J.Animal and Poultry Prod., Mansoura Univ., Vol.2(12): 561 - 578,2011

THE EFFECT OF ORAL ADMINISTRATION OF GARLIC (*Allium sativum)* ON SOME BLOOD COMPONENTS IN RATS

Helal, A. F. ; M. I. Badr ; A. A. Abd El Hamid and I. A. A. Wahba
Faculty of Agriculture, Al-Azhar University, Cairo, Egypt

ABSTRACT

An experiment was conducted to study the effect of feeding *Allium Sativum* (*AS*) at three levels 4 ,6 and 12% on serum glucose, insulin and some physiological parameters in male rats. This study included 24 adult male albino rats, with an average live body weight 140 gm. Rats were distributed into 4 groups (6 rats each). Blood samples were collected at 8 am , 4 pm and 12 pm twice after 4 then 8 weeks from the beginning of the experiment . Blood samples were centrifuged at 3000 rpm for 15 min to obtain serum. Results show that *AS* did not show any significant effect on serum glucose after 4 weeks, meanwhile after 8 weeks 4% *AS* was significantly decreased serum glucose. Serum glucose tended to be higher at 4 pm in control and most treated groups after 4 or 8 weeks from the start of the experiment. Treatment with 4 % or 6% *AS* for 4 weeks significantly increased serum insulin. Serum insulin were increased at 8 am after 4 weeks ,while after 8 weeks serum insulin were increased at 12 p.m. *AS* significantly decreased serum total protein and albumin after 4 or 8 weeks as compared with the control group .Serum cholesterol were increased after treatment with *AS*. .*AS* did not show any significant effect on serum triglycerides after 4 weeks, Meanwhile after 8 weeks *AS* significantly decreased serum triglycerides .After 4 weeks from the treatment 4% and 12 % *AS* significantly increased serum alkaline phosphatase , while after 8 weeks all groups treated with *AS* significantly decreased Alkaline phosphates .serum creatinine significantly decreased after treatment with *AS* for 4 weeks ,while after 8 weeks from the treatment 4% and 12 % *AS* significantly decreased serum creatinine as compared with the control group .

It could be concluded that the addition of several levels of garlic in rats diet cause a several effect on some blood components under study. Feeding of diet contain garlic enhance serum insulin and glucose levels in the experimental rats. Thus we can add garlic to rat's diet by 4% or 6% from the diet to increase the performance in this animal.

Keywords :*Allium sativum* – glucose – insulin – rat

INTRODUCTION

Vegetation on the earth is the perennial and renewable source of food and energy for survival of living beings. Plants are the green factories of our planet. Besides being food, plants are considered the natural green Pharmacy which provides drugs to maintain health and treat failing health of human beings. The medicinal art had its origin since mankind and early began remedial measures to get rid of suffering pains and other illnesses using medicinal portions prepared from plants. Al – Yahya *et al*. (1987) and Haney (1987) stated that many herbs and other plants were recognized very early for their medicinal properties. Herbs had been extensively used in the last two centuries in processing and making drugs. Macrae *et al*. (1993) [b] reported that garlic is one of these famous medicinal herbs, and has been known since ancient times, originated in central Asia. Macrae *et al*. (1993) [a] reported that

number of garlic products, including capsule, extract and tablets are now marketed while Odor–free garlic products also has recently appeared. Mostofa *et al*. (2007) showed that *AS* extracts at oral dose of 1g/kg and,500 mg/kg BW for 14 days was significantly decreased blood glucose in diabetic induced rat as compared with the patent drug. They indicated the significant anti diabetic activity of *AS* and supported the traditional usage of herbal preparations by Ayurvedic Physicians for the therapy of diabetics. Quan and Suzuki (2007) reported that plasma glucose concentrations were significantly lower in animals on 1% garlic diets compared with those on 1% turmeric diet. Jain *et al*. (2006) showed that Streptozotocin administration led to a highly significant elevation in fasting blood glucose (FBG). They showed that standardized extract of *AS* (0.6% allicin) decrease FBG in the Streptozotocin after 3 weeks of treatment to 48.2 ±22.4%. Eidi *et al*. (2006) reported that oral administrations of garlic extract (0.1, 0.25 and 0.5 g/kg BW) significantly decreased serum glucose, total cholesterol, triglycerides creatinine , AST and ALT levels, while increased serum insulin in diabetic rats but not in normal rats. Parveen *et al*. (2006) showed that garlic treatment to Sevin – induced toxicity (Sevin, is a highly toxic carbamate compound used frequently as a pesticide) had reduced it and the activity of GOT, GPT and Alkaline phosphates were increased. Garlic showed protective effect towards the chronic toxicity of Sevin in mice. These enzymes were significantly increased due to garlic treatment .They indicated that garlic plays an important role in retrieval of enzymes depleted by Sevin toxicity. Hussein *et al*. (2007) reported that serum hepatic markers (ALT, AST and Alkaline phosphates), serum cholesterol and triglyceride were significantly increased by ethanol abuse and returned to the normal levels after garlic oil treatment (100 mg oil /kg BW/day). They showed a damaging effect, necrosis and fibrosis of liver cells after ethanol abuse and a marked improvement was seen after garlic oil treatment. These results proved the potent antioxidant activity of garlic oil. Jalal *et al*. (2007) showed that fasting blood glucose in fructose -induced insulin resistance animals had been significantly decreased in 8-weeks treated rats by garlic extracts (500 mg/kg body weight /day). They indicated that garlic extracts has a hypoglycemic influence on the fructose induced insulin resistance.

The objective of this study was designed to determine whether the additive of *Allium sativum* into rats diet have a useful effect on serum glucose and insulin levels in normal rats .

MATERIALS AND METHODS

The study was implemented in Department of Animal Production, Faculty of Agriculture, Al-Azhar University, Cairo.

Animals:

This study included 24 adult male albino rats, with an average live body weight 140 gm .The albino rats used in this study were originally bought from Egyptian Organization for biological products and Vaccines, Cairo, Egypt

and raised in Faculty animal house. Animals were housed in cages under conditions of ambient temperature (between 27 and 31 $C^{o)}$. They maintained on about 12-hour light /dark cycle. The standard laboratory chow and tap water were provided ad libitum. All animals were healthy and clinically free from diseases.

