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Effect of thyme, ginger and boldenone as growth promoters on some biochemical blood parameters in white male New-Zealand rabbits

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ABSTRACT

The present study was designed to investigate the biochemical effect of thyme, ginger and Boldenone(BOL) as growth promoters on some blood serum parameters in male New-Zealand rabbits. White New-Zealand male rabbits (n=24) were randomly divided into four main equal groups; Group I (control) rabbits fed normal commercial basal diet, Group II (Thyme) rabbits fed normal basal diet contained 5 % thyme (5gm/100gm basal diet), Group III (Ginger) rabbits fed normal basal diet contained 5 % ginger powder (5gm/ 100gm basal diet) and Group IV (Boldenone) rabbits received boldenone5% oily solution (5ml/Kg. b.wt.,) two times. The first dosage was at the onset of experiment and the second dose after 15 days. Blood samples for sera separation were collected once from all animal groups after 30 days of experiment for determination of total protein, albumin, lipids profile (total cholesterol and triacylglycerol), creatinine, aspartate aminotransferase (AST), alkaline phosphatase (ALP), in addition to reduced glutathione (GSH), and interlukin-6 (IL-6). Results after one-month treatments, no difference was found between the rabbit groups in initial body weight in the1stadministration compared 2ndadministration. There was increasing of ALP and AST with ginger and increases of ALP with thyme even their positive effect on the other concerned parameters in our study. Ginger increase the level of serum IL-6 levels and GSH concentrations, while thyme decrease its level. Thyme supplementation improved the growth performance and feed efficiency of rabbits in comparison to ginger supplementation group and control group.

1. INTRODUCTION

Producers use growth promoters to increase growth rates and improve overall efficiency and product quality. Various compounds have been tried for growth promotion, including hormones and antimicrobial agents. Natural hormones such estradiol (estrogen), progesterone and testosterone or synthetic hormones such as zeranol, melengestrol acetate and trenbolone acetate are widely used as growth promoters in animals (Jeong *et al*., 2010). Boldenone undecylenate (BOL) is one of the anabolic steroid hormones (synthetic androgenic steroid) that derived from testosterone. Moreover, BOL is applied as a growth promoter in meat producing farms in order to increase growth, productivity and feed conversion, to achieve more efficient meat production and to reduce breeding expense (Tousson *et al*., 2016).

Herbs are natural alternatives to antibiotic growth promoters (AGPs) in animal nutrition due to their antimicrobial properties. Herbal feed additives play a significant role in health and nutrition. Many herbs and their bio-active constituents possess a broad antimicrobial activity, and appetite and digestion stimulating effects (Demir *et al*., 2008). Thyme (*Thymus vulgaris* L.) is one of the popular medicinal plant mostly grown in Mediterranean region and is one of the herbal plants that have received attention as it has antioxidant and anti-bacterial (Vincent, 2002), free radical scavenging properties (Fujisawa and Kadoma, 1992), antifungal (Segvi *et al*., 2007), antirheumatic carminative (Mossa, 1987), antiparasitic, analgesic, hypotensive agent (Guseinov *et al*., 1987), anti-inflammatory (Braga *et al*., 2006), immunomodulating effect (Suzuki and Furuta, 1988). Thyme can be used traditionally for several medicinal purposes: respiratory disease, antimicrobial and antinociceptive (Mikaili *et al*., 2010).

Supplementation with thyme oil improved the growth performance and antioxidant enzyme activities in rainbow trout (Oncorhynchusmykiss) juveniles (Adem*et al*., 2015). Also, thyme contains volatile oil (consisting of 55% phenols) thymol and carvacrol, thymine, numerous types of flavonoids and vitamin E. Moreover, feeding thyme resulted in a marked increase in HDL- cholesterol concentration (Mikaili *et al*., 2010). Additionally, thyme is bioactive compounds decrease levels of the proinflammatory cytokines IL-1β, IL-6, and TNF-α (Bukovska*et al*., 2007). Dietary thyme oil increases plasma level of triglycerides, LDL-cholesterol and HDL-cholesterol in animal meat (Seo and Jeong, 2015).On the other hand, administration of ginger to animals increased their performance and boosted their immunity. Ginger contains several compounds including

