Effect of dried immature leaves and fruit Ficus carcia On some biochemical parameters in normal rats

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الخلاصة

درس تأثير   كل مــن أوراق وثمــار التــين المجففــة قبــل مرحلــة نــضج الثمــار، (وبتراكيز 5%و10%)في قابلية هضم الغذاء المتناول ودليل النمو في الجرذان السليمة.فضلا عن دراسة هذا التأثير في مستوى الهيموكلوبين وحديده فــي الــدم وعلــى مــستوى الكلوكــوز و الكوليسترول والبروتين الكلي في مصل الدم   استخدم 24 ذكراً من ذكور الجرذان السليمة البيض الحديثة الفطام المشتقة من النوعين (ويستروسبراكو –داولي) بعمــر(30-35)يومــاً.وبــأوزان تراوحت بين (36-90)غراماً. قسمت الحيوانات على ست مجموعات متساوية وفقا لوزن الجسم ، وعدت المجموعتان الأولى والرابعة مجموعتي ســيطرة إذ غــذيت مــدة عــشرة أيــام(مــدة التجربة)على العليقة النموذجية فقط .أما المجموعات الثانية والثالثة والخامسة والسادسة فقد غذيت كما يأتي وعلى التوالي:عليقة نموذجيه مضافا إليها 5   % اوراق التين المجففة وعليقة نموذجيــه مضافا اليها10%أوراق التين المجففة وعليقة نموذجيه مضافا اليها 5%ثمار التين المجففة وعليقة نموذجيه مضافا اليها10% ثمار التين المجففة.أظهرت النتائج الإحصائية وجود ارتفاع معنــوي محسوس في قابلية هضم الغذاء المتناول لدى مجوعتي الحيوانات الخامسة و السادسة اللتين غذيت على 5% و10% ثمار التين المجففة (P<0.05)، في حين لم تلحظ فروقات معنوية فــي دليــل النمو لمجموعات الحيوانات التي غذيت على أوراق أو ثمار التين المجففة مقارنــة بمجمــوعتي السيطرة .ولوحظ من النتائج كذلك ارتفاع محسوس في كمية الهيموكلوبين وحديده لدى المجموعة

الثالثة التي غذيت على10% أوراق التين المجففة مقارنة بمجموعة الـسيطرة (P<0.05) كمــا لوحظ حدوث انخفاض محسوس في مستوى كلوكوز الدم للمجموعتين الخامسة والسادسة اللتــين غذيتا على5%و10%ثمار التين المجففة مقارنة بمجموعتي السيطرة(P<0.05) وكــذلك لــوحظ حدوث انخفاض محسوس في مستوى كولسترول الدم لمجموعتي الحيوانات الثانية والسادسة اللتين غذيتا علــى 5% أوراق و10% ثمــار التــين المجففة علــى التــوالي، مقارنــة بمجموعــة السيطرة(P<0.05) وأشارت النتائج إلى ظهور ارتفاع معنوي فــي مــستوى البــروتين الكلــي لمجموعتي الحيوانات الثانية و الثالثة اللتين غذيتا على 5% و10% أوراق التين المجففة علــى التوالي مقارنة بمجموعة السيطرة(P <0.05).

Abstract

The effect of dried Ficus carcia leaves and fruit, before fruit maturing stage, (each of concentration 5% and 10%) were studied on the apparent digestibility and growth index of normal rats. These effects were also studied on blood hemoglobin level and its iron content ,and also on the glucose, cholesterol and total protein levels in the serum. 24 male weanling albino rats derived from (wister and Sprague – Dawley) types, with age of (30-35) day, and weight of (36-90) g were used. The rats were divided into six groups according to body weight. The first and fourth groups consumed the control groups, which fed for ten days (experimental period) the ideal diet only. The second, third, fifth and sixth groups were fed respectively : ideal diet plus 5% dried leaves, ideal diet plus 10% dried leaves, ideal diet plus 5% dried fruit and ideal diet plus 10% dried fruit.

The statistical results showed a significant increasing in apparent digestibility of groups 5 & 6 that fed on 5% and 10% dried figue fruit respectively compared with the control group (P<0.05) while insignificant differences was showed in growth index of all animals groups that fed on dried leaves or fruit, compared with the control groups. The results showed a significant increasing in the hemoglobin amount and its iron of group that fed on 10% dried figue leaves compared with the control group (P<0.05).