Experimental design

Materials

The whole plant of garlic, *Allium Sativum* (obtained from the local market in Cairo) is grounded to fine powder and used as feed additives.

Animals Feeding and Management :

The experiment lasted two months (August and September 2009). Animals were divided randomly into four equal groups. Each group contained 6 rats and fed on one of the following diets :

1-Control diet.
2- Control diet + 4% *Allium Sativum*. (w/w)
3- Control diet.+6% *Allium Sativum*.(w/w)
4-Control diet+ 12% *Allium Sativum*.(w/w)

Table (1): Composition of the control diet :

Ingredient	Quantity (kg)
Yellow corn	56.65
Soybean meal (44%)	14.60
Wheat bran	20.30
Lime stone	7.40
$Caco_3$	0.40
Mineral and vitamin premix	0.30
Salt	0.25
Fish male	0.05
Methionine	0.05

Bader, (2006) showed that 4% *AS* in rats diet caused a significant increase in plasma insulin levels .

Experimental outline

Two diurnal variations were considered during the experiment. The experiments started at zero time, one moth and two months after treatment of garlic.

Blood samples

Blood samples were obtained from rats by withdrawing blood from the orbital venous plexuses using a capillary tube. Samples were collected at 8:00 am, 4:00 pm12:00 pm . Two blood samples were withdrawn at the 30th and 60th days of the experimental treatment. Blood samples were collected and centrifuged at 3000 rpm for 15 min to obtain serum which transferred to Ependorff tube and stored at – 20C^{o}until subsequent analyses.

Blood serum parameters

Insulin hormone in serum was measured by radioimmunoassay (RIA) (Reeves 1983) .The glucose concentration was determined by glucose oxidase method (Trinder 1969). Serum total lipids was measured by colorimetric method based on the method of Zollner *et al*. (1962). Serum cholesterol was measured by enzymatic colorimetric method (PAP) based on

the method of Allain (1974). Serum triglycerides were determined using enzymatic colorimetric method according to Buccolo and David (1973). Serum total protein was determined using colorimetric method according to Henry (1964). Serum albumin was measured using kits according to Dumas and Biggs (1972). Serum globulin was calculated by subtraction of albumin from total protein. Serum creatinine was measured by colorimetric method based on Murray (1984). Serum ALP was determined by using a colorimetric method according to Kind and King (1954). Serum AST was determined by using a quantitative colorimetric method according to Henry (1974). Serum Alt was determined by using a colorimetric method according to Reitman and frankel (1957).

Statistical analyses:

Data collected were statistically analyzed by the analysis of variance using ANOVA procedure of SAS program (SAS, 1998). All statements of significant are based on the 0.05 level of probability. Duncan's Multiple Range Test (Duncan, 1955) was used to compare the effects of ***AS*** after 4 and 8 weeks from the experiment as well as time of the day within each group.

RESULTS

Effect of feeding *Allium Sativum* on serum glucose concentrations :

Table (2) indicated that *AS* did not show any significant effect on serum glucose levels after 4 weeks from the start of the experiment. While after 8 weeks 4% *AS* significantly decreased serum glucose, while 6% *AS* significantly increased it. 12% *AS* did not show increase also after 8 weeks**.**

Table (2) : Means ± S.E for the effect of *Allium Sativum* on serum Glucose Concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	142.88 ± 6.34	a	155.07 ± 19.41	b
G2	136.12 ± 19.29	a	143.14 ± 16.60	c
G3	143.66 ± 12.68	a	170.82 ± 4.11	a
G4	146.12 ± 5.87	a	157.82 ± 13.72	b

S.E. = Standard error.

d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05

Diurnal rhythm :

After 4 weeks of treatment, Table (3) show that at 4 pm serum glucose were higher in control group and 12% *AS* groups. After 8 weeks of treatment serum glucose was significantly higher at 4 pm in all groups expect with 12 % *AS* supplement, where serum glucose was higher at 8 am than other times.

Table (3) : Means ± S.E for the effect of *Allium Sativum* on serum glucose concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	133.1	5.15	c	154.7	16.65	a	140.8	9.27	b	170.5	18.84	b	178.2	10.15	a	116.5	52.69	c
G2	111.9	5.46	c	122.2	8.63	b	174.2	31.73	a	143.2	5.74	b	171.9	18.87	a	114.4	17.13	c
G3	168.4	11.79	a	126.6	14.50	c	136.0	3.58	b	163.0	16.90	c	176.8	15.52	a	172.7	0.95	b
G4	144.0	11.35	b	157.2	6.36	a	137.2	7.30	c	185.2	7.64	a	145.7	5.34	b	142.5	15.34	c

S.E. = Standard error.
d.t: Duncan's Multiple Range Test between Times. Means within each column with similar letters are not significant at p≤ 0.05 .

Effect of feeding *Allium Sativum* on serum insulin concentration:

Table (4) indicate that treatment with 4 % or 6% *AS* for 4 weeks caused a significant increase in serum insulin levels compared with the control group. Meanwhile after 8 weeks, 4% *AS* supplement caused a significant increase in serum insulin, while 12 % supplement caused a significant decrease in serum insulin level compared with control diet group.

Table (4) : Means ± S.E for the effect of Allium Sativum on serum Insulin concentration(µU/mL) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	1.29 ± 0.45	c	0.90 ± 0.13	b
G2	1.42 ± 0.46	b	1.05 ± 0.04	a
G3	1.53 ± 0.69	a	0.89 ± 0.16	b
G4	1.33 ± 0.05	c	0.77 ± 0.05	c

S.E. = Standard error.
d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05.

Diurnal rhythm :

Table (5) show that after 4 weeks of treatment serum insulin were increased at 8:00 am than at 4:00 or 12:00 pm. Meanwhile after 8 weeks of treatment serum insulin was significantly increased at 12:00 pm in all groups except in the control group that serum insulin decreased at 12:00 pm than at 8:00 am or 4:00 pm .

globulin concentrations:

Diet containing *AS* at a doses of 4 , 6 or 12 % significantly decreased serum total protein and Albumin (tables 6 and 8) after 4 or 8 weeks of treatment compared with the control group.