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gingerdiol, gingerol, gingerdione and shogaols (Oleforuh-Okoleh *et al*., 2018). These compounds have been blocking the production of interleukins, and inflammatory markers and have antimicrobial, antioxidative and pharmacological effects (Ali *et al*., 2008). Also, gingerol is the major ingredient representing a variety of bioactivities including antitumor promotional and antiproliferative (Zhao *et al*., 2011). Therefore, the present study was designed to evaluate the biochemical effect of thyme, ginger and boldenone additives as growth promoters on male New-Zealand Rabbits.

2. MATERIAL AND METHODS

2.1. Animals:
Twenty-four white male New-Zealand Rabbits of 6-8 weeks old and average body weight 0.600 - 0.750 g were used in this study. The animals were purchased from the Laboratory Animal Research Center, Faculty of Veterinary Medicine, Benha University. The rabbits were kept in well ventilated, clean, sterile, plastic cages with wood shavings under conventional conditions and had free access to food and water. The animal room was well ventilated with 12 hrs light/dark cycle throughout the experimental period. The animal experiments were carried for a period of 30 days and according to the guidelines of the Institutional Animals Ethics Committee (IAEC).

2.2. Experimental design:
After acclimatization to the laboratory conditions, the rabbits were randomly divided into four equal groups, each of six animals, placed in individual cages as follows:
Group I (control) rabbits received normal commercial basal diet contained CP 17% and Metabolizable energy 2415Kcal/kg fed pelleted commercial feed (Ibex Co., Cairo, Egypt) and its composition according to (Source: www.vuatkerala.org, 2009); and the Chemical Composition of thyme and ginger powder based on dry matter according to Al-Jugifi, (2009) and Famurewa *et al*. (2011).
Group II (Thyme): rabbits fed normal basal diet contained 5 % thyme (5gm/100gm basal diet).
Group III (Ginger): rabbits fed normal basal diet contained 5 % ginger powder (5gm/100gm basal diet).
Group IV (Boldenone): rabbits received boldenone injection as a growth promoter 5% oily solution (Equigan®; Lab Tornel, Co., Mexico) (5ml/Kg. b.wt., injection) two times, the first dosage at the onset of experiment and the second dose after 15 days. The doses of BOL were calculated according to Paget and Barnes (1964). Body weights were recorded three times at the beginning of experiment, then after 15 day and at the end of the experiment (30 day).

2.3 Sampling:
Random blood samples were collected from all animal groups two times, at 15 and 30 days from the onset of rabbits received (Thyme, Ginger and Boldenone) as Growth Promoters.
Blood samples were collected by vein puncture of the marginal ear vein from all animal groups in dry, clean tubes and allowed to clot for 30 minutes and serum was separated by centrifugation at 3000 rpm for 10 minutes.The clean, clear serum was processed directly for determination of AST and ALP activities, then kept in a deep freeze at -20°C until used for subsequent biochemical analysis. All sera were used for determination of the following parameters:Total protein, albumin, creatinine, total cholesterol, triacylglycerols, GSH and IL-6.

2.4. Biochemical analysis:
Serum total protein, albumin, AST, ALP, creatinine, total cholesterol and triacylglycerols and reduced glutathione (GSH) concentrations were determined according to the methods described by Josephson and Gyllensward (1957), Doumas *et al.* (1971), Schumann *et al.* (2002), Rick (1990), Bartels and Bohmer (1971), Bucolo and David (1973), Lopes-Virella *et al.* (1977) and Tietze (1969), respectively. However, serum IL-6 concentration was determined by using validated ELISA kits (ENZOR life sciences) according to the method described by (Tijssen *et al*., 1985; Chard, 1990).