It was showed also a significant decreased in glucose level of groups 5 and 6 that fed on 5% and 10% dried fruit respectively, compared with the control group (P<0.05). Also, showed a significant decreased in cholesterol level of group 2 and 6 that fed on 5% and 10% of dried leaves and fruit respectively, compared with the control groups (P<0.05). A significant increasing also showed in the total protein level of groups 2 and 3 that fed on 5% and 10 % dried figue leaves respectively, compared with control group (P<0.05).

Introduction

The fig tree (*Ficus carcia*), is one of the most important fruit trees. Grows fast to 10 foot tall, and has low branching. Tolerates summer heat and full sun. can with stand drought conditions. Grows best in well- drained areas. Has a juicy, sweet fruit that can be pruned in the spring. Has a smooth, gray bark and shiny, green oval leaves (1&2). *Ficus carcia* contain number of natural enzymes, such as B gluconase, cellulase and xylonase proteolytic enzymes(3). Its protein content appeared large differences (4), and has fat low content (1-3) % of dry material (5). Its starch about (10-15)% of dry material, contain amylopectin more than amylose. *Ficus carcia* is known for its pharmacologic and nutritional properties (6). Many studies used *Ficus carcia* as antihyperglycemic (7), hypocholestrolemic (8) and hypotriglyceridemic agent (9). *Ficus carcia* fruit used to increase the growth and as inflammatry agent (10). In this study we try to know the effect of *Ficus carcia*, leaves and fruit at immaturing fruit stage, on the growth, blood glucose level and other biochemical effects.

Materials and Methods

Sample preparation:*Ficus carcia* leaves and fruit(before maturing), 2.5Kg of each were obtained from local farms in May,dried completely in an electrical oven at 50c, then crushed well, and mixed with diet as follows:

5% *Ficus carcia* leaves before fruit maturing.
10% *Ficus carcia* leaves before fruit maturing.
5% *Ficus carcia* fruit before fruit maturing.
10% *Ficus carcia* fruit before fruit maturing.

The humidity of leaves and fruit *Ficus carcia* were determined.

Experimental animals:

Albino male weanling healthy rats 24, derived from Wister and Sprague- dawley types were used. Having body weight of (36-90)g, and age between (30 –35) day. The rats were divided into six equal groups. Each group was fed separately for ten days (experimental period) as follows: -

Group (1): diet only (control).
Group (2): diet + 5% *Ficus carcia* leaves before fruit maturing.
Group (3): diet + 10% *Ficus carcia* leaves before fruit maturing.
Group (4): diet only(control).
Group (5): diet + 5% *Ficus carcia* immature fruit.
Group (6): diet + 10% *Ficus carcia* immature fruit.

Polyethylene with stainless steel cages were used for housing each rat. Deionized water in polyethylene bottles was available. The animal room was maintained at 25°c.

Chemical tests:

The apparent digestibility % for animal groups were calculate according to Sharaf (11) using the following equation:

$$\text{Apparent digestibility \%} = \frac{\text{Total diet in take (g)} - \text{feces (g)}}{\text{Total diet in take (g)}} \times 100$$

The growth index % for animals groups were calculated according to
The following equation:

$$\text{Growth index \%} = \frac{\text{Body weight gain}}{\text{Final body weight}} \times 100$$

The blood hemoglobin (Hb) was determined by cyanomethemoglobin method according to crosby *etal* (12). Hemoglobin iron content was calculated according to Sharaf (11) using the following equation:

$$\text{Hb iron (mg)} = \text{B.W} \times \frac{6.7\text{ml of blood}}{100\text{g B.W}} \times \frac{\text{Hb (g)}}{100\text{ml blood}} \times \frac{3.35\text{mg iron}}{1\text{g Hb}}$$

where B.W = body weight

Blood glucose was determined using the Kit from Biocon company, cholesterol was determined using the Kit from bio Merieux company. Total protein was determined using Biuret method (13).

Statistical analysis:

The t- test statistical method was used to compared the results between different groups were studied (14).

Results and discussion

Digestibility:

The results of apparent digestibility showed in table (1). There were insignificant differences in the digested diet between the control group (85+/- 2.18) and group 2 (80.55 +/- 2.66) and group 3 (80.62 +/- 2.59) fed on 5% and 10% *Ficus carcia* leaves respectively. These results were not agreed with that obtained by Nimruzi who explained that *Ficus carcia* powder (leaves and fruit) caused increasing digestibility in the chicken (10).