Meanwhile after 4 weeks of treatment, 4 and 12 % *AS* significantly decreased serum globulin (table 10) compared with the control group, while after 8 weeks, *AS* did not show any significant effect on serum globulin except 6% *AS* (Table 10) which significantly decreased serum globulin as compared with the control group.

Table (5) : Means ± S.E for the effect of *Allium Sativum* on serum insulin concentrations (µU/mL) at different times after 4 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	2.2	0.49	a	0.8	0.13	c	0.9	0.07	b	1.2	0.30	a	0.8	0.12	b	0.8	0.13	b
G2	2.3	0.67	a	0.7	0.10	c	1.3	0.36	b	1.0	0.21	c	1.1	0.22	b	1.1	0.22	a
G3	2.9	0.48	a	0.9	0.14	b	0.8	0.13	b	0.7	0.10	b	1.2	0.11	b	1.2	0.32	a
G4	1.4	0.22	a	1.3	0.36	b	1.2	0.19	b	0.8	0.13	a	0.8	0.10	b	0.8	0.00	a

S.E. = Standard error.

d.t: Duncan's Multiple Range Test between Times. Means within each column with similar letters are not significant at p≤ 0.05 .

G1 : Control ***G3 : 6% Allium sativum***

G2 : 4% Allium sativum ***G4 : 12% Allium sativum***

Table (6) : Means ± S.E for the effect of *Allium Sativum* on serum total protein Concentrations (mg/dl) at different times 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	8.93 ± 0.56	a	7.68 ± 0.18	a
G2	8.06 ± 0.74	b	7.39 ± 0.30	b
G3	7.85 ± 0.62	c	6.82 ± 0.22	d
G4	7.42 ± 0.17	d	7.26 ± 0.53	c

S.E. = Standard error.

d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05 .

Effect of feeding *Allium Sativum* on serum total protein, albumin and Diurnal rhythm :

Table (7) show that after 4 weeks of treatment serum total protein was significantly decreased at 8 am than at 4:00 or 12:00 pm in the control and 4 % *AS* groups, meanwhile 6 and 12 % *AS* were significantly higher at 8 am than at 12 pm ,while after 8 weeks of treatment serum total protein was significantly higher at 8:00 am than at 4:00 pm in all groups except 12 % *AS* group.

Table (7) : Means ± S.E for the effect of Allium Sativum on serum total protein concentrations (g/dl) at different times after 4 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	7.83	0.60	c	9.26	0.55	b	9.69	0.31	a	8.00	0.48	a	7.63	0.53	b	7.38	0.37	c
G2	6.60	0.73	c	9.04	0.76	a	8.54	0.66	b	7.93	0.44	a	7.35	0.16	b	6.88	0.85	a
G3	9.06	0.97	a	7.09	0.72	c	7.36	0.63	b	7.25	0.64	a	6.67	0.14	b	6.54	0.20	c
G4	7.39	0.74	b	7.71	0.61	a	7.13	0.60	c	6.19	1.23	c	7.90	0.43	a	7.66	0.79	b

S.E. = Standard error.

d.t_.: Duncan's Multiple Range Test between Times .Means within each column with similar letters are not significant at p≤ 0.05 .

Table (8) : Means ± S.E for the effect of *Allium Sativum* on serum Albumin Concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	7.10 ± 0.77	a	6.22 ± 0.17	a
G2	6.44 ± 0.75	b	6.00 ± 0.19	b
G3	5.97 ± 0.48	c	5.14 ± 0.06	d
G4	5.73 ± 0.17	d	5.71 ± 0.54	c

S.E. = Standard error.
d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05 .

Table (9) indicate that after 4 weeks serum albumin was significantly decreased at 8:00 am than at 4:00 or 12:00 pm in all groups except 6% *AS* where serum albumin was increased at 8:00 am than other times .

Table (9) : means ± s.e for the effect of *Allium Sativum* on serum albumin concentrations (g/dl) at different times after 4 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	5.56	0.9	c	7.69	0.5	b	8.02	0.2	a	6.49	0.6	a	6.3	0.4	b	5.9	0.5	c
G2	4.97	0.6	c	7.41	0.8	a	6.95	0.6	b	6.26	0.4	a	6.1	0.3	b	5.6	0.7	c
G3	6.91	1.2	a	5.35	0.7	c	5.61	0.7	b	5.09	1.0	b	5.3	0.3	a	5.1	0.3	b
G4	5.50	0.6	c	6.06	0.5	a	5.62	0.6	b	4.64	1.2	c	6.4	0.5	a	6.1	0.7	b

S.E. = Standard error.
d.t.: Duncan's Multiple Range Test between times. Means within each column with similar letters are not significant at p≤ 0.05 .
G1 : Control ***G3 : 6% Allium sativum***
G2 : 4% Allium sativum ***G4 : 12% Allium sativum***

Table (10) : Means ± S.E for the effect of *Allium Sativum* on serum globulin concentrations (g/dl) after 4 or 8 weeks from the beginning of the treatment.

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	1.84 ± 0.22	a	1.46 ± 0.04	b
G2	1.62 ± 0.02	b	1.39 ± 0.14	b
G3	1.88 ± 0.14	a	1.68 ± 0.24	a
G4	1.68 ± 0.11	b	1.54 ± 0.01	b

S.E. = Standard error.
d.t.: Duncan's Multiple Range Test between groups. Means within each groups with similar letters are not significant at p≤ 0.05 .

After 8 weeks of treatment serum albumin in both the control and 4% *AS* groups were significantly higher at 8:00 am than at 4:00 and 12:00 pm, while in 6 and 12 % *AS* groups serum albumin was higher at 4:00 pm than at 8:00 am or 12:00 pm.

Table (11) show that serum globulin was significantly higher at 8:00 am than at 4:00 pm or 12:00 pm in all experimental groups after either 4 or 8 weeks of treatment except 12 % *AS* after 8 weeks. There were no diurnal changes in this group.