2.5. Statistical analysis
All values are presented as means ± standard error (SE). Statistical analyses were performed by using SPSS Version 20 using One-way ANOVA test for multiple groups' comparison. Differences among means of the two time points were analyzed using *t*- test, with $p < 0.05$ considered as significant.

3. RESULTS

3.1. Live body weight
The obtained results showed that there was no statistical significance difference between the rabbit groups in initial body weight at the 1st administration ($p = 0.51$), but there were significance ($p< 0.001$)differences between them in 2nd administration. The difference was between Ginger group and other groups. Additionally, there was a significant difference in body weight between BOL group and other groups. There was a significant increase in body weight in 2ndadministration between all rabbit groups compared to 1st administration (Table 1).

Table 1 Effect of Thyme, Ginger and BOL administration on absolute body gain in male rabbits

Animal groups	Absolute body gain (Kg) (15 day)	Absolute body gain(Kg) (30 day)	*t*	*P*	% of change
Control	1.17±0.01	1.81±0.01^{a,**}	24.33	<0.001	54.21%
Thyme	1.18±0.01	1.76±0.02 ^{a,**}	24.84	<0.001	49.85%
Ginger	1.16±0.01	2.03±0.03 ^{c,**}	25.97	<0.001	75.66%
BOL	1.18±0.01	2.27±0.02^{b,**}	35.87	<0.001	92.23%
F	0.81	115.66			
P	0.51	<0.001**			

Data are presented as mean ±SE (n=6). F: ANOVA test. **: Highly significant (P<0.01).Mean values with different superscript letters in the same column were significantly different at (P<0.05)

3.2. Biochemical parameters effect of thyme, ginger and BOL on of rabbit serum
There was no statistical significance difference between the rabbit groups in albumin at the 1st administration; but there were significance differences between them at 2nd administration and in protein at both 1st and 2nd administration. The serum protein levels at 1st administration, thyme group was different from all other groups; but no significant difference was found between other groups. On the other hand, serum protein levels at the2nd administration, the difference was between thyme group and all other groups and between BOL group and

control group, but there was no significant difference between ginger group and both BOL and control group. Also, there was significant increase in protein concentration at 2nd administration in all groups compared to the1st administration (Table 2).

The results of our study revealed that, there were statistical significance differences between the rabbit groups in AST and ALP in both 1st and 2nd administration. According to the investigation of ALP at the 1st and 2nd administration; statistically, no difference was found between thyme and ginger groups. On the other hand, there were significance differences between BOL group and all other groups and between control group and all other groups at the 1st when compared with the 2nd administration; but no significant difference was found between control, ginger or thyme groups. Additionally, there was statistical significantly increase in AST in 2nd administration in BOL group compared to 1st administration. Also, there was a significantly increase in ALP in 2nd administration in all groups (Table 3).

Table 2 Effect of Thyme, Ginger and BOL administration on serum albumin and total protein concentrations in male rabbits

Animal groups	Albumin (gm/dl) (15 day)	Albumin (gm/dl) (30 day)	*t*	*P*	% of change	Total Protein (gm/dl) (15 day)	Total Protein (gm/dl) (30 day)	*t*	*P*	% of change
Control	3.23±0.02	3.29±0.03^{a}	1.76	0.11	2.01	4.62±0.02^{a}	4.79±0.04^{a,*}	3.61	0.02	3.79
Thyme	3.26±0.04	3.32±0.02^{a}	1.34	0.24	1.91	4.91±0.04^{b}	5.26±0.09^{c,**}	5.82	0.002	7.34
Ginger	3.29±0.05	3.25±0.02^{a}	0.69	0.52	-1.01	4.64±0.02^{a}	4.83±0.02^{ab,**}	4.99	0.004	4.10
BOL	3.27±0.03	3.40±0.03^{b}	2.56	0.05	4.08	4.58±0.02^{a}	4.97±0.04^{b,**}	6.99	0.001	8.46
F	0.54	6.01				31.05	15.09			
P	0.66 NS	0.004**				<0.001**	<0.001**			

