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Effects of Nigella Sativa and Allium Sativum on some Physiological Parameters in Normal and Diabetic Rats

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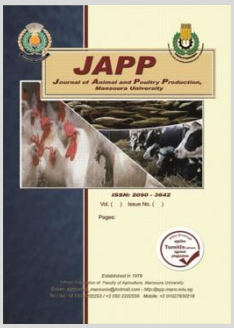

ABSTRACT

An experiment was conducted to study the effects of *Nigella Sativa* (NS) and *Allium Sativa* (garlic) on some physiological parameters in normal and diabetic rats. The study included two experiments. The first experiment was in summer season, while the second experiment were in winter season. Each experiment included 120/each season adult male Albino rats with an average live body weight of 100±10 gm. Rats were distributed into 8 groups (15 rats each). Normal rats were fed the control diet (G1), control diet with 5% garlic (G2), 5% NS (G3) or 2.5% Garlic + 2.5% NS (G4). However, diabetic rats were fed the control diet with 5% garlic (G6), 5% NS (G7) or 2.5 % Garlic 2.5% + 2.5% NS. Blood sample were collected after 4 and 8 weeks from the start of the experiment for determination of biochemicals and enzyme activity in blood serum. Results show that serum activity of ALT and AST, and concentration of creatinin and glucose were significantly ($P<0.05$) increased in diabetic rats than normal rats, but were significantly decreased after treatment with medicinal plants. Concentration of serum T3 and T4 were significantly decreased in diabetic rats than in normal rats, but were significantly increased with medicinal plants.Conclusion :The use of medicinal plants (garlic and nigella seeds) worked to improve the health of animals, and the use of garlic mixture and nigella seeds was the best effect in improving the health status of animals, especially those with diabetes.

Keywords: T3 Triiodothyronine , T4 Thyroxin , ALT Alanine aminotransferase and AST aspartate aminotransferase

INTRODUCTION

The seeds of *Nigella sativa* sometimes known as black seed, black cumin *Nigella sativa* have long been used in the Middle East as a traditional medicine for a variety of complaints, headache, cough, flatulence, as a choleretic, antispasmodic and uricosuric. Furthermore, the pharmacological and toxicological studies have demonstrated that crude extract or ethanolic extract of *Nigella sativa* and some of its active constituents might have protective effect against renal ischemia-reperfusion-induced oxidative injury and nephrotoxicity and hepatotoxicity that induced by either disease or chemicals (Ali and Blunden, 2003; Hosseinzadeh and Montahaei, 2007).

Allium sativum, which is commonly called garlic, belongs to the family Liliacea and genus Allium (Krishnaraju *et al*. 2006). Garlic is commonly used in food and its medical properties have been well recognized since time immemorial. The traditional medical practitioners have considered garlic as an excellent medicinal plant that has a lot of therapeutic potential. Borek (2001) reported that garlic compounds have tremendous anti-oxidant property which exerts actions by scavenging reactive oxygen species (ROS) enhancing cellular antioxidant enzymes and increasing glutathione in the cells. Diabetes Mellitus affects skeletal system through multiple pathways and it recognized as a major risk factor for a lot of physiological parameters Leidig-Bruckner and Zeigler. (2001).

The main objective of this work to determine the effect of garlic or *Nigella Sativa* on function of liver, kidney and thyroid gland of normal and diabetic rats during summer season and winter seasons .

MATERIALS AND METHODS

This study was carried out in Animal House Lab. Department of Animal Production, Faculty of Agriculture, Al-Azhar University, Cairo, Egypt which provided standard laboratory chemicals and equipment for this study.

Experimental animals: The albino rats used in this study were originally bought from El Osman Farm, Cairo, Egypt. Animal were housed in cages under ambient temperature (ranged from 30 to 43 C^0) in summer season or between 6 and 18 C^0 in winter season. In summer season, averages of ambient temperature (AT) and relative humidity (RH) ware 30.20±10 ºC and 70.8±10.22%. In winter season averages of AT and RH were 12±5.1 ºCand 61.1±8.75%. Light dark cycle was maintained about 12-hour. The standard laboratory chow and tap water were provided ad libitum. All animals were healthy and clinically free from diseases.