Table(1)also showed asignificant increasing (P< 0.05)in the digested diet in group 5 (65.21 +/- 3.63) and 6 (73.65 +/- 1.85) that fed on 5% and 10% *Ficus carcia* fruit, compared with the control group (50.07 +/- 5.41). This might be return to the naturally occurring digestive enzymes in the figue fruit (5), in addition, the fiber role (present in figue fruit) was to arranged the digested diet movement in the gastrointestinal track and offered maximum surface of diet to be attacked by the digestive enzymes system (15). Also decreasing in faces weight in group 5 (30.27 +/- 1.14) and 6 (21.71 +/- 0.85) compared with the control group (34.87 +/- 3.90), support the increasing in the digestibility of these groups.

Growth index:

Table(2)showed the result of growth index.There were insignificant differences in growth index in group 2(37.72+/-9.38) and group3 (40.60+/-11.66)fed on 5%and 10% ficus leaves respectively,compared with the control group(35.10+/-9.36).Also,insignificant differences were showed in group5 (35.83+/-9.86) and group 6 (38.36+/-3.71) fed
on 5% and 10% ficus fruit respectively compared with the control group (32.24 +/- 10.22). These results were not agreed with the results, which indicated on effect of mature Ficus carcia on growth and body synthesis (16). Also, these results were not agreed with Nimruzi's results who mentioned that the addition of 25% ficus carcia fruit powder to the chicken diet, caused increasing in the growth index (17). It was concluded that the uses of mature Ficus carcia fruit, with higher concentrations may play a good role and may give more clear results.

Hemoglobin and hemoglobin iron:

Table (3) showed the results of hemoglobin and iron hemoglobin contents in blood of rat groups. Group 3, that fed with 10% *Ficus carcia* leaves, showed a significant increasing (P<0.05) in hemoglobin (19.38 +/-

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1.47) and its iron content (5.55 +/- 1.86) compared with the control group value of hemoglobin (16.14 +/- 3.42) and its iron content (4.59 +/- 0.75). But there were insignificant differences in hemoglobin value and its iron in group 2 (fed on 5% leaves), group 5 (fed on 5% fruit) and group 6 (fed on 10% fruit) compared with the control groups. Many workers mentioned the nutritional properties of *Ficus carcia* (18), Majeed & Mahmood mentioned its role in the body synthesis (19), Al-Kabani explained the effect of mature carcia ficus fruit in the treatment of anemia, its role in hemoglobin production, and its high minerals and iron content (20). It was concluded that the differences in the results may be returned to the differences in the concentrations, or to the differences between mature and immature *Ficus carcia* constituents.

Serum glucose, cholesterol and total protein:-

The results of serum glucose, cholesterol and total protein were showed in table (4). Serum glucose was insignificantly increased in groups 2 (135.26 +/- 11.2) and 3 (131.09 +/- 16.45) fed on 5% and 10% ficus leaves respectively, compared with the control group (104.49 +/- 14.58). these results were not agreed with that obtained by Torres who stated that ficus leaves extract showed a clear hypoglycemic activity in the diabetic rats (21). Also, these results were not similar with that obtained by Serraclava who demonstrated the hypoglycemic properties of ficus leaves in the rats (22). On the other hand, serum glucose was significantly decreased (P < 0.05) in groups 5 (152.88 +/- 14.65) and 6 (139.7 +/- 12.03) fed on 5% and 10% ficus fruit respectively compared with the control group (189.70 +/- 11.9). this results were similar with that obtained by Pereze (7) and Day (23) who demonstrated the hypoglycemic effect of *Ficus carcia* on the diabetic rats. Table(4) showed a significant decrease (P < 0.05) in serum cholesterol in group 2 (103.17 +/- 0.85) fed on 5% ficus leaves and group 6 (123.15 +/- 14.16) fed on 10% ficus fruit, compared with the control groups (129.64 +/- 17.86) and (163.93 +/- 16.63) respectively. These results were agreed with that obtained by Shukla (24) who explained that the water extract of *Ficus carcia* has a significant hypocholesterolemic effect on the rabbits. Also, these results were agreed with that obtained by Slowing (6) who explained the ficus and garlic extracts decreased total plasma cholesterol and LDL and increased significantly the HDL. Also, Canal (8) mentioned that an administration of chloroform extract obtained from *Ficus carcia* leaves led to a decline in total cholesterol levels and decreased in the total cholesterol/HDL in the streptozotocin–induced diabetes rats (8).

Table (4) showed an increasing in the serum total protein level in all animals

groups compared with the control groups, but the total protein level was significantly increased (P < 0.05) in groups 2 (8.23 +/- 1.07) and 3 (8.60 +/- 1.24) fed on 5% and 10% ficus leaves respectively, compared with the control group (5.40 +/- 0.80).