Data are presented as mean ±SE (n=6). F: ANOVA test. *: Significant (P<0.05). **: Highly significant (P<0.01). Mean values with different superscript letters in the same column are significantly different at (P<0.05)

Table 3 Effect of Thyme, Ginger and BOL administration on serum AST and ALP activities in male rabbits

Animal groups	AST (IU/L) (15 day)	AST (IU/L) (30 day)	*t*	*P*	% of change	ALP (IU/L) (15 day)	ALP (IU/L) (30 day)	*t*	*P*	% of change
Control	27.40±2.33^{a}	29.11±0.43^{a}	0.73	0.50	10.85	53.90±1.97^{a}	70.08±5.79^{a,**}	11.71	0.001	29.22
Thyme	21.35±1.01^{c}	19.40±1.99^{c}	0.87	0.42	-7.96	58.40±2.46^{a}	63.95±3.04^{a,*}	3.40	0.02*	9.46
Ginger	22.21±1.25^{c}	20.81±0.63^{c}	1.12	0.31	-5.01	58.93±0.07^{a}	66.40±1.84^{a,*}	3.71	0.01	12.74
BOL	38.10±0.57^{b}	41.91±0.65^{b,*}	3.66	0.02	10.20	86.06±1.93^{b}	101.6±3.41^{b,**}	4.80	0.005	18.53
F	28.40	86.13				51.41	21.40			
P	<0.001**	<0.001**				<0.001**	<0.001**			

Data are presented as mean ±SE (n=6). F: ANOVA test NS: Non-significant (P>0.05) *: Significant (P<0.05). **: Highly significant (P<0.01). Mean values with different superscript letters in the same column are significantly different at (P<0.05)

Our results revealed that there were significance differences between the studied groups in creatinine in both 1st and 2nd administration. However, there was a significant decrease in creatinine on the 2nd administration in thyme group compared to 1st administration. Moreover, the difference in 1st administration was between BOL group and all other groups and between ginger group and all other groups; but no difference was found between thyme group and control group. In 2nd administration the difference was between BOL group and all other groups and between thyme group and all other groups; but no difference was found between ginger group and control group (Table 4).

There were significant difference between the rabbit groups in cholesterol and triglyceride in both 1st and 2nd administration. The difference in cholesterol at both 1st and 2nd was between all groups. In triglyceride 1st administration, thyme group was different from all other groups. On the other hand, triglyceride at the 2nd administration was significant difference between thyme group and other groups and between BOL group and all other groups; but no significant difference was found between ginger and control group. However, there were a significant increase in cholesterol in 2nd administration in BOL group and decrease in control, ginger and thyme group compared to 1st administration. Also, there were statistical significantly increase in triglyceride in 2nd administration in BOL group and decrease in thyme group compared to 1st administration (Table 5).

Table 4 Effect of Thyme, Ginger and BOL administration on serum creatinine concentration in male rabbits

Animal groups	Creatinine(mg/dl) (15 day)	Creatinine (mg/dl) (30 day)	*t*	*P*	% of change
Control	0.80±0.01^{a}	0.84±0.02^{a}	1.88	0.12	4.79%
Thyme	0.77±0.02^{a,*}	0.75±0.03^{c}	2.65	0.04	-3.11%
Ginger	0.94±0.04^{c}	0.91±0.03^{a}	0.94	0.39	-2.86%
BOL	1.06±0.04^{b}	1.16±0.02^{b}	2.00	0.10	10.56%
F	18.46	45.67			
P	<0.001**	<0.001**			

Data are presented as mean ±SE (n=6) F: ANOVA test. *: Significant (P<0.05). **: Highly significant (P<0.01). Mean values with different superscript letters in the same column are significantly different at (P<0.05).

The results of our study revealed that there were significant differences between the rabbit groups in GSH at both the 1st and 2nd administration. At the 2nd administration, there was a significant increase in GSH in control and thyme group and decrease in BOL group compared to 1st administration. The difference in GSH 1st was between BOL group and other groups and between ginger group and thyme group; but no significant difference was found between control group and both ginger and thyme group(Table 6).