In both summer and winter season, total of 120/each season animals for each seasons were assigned into eight groups each contain 15 rats. Each experiment included 120/each season adult male Albino rats with an average live body weight of 100±10 gm. Rats were distributed into 8 groups (15 rats each). Normal rats were fed the control diet (G1), control diet with 5% garlic (G2), 5% NS (G3) or 2.5% Garlic + 2.5% NS (G4). However, diabetic rats were fed the control diet with 5% garlic (G6), 5% NS (G7) or 2.5 % Garlic 2.5% + 2.5% NS.

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Induction of diabetes mellitus in rats:

Diabetes mellitus was induced by interperitoneal injection of Alloxan solution (0.1 ml/100 gm. body weight). Alloxan solution consists of 0.12 gm. (120/each season mg/kg) alloxan hydrasin per 1 ml 1 buffer solution. Alloxan buffer is prepared by the addition of 7.5 ml of 5.7% glacial acetic acid to 29.5 ml of 8.2% sodium acetate solution.

Injected animals were fasted 18 and 2 hour before and after injection, respectively, according to Malaisse 1982; Mohammed, 2005). Ten days later, animals injected with alloxan were considered diabetic from some symptoms (such as increased urine volume and body weight loss).

Experimental outline:

First experiment was carried out during summer season (First July to end August, 2017), while the second experiment was carried out during winter season (15th December 2017 until 15th February, 2018). The experiments started after one week of alloxan injection in summer season and winter season.

Blood sampling:

Blood samples were obtained from rats by withdrawing blood from the orbital venous plexuses using a capillary tube. Samples were collected at 4 weeks and 8 weeks from the start of the experiment. Blood samples were centrifuged at 3000 rpm for 20 min to obtain serum. Serum was transferred to Ependorff tube and stored at – 20 C^{o} until subsequent analyses .

Glucose commercial determination kits Glutamic oxaloacetic transaminase GOT (AST), Glutamic pyrvic transaminase GPT (ALT), were performed using Diamond-Egypt kits. Alloxan was obtained from B.D.H. chemical LTD England. and T3&T4 ware analysis at A.R.C.

Serum parameters:

At 4 and 8 weeks of the experimental period in each season, glucose concentration was determined by glucose oxidase method (Trinder, 1969) using commercial kit (bioMeieux, Lyon, France). Activities of asprtate and alanine transaminases (AST and ALT) in serum were measured by a colorimetric method as described by White *et al*., (1970) using Diamond-Egypt kits. Serum creatinine concentration was determined by a kinetic method according to Henry., (1974) using Diamond-Egypt kits.

However, conentrations of thyroid hormones (T3 and T4) in serum were measured after 8 weeks of the experimental period in each season by radio-immunoassay (RIA) (Bablok, 1988). In all these methods the second antibody separation technique was utilized.

Statistical analysis:

Data were subjected to analysis of variance using the General Linear Models procedure of SPSS software program package (SPSS, 2001, version 11.0). All percentages were first transformed to arcsine than analyzed to approximate normal distribution before ANOVA. addition, significant differences among means determined by Duncan's multiple range test Duncan, (1955) at 5% level of significance. Data were analyzed by one-way method.

RESULTS AND DICTATIONS

Serum T3 (Triiodothyronine) and serumT4 (Thyroxine) Concentration:

Table (1) shows that during summer season after 8 weeks from the start of the experiment on healthy rats 5% *Nigella Sativa* did not show any significant effect on serum T3 concentration, while treatment of health rats with 2.5% *Nigella sativa*+2.5% garlic significantly (P<0.05) increased serum T3 concentration compared with the control group. Meanwhile, in summer season treatment of healthy rats with 5% garlic for 8 weeks significantly (P<0.05) decreased serum T3 concentration compared with the control group.

