

## **BIOCHEMICAL STUDY OF BLOOD IN BROILER FED THIAMIN IN THEIR DIET**

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### **ABSTRACT**

210 one day old broiler chicks were used in this study. They were divided in to two groups. The first kept on commercial diet as (control); the second group was given thiamin (vit. B1) in dose 10 mg /bird was added to same commercial diet. Glucose concentrations, total cholesterol, total protein and the activity of the blood enzymes were determined. Results revealed a significant ( $p < 0.05$ ) increase in the glucose concentrations, total cholesterol and total serum protein due to thiamin addition. However, no significant effect ( $p > 0.05$ ) for this vitamin on the blood enzymes activity. The physiological impact of these changes were discussed.

### **INTRODUCTION**

Vitamins are natural small components of food that are distinct from carbohydrates, fat, proteins and minerals and they enable the efficient utilization of these other nutrients. The vitamins are classified into two groups based on their solubility in fat solvent or in water. The water-soluble vitamins include the B-complex vitamins, biotin and vitamin C. (1; 2). Vitamin B1 (Thiamine) is one of these vitamins, its functions in all cells as the coenzyme thiamin pyrophosphate (TPP), which is involved in all enzymatic carboxylation of  $\alpha$ -keto acids, oxidative decarboxylation reactions in the TCA cycle arise in pyruvate content of tissues and this effect on carbohydrate metabolism probably is the key to many deficiency-induced lesions. (3). Thiamine deficiency In the chick included severe anorexia, retarded growth, nervous derangements and death. (4). In poultry, many symptoms observed in their diet deficient with thiamin like skin edema/fatty liver and heart, neck retraction, cyanosis and ovarian atrophy. (5). Therefore, intake of this vitamin is required almost daily, because of its effect on growth, reproduction and health. However, no literature is currently available on the effect of this vitamin intake on some blood biochemical changes. Thus, the objective of this investigations to determine the effect of thiamin intake in the diet on blood glucose, cholesterol, total protein and the activity of blood enzymes (GOT and GPT) in the broiler chicks.

### **MATERIAL AND METHODS**

210 one day old broiler chicks were used in this study. They were dividing into two groups. Chicks were housed in a bricked building within wired compartments. Heating and cooling were provided by using gas heaters, air coolers and exhaust fans. Temperature was monitored using thermometer. Chicks were vaccinated against Gumboro, Newcastle at the appropriate times. The birds were kept on commercial diet served as control (group 1) and the group fed diet with vit. B1 added to diet in dose 10 mg/bird served as (group 2). Weekly and for period of 50 days, blood

samples were collected to measure glucose concentrations. total cholesterol, total protein and the activity of the Glutamic oxaloacetic transaminase (GOT) and Glutamic pyruvate transaminase (GPT).Glucose concentration was determined by using the enzymatic oxidation method according to (6).Total cholesterol was determined according to the enzymatic method by (7).Total serum protein was determined by hand refract meter (Atago.cat no. 313). Serum Glutamic oxaloacetic transaminase (GOT) and Glutamic pyruvate transaminase (GPT) activity were determined according to the method of Reitman and Frankel (8).Student "t" test used for statistical analysis.(9).

## **RESULT**

Glucose concentration:Changes in glucose concentrations of two groups were presented in (Tab. 1). Addition of thiamin caused a significant ( $p<0.05$ ) increase in glucose concentrations in the second group in comparison with the first group for all weeks at each time of blood collection.

Total cholesterol:Addition of Thiamin caused a significant ( $p<0.05$ ) increase in total cholesterol in the second group in comparison with the first group for all the week at each time of blood collection. (Tab. 1).

Total protein:Changes in the total serum protein concentrations of two groups were presented in table(1). Addition of Thiamin caused a significant ( $p<0.05$ ) increase in total serum protein concentration in the second group in comparison with the first group for all weeks at each time of blood collection. (Tab.1).

Glutamic oxaloacetic transaminase (GOT) and Glutamic pyruvate transaminase(GPT) enzymes:Changes in the activity of the GOT and GPT enzymes are presented in (Tab.2). Addition .of thiamin caused a non significant effect in the activity of both GOT and GPT in second group in comparison with the first group and for all weeks at each time of blood collection (Table 2).

**Table (I):** Effect of thiamine addition on the glucose concentration (mg / D.L). total cholesterol (mg / D.L) and the total serum protein (gm / D.L)

Age / Week	Measurements	1st group (control)	2nd. group
1 <sup>st</sup>	Glucose concentration	182.5 ± 3.4 a	217 ±4.1 b
	Total cholesterol	98.500 ±21 a	106 ±2.3 b
	Total protein	2.170 ±0.05 a	2.390 ±0.11 b
2 <sup>nd</sup>	Glucose concentration	218 ± 5.6 a	233 ±5.1 b
	Total cholesterol	110 ± 1.8 a	72.8 ±1.6 b
	Total protein	2.330 ± 0.1 a	2.640 ±0.140 b
3 <sup>rd</sup>	Glucose concentration	225 ± 3.8 a	245 ±4.7 b
	Total cholesterol	119 ± 2.3 a	131 ±3.4 b
	Total protein	2.420 ±0.13 a	2.630 ±0.150 b
4 <sup>th</sup>	Glucose concentration	232 ± 4.3 a	253 ±4.6 b
	Total cholesterol	123 ±2.1 a	133 ±2.8 b
	Total protein	2.48 ±0.14 a	2.73 ±0.11 b