Table 5 Effect of Thyme, Ginger and BOL administration on Serum total cholesterol and triacylglycerols concentrations in male rabbits

Animal groups	Total cholesterol(mg/dl) (15 day)	Total cholesterol (mg/dl) (30 day)	*t*	*P*	% of change	Triacylglycerols(mg/dl) (15 day)	Triacylglycerols(mg/dl) (30 day)	*t*	*P*	% of change
Control	62.91±1.15^{a,**}	53.05±1.28^{a}	7.1	0.001	-15.61	104.92±2.42^{a}	103.71±1.48^{a}	0.48	0.65	-0.97
Thyme	43.78±0.92^{d,**}	36.65±1.60^{d}	8.98	0.001	-15.95	93.9±1.10^{c,**}	78.56±1.91^{c}	11.75	0.001	-16.36
Ginger	51.58±1.26^{c,*}	45.31±1.61^{c}	3.31	0.02	-12.23	99.78±1.05^{a}	102.28±3.25^{a}	0.88	0.42	2.47
BOL	76.53±1.57^{b}	91.31±2.09^{b,**}	12.82	0.001	19.33	120.05±2.33^{a}	128.41±1.63^{b,*}	2.70	0.04	7.21
F	130.44	208.37				36.92	86.95			
P	<0.001**	<0.001**				<0.001**	<0.001**			

TG: Triglyceride. Data are presented as mean ±SE (n=6) F: ANOVA test. *: Significant (P<0.05). **: Highly significant (P<0.01). Mean values with different superscript letters in the same column are significantly different at (P<0.05)

The results of our study revealed that, there were statistical significance differences between the rabbit groups in both 1st and 2nd administration. According to the investigation of IL-6 at the 1st and 2nd administration, there was no significant difference found between ginger and thyme group.

On the other hand, the difference was between control group and all other groups and between BOL group and all other groups. Statistically, there was a significantly increase in IL-6 at 2nd administration in BOL group and decrease in ginger and thyme group compared to 1stadministration (Table 7).

Table 6 Effect of Thyme, Ginger and BOL administration on Serum GSH concentration in male rabbits

Animal groups	GSH (ng/g) (15 day)	GSH(ng/g) (30 day)	*t*	P	% of change
Control	11.04±0.06^{a,c}	11.45±0.17^{a,*}	2.74	0.04	4.55
Thyme	11.26±0.07 ^{c}	12.2±0.10^{d,**}	14.12	0.001	8.73
Ginger	10.96±0.08 ^{a}	11.12±0.0^{c}	1.21	0.28	1.43
BOL	8.93±0.11 ^{b}	7.95±0.05^{b,**}	8.6	0.001	-10.84

Data are presented as mean ±SE (n=6). F: ANOVA test.*: Significant (P<0.05). **: Highly significant (P<0.01). Mean values with different superscript letters in the same column are significantly different at (P<0.05)

Table 7 Effect of Thyme, Ginger and BOL administration on serum IL-6 concentration in male rabbits

Animal groups	IL-6 (pg/ml) (15 day)	IL-6 (pg/ml) (30 day)	*t*	P	% of change
Control	5.18±0.09^{a}	5.24±0.06^{a}	0.59	0.58	1.29
Thyme	4.71±0.05^{c,*}	4.40±0.05^{c}	4.06	0.01	-6.46%
Ginger	4.65±0.07^{c,**}	4.21±0.08^{c}	4.67	0.005	-9.40
BOL	8.55±0.15^{b,**}	9.48±0.07^{b}	6.58	0.001	11.06

Data are presented as mean ±SE (n=6). F: ANOVA test.*: Significant (P<0.05). **: Highly significant (P<0.01)Mean values withdifferent superscript letters in the same column are significantly different at (P<0.05)

4. DISCUSSION

The obtained results of body weight were in agreement with those reported by Moorthy *et al*. (2009), Najafi and Torki (2010), Rahimi *et al*. (2011), Sadeghi *et al*. (2011) and Mohamed *et al*. (2012), who mentioned that ginger supplementation into the feed diet had a positive significant effect on the live body weight of their experimental animals, while addition of thyme powder or essential oil into the feed diet did not affect the live body weight.