In summer season, all T3 concentrations were significantly (P<0.05) lower in diabetic than in normal rats. Treatment of diabetic rats with 5% garlic or 2.5% garlic+2.5% *Nigella Sativa* during summer season significantly (P<0.05) increased serum T3 concentration compared with diabetic rat groups, but did not reach to the normal range in the control rats group. Treatment of diabetic rats with 5% *Nigella Sativa* during summer season did not show any significant effect on serum T3 concentration compared with diabetic rat group.

Table 1. Mean±SE of serum T3 and T4 concentration (nmol/L) in normal and diabetic rats treated with garlic, *Nigella Sativa* and their combination after 8 weeks of the experimental period during summer or winter season

Group		Triiodothyronine (T3)		Tetraiodothyronine (T4)	
		Summer	Winter	Summer	Winter
Normal	G1	114.24±2.31^{b}	128.75±4.03^{b}	8.05±0.86^{b}	9.07±0.62^{c}
	G2	91.9250±1.69^{c}	154.40±3.21^{a}	9.32±0.38^{a}	9.97±0.39^{bc}
	G3	107.77±4.62^{b}	139.27±2.52^{b}	8.45±0.75^{b}	9.22±0.48^{c}
	G4	126.30±1.31^{a}	164.52±8.99^{a}	9.50±0.25^{a}	10.55±0.11^{a}
Diabetic	G5	67.59±1.59^{e}	78.07±1.78^{d}	3.40±0.38^{d}	2.79±0.24^{f}
	G6	75.97±1.99^{d}	90.67±2.09^{d}	4.55±0.25^{c}	6.07±0.33^{d}
	G7	68.30±1.07^{e}	88.82±2.30^{d}	4.75±0.72^{c}	4.45±0.21^{e}
	G8	91.30±1.64^{c}	111.75±3.91^{c}	8.07±0.79^{b}	9.47±0.19^{bc}

Means within each column with similar letters are not significant different at P≥0.05
G1 and G5: control. G2 and G6: 5% Garlic. G3 and G7: 5% *Nigella Sativa.*
G4 and G8: 2.5% Garlic+ 2.5% *Nigella Sativa.*

In winter season, treatment of healthy rats with 5% garlic or 2.5% garlic +2.5% *Nigella Sativa* significantly (P<0.05) increased serum T3 concentration compared with the control group, while treatment with 5% *Nigella Sativa* for 8 weeks did not show any significant change on serum T3 concentration compared with the control group. The results also show that T3 concentration was significantly (P<0.05) lower in diabetic than in the control rats. Treatment of diabetic rats with 5% *Nigella Sativa* or 5% garlic did not show any significant effect on serum T3 concentration compared with diabetic rat groups. Meanwhile, treatment of diabetic rats with 2.5% garlic +2.5% *Nigella Sativa* for 8 weeks in winter season significantly (P<0.05) increased

serum T3 concentration compared with diabetic rats, but did not reach to the normal range in the control group (Table 1).

Table (1) shows that during summer season after 8 weeks from the start of the experiment on healthy rats, 5% *Nigella Sativa* did not show any significant effect on serum T4 concentration, while treatment of health rats with 5% garlic or 2.5% *Nigella Sativa*+2.5% garlic significantly (P<0.05) increased serum T4 concentration compared with the control group. Diabetes significantly decreased serum T4 concentration compared with the control rats. Treatment of diabetic rats during summer season with 2.5% garlic+2.5% *Nigella Sativa* significantly (P<0.05) increased serum T4 concentration compared with diabetic rats to reach to the normal range in the control rat group. Treatment of diabetic rats with 5% garlic or 5% *Nigella Sativa* during summer season significantly (P<0.05) increased serum T4 concentration compared with diabetic rats, but did not reach to the normal range in the control rat group.

