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 boldenone 5% 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 interleukin-6 (IL-6). Results after one-month treatments, no difference was found between the rabbit groups in initial body weight in the 1st administration compared 2nd administration. 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 performance and product quality. Various compounds have been tried for growth promotion, including hormones and antimicrobial agents. Natural hormones such as 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), antimicrobial and carminative (Mossa, 1987), immunomodulating effect (Suzuki and Furuta, 1988). Thyme can be used traditionally for several medicinal purposes: respiratory disease, antimicrobial and anticoagulant (Mikaili et al., 2010). Supplementation with thyme oil improved the growth performance and antioxidant enzyme activities in rainbow trout (Onchorhynchusmykiss) juveniles (Ademet et al., 2015). Also, thyme contains volatile oil (consisting of 55% phenols) thymol and carvacrol, thyme, 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 (Bukovská 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...
gingerdioil, gingerol, gingerdione and shogaols (Oleforu-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 Rabbit.

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 Fumurewa 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 (Equipian@; Lab Torrel, Co., Mexico) (5ml/Kg. b.w., 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.

<table>
<thead>
<tr>
<th>Animal groups</th>
<th>Absolute body gain (Kg) (15 day)</th>
<th>Absolute body gain (Kg) (30 day)</th>
<th>t</th>
<th>P</th>
<th>% of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.17±0.01</td>
<td>1.81±0.01**</td>
<td>24.33</td>
<td>&lt;0.001</td>
<td>54.21%</td>
</tr>
<tr>
<td>Thyme</td>
<td>1.18±0.01</td>
<td>1.76±0.02**</td>
<td>24.84</td>
<td>&lt;0.001</td>
<td>49.85%</td>
</tr>
<tr>
<td>Ginger</td>
<td>1.16±0.01</td>
<td>2.03±0.03**</td>
<td>25.97</td>
<td>&lt;0.001</td>
<td>75.66%</td>
</tr>
<tr>
<td>BOL</td>
<td>1.18±0.01</td>
<td>2.27±0.02**</td>
<td>35.87</td>
<td>&lt;0.001</td>
<td>92.23%</td>
</tr>
<tr>
<td>F</td>
<td>0.81</td>
<td>115.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>0.51</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 the 1st administration (Table 2).

The results of our study revealed that, there were statistical significant 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 statistically 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

<table>
<thead>
<tr>
<th>Animal groups</th>
<th>Albumin (gm/dl) (15 day)</th>
<th>Albumin (gm/dl) (30 day)</th>
<th>t</th>
<th>P</th>
<th>% of change</th>
<th>Total Protein (gm/dl) (15 day)</th>
<th>Total Protein (gm/dl) (30 day)</th>
<th>t</th>
<th>P</th>
<th>% of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3.23±0.02</td>
<td>3.25±0.03</td>
<td>1.76</td>
<td>0.11</td>
<td>2.01</td>
<td>4.62±0.02</td>
<td>4.79±0.03</td>
<td>3.61</td>
<td>0.02</td>
<td>3.79</td>
</tr>
<tr>
<td>Thyme</td>
<td>3.26±0.04</td>
<td>3.32±0.02</td>
<td>1.34</td>
<td>0.24</td>
<td>1.91</td>
<td>4.91±0.04</td>
<td>5.26±0.09</td>
<td>5.82</td>
<td>0.002</td>
<td>7.34</td>
</tr>
<tr>
<td>Ginger</td>
<td>3.29±0.05</td>
<td>3.25±0.02</td>
<td>0.69</td>
<td>0.52</td>
<td>-1.01</td>
<td>4.64±0.02</td>
<td>4.83±0.02</td>
<td>4.99</td>
<td>0.004</td>
<td>4.10</td>
</tr>
<tr>
<td>BOL</td>
<td>3.27±0.03</td>
<td>3.40±0.03</td>
<td>2.56</td>
<td>0.05</td>
<td>4.08</td>
<td>4.58±0.02</td>
<td>4.97±0.04</td>
<td>6.99</td>
<td>0.001</td>
<td>8.46</td>
</tr>
</tbody>
</table>

Data are presented as mean ±SE. Also, in control, ginger and thyme group compared to 1st administration was between BOL group and all other groups and between thyme group and all other groups; but no significant difference between thyme group was different from all other groups. On the other hand, there were significant differences between thyme group and control group (Table 4).

