62.48	7.49
Sesame oil seed diet	10.48	92.04	23.44	2.56	5.50	60.54	7.96
Raddish seed oil diet	12.57	92.98	23.99	2.91	5.36	60.72	7.02
Mixed seed oil diet	12.28	92.28	23.23	2.69	5.86	60.50	7.72

TABLE (3-1). Fatty acids composition % of Nigella seed oil [14].

Fatty acid	Cold press extraction	Solvent extraction oil
Myristic acid C_{14}:0	1 ± 0.1	0.2 ± 0.1
Palmitic acid C_{16}:0	13 ± 0.2	11.9 ± 0.2
Palmitoleic acid C_{14}:1	0.2 ± 0.1	0.2 ± 0.1
Steoric acid C_{18}:0	2.3 ± 0.1	3.2 ± 0.1
Oleic acid C_{18}:1	23.8 ± 0.1	24.9 ± 0.5
Linoleic acid C_{18}:2	58.5 ± 0.1	56.5 ± 0.7
Linolenic acid C_{18}:3	0.4 ± 0.1	0.2 ± 0.1
Arachidic acid C_{20}:0	0.5 ± 0.1	0.2 ± 0.1
∑Saturated fatty acids	16.8 ± 0.5	15.5 ± 0.5
∑UnSaturated fatty acids	82.9 ± 0.5	82.1 ± 0.5

TABLE (3-2). Fatty acids composition % of sesame seed oil [15].

Fatty acid	Cold press extraction
Palmitic acid C_{16}:0	12.96
Palmitoleic acid C_{14}:1	0.22
Steoric acid C_{18}:0	5.76
Oleic acid C_{18}:1	41.68
Linoleic acid C_{18}:2	38.29
Linolenic acid C_{18}:3	0.48
Arachidic acid C_{20}:0	0.53
Ficosenoic acid C_{20}:1	0.15
∑Saturated fatty acids	19.25
Mono-unsaturated fatty acids	42.05
Poly-unsaturated fatty acids	38.77

TABLE (3-3). Fatty acids composition % of radish seed oil [16].

Fatty acid	Centrifuged oil (CO) %	Filtered oil (FO) %	Solvent extracted oil (SEO) %
Myristic acid C_{14}:0	0.0	0.0	0.0
Palmitic acid C_{16}:0	3.9	4.5	3.5
Steoric acid C_{18}:0	2.3 ± 0.1	5.76	0.0
Vaccenic acid C_{18}:1	0.0	0.0	0.0
Oleic acid C_{18}:1	31.3	29.5	31.1
Linoleic acid C_{18}:2	7.7	10.6	9.2
Linoleic acid C_{18}:3	3.5	7.0	6.0
Arachidic acid C_{20}:0	9.0	9.2	7.8
Gadoleic acid C_{20}:1	0.0	0.0	0.0
Behenic acid C_{22}:0	44.6	39.2	42.2
Erucic acids C_{22}:1	-	-	-

TABLE 4. Body weight and body weight gain of growing Japanese quail fed different oil.

Item	Control	Black seed oil	Sesame seed oil	Radish seed oil	Mixture	Overall mean
			Body weight (g)			
1st Week	24.71	24.87	24.84	24.73	24.70	24.77 ± 0.11
3rd Week	80.27^{b}	89.45^{a}	94.82^{a}	89.02^{a}	93.73^{a}	89.46 ± 1.55
5th Week	177.38^{b}	186.81^{ab}	192.82^{a}	187.56^{ab}	194.57^{a}	187.83 ± 2.01
7th Week	242.25^{d}	258.07^{a}	259.77^{a}	252.18^{b}	247.19^{c}	251.89 ± 1.84
			Body weight gain (g)			
1-3 Week	55.57^{b}	64.59^{a}	69.98^{a}	64.29^{a}	69.03^{a}	64.69 ± 1.56
3-5 Week	97.11	97.36	98.00	98.54	100.84	98.37 ± 1.64
5-7 Week	64.86^{a}	71.26^{a}	66.95^{a}	64.61^{a}	52.62^{b}	64.06 ± 2.09
1-7 Week	217.54^{c}	233.21^{a}	234.93^{a}	227.44^{b}	222.49^{bc}	227.12 ± 1.84

*a,b,c and d in each column means having different superscripts are significantly different ($p<0.05$)

TABLE 5. Feed intake and feed conversation of growing Japanese quail fed different oil.

Item	Control	Black seed oil	Sesame seed oil	Radish seed oil	Mixture	Overall mean
			Feed intake (g)			
1-3 Week	189.69	180.98	186.09	177.22	179.31	182.66 ± 1.93
3-5 Week	266.09	255.89	266.73	249.88	260.12	260.14 ± 2.92
5-7 Week	408.12	464.14	418.47	424.36	450.81	433.18 ± 11.20
1-7 Week	873.46	902.59	868.78	878.88	892.90	883.32 ± 8.69
			Feed conversation ratio			
1-3 Week	3.45^{a}	2.81^{b}	2.66^{b}	2.76^{b}	2.60^{b}	2.85 ± 0.10
3-5 Week	2.75	2.65	2.75	2.54	2.58	2.66 ± 0.05
5-7 Week	6.29^{b}	6.52^{b}	6.24^{b}	6.61^{b}	8.63^{a}	6.86 ± 0.28
1-7 Week	4.02	3.87	3.70	3.87	4.01	3.89 ± 0.05

^{*a,b} in each column means having different superscripts are significantly different (p<0.05)

TABLE 6. Slaughter trials of growing Japanese quail fed different medicinal seed oils.