Table (11) : Means ± S.E for the effect of *Allium Sativum* on serum globulin concentrations (g/dl) at different times after 4 or 8 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	2.3	0.68	a	1.6	0.09	c	1.7	0.12	b	1.5	0.15	a	1.4	0.19	b	1.5	0.11	b
G2	1.6	0.12	a	1.6	0.00	b	1.6	0.15	b	1.7	0.02	a	1.2	0.17	b	1.3	0.23	b
G3	2.2	0.24	a	1.7	0.08	b	1.8	0.09	b	2.2	0.46	a	1.4	0.11	b	1.5	0.14	b
G4	1.9	0.20	a	1.6	0.11	b	1.5	0.08	c	1.6	0.16	a	1.5	0.05	a	1.6	0.12	a

S.E. = Standard error.
d.t_.: Duncan's Multiple Range Test between times . Means within each column with similar letters are not significant at p≤ 0.05 .

Effect of feeding *Allium Sativum* on serum cholesterol concentrations:

Table (12) indicated that *Allium Sativum* significantly increased serum cholesterol in all experimental groups compared with the control group either after 4 or 8 weeks except 12% *AS* level after 4 weeks which did not show significant change in serum cholesterol.

Table (12) : Means ± S.E for the effect of *Allium Sativum* on serum Cholesterol concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	62.22 ± 7.94	c	57.31 ± 8.59	c
G2	69.74 ± 7.91	b	63.13 ± 8.69	a
G3	81.37 ± 16.13	a	62.69 ± 5.45	b
G4	62.13 ± 2.89	c	62.07 ± 6.15	b

S.E. = Standard error.
d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05 .

Diurnal rhythm :

Table (13) show that in the control group serum cholesterol was significantly decreased at 8:00 am than at 4:00 or 12:00 pm ,while a reverse trend was shown in *AS* groups after 4 weeks from the start of the experiment where 4 and 12 % *AS* had significantly lower serum cholesterol at 4:00 pm than at 8:00 am and 12 pm , while 6% *AS* had significant increase in serum cholesterol at 4:00 pm than at 8:00 am or 12 pm. Meanwhile after 8 weeks of treatment 6 and 12 % *AS* showed significant decrease in serum cholesterol at 4 pm than at 8:00 am or 12pm, while 4 % *AS* significantly decreased serum cholesterol at 12 pm than at 8:00 am or 4:00 pm.

Table (13) : Means ± S.E for the effect of *Allium Sativum* on serum cholesterol concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	49.5	17.79	c	76.8	5.50	a	60.4	7.94	b	40.2	5.71	c	66.9	10.38	a	64.8	5.20	b
G2	84.6	9.67	a	57.6	3.74	c	67.0	3.62	b	75.2	4.34	a	67.9	1.79	b	46.3	5.84	c
G3	79.5	2.92	b	110.2	1.73	a	54.4	4.22	c	57.8	3.22	b	56.7	5.58	c	73.6	3.72	a
G4	59.3	22.53	b	59.2	9.97	c	67.9	1.94	a	71.0	17.39	a	50.3	1.34	c	65.0	7.91	b

S.E. = Standard error.

d.t.: Duncan's Multiple Range Test between times. Means within each column with similar letters are not significant at p≤ 0.05 .

G1 : Control ***G3 : 6% Allium sativum***

G2 : 4% Allium sativum ***G4 : 12% Allium sativum***

Effect of feeding *Allium Sativum* on serum triglycerides concentrations:

Table (14) indicate that after 4 weeks of treatment with *AS* did not show any significant effects on serum triglycerides except with 12 % *AS* which significantly reduced serum triglycerides as compared to the control or other treated groups. Meanwhile after 8 weeks of treatment the treated groups significantly had decrease in serum triglycerides in rats compared with the control group .

Table (14) : Means ± S.E for the effect of *Allium Sativum* on serum Triglycerides concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	77.28 ± 1.50	a	84.57 ± 3.17	a
G2	76.21 ± 0.75	a	82.02 ± 1.25	b
G3	71.93 ± 3.20	a	71.40 ± 7.70	c
G4	68.49 ± 2.17	b	55.27 ± 0.37	d

S.E. = Standard error.

d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05.

Diurnal rhythm :

Table (15) show that after 4 weeks of treatment, serum triglycerides tended to be lower at 12:00 pm in the control group, while in the treated groups serum triglycerides tended to be lower at 8:00 am or 4:00 pm than at 12:00 pm. After 8 weeks from the start of the experiment, serum triglycerides tended to be lower at 12:00 pm in control& 4% *AS* group, while in 12% *AS* group serum triglycerides were significantly high at 12;00 pm than at 8:00 am or 4:00 pm.

Table (15) : Means ± S.E for the effect of *Allium Sativum* on serum triglycerides concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	78.4	4.49	b	79.1	1.43	a	74.3	7.09	c	88.5	6.34	a	86.9	6.36	b	78.3	6.41	c
G2	75.6	4.81	b	75.3	3.84	c	77.7	3.94	a	83.1	4.44	b	83.4	4.67	a	79.5	5.75	c
G3	65.7	7.43	c	73.7	5.46	b	76.4	6.30	a	78.9	3.58	b	79.3	3.78	a	56.0	24.79	c
G4	65.0	0.58	c	68.0	0.58	b	72.5	0.29	a	54.9	6.10	b	54.9	6.10	b	56.0	6.11	a

S.E. = Standard error.
d.t.: Duncan's Multiple Range Test between Times. Means within each column with similar letters are not significant at p≤ 0.05 .

Effect of feeding *Allium Sativum* on serum total lipids concentrations:

After 4 weeks of treatment, 4% *AS* significantly decreased serum total lipids as compared with the control groups, while 6% or 12% *AS* significantly increased serum total Lipids as compared with the control group as shown in table (16). While after 8 weeks of treatment all *AS* treated groups show significant decrease in serum total lipids in rats

Table (16) : Means ± S.E for the effect of *Allium Sativum* on serum Total lipids concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	398.26 ± 74.57	c	313.42 ± 10.82	a
G2	348.80 ± 51.58	d	294.03 ± 38.53	b
G3	537.25 ± 49.60	a	270.88 ± 8.73	c
G4	407.83 ± 60.73	b	254.42 ± 27.49	d

S.E. = Standard error.
d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05.