Recently, Abd EL-Latif *et al*. (2019) studied the effect of dietary ginger powder and other herbal source on performance, carcass traits of growing rabbits. The authors found that the body weight was significantly increased after 12 weeks compared to other dietary treatments between the groups fed different feed supplementations. Moreover, the results of the present study were in contrast to some of the earlier observations that indicated herbs, especially ginger and their main components, did not affect live body weight in the feed animal (El-Deek *et al*., 2002; AL-Homidan, 2005; Ademola *et al*., 2009), while adding thyme powder or essential oil into the feed diet or drinking water had a significant positive impact on the live body weight of broiler animal according to Al-Jugifi, (2009), Al-Mashhadani *et al*. (2011), Foroughi *et al*. (2011), Sadeghi *et al*. (2011) and Toghyani *et al*. (2011), who investigated that supplementation of thyme herb 5g/liter water had a significant (P<0.05) negative impact on the live body weight of 21-day-old broilers when compared to the control group (681g and 725g), respectively. However, Najafi and Torki (2010) concluded that addition of 200 mg/kg of thyme essential oil did not have any effects on broiler body weight during the periods 1 – 42 and 1 – 49 days of age.

Also, the current results are consistent with previous reports obtained by Thabet *et al*. (2010), who stated that, the growth performance improved in BOL treated groups relative to the control group. In addition, Tousson *et al*. (2016) indicated that the use of BOL resulted in obvious improvement in the growth rate. Also, Mohammed *et al*. (2016) reported that, BOL injection in rabbits resulted in an increase in total final body weight. Additionally, Nafeaa *et al*.(2016)demonstrated that the BOL resulted in a significant increase in body weight (in a dose dependent manner) in between the rabbit groups after the 2nd administration of treatment.

Regarding the serum protein level, the present findings comes in agreement with that reported by Mansoub and Myandoab (2011) and Mohamed *et al*. (2012), who found that, the total protein didn't differ significantly between the treatment groups. Findings of the research study indicated that groups receiving ginger at the rate of 0.1 and 0.2% of the diets showed better performance and serum profiles in broiler.

On the other hand, the results are in disagreement with the findings of Saeid *et al*. (2010), Toghyani *et al*. (2010), and Toghyani*et al*. (2011), who used thyme and ginger in additive growth promoters and did not find any effect on the serum blood proteins. Furthermore using high dose of ginger powder in feed diet had a negative significant effect on the serum proteins according to El-Sayed and Ahmed (2010) also revealed that, thyme and ginger insignificantly changed serum total proteins and albumin, which agree with Toghyani*et al*. (2010), who recorded that thyme powder didn't affect serum protein and albumin of broiler chicks but this result disagree with Lebda *et al*. (2013). Recently, Usur (2019) concluded that, adding garlic or thyme or both improved animal health as reflected in the improvement of serum protein levels, the reduction in lipid level and the normal levels of liver enzymes. Similarly, Alm-Eldeen and Tousson (2012), and El-Moghazy *et al*. (2012) reported that the total protein concentrations in male rabbits were significantly increased after BOL injections. The study of Tousson *et al*. (2016) revealed that, the levels of total protein concentrations were significantly increased after BOL injections as compared to their values in the control group. Also, Thabet *et al*. (2010) establish that BOL as a

consequence of increasing the promotion of protein synthesis and reducing protein destruction. Moreover, the increase in body weight may be ascribed to the increment in serum total proteins, which indicate improvement in wellness and immunity, in this study, the levels of total proteins concentrations were significantly increased (Thabet *et al*., 2010). As confirmed with El-Moghazy *et al*. (2012) who reported that, the total protein concentrations were significantly increased after BOL administration in male rabbits.