Item	LBW	Dressing%	Giblets%	Total edible parts%	Offals%
Control T_1	236.67	67.83	6.20	74.03	25.98
Black seed oil T_2	235.83	75.33	5.10	80.43	25.91
Sesame oil seed T_3	227.17	68.49	4.53	73.02	26.98
Radish seed oil T_4	249.70	68.87	4.52	73.39	26.61
Mixed seed oil T_5	237.67	74.47	6.20	80.67	26.31
Overall mean	237.41 ± 3.94	70.99 ± 1.11	5.31 ± 1.39	76.31 ± 1.75	26.36 ± 0.39

TABLE 7. Response of growing Japanese quail fed different oils on some blood parameters.

Item	Control T_1	Black seed oil T_2	Sesame oil seed T_3	Radish seed oil T_4	Mixture seed oil T_5	Overall mean
ALT (U/ml)	148.46	142.82	140.54	138.56	138.12	141.10 ± 1.28
T. Protein (g/dl)	4.03	4.50	4.61	4.25	4.35	4.35 ± 0.09
Albumin (g/dl)	1.81^{ab}	2.36^{a}	1.71^{b}	1.70^{b}	1.77^{b}	1.87 ± 0.09
Globulin (g/dl)	2.22	2.14	2.90	2.55	2,58	2.48 ± 0.12
A/G ratio	0.87^{ab}	1.16^{a}	0.60^{b}	0.68^{ab}	0.72^{ab}	0.81 ± 0.08
Glucose (mg/dl)	57.60	68.03	56.76	70.11	57.38	61.98 ± 3.25
T. Cholesterol (mg/dl)	165.9	156.23	158.73	162.77	156.30	159.40 ± 1.83
Triglycerides (mg/dl)	118.70	107.50	85.87	98.00	108.91	102.81 ± 4.42
Creatinine (mg/dl)	0.24^{a}	0.19^{b}	0.18^{b}	0.18^{b}	0.19^{b}	0.19 ± 0.00
G-S-Transf. activity	2.12^{b}	2.88^{ab}	2.31^{b}	3.10^{a}	2.30^{b}	2.54 ± 0.13
CAT activity (U/ml)	1.74	3.56	2.48	1.9	2.48	2.44 ± 0.34
LPO activity	9.94^{ab}	9.99^{a}	9.81^{b}	9.99^{a}	9.96^{ab}	9.94 ± 0.03
TAC (molTrolox/L)	0.30^{b}	0.61^{a}	0.43^{ab}	0.39^{ab}	0.48^{ab}	0.44 ± 0.04

^{*a,b} in each row means having different superscripts are significantly different (p≤0.05)

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استجابة نمو السمان الياباني لبعض الأنواع المختلفة من زيوت البذور الطبية كإضافات محفزة

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الملخص

هدفت هذه الدراسة إلى معرفة تأثير بعض زيوت بذور النباتات الطبية على الأداء الإنتاجي وقياسات الذبيحة وبعض القياسات الكيموحيوية لطيور السمان الياباني، تم تقسيم 450 طائر غير مجنس بعمر أسبوع واحد إلى خمس معاملات، وكل معاملة تتكون من 90 طائر (ثلاث مكررات كل منها 30 طائر)؛ وذلك بطريقة عشوائية، وتم تربية جميع الطيور في أقفاص مجهزة بأرضيات سلكية مرتفعة ووضعها في غرفة يتم التحكم في جميع ظروفها البيئية حتى عمر 7 أسابيع، وتم تغذية جميع المعاملات الخمسة على العليقة الأساسية بدون أو مضافة مع 1 مل من زيت بذور حبة البركة وزيت بذور السمسم وزيت بذور الفجل وخليط منها يحتوي على 3/1 مل من كل زيت/كجم عليقة على التوالي. وأظهرت النتائج أن جميع إضافات الزيوت المختلفة أدت إلى زيادة وزن الجسم، وحققت زيادة غير معنوية في العلف المأكول وحسنت في معدل التحويل الغذائي مقارنة بالمجموعة السيطرة؛ ومع ذلك، حقق زيت بذور حبة البركة أعلى وزن للذبيحة، ولم يلاحظ أي فروق معنوية في الأحشاء والأجزاء الصالحة للأكل في جميع المعاملات. كما لوحظ حدوث زيادة معنوية في الكرياتينين وانخفاض غير معنوي في تركيز الكوليسترول الكلي والدهون الثلاثية والألانين ترانس أميناز مقارنة مع السيطرة. وكان هناك تحسن في مستويات G-S-transferase وCat وLpo وTAC في معاملات الزيوت مقارنة بالسيطرة. ونستنتج من ذلك أن جميع الزيوت النباتية الطبية التي تم استخدامها وخاصة زيت الحبة السوداء وزيت بذور السمسم أدت إلى تحسين وتعزيز النمو وبعض الاستجابات الفسيولوجية مما انعكس على الأداء الإنتاجي لطائر السمان الياباني.

الكلمات الدالة: الزيوت الأساسية، الأداء الإنتاجي، مضادات الأكسدة، قياسات الذبيحة، قياسات الدم الكيموحيوية.