Diurnal rhythm :

Table (17) show that serum total lipids were significantly lower at 12:00 pm than at other times after 4 weeks. Meanwhile, after 8 weeks serum total lipids were significantly lower at 12:00 pm in the control and 4% *AS* groups, while 6% *AS* significantly lower serum total lipids at 4:00 p.m. and 12 % *AS* significantly lower serum total lipids at 8:00 a.m. as compared with other times.

Table (17) : Means ± S.E for the effect of Allium Sativum on serum total lipids concentrations (g/l) at different times after 4 or 8 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	459.4	35.22	b	485.5	36.51	a	249.9	109.68	c	302.9	15.90	b	335.1	34.53	a	302.3	74.66	b
G2	409.7	25.50	a	390.5	41.97	b	246.2	19.39	c	369.9	5.30	a	267.9	17.11	b	244.3	16.91	c
G3	600.3	35.26	a	572.0	49.08	b	439.4	65.65	c	280.3	133.21	a	253.4	12.52	c	278.9	4.37	b
G4	396.3	12.04	b	518.3	222.04	a	308.9	3.81	c	224.6	6.94	c	309.3	41.01	a	229.4	11.52	b

S.E. = Standard error.

d.t.: Duncan's Multiple Range Test between times . Means within each column with similar letters are not significant at p≤ 0.05 .

G1 : Control ***G3 : 6% Allium sativum***

G2 : 4% Allium sativum ***G4 : 12% Allium sativum***

Effect of feeding *Allium Sativum* on serum alkaline phosphatase (ALP) concentrations:

After 4 weeks, 4% *AS* were significantly increased serum ALP, while 6% *AS* significantly decreased serum ALP as compared with the control group as shown in Table (18). While after 8 weeks all groups treated with *AS* significantly decreased serum ALP as compared with the control group ,but 4% AS caused a big decreased in serum ALP .

Table (18) :Means ± S.E for the effect of *Allium Sativum* on serum ALP concentrations (U/l) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	109.83 ± 2.70	b	112.90 ± 1.09	a
G2	115.55 ±1.99	a	69.63 ± 34.75	d
G3	107.31 ±1.04	c	107.74 ± 1.39	c
G4	110.30 ± 1.14	b	108.13 ± 1.63	b

S.E. = Standard error.

d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05.

Diurnal rhythm :

After 4 weeks of treatment, table (19), serum ALP significantly decreased at 12:00 pm in the control rat group, while 6% or 12 % *AS* significantly decreased ALP at 8:00 a.m. than other times (4:00 p.m. or 12:00 pm.),Meanwhile after8 weeks from the start of the experiment ALP significantly decreased at 8:00 a.m. , while in the other *AS* treated groups (4% , 6% or 12 %) ALP significantly increased at 8:00 a.m. than 4:00 p.m. or 12:00 pm..

Table (19) :Means ± S.E for the effect of Allium Sativum on serum ALP concentrations (U/L) at different times after 4 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	109.5	4.16	b	114.7	0.84	a	105.3	1.07	c	110.7	0.84	b	114.0	1.76	a	114.0	2.08	a
G2	118.3	2.94	a	111.7	5.62	c	116.7	1.41	b	105.5	0.12	a	104.0	1.56	b	104.7	1.79	b
G3	105.7	3.55	c	109.2	7.49	a	107.0	3.03	b	109.5	1.50	a	105.0	3.06	c	108.7	2.69	b
G4	108.3	4.49	c	110.4	4.73	b	112.2	4.00	a	111.4	3.26	a	106.8	2.60	b	106.2	3.67	b

S.E. = Standard error.

d.t.: Duncan's Multiple Range Test between times. Means within each column with similar letters are not significant at p≤ 0.05 .

Effects of feeding *Allium Sativum* on serum AST and ALT concentrations:

After 4 weeks 6% or 12 % *AS,* did not show any significant effect on serum AST as compared with the control group, while 4% *AS* significantly increased serum AST as compared with control group as shown in table (20). After 8 weeks, 4% didn't show difference, 6% had significant and the highest increase in AST while 12% had decreased AST compared to control group.

Table (20) :Means ± S.E for the effect of *Allium Sativum* on serum AST (GOT) concentrations (IU/L) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	21.89 ± 4.43	b	28.89 ± 6.22	a
G2	36.67 ± 5.55	a	29.67 ± 8.04	a
G3	21.33 ± 4.23	b	37.33 ± 5.87	a
G4	21.55 ± 5.17	b	21.89 ± 3.87	b

S.E. = Standard error.

d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05 .

Table (21) :Means ± S.E for the effect of Allium Sativum on serum AST (GOT) concentrations (U/L) at different times after 4 or 8 weeks from the beginning of the treatment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	20.0	8.51	b	15.3	7.84	c	30.3	11.02	a	17.0	5.51	c	38.0	4.62	a	31.7	5.84	**b**
G2	28.7	3.84	c	47.3	18.98	a	34.0	9.29	b	14.0	4.04	c	40.7	11.35	a	34.3	13.17	**b**
G3	14.0	3.61	c	21.3	7.22	b	28.7	5.46	a	49.0	14.57	a	32.7	13.17	b	30.3	9.03	**c**
G4	25.3	7.45	b	11.3	4.33	c	28.0	7.55	a	20.0	5.77	b	29.3	7.69	a	16.3	6.17	**c**

S.E. = Standard error.

d.t.: Duncan's Multiple Range Test between times. Means within each column with similar letters are not significant at p≤ 0.05 .

G1 : Control ***G3 : 6% Allium sativum***

G2 : 4% Allium sativum ***G4 : 12% Allium sativum***

Table (22) indicated that *Allium Sativum* significantly increased serum ALT in all experimental groups compared with the control group either after 4 or 8 weeks .

Table (22) :Means ± S.E for the effect of *Allium Sativum* on serum ALT (GPT) concentrations (IU/L) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	12.11 ± 2.80	d	9.56 ± 1.10	d
G2	20.11 ± 3.75	a	16.44 ± 3.86	a
G3	15.55 ± 2.30	c	13.33 ± 1.17	c
G4	17.44 ± 2.23	b	14.22 ± 2.13	b

S.E. = Standard error.
d.t.: Duncan's Multiple Range Test between times. Means within each column with similar letters are not significant at p≤ 0.05 .