In winter season treatment of healthy rats with 2.5% garlic +2.5% *Nigella Sativa* significantly (P<0.05) increased serum T4 concentration compared with the control group, while treatment of rats with 5% garlic or 5% *Nigella Sativa* for 8 weeks in winter season did not show any significant effect on serum T4 concentration compared with the control group. After 8 weeks from the start of the experiment, diabetes significantly (P<0.05) decreased serum T4 concentration compared with the control group. Treatment of diabetic rats with 2.5% garlic +2.5% *Nigella Sativa* during winter season significantly (P<0.05) increased serum T4 concentration compared with diabetic rats to reach to the normal range in the control rat group. Treatment of diabetic rats with 5% garlic or 5% *Nigella Sativa* during winter season significantly (P<0.05) increased serum T4 concentration compared with diabetic rats, but did not reach to the normal range in the control rats.

The above results indicate that diabetic significantly decreased serum T3 and T4 concentration during summer or winter season. These results are in agreement with those found by Abdel Ghfar (2016) and Saha (2012), who observed that the incidence of thyroid dysfunction was significantly higher under diabetic subjects (20%) than with non-diabetic. The incidences of hypothyroidism was significantly (P<0.05) increase in diabetic female group (6.66%) compared with non-diabetic female group. Nima (2011) observed that T3 and T4 levels were significantly higher in normal compared to diabetic (P<0.05). At the same time, these levels remained significantly low in hypothyroidism subjects when compared with normal subject.In addition The present results are in agreement with those found by Farhangi *et al*. (2016), who showed that serum T3 concentrations increased in *Nigella Sativa*-treated group after 8 weeks from the start of experiment. Eman *et al*. (2018) showed that serum T3 and T4 concentration showed insignificant change in treated groups with *Allium Sativum* when compared with control group.

These results indicated that activity of thyroid gland decreased in diabetic rats than normal rats. The decrease in activity of thyroid gland in diabetic rats may be due to the decrease in the energy availability to the thyroid gland under decreasing insulin hormone level in diabetic rats. Insulin facilitates entry of glucose into muscle, adipose tissues and several other tissues (Khalil, 2013). This means that the decrease of glucose lead to decrease of ATP and decrease the metabolism of the thyroid gland.

Results also revealed that medicinal plants can play an important role in increasing serum T3 and T4 concentration that well decreased after induction of diabetes. Mixture of garlic and *Nigella sativa* can increase serum T3 and T4 levels in diabetic rats to reach near the normal levels in control group. In this respect, Farhangi *et al*. (2016) showed that serum T3 concentration increased in *Nigella Sativa*-treated group after 8 weeks from the start of experiment. Eman *et al*. (2018) showed that serum T3 and T4 concentrations insignificantly increased in groups treated with *Allium Sativum* when compared with control group

Serum Glucose Concentration:

In summer season after 4 weeks from the start of the experiment, treatment of healthy rats with medicinal plants did not show any significant effect on serum glucose as compared to the control group, while after 8 weeks, medicinal plants significantly (P<0.05) decreased serum glucose levels compared with the control group, except 5% garlic that did not affect significantly serum glucose level (. Indication of diabetes significantly (P<0.05) increased serum glucose level compared with the control rats. While treatment of diabetic rats with medicinal plants for 4 or 8 weeks during summer season significantly decreased serum glucose levels compared with diabetic rats, but did not reach to the normal rang in the control group (Table 2).

Table 2. Mean ±S.E of serum Glucose (mg/dl) in normal and diabetic rats treated with garlic, Nigella Sativa and their mix during summer or winter season

Group		Summer		Winter	
		4 weeks	8 weeks	4 weeks	8 weeks
Normal	G1	84.2±2.46 ^{e}	105.0±5.18 ^{e}	104.60±2.88 ^{e}	106.25±2.42 ^{e}
	G2	86.2±0.7 ^{e}	87.12±1.88 ^{ef}	111.65±2.77 ^{e}	102.10±2.95 ^{ef}
	G3	84.5±2.18 ^{e}	84.25±1.99	111.60±1.37 ^{e}	106.57±2.78 ^{e}
	G4	70.9±0.2 ^{e}	83.05±1.22	89.30±0.64 ^{e}	91.62±0.61 ^{e}
Diabetic	G5	357.5±22.59^{a}	352.80±16.42 ^{a}	368.75±5.99 ^{a}	398.0±7.92 ^{a}
	G6	234.5±18.09^{c}	210.35±4.06 ^{c}	242.80±17.98 ^{c}	221.7±4.22 ^{c}
	G7	308.4±2.35^{b}	294.85±2.92 ^{b}	320.67±9.33 ^{b}	307.7±5.13 ^{b}
	G8	139.8±10.22^{d}	153.05±3.06 ^{d}	150.97±1.59 ^{d}	152.8±2.361 ^{d}