<b>5<sup>th</sup></b>	<b>Glucose concentration</b>	<b>239 ± 3.4 a</b>	<b>261 ±2.9 b</b>
	<b>Total cholesterol</b>	<b>135 ± 2.8 a</b>	<b>148. ±2.6 b</b>
	<b>Total protein</b>	<b>2.600 ± 0.12 a</b>	<b>2.880 ±0.11 b</b>
<b>6<sup>th</sup></b>	<b>Glucose concentration</b>	<b>236 ± 2.7 a</b>	<b>262 ±2.5 b</b>
	<b>Total cholesterol</b>	<b>138 ± 2.3 a</b>	<b>153 ±2.6 b</b>
	<b>Total protein</b>	<b>2.680 ± 0.13 a</b>	<b>2.900 ±0.13 b</b>
<b>7<sup>th</sup></b>	<b>Glucose concentration</b>	<b>245 ± 3.2 a</b>	<b>275 ±3.3 b</b>
	<b>Total cholesterol</b>	<b>140. ± 2.5 a</b>	<b>154 ±2.3 b</b>
	<b>Total protein</b>	<b>2.850 ± 0.12 a</b>	<b>3.050 ±0.15 b</b>

\*Values are means ± standard error\*\* Variable small letters indicate significant differences at the 5% level between groups at the same week.

**Table (2):** Effect of addition of thiamin on the activity of GOT and GPT (IU) enzymes

<b>Age/week</b>	<b>Enzyme</b>	<b>Group 1</b>	<b>Grop2</b>
<b>1<sup>st</sup></b>	<b>GOT</b>	<b>8.81 ± 1.21</b>	<b>8.73 ±1.08 N.S</b>
	<b>GPT</b>	<b>2.040 ± 0.24</b>	<b>2.04 ± 0.26 N.S</b>
<b>2<sup>nd</sup></b>	<b>GOT</b>	<b>11.81 ± 1.34</b>	<b>12.08 ±1.86</b>
	<b>GPT</b>	<b>3.30 ±0.40</b>	<b>3.25 ±0.35</b>
<b>3<sup>rd</sup></b>	<b>GOT</b>	<b>16.52 ±1.60</b>	<b>16.61 ±1.54</b>
	<b>GPT</b>	<b>4.07 ±0.41</b>	<b>3.95 ±0.36</b>
<b>4<sup>th</sup></b>	<b>GOT</b>	<b>16.83±1.50</b>	<b>16.75± 1.47</b>
	<b>GPT</b>	<b>4.18 ±0.40</b>	<b>4.04 ± 0.41</b>
<b>5<sup>th</sup></b>	<b>GOT</b>	<b>18.340 ±1.92</b>	<b>18.21 ± 1.94</b>
	<b>GPT</b>	<b>5.68 ±0.48</b>	<b>5.78 ± 0.49</b>
<b>6<sup>th</sup></b>	<b>GOT</b>	<b>19.670 ±2.03</b>	<b>19.68 ± 1.98</b>
	<b>GPT</b>	<b>6.65 ± 0.58</b>	<b>6.64 ± 0.6</b>
<b>7<sup>th</sup></b>	<b>GOT</b>	<b>20.850.1 ±2.07</b>	<b>20.93 ± 2.11</b>
	<b>GPT</b>	<b>8.210 ±0.64</b>	<b>8.07 ± 0.66</b>

\*Values are means ± standard error. \*\*N.S means no significant differences between

## DISCUSSION

Addition of Thiamin was revealed significant effects on some parameters that studied in this experiment. (Table I).Increasing of the glucose concentration due to Addition of thiamin caused by its effect on the excess of the carbohydrate metabolism to glucose sugar. (10). The same results were obtained by (11)when studying the effect of this vitamin (in dose 5, 20 mg) on glucose concentrations. In the respect of our results about the total protein, thiamin addition increased the globulin synthesis lead to

increase the protein synthesis and the total protein. (11; 12). These results are in agreement with our results about the total protein. (Table 1). On the other hand, thiamin addition played a significant ( $P < 0.05$ ) role on the increasing the total cholesterol (Table 1). These increased might be attributed to the thiamin ability to produced a large amounts of a acetyl Co enzyme A. which must be the main source for all cholesterol carbon atoms (13), that's leading for cholesterol synthesis, and therefore, increased its levels in the blood. (11). Our findings about the activity of GOT and GPT blood enzymes showed non significant a slight increase in these two enzymes due to thiamin addition. (Table 2). The activity of these two enzymes associated with the cell damage in cardiac muscle, liver and skeletal muscle. (14). Moreover, thiamine deficiency caused cardiac failure and increased the catabolism reactions, that means high levels for these two enzymes. (15). Thus, the activities of these two enzymes were still in the normal limits when we treated the animals with the thiamin. In conclusion, thiamine addition (in dose 10 mg/bird) improved the haemostatic environment of the chicks.

### دراسة كيميائية حيوية لدم فروج اللحم المغذاة على العليقة المضاف إليها الثايمين

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### الخلاصة

210 فرخ فروج لحم عمر يوم واحد قد استخدمت في هذه الدراسة قسمت إلى مجموعتين، الأولى غذيت على العليقة التجارية كمجموعة سيطرة، والمجموعة الثانية أعطيت الثايمين مع العليقة بجرعة 10 ملغم لكل طير. فیس في هذه التجربة تركيز الكلوكوز، الكولسترول الكلي، البروتين الكلي وفعالية إنزيمات الدم. أشارت النتائج لوجود فروق حيث ازداد تركيز الكلوكوز، الكولسترول الكلي و البروتين الكلي بفعل الثايمين ولم يوجد فرق ( $P < 0.05$ ) معنوية في فعالية إنزيمات الدم. ( $P > 0.05$ ) معنوية

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