Regarding the levels of AST and ALP, similar to the present results ,Sakr *et al*. (2011) stated that ginger (1%) decreased serum AST and ALP activities of rats and Ahmad *et al*. (2014) reported that the increased serum AST activity of injected rat with CCl4 restored to normal by ginger. Also, Tawfeek and Mustafa (2012) revealed that thyme 2gm/Kg caused decrease of serum AST activity in broiler chicken. ALP is commonly found in biliary tree and bile ducts, a blockage in this system will cause an elevated ALP (Basten, 2010). Moreover, Tousson *et al.* (2016), reported that BOL caused a significant increase in serum AST and ALP activities when compared with the other groups.Furthermore, Urhausen *et al*. (2003) and Gabr*et al*. (2009) reported that the liver functions significantly increased after intramuscular BOL undecylenate injection on weaned male lambs. Additionally, Dickerman *et al*. (1999) and Tousson*et al*. (2011a, b) reported that the anabolic steroid-induced hepatotoxicity and Welder *et al*. (1995) reported that the anabolic androgenic steroids have toxic effects in primary rat hepatic cultures.

Regarding to serum creatinine concentration thyme administration reduced serum creatinine in rabbits. The obtained results are in agreement with Monira and Naima (2012) and Abu-Raghif *et al*. (2015) who reported that thyme maintains normal kidney functions by maintaining normal level of oxidative stress parameters. On the other hand, ginger significantly increased serum creatinine level. On the contrary, Mehardad *et al*. (2007) recorded that a beneficial effect of ginger for creatinine taking away from plasma of normal rats and Manal *et al*. (2012) stated that ginger extracts (twice a week for six consecutive weeks) reduced serum creatinine level in normal rats when compared to control group. The disagreement may be due to the difference in the administration regime. As the increased of serum creatinine considered one of the indicator for kidney injury and misusing of ginger must be avoided (Khan *et al*., 2009). On the other hand, the present findings going with the results of Tousson*et al*. (2016) who reported that BOL caused a significant increase in serum creatinine concentration when compared with the other groups. These results were in agreement with Urhausen*et al*. (2003) and Gabr *et al*. (2009) who reported that the kidney functions significantly increased after intramuscular BOL injection on weaned male lambs. Also, Nafeaa *et al*. (2016) revealed that, significantly higher concentration of serum creatinine was observed in rabbits treated by BOL after one and two months of treatment as compared with the control groups. Moreover, Anderson *et al*. (1997) reported that, androgenic steroids are responsible for increase in muscle bulk and consequently rise in creatinine level and Taher *et al*. (2008) reported significantly higher serum creatinine concentrations was observed in androgenic steroid user athletes. Furthermore, Ahmed (2014) reported that BOL injection caused elevation in serum creatinine level in New Zealand rabbits.

Regarding the cholesterol concentration, the results are in agreement with previous studies which used thyme and ginger through feed diet and they found a significant decrease in the cholesterol concentration compared with the control group (Ademola *et al*., 2009; Saeid *et al*., 2010; Al-Mashhadani *et al*., 2011; Toghyani *et al*., 2011; Mohamed *et al*., 2012).

Toghyani*et al*. (2011) reported that adding thyme powder 5 and 10 g/kg feed diet did not have any effects on triglyceride, and cholesterol when compared to control groups. On the other hand, Mohamed *et al*. (2012) found that cholesterol, and triglyceride levels in the blood serum was significantly ($P<0.05$) reduced by the supplementation of dietary ginger powder when compared to the control group. According to the Al-Homidan (2005) using high level of ginger 6% over 49 days of growth period caused a significant decrease ($P<0.05$) in the levels of total protein, and albumin when compared to the control group.