Means within each column with similar letters are not significant different at P≥0.05
G1 and G5: control. G2 and G6: 5% Garlic. G3 and G7: 5% *Nigella Sativa.*
G4 and G8: 2.5% Garlic+ 2.5% *Nigella Sativa.*

In winter season after 4 or 8 weeks from the start of the experiment, treatment of healthy rats with medicinal plants did not show any significant effect on serum glucose levelcompared with the control group, except after 8 weeks, treatment of healthy rats with 2.5% *Nigella Sativa*+2.5%

garlic significantly (P<0.05) decreased serum glucose level compared with the control group (Table 2).

Diabetes significantly (P<0.05) increased serum glucose level compared with the control rats. During winter season, treatment of diabetic rats with medicinal plant for 4 or 8 weeks significantly (P<0.05) decreased serum glucose level compared with the diabetic rats, but did not reach to the normal range in the control group.

The significant trend of increase of serum glucose level after indication of diabetes is in agreement with Saha (2012) and Sultan (2008), who found that blood glucose was significantly increased in diabetic group compared with non-diabetic group.

Medicinal plant can decreased the elevated level of serum glucose due to diabetes. Mixture of garlic and *Nigella Sativa* has more effect on decreasing serum glucose level as compared to treatment of each plant alone. These results indicated that medicinal plants have anti-diabetic properties.

These results are in accordance with those found by Ayed *et al*. (2011), who reported that administration of *Nigella Sativa* oil to diabetic rats resulted in a significant (P<0.001) decrease in blood glucose levels of 64.9% after 7 weeks, as compared to un-treated diabetic rats. Jelodar *et al*. (2005) indicated that garlic was able to reduce blood glucose in alloxan induced diabetic rats significantly compared with the control group.

Activity of Serum AST and ALT:

Table (3) shows that during summer season after 4 or 8 weeks from the start of the experiment, treatment of healthy rats with the medicinal plants significantly (P<0.05) decreased serum ALT activity compared with the control group. Treatment of diabetic rats with medicinal plants for 4 weeks during summer season significantly (P<0.05) decreased serum ALT activity as compared to diabetic rats to reach to or near the normal level in the control group. Meanwhile, treatment of diabetic rats with medicinal plants for 8 weeks during summer season significantly (P<0.05) decreased serum ALT activity compared with the diabetic rats to reach the normal rang or less in the control group (Table 3).

Table 3. Mean ±S.E of serum ALT (U/L) in normal and diabetic rats treated with garlic, Nigella Sativa and their mix during summer or winter season

Group		Summer		Winter	
		4 weeks	8 weeks	4 weeks	8 weeks
Normal	G1	67.25±4.95^{C}	72.31±3.58^{b}	23.10±1.53^{de}	22.18±1.19d^{e}
	G2	53.10±2.60^{de}	56.77±0.53^{d}	21.18±0.79^{de}	21.18±0.79d^{e}
	G3	60.77±1.93^{cd}	64.00±1.80^{c}	20.22±0.46^{ef}	20.40±0.38e^{f}
	G4	50.62±2.94^{e}	50.10±1.73^{e}	17.60±0.91^{f}	17.92±0.94^{f}
Diabetic	G5	94.85±1.28^{a}	94.85±1.28^{a}	33.62±0.56^{a}	34.38±1.14^{a}
	G6	83.47±1.39^{b}	64.62±0.78^{c}	26.67±1.50^{c}	26.67±0.97^{c}
	G7	84.90±2.27^{b}	72.70±1.67^{b}	30.40±0.39^{b}	31.40±1.29^{b}
	G8	67.25±2.08^{c}	63.45±1.60^{c}	23.80±1.25^{cd}	24.10±0.66^{cd}