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

<table>
<thead>
<tr>
<th>Animal groups</th>
<th>AST (IU/L) (15 day)</th>
<th>AST (IU/L) (30 day)</th>
<th>t</th>
<th>P</th>
<th>% of change</th>
<th>ALP (IU/L) (15 day)</th>
<th>ALP (IU/L) (30 day)</th>
<th>t</th>
<th>P</th>
<th>% of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>27.40±0.33</td>
<td>29.14±0.43</td>
<td>0.73</td>
<td>0.50</td>
<td>10.85</td>
<td>53.90±1.97</td>
<td>70.08±6.79</td>
<td>11.71</td>
<td>0.001</td>
<td>29.22</td>
</tr>
<tr>
<td>Thyme</td>
<td>21.35±1.01</td>
<td>19.40±1.99</td>
<td>0.87</td>
<td>0.42</td>
<td>-7.96</td>
<td>58.40±2.46</td>
<td>63.95±3.04</td>
<td>5.40</td>
<td>0.02</td>
<td>9.46</td>
</tr>
<tr>
<td>Ginger</td>
<td>22.21±1.25</td>
<td>20.81±0.63</td>
<td>1.12</td>
<td>0.31</td>
<td>-5.01</td>
<td>58.93±0.07</td>
<td>66.40±1.84</td>
<td>5.71</td>
<td>0.01</td>
<td>12.74</td>
</tr>
<tr>
<td>BOL</td>
<td>38.10±0.57</td>
<td>41.91±0.65</td>
<td>3.66</td>
<td>0.02</td>
<td>10.20</td>
<td>86.06±1.93</td>
<td>101.63±4.13</td>
<td>4.80</td>
<td>0.005</td>
<td>18.53</td>
</tr>
</tbody>
</table>

Data are presented as mean ±SE. Also, there were significant differences between the studied groups 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 group 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 statistically significant 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

<table>
<thead>
<tr>
<th>Animal groups</th>
<th>Creatinine (mg/dl) (15 day)</th>
<th>Creatinine (mg/dl) (30 day)</th>
<th>t</th>
<th>P</th>
<th>% of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.80±0.02</td>
<td>0.84±0.02</td>
<td>1.88</td>
<td>0.12</td>
<td>4.79%</td>
</tr>
<tr>
<td>Thyme</td>
<td>0.77±0.02</td>
<td>0.75±0.03</td>
<td>2.65</td>
<td>0.04</td>
<td>-3.11%</td>
</tr>
<tr>
<td>Ginger</td>
<td>0.94±0.04</td>
<td>0.91±0.03</td>
<td>0.94</td>
<td>0.39</td>
<td>-3.86%</td>
</tr>
<tr>
<td>BOL</td>
<td>1.06±0.04</td>
<td>1.16±0.02</td>
<td>2.00</td>
<td>0.10</td>
<td>10.56%</td>
</tr>
</tbody>
</table>

Data are presented as mean ±SE. Also, there were significant differences between the rabbit groups in GSH at both the 1st and 2nd 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).

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).
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 1st administration (Table 7).

Regarding the serum protein level, the present findings comes in agreement with that reported by 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, Nafeea 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 th...

<table>
<thead>
<tr>
<th>Animal groups</th>
<th>Total cholesterol (mg/dl)</th>
<th>Triacylglycerols (mg/dl)</th>
<th>P</th>
<th>% of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>62.94±1.35</td>
<td>55.05±2.28</td>
<td>2.1 0.011</td>
<td>-15.62</td>
</tr>
<tr>
<td>Thyme</td>
<td>43.78±0.02</td>
<td>56.95±0.16</td>
<td>8.98 0.001</td>
<td>-15.95</td>
</tr>
<tr>
<td>Ginger</td>
<td>31.58±2.64</td>
<td>53.12±6.14</td>
<td>3.31 0.02</td>
<td>-12.23</td>
</tr>
<tr>
<td>BOL</td>
<td>76.53±5.79</td>
<td>91.3±2.09**</td>
<td>12.82 0.001</td>
<td>19.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>120.05±32.33*</td>
<td>128.4±1.63**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>39.62</td>
<td>76.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.01**</td>
<td>0.01**</td>
</tr>
</tbody>
</table>

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

| TOL | Triacylglyceride: 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).

4. DISCUSSION

The obtained results of body weight were in agreement with those reported by Moorby 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; Adenoma 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, Nafeea 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.

On the other hand, the results are in disagreement with the findings of Saeid et al. (2010), Toghyani et al. (2010), and Toghyaniet 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 Toghyaniet al. (2010), who recorded that thyme powder didn’t affect serum protein and albumin of broiler chicks but this result disagree with Leda 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-Eleeden 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) established 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 CC14 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 Gabret et al. (2009) reported that the liver functions significantly increased after intramuscular BOL undeceyleatne injection on weaned male lambs. Additionally, Dickerman et al. (1999) and Toussonet 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-Raghil 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 Toussonet 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 Urhausenet 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 that 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 Naji 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 gingerdol, gingerol, gingerdione and shogauls. 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, Nafeea 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-Moghazi et al., 2012).

5. CONCLUSION

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.

6. REFERENCES