Diurnal rhythm :

Table (21) show that after 4 weeks serum AST was significantly increased at 12:00 pm than at 8:00 am or 4:00 pm in all groups except in 4 % *AS* group which showed significant increase in serum AST at 4 :00 pm than at 8:00 am or 12:00 pm.. Meanwhile after 8 weeks serum AST was significantly increased at 4:00 pm in all groups except in 6% *AS* group which showed significant increase in serum AST at 8 :00 am than at 4:00 pm or 12:00 pm .

After 4 weeks serum ALT significantly decreased at 12 pm.. in control and 4 % *AS* groups , while in 6 % and 12 % *AS* serum ALT significantly decreased at 8: 00 a.m. than at 4:00 p.m. or 12:00 pm. , Meanwhile after 8 weeks from the start of the experiment serum ALT significantly increased at 4:00 p.m. than at 8:00 a.m. or 12 :00 pm.. in all groups .

Table (23) :Means ± S.E for the effect of *Allium Sativum* on serum AlT concentrations (U/L) at different times after 4 or 8 weeks from the beginning of the experiment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	16.0	3.61	a	13.7	1.45	b	6.7	0.33	c	9.0	2.65	b	11.7	2.60	a	8.0	1.16	c
G2	23.0	7.94	b	24.7	2.96	a	12.7	4.26	c	11.3	3.18	c	24.0	9.54	a	14.0	3.51	b
G3	11.0	1.73	c	17.3	4.41	b	18.3	2.73	a	14.3	4.81	b	14.7	0.67	a	11.0	0.00	c
G4	13.0	3.61	c	19.3	4.67	b	20.0	5.20	a	10.3	3.33	c	17.7	1.20	a	14.7	4.98	b

S.E. = Standard error.
d.t.: Duncan's Multiple Range Test between times .Means within each column with similar letters are not significant at p≤ 0.05.

Effect of feeding *Allium Sativum* on serum creatitine concentrations:

Table (24) show that all levels (4, 6 and 12 %) of *AS* decreased serum creatinine either after 4 or 8 weeks of treatment. All difference were significant unless 6% level after 8 weeks.

Table (24):Means ± S.E for the effect of *Allium Sativum* on serum Creatinine concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of treatment .

Group	4 week		8 week	
	Mean ± S.E	d.t	Mean ± S.E	d.t
G1	0.55 ± 0.13	a	0.42 ± 0.02	a
G2	0.41 ± 0.07	b	0.27 ± 0.09	b
G3	0.48 ± 0.06	b	0.37 ± 0.01	a
G4	0.48 ± 0.17	b	0.35 ± 0.08	b

S.E. = Standard error.
d.t.: Duncan s, Multiple range test between groups Means within each Groups with similar letters are not significant at p≤ 0.05 .

Diurnal rhythm :

Table (25) show that after 4 weeks serum creatinine significantly increased at 4:00 pm than at 8:00 am or 12:00 pm in all groups except 6% *AS* group where serum creatinine significantly increased at 12:00 pm than at 8:00 am or 4:00 pm, Meanwhile after 8 weeks from the start of the experiment there were no significant diurnal rhythm in serum creatinine in all groups except when 12 % *AS* were used that serum creatinine significantly increased at 8:00 a.m. than at 4:00 p.m. or 12 m.n.

Table (25) :Means ± S.E for the effect of *Allium Sativum* on serum creatinine concentrations (mg/dl) at different times after 4 or 8 weeks from the beginning of the experiment.

Group	4 week									8 week								
	8:00 AM			4:00 PM			12:00 PM			8:00 AM			4:00 PM			12:00 PM		
	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t	Mean	S.E	d.t
G1	0.5	0.05	b	0.8	0.18	a	0.4	0.03	c	0.4	0.02	a	0.4	0.04	a	0.4	0.05	a
G2	0.4	0.13	b	0.5	0.04	a	0.3	0.03	b	0.4	0.01	a	0.4	0.01	a	0.3	0.08	a
G3	0.5	0.21	b	0.4	0.12	c	0.6	0.06	a	0.4	0.01	a	0.4	0.02	a	0.4	0.01	a
G4	0.7	0.14	a	0.6	0.12	b	0.3	0.13	c	0.5	0.20	a	0.4	0.00	a	0.2	0.10	c

S.E. = Standard error.
d.t.: Duncan's Multiple Range Test between times .Means within each column with similar letters are not significant at p≤ 0.05.
G1 : Control ***G3 : 6% Allium sativum***
G2 : 4% Allium sativum ***G4 : 12% Allium sativum***

DISCUSSION

The results of the current study showed that after 4 weeks of treatment *AS* did not show any significant effect on serum glucose, while after 8 weeks 4%*AS* significantly decreased serum glucose . The lowering of serum glucose level after 8 weeks of feeding rats on 4% *AS* is in accordance with those of (Eidi *et al*. 2006) who reported that administration of the garlic extract (0.1, 0.25 and 0.5 g/kg body weight) significantly decreased serum glucose.

Also this study showed that serum glucose tended to be higher at 4:00pm in most groups . The higher glucose level at 4:00 pm in this groups

may be explained as a feed forwarded mechanism to increase the energy requirement for the beginning of activation period of rats .

In this study treatment with 4 % or 6% *AS* for 4 weeks caused a significant increase in serum insulin levels ,while after 8 weeks, 4% *AS* supplement caused a significant increase in serum insulin .

The increase in serum insulin after garlic supplementation may be due to that garlic can increase the sensitivity of beta cell in the pancreas to levels of glucose and this was contained by increase of secretion of the insulin from the pancreas. Khalil (2005) reported that the increase in blood glucose due to feeding on carbohydrates promote the biosynthesis of pro-insulin in the rough endoplasmic reticulum in beta cells and after this pro.insulin were transport to Golgi complex that may be transform to insulin hormone and then mature beta granules were secreted in the cytoplasm .The granules were release the insulin hormone by exocytosis.

This result is in accordance with (Bader ,2006) who showed that 4% *AS* in rats diet caused a significant increase in serum insulin levels and this effect was more pronounced in summer than winter.