Means within each column with similar letters are not significant different at P≥0.05
G1 and G5: control. G2 and G6: 5% Garlic. G3 and G7: 5% *Nigella Sativa.*
G4 and G8: 2.5% Garlic+ 2.5% *Nigella Sativa.*

Table (3) showed that during winter season after 4 or 8 weeks from the start of the experiment treatment of healthy rats with 2.5% *Nigella Sativa*+2.5% garlic significantly (P<0.05) decreased serum ALT activity compared with the control group. Treatment of healthy rats with 5% garlic or 5% *Nigella Sativa* did not show any significant effect on serum ALT activity compared with the control group.

Diabetes significantly increased serum ALT activity compared with the control group. Treatment of diabetic rats with medicinal plants significantly (P<0.05) decreased serum ALT activity compared with diabetic rats to reach less or near the normal range in the control group (Table 3).

Table (4) shows that during summer season treatment of healthy rats with medicinal plants for 4 or 8 weeks decreased serum AST activities but these effect were more pronounced after treatment with 2.5% *Nigella Sativa*+2.5% garlic than other groups.

The results in Table (4) also showed that after 4 or 8 weeks from the start of the experiment during summer season, diabetes significantly (P<0.05) increased serum AST activity compared with the control rats. Treatment of diabetic rats with medicinal plants significantly (P<0.05) decreased serum AST activities as compared with diabetic rats but did not reach to the normal rang in the control group. The marked reduction in serum AST activity was observed in diabetic rats treated with 2.5% *Nigella Sativa*+2.5% garlic.

Table 4. Mean ±S.E of serum AST (U/L) in normal and diabetic rats treated with garlic, Nigella Sativa and their mix during summer or winter season

Group		Summer		Winter	
		4 weeks	8 weeks	4 weeks	8 weeks
Normal	G1	22.8±1.01 ^{CD}	24.8±0.2^{c}	39.82±0.70^{b}	31.72±2.29^{b}
	G2	20.1±0.92^{de}	20.2±0.5^{de}	34.52±0.85^{cd}	27.02±2.061^{c}
	G3	22.4±0.5^{cd}	23.8±1.64^{cd}	31.77±0.76^{d}	32.22±2.311^{b}
	G4	18.5±0.55^{e}	18.9±0.3^{e}	25.35±0.60^{e}	23.32±0.97^{d}
Diabetic	G5	44.2±1.89^{a}	45.5±2.55^{a}	54.88±1.57^{a}	57.07±1.972^{a}
	G6	32.02±0.95^{b}	32.2±0.7^{b}	33.12±1.07^{cd}	31.87±2.322^{b}
	G7	30.7±1.16^{b}	32.3±2.22^{b}	35.47±1.79^{c}	34.90±3.029^{b}
	G8	24.1±0.57^{c}	23.7±1.05^{cd}	25.47±1.05^{e}	26.57±0.92^{b}

Means within each column with similar letters are not significant different at P≥0.05
G1 and G5: control. G2 and G6: 5% Garlic. G3 and G7: 5% *Nigella Sativa.*
G4 and G8: 2.5% Garlic+ 2.5% *Nigella Sativa.*

Table (4) shows that during winter season after 4 or 8 weeks from the start of the experiment, treatment of healthy rats with medicinal plants significantly decreased serum AST activity, except treatment of healthy rats with

5% *Nigella Sativa* for 8 weeks that did not show any significant effect on serum AST activity compared with the control group. After 4 or 8 weeks from the start of the experiment during winter season, diabetes significantly (P<0.05) increased serum AST activity compared with the control rats. Treatment of diabetic rats with medicinal plants for 4 or 8 weeks during winter season significantly (P<0.05) decreased serum AST activity compared with diabetic rats, reaching to the normal range or less in the control group.

