Effect of Fennel and Dill Seeds on Serum Lipid Profiles of Rats Feeding High Fat Diet

Wafaa A. Refaat[1] and Doaa E. El-Nassag[2]

[1]Department of Nutrition and Food Science, Faculty of Home Economics, Menoufia University, Egypt
[2]Department of Home Economics, Faculty of Specific Education, Alexandria University, Egypt

Abstract:

Dill and fennel seeds are herbal plants cultivated in various regions worldwide; they have many therapeutic effects such as anti-inflammatory, antibacterial, antiviral, anti-hyperlipidemia and antidiabetic. Therefore, this study was conducted to examine the effect of fennel and dill seeds powder on serum lipid profile of rats feeding high fat diet. Forty adult male albino rats weighting (200 ±7g) were divided into eight equal groups of 5 animals each, one was kept as a control (-Ve) group, while the other 7 groups were fed on high fat diet (HFD), group (2) were left as a control (+Ve) fed on HFD only all experiment period (28 days), groups (3,4) fed on HFD+ 2.5% and 5% of dill seeds, respectively, while groups (5,6) fed on HFD+ 2.5% and 5% of fennel seeds, respectively, the last groups (7,8) fed on dill and fennel seeds mix (50/50 w/w) with 2.5% and 5%, respectively. At the end of experiment serum glucose level, liver enzymes activities, kidney functions and lipid profile were examined. The results indicated that the increase of fennel seeds or dill seeds concentration resulted in reduction of serum glucose level and significant ($p \leq 0.05$) decreased serum very low-density lipoprotein (VLDL), low density lipoprotein (LDL), triglyceride and cholesterol. Also, the results revealed that fennel seeds have a better effect than dill seeds on high density lipoprotein (HDL) level. Treatment with fennel seeds or dill seeds at different levels caused significant ($p \leq 0.05$) decreased uric acid, creatinine and urea levels compared to positive control group. The results also revealed there no significant differences between the groups in albumin level. There was a significant ($p \leq 0.05$) decrease in the activities of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) of fennel seeds and dill seeds groups compared to positive control group. Therefore, the present study concluded that fennel and dill seeds powder could be used into daily foods and beverages as hypo-lipidemic herbs.

Key words: Dill, Fennel, Seeds, Serum lipid profile, albumin, liver