The above result show that garlic increased serum insulin, while did not cause any significant effect on serum glucose level at the same time. These results indicate that *AS* regulate blood glucose by controlling secretion of insulin from beta cells in the pancreas.

The above results Showed that after 8 weeks of the treatment all garlic treated groups significantly decreased serum triglycerides and total lipids and this effect may be that AS can inhibit fatty acid synthesis in the liver , this result in accordance with Nwanjo and Oze (2007) reported that the Triglyceride lowering effect of garlic by inhibition of fatty acid synthesis .Yan and Yeh (2001) reported that garlic can depress the hepatic activity of lipogenic ,cholesterologenic enzymes such as malic enzymes, fatty acid synthase and glucose -6-phosphate dehydrogenase .

The above result show that after 4 weeks from the start of the experiment 4% *AS* significantly increased serum Alkaline phosphates and this result may be due to that *AS* significantly decreased serum creatinin and this indicate that garlic enhance kidney function and the enhance of kidney function is contained by increased in Alkaline phosphates secretions from the kidney .

The result showed that after 8 weeks serum AST was significantly increased at 4:00 pm in all groups except in 6% *AS* group which showed significant increase in serum AST at 8 :00 am than at 4:00 pm or 12:00 pm .Meanwhile after 8 weeks from the start of the experiment serum ALT significantly increased at 4:00 p.m. than at 8:00 a.m. or 12 :00 pm.. in all groups .

The significant increase in serum ALT is in accordance with (Sheo 1999) who showed that when rats given a high saturated fat diet, oral treatment with 2% raw garlic juice, led to increase blood GOT and GPT

Bader (2006) reported that 2% or 4 % *AS* in summer significantly decreased plasma GOT (AST) in rats.

The higher activity in serum ALT at 4:00 p.m. may be due to the Increase in muscle activity and heart rate with start of the activity of rats at night (4:00 p.m.). Aschoff (1963) and Hoffman (1985) reported that the activity of rats was increased at night. Sherlock and dooley (1997) Stated that the AST is a mitochondrial enzyme present in large quantities in the heart , Liver , skeletal muscle and kidney and its serum level increase Whenever these tissue are acutely destroyed presumable due to Release from damaged cells, Meanwhile , the ALT is a cytosolic enzyme also present in liver , although that absolute amount is less than of AST , a greater proportion of ALT is present in liver compared with heart and skeletal muscles .a serum increase is therefore more specific for liver damage that AST .

The above results show that all levels (4, 6 and 12 %) of *AS* decreased serum creatinine either after 4 or 8 weeks of treatment, and this result indicate that *AS* have a beneficial effect on kidney function.

It could be concluded that the addition of several levels of garlic in rats diet cause a several effect on some blood components under study .Feeding of diet contain garlic enhance serum insulin and glucose levels in the experimental rats. Thus we can added garlic to rats diet by 4% or 6% from the diet to increase the performance in this animals.

REFERENCES

Al –yahya M ., Mossa . S. And Al-Meshal I.A.(1987). Medicinal Plants of Saudi Arabia. Published by King Saud University libraries Saudi Arabia .(1):1.Haney A.w(1978) plant life .Macmillan publishing Co.,Inc.389.

Allain.C.C. (1974).Clin.Chem.20:470 .

Bader, M.I. (2006). Effect of energy and protein levels in diets and some medicinal plants on plasma insulin and glucose levels in rats.p.h.D. Thesis, Fac. Of Agri.,Al-Azhar Uni., Cairo, Egypt .

Buccolo,G. And David,M.(1973).Clin . Chem. . 19,476.

Dumas B.T and Biggs, H.G.(1972).In standared methods of clinical chemistry.Vol.7 academic press , New york.P.175.

Duncan (1995).Mutiple range and multiple F test. .Biometric ,11:1.

Eidi,-A; Eidi,-M and Esmaeili,-E .(2006).Antidiabetic effect of garlic (Allium sativum L.) In normal and streptozotocin-induced diabetic rats. Phytomedicine-. 2006; 13(9/10): 624-629 .

Henry J.B. (1974). Clinical Diagnosis and management by laboratory method W.B saunders Co.,Philadelphia 361.

Henry, R. J (1964).Clinical chemistry , Harper and row publishers, New York .P..(181) .

Hussein, J. S; Oraby, F. S. And El-Shafey, N .(2007). Antihepatotoxic effect of garlic and onion oils on ethanol-induced liver injury in rats. Journal-of-Applied-Sciences-Research. 2007; (November): 1527-1533 .

Jain. S., pandhi, P; Singh, A. P and Malhotra. S. (2006). Efficacy of standardized herbal extracts in type I diabetes on experimental study .African Journal. Of traditional Complementary.and alternative .medicines .3(4):23-33.

Jalal, R; Bagheri, S. M.; Moghimi, A. And rasuli, M. B. (2007). Hypoglycemic effect of aqueous shallot and garlic extracts in rats with fructose-induced insulin resistance Journal – of – Clinical – Biochemistry – and -Nutrition. 2007; 41(3): 218-223

Khalil , M.H.(2005) . Endocrinology, 3 rd edition University book House, .Al-Ain, U.A.E, p 297-298

Kind P. R. N. And King, E. G (1954). Clin. Pathol .7:322.

Macrae R., Robinson, R. K., and Sadler M.J(1993)[a]. Onions and Related crops in (Encylopaedia of food , science , food technology . And nutrition ,Ed 47. Harcout Brace Jovanovich .Lodon. (5)3362.

Macrae R., Robinson R.K., and Sadler M. J (1993)[b] . Sald crops in (Encylopaedia of food , science , food technology . And nutrition ,Ed 47. Published by Harcourt Brace Jwvanovich .london .(6):3978.

Mostofa,-M; Choudhury, M. E.; Hossain,-M. A.; Isla.m., M. Z.; Isla.m., M. S. And Sumon, M. H. (2007).Antidiabetic effects of Catharanthus roseus, Azadirachta indica, Allium sativum and glimepride in experimentally diabetic induced rat. Bangladesh-Journal-of-Veterinary-Medicine. 2007; 5(1/2): 99-102.