These results indicated that diabetes significantly (P<0.05) increased serum ALT and AST activaties and these results are in agreement with those found by Abdel Ghfar (2016), El-Demerdash (2005) , Celik *et al.* (2002) and Radhia (2012), who observed that the activities of plasma AST and ALT were significantly (P<0.05) increased in Alloxan-diabetic rats as compared to the control group. They also indicated that diabetes may induce hepatic dysfunction. These results are in agreement with those found by Bashandy (1996), who showed that administration of *Nigella Sativa* oil (daily dose of 0.27 g/100 g) to senile rats decreased serum AST. Also, El-Demerdash *et al.* (2005) showed that when rats injected subcutaneously with a single dose of alloxan (120/each season mg/kg BW) plasma AST and ALT activities significantly increased compared with the control group. While treatment of diabetic rats with garlic juice (1 ml/100g BW/day) significantly decreased activities of AST and ALT in the liver tissue when compared with the control group.

Serum creatinine concentration:

Table (5) shows that during summer season after 4 weeks from the start of the experiment, treatment of healthy rats with medicinal plants significantly (P<0.05) decreased serum creatinine concentrtion compared with the control group. While after 8 weeks from the start of the experiment, treatment of healthy rats with medicinal plants did not show any significant effect on serum creatinine, except treatment with 2.5% *Nigella Sativa*+2.5% garlic that caused a significant decrease in serum creatinine level compared with the control group. During summer season after 4 or 8 weeks from the start of the experiment, serum creatinine in diabetic rats were significantly (P<0.05) increased compared with the control group. Treatment of diabetic rats with medicinal plant significantly (P<0.05) decreased serum creatinine compared with diabetic rats to reaching near the normal rang in the control rats.

Table 5. Mean ±S.E of serum Criatine (mg/dl) in normal and diabetic rats treated with garlic, Nigella Sativa and their mix during summer or winter season

Group		Summer		Winter	
		4 weeks	8 weeks	4 weeks	8 weeks
Normal	G1	.57±.062^{c}	.52±.026^{cd}	.53±.017^{d}	.53±.019^{d}
	G2	.48±.024^{d}	.48±.024de	.48±.027^{e}	.48±.024d^{e}
	G3	.45±.019^{d}	.45±.019de	.40±.010^{ef}	.45±.019^{ef}
	G4	.41±.004^{d}	.41±.006^{e}	.41±.004^{f}	.41±.006^{f}
Diabetic	G5	.90±.029^{a}	.88±.045^{a}	.95±.024^{a}	.97±.004^{a}
	G6	.75±.019^{b}	.76±.022^{b}	.78±.014^{b}	.77±.010^{b}
	G7	.80±.007^{b}	.80±.009^{b}	.79±.018^{b}	.79±.031^{b}
	G8	.64±015^{c}	.59±.029^{c}	.64±.015^{c}	.61±.024^{c}

Means within each column with similar letters are not significant different at P≥0.05
G1 and G5: control. G2 and G6: 5% Garlic. G3 and G7: 5% *Nigella Sativa.*
G4 and G8: 2.5% Garlic+ 2.5% *Nigella Sativa.*

During winter season after 4 or 8 weeks from the start of the experiment, treatment of healthy rats with medicinal plants was significantly (P<0.05) decreased serum creatinine level compared with the control group. After 4 or 8 weeks in winter season, diabetes significantly (P<0.05) increased serum creatinine level compared with the control rats. Treatment of diabetic rats with medicinal plants for 4 or 8 weeks during winter season significantly (P<0.05) decreased serum creatinine compared with diabetic rats to reach near the normal rang in the control group.

The above results indicated that diabetes significantly (P<0.05) increased serum creatinine, which may be due to rise of blood glucose in diabetic rats, leading to renal dysfunction.

These results are in agreement with those found by Abdel Ghfar (2016), Radhia (2012), Ranjbar (2012) and El-Demerdash (2005), who observed that levels of creatinine were significantly (P<0.05) increased in plasma of Alxoan–diabetic rats as compared to control group. Also, they indicted that diabetes could lead to renal dysfunction.

The above results also revealed that treatment of diabetic rats with medicinal plans showed positive effect on reducing the elevation in serum creatinine in diabetic rats, and this effect was more pronounced after treatment with 2.5 % garlic + 2.5 % *Nigella Sativa* than other treatments. These results are in according with Ayed *et al.* (2011), who showed a significant (pP<0.001) increase in blood uric acid, urea and creatinine by 23.7, 155.4 and 29.7%, respectively, as compared to the control. Administration of *Nigella Sativa* oil to diabetic rats resulted in a significant (P<0.01) decrease in the levels of uric acid by 30%, while there were no significant differences in the levels of total proteins, urea and creatinine after 7 weeks, as compared to untreated diabetic rats. In comparison with control, administration of black seed oil in non-diabetic rats showed insignificant differences in the level of blood total proteins, urea, uric acid and creatinine after 7 weeks. Anusuya *et al.* (2013) showed that garlic extract caused a reduction in the levels of creatinine compared with control rats .

In conclusion, *Nigella Sativa*_and garlic could enhance liver, kidney and thyroid gland functions in normal and diabetic rats.

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تأثير الثوم وحبة البركة علي بعض القياسات الفسيولوجية في الفئران الطبيعية والمصابة بالسكري

مدحت حسين خليل ، مصطفى إسماعيل بدر ، عبد الحميد عبد الله عبد الحميد* و سيد سليمان عبد الغفار أبو شادى

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تم إجراء تجربة لدراسة تاثير حبة البركة والثوم علي بعض القياسات الفسيولوجية في الفئران الطبيعية والمصابة بالسكري . وشملت الدراسة تجربتين ، التجربة الأولى في فصل الصيف والثانيه فى الشتاء. استخدم فى هذه الدراسه عدد each season/120 من فئران ذكور ألبينو بمتوسط وزن الجسم الحي 100 ± 10 جم. فى التجربه الأولى (فصل الصيف) تم توزيع الفئران في 8 مجموعات (15 فأر لكل مجموعه). الفئران طبيعية غذيت على عليقه ضابطة (المجموعه الأولى)، العليقه الضابطه مضاف لها ثوم 5 ٪ (المجموعه الثانيه)، حبة البركة 5 ٪ (المجموعه الثالثه)، أو الثوم 2.5 ٪ + حبة البركة 2.5 ٪ (المجموعه الرابعه). بينما الفئران المصابة بالسكري كانت تغذى على العليقه الضابطه (المجموعه الخامسه)، العليقه الضابطه مضاف اليها الثوم 5 ٪ (المجموعه السادسه)، حبة البركة 5٪ (المجموعه السابعه) أو الثوم 2.5 ٪ + حبة البركة 2.5 ٪ (المجموعه الثامنه). التجربة الثانية في فصل الشتاء تم تقسيم المجموعات كما في التجربة الاولي في فصل الصيف. تم جمع عينة دم بعد شهر وبعد شهرين من بداية التجربة وتم عمل التحليلات. أظهرت النتائج مايلى:
1- حدث زيادة معنوية في نشاط انزيمات الكبد، وتركيز الجلوكوز والكرياتينين فى سيرم الدم في الفئران المصابة بالسكري عن الفئران الطبيعية ولكن انخفضت بشكل ملحوظ مع اضافات النباتات الطبية. 2- انخفضت مستويات هرمونات الغده الدرقيه (T3&T4) بشكل ملحوظ في الفئران المصابة بالسكري عن الفئران الطبيعية ولكن زادت مستويات هذة الهرمونات بشكل ملحوظ مع اضافة النباتات الطبية. التوصيات والخلاصة استخدام النباتات الطبية (الثوم وحبة البركة)عمل علي تحسين الحالة الصحية للحيوانات وكان استخدام خليط الثوم وحبة البركة الأثر الأفضل في تحسين الحالة الصحية للحيوانات خاصا المصابة بالسكر