Al-Mashhadani *et al.* (2011) reported that dietary thyme essential oil 300mg/kg was significantly ($P<0.05$) lower serum cholesterol compared to the control group. Mansoub and Myandoab (2011) used different levels of thyme supplementation 0.75, 1, 1.5 and 2%. They observed that triglyceride reduced significantly ($P<0.05$) of broilers fed 2% thyme powder compared to the control group.

The positive effect of ginger and thyme on the concentration of cholesterol may be due to the effects of active compounds present in these two plants. The supplementation of ginger reduced cholesterol levels in blood serum because of its antioxidative action which also a mechanism could be used as anti-stress approach (Jang *et al*., 2007).Other results were observed by Najafi and Torki (2009), who found no differences in cholesterol and triglyceride concentration of the broiler fed on diets containing thyme essential oil 200mg/kg. Also, the results of Rahimi *et al*. (2011) found no significant differences in the cholesterol concentration compared to the control, while triglyceride reduced significantly in broilers that drank water containing 0.1% aqueous thymus vulgaris extract compared to the control group. Similar results were observed by Toghyani *et al*. (2011) when used 5g/kg feed diet of thyme powder used and no differences were found in the serum total protein, and triglyceride while serum albumin, and cholesterol concentration reduced significantly compared to the control group.

The present findings of GSH are coordinated with that reported by Ahmed (2014) and Hassan *et al*. (2015) who mentioned that the administration of ginger resulted in over increased in the concentration level of GSH.

Our results are in agreement with the results of Pey *et al*. (2003) who reported that, the anabolic androgenic steroids induced changes in oxidative stress and Ahmed (2014) who found that, BOL administration can induce an oxidative stress in the liver and kidney. Furthermore, administration of the anabolic steroid boldenone induced changes in oxidative stress bio-marker levels in the liver and kidney (El-Moghazy *et al*., 2012).

In agreement with the study go with El-Sayed and Ahmed (2010) using thyme and ginger supplementation diet feed for rats, the finding was that ginger reduce the level of serum IL-6 concentrations in rats, these results also was agreed with Hassan *et al*. (2015), who mentioned that the administration of ginger resulted in over decreased in the production of IL-6. Also, Ueda *et al*. (2010) illustrated that

the oral administration of squeezed ginger increased the production of IL-6 in rat leukemic monocytes. While Zhao *et al*. (2011) mentioned that ginger contains several compounds and enzymes including gingerdiol, gingerol, gingerdione and shogaols. These compounds had been blocking the production of interleukins, and inflammatory markers and have antimicrobial, antioxidative and pharmacological effects (Thomson *et al*., 2002; Lantz *et al*., 2007; Ali *et al*., 2008).

Thyme significantly decrease production of serum IL-6 in mice and these results agreed with Ocana and Reglero (2012), who mentioned that IL-6 gene expression in mice fed with any of thyme extracts was reduced until level of non-activated control cells which expression was decreased to half compared to activated cells. Additionally, Nafeaa *et al*. (2016) demonstrated that, BOL administration resulted in significant increase in interleukin-6 (IL-6) in rabbits after one and two months of treatment as compared with the control groups. These results were in agreement with Hughes *et al.* (1995) and Sullivan *et al.* (1998), who recorded many adverse effects associated with anabolic androgenic steroids such as the disturbance of the endocrine and immune functions.

Pey *et al*. (2003) reported that, the anabolic androgenic steroids induced changes in oxidative stress and Ahmed (2014), who found BOL administration can induce an oxidative stress in the liver and kidney. Furthermore, administration of the BOL induced changes in oxidative stress bio-marker levels in the liver and kidney (El-Moghazy*et al*., 2012).

5. CONCULSION

In conclusion, the experimental findings indicated that thyme and ginger have a growth promoting action in addition to protecting action on liver and kidneys,these natural substances decrease biochemical parameters AST,ALP,Creatinine,total protein and increase glutathione level that play as antioxidant and decrease lipid profile(Cholesterol and TG).In contrast,Boldenone has growth promoting action by increasing body weight more than thyme and ginger but increases biochemical parameters ,decreases glutathione level and increases IL6 level.

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