Murray R.L (1984) . Lin . Chem. The C.v mosby Co.st louis Tronto. Priceton.1261-1266.

Nwanjo, H.U. and Oze , G.O (2007).Changes in serum lipid profiles and heart rate in rats treated with aqueous Garlic extract . Internet.J.Nutr.Wellness .4,1.

Parveen, M; shrivastava,-V-K and Qureshi,-M-S.(2006). Effect of sevin on enzymes of mice, Mus musculus and retrieval effect of garlic . Journal-of-Ecotoxicology-and-Environmental-Monitoring. 2006; 16(1): 31-35 .

Quan, Y.L and Suzuki , H.(2007).Effects of tasao-ko,turmeric and garlic on body fat content and plasma lipids glucose and liver lipids levels in mice (acomparative study of spices). Food. Science and .technology, Research.13(3): 241-246.

Reeves , W.G .(1983). Insulin antibody determination:Theoretical and practical consideration . Diabtologia 24:399-403 .

Reitman , S. And Frankel, S.(1957). A.m..J. Clin .Path. 25: 56.

SAS (1998).Satistical Analysis System Institute, SAs User's Guide Statistics,5 th Edition , SAS Institute Inc.,Cary,NC.

Sheo,H.J. (1999) .Effects of garlic on the blood lipids and other serum components in rats. Journal of the Korean Society of food science and Nutrition,28(6):1339-1348.

Sherlock, S. And dooley.,J. (1997). Diseases of the liver and bilary system 10 th ed . Black well, London,Edinburgh, Melbourne, PP: 19-21.

Trinder.P. (1969).Ann, Clin. Biochem.6:24-33.

Yan,Y and Yeh , l.l. (2001). Cholesterol – lowering effect of garlic extracts and organ sulfar compounds: Human and animal studies .J.Nutr.131,9895-9935.

Zollner,N.;Kirsch,K and ges.z.(1962).Exp.Med 135-545.

أثر تناول الثوم على مستويات بعض مكونات الدم فى الفئران

أحمد فتحى هلال ، مصطفى إسماعيل بدر ، عبدالحميد عبدالله عبدالحميد و إبراهيم على أحمد وهبة
قسم الإنتاج الحيواني كلية زراعة- جامعة الازهر .

أجريت هذه التجربة بمعامل بحوث قسم الإنتاج الحيوانى بكلية الزراعة جامعة الازهر . القاهرة .بهدف دراسة تأثير اضافة الثوم المجروش على مستوى بعض المكونات بالدم فى فئران التجارب . حيث تم تقسيم 24 فأر ذكرإلى أربعة مجاميع كل مجموعة تحتوى على 6فئران الأولى إستخدمت كمجموعة مقارنة وثلاثة مجاميع معاملة ثم وضع الثوم المجروش فى الغذاء المقدم لهم بالنسب التالية 4%, -*6%,12% وتمت التغذية على هذه العلائق لمدة ثمانية أسابيع ثم تم سحب عينات الدم بعد أربعة أسابيع وبعد ثمانية أسابيع كما تم أيضاً إجراء تجربيتين لمعرفة الإيقاع اليومى وذلك بسحب عينات دم الساعة 8 صباحا والساعه 4 عصراً والساعه 12 عند منتصف الليل وذلك بعد أربعة أسابيع وبعد ثمانية أسابيع من بداية المعاملة .تم فصل مصل الدم وحفظه على درجة -20 م حتى إجراء التحليلات. وأظهرت النتائج أنه لم يكن لإستخدام الثوم تاثير معنوى على مستويات الجلوكوز بعد أربع أسابيع من المعاملة بينما بعد ثمانية أسابيع أدى استخدام الثوم بنسبة 4% إلى إنخفاض معنوى فى مستوى جلوكوز الدم . مستوى الجلوكوز فى الدم يميل إلى الإرتفاع الساعة الرابعة عصراً فى معظم المجاميع المعاملة . أدى إستخدام الثوم بنسبة 4 او 6 % لمدة أربعة أسابيع إلى زيادة معنوية فى مستوى الإنسولين . بينما بعد 8 أسابيع أدى إستخدام الثوم بنسبة 4 % إلى زيادة معنوية فى مستوى الإنسولين . كما أظهرت النتائج أنة بعد 4 أسابيع من المعاملة إرتفع مستوى الإنسولين الساعة 8 صباحاً بينما بعد 8 أسابيع من المعاملة كان مستوى الإنسولين مرتفعاً الساعة 12 مساءاً . أدى إستخدام الثوم إلى نقص مستوى كل من البروتينات الكلية والألبيومين بعد 4 او 8 أسابيع من المعاملة .

أدى إستخدام الثوم إلى زيادة معنوية فى مستوى الكوليستيرول بينما لم يكن لإستخدام الثوم تأثير معنوى على مستوى الجلسريدات الثلاثية بعد 4 أسابيع من المعاملة ولكن بعد 8 أسابيع أدى إستخدام الثوم إلى نقص معنوى فى مستوى الجلسريدات الثلاثية .

بعد 4 أسابيع من المعاملة أدى إستخدام الثوم بنسبة 4 أو 6% من العلف المقدم للحيوان إلى نقص معنوى فى مستوى اللبيدات الكلية بينما بعد 8 أسابيع من المعاملة أدى إستخدام الثوم بنسبة 4، 6، 12%الى نقص معنوى فى مستوى اللبيدات الكلية بالنسبة للمجموعة المقارنة .

الخلاصة و التوصيات :

نستخلص من نتائج هذا البحث أن اضافة الثوم المجروش بمستويات مختلفة أدى الى تغيرات فى بعض مكونات الدم التى درست خاصة تحسن مستوى كل من الانسولين و الجلوكوز فى دم فئران التجارب . ولذلك يمكن التوصية باضافة الثوم المجروش عند تغذية حيوانات التجارب خاصة بمستوى 4 او 6 % لتحسين آداء تلك الحيوانات .

قام بتحكيم البحث

أ.د / مصطفى عبد الحليم الحرايرى	**كلية الزراعة – جامعة المنصورة**
أ.د / مدحت حسين خليل محمد	**كلية الزراعة – جامعة الازهر**