No studies were available to explain the effect of *Ficus carcia* on the serum protein level, but it can be concluded that the hypoglycemic effect of *Ficus carcia* may be ascribed to the increased in the utilization of glucose by the cells. Also, hypocholesterolemic effect of *Ficus carcia* led to the accumulation of acetyl COA that entering krebs cycle (24). In addition, many studies explained the hypotriglyceridemic effect of *Ficus carcia* (25)(26), which may cause an increasing in the glycerol-3- phosphate level. These effects as well as the fiber effect in activation of the digestion process (15), may cause increasing in the metabolites that necessary in the amino acid and protein synthesis.

Table (1): effect of immature leaves and fruit *Ficus carcia* on the digestibility of normal rats (mean +/- S.D)*

Group no.	Diet sample	Total diet intake(g)	Faces weight (g)	Apparent digestibility(%)
1	Control	196.33+/-17.28	29.75+/-7.75	85 +/- 2.18
2	Diet+5% leaves	217.75+/-6.53	42.19+/-4.74	80.55+/-2.66
3	Diet+10% Leaves	214.75+/-7.25	41.46+/-4.39	80.62+/-2.59
4	Control	69.90+/-2.77	34.87+/-3.90	50.07+/-5.41
5	Diet+5% fruit	80.90+/-2.29	30.27+/-1.14	65.21+/-3.36**
6	Diet+10% fruit	82.74+/-5.28	21.71+/-0.85	73.65+/-1.85**

* Mean for four rats.
**Significant at (P<0.05).

Table (2) effect of immature leaves fruit *Ficus carcia* on the growth index of normal rat (mean +/- S.D*)

Group no.	Diet samples	Initial body weight(g)	Final body weight(g)	Growth index(%)
1	Control	75.29+/-0.74	127.42+/-4.34	35.10+/-9.36
2	Diet+5% leaves	75.62+/-11.65	138.49+/-14.50	37.32+/-9.38
3	Diet+10% leaves	72.70+/-14.32	129.22+/-17.1	40.60+/-11.66
4	Control	55.0+/-13.72	75.87+/-9.74	32.24+/-10.22
5	Diet+5% fruit	55.0+/-16.76	83.90+/-12.73	35.83+/-9.86
6	Diet+10%fruit	48+/-12.24	67.22+/-4.64	38.36+/-3.71

* Mean for four rats.
** Significant at (P<0.05).

Table (3): effect of immature leaves and fruit *Ficus carcia* on the hemoglobin and hemoglobin iron content of normal rats (mean +/- S.D)*

Group No.	Diet samples	Hb value(g/dl)		Hb iron value(g/dl)	
		Initial	Gain	Initial	Gain
1	Control	16.76+/-0.94	16.14+/-3.42	2.83+/-0.12	4.59+/-0.75
2	Diet+5% leaves	15.98+/-3.93	14.67+/-1.23	2.64+/-0.22	4.59+/-0.95
3	Diet+10% leaves	15.76+/-3.16	19.38+/-1.47	2.69+/-1.31	5.55+/-1.86**
4	Control	18.95+/-2.96	19.25+/-3.05	2.56+/-0.22	3.30+/-0.10
5	Diet+5% fruit	19.23+/-1.86	17.89+/-1.87	2.43+/-1.12	2.90+/-1.23
6	Diet+10% fruit	19.64+/-1.84	15.64+/-1.66	2.40+/-0.59	2.57+/-0.54

* Mean for four rats
** Significant at (P<0.05)

Table (4): effect of immature leaves and fruit *Ficus carcia* on the level of glucose, cholesterol and total protein of normal rats (mean +/- S.D)*

Group no.	Diet Samples	Glucose(mg/dl)	Cholesterol (mg/dl)	Total protein (g/dl)
1	control	104.49+/-14.58	129.64+/-17.86	5.40+/-0.80
2	Diet+5% leaves	135.26+/-11.2	103.17+/-0.85**	8.23+/-1.07**
3	Diet+10% Leaves	131.09+/-16.45	128.68+/-17.62	8.60+/-1.24
4	Control	189.70+/-11.9	163.93+/-16.63	8.65+/-1.40
5	Diet+5% fruit	152.88+/-14.65**	127.36+/-10.40	10.15+/-0.96
6	Diet+10% fruit	139.7+/-12.03**	123.15+/-14.16**	8.83+/-0.66

* Mean for four rats.
** Significant at (P<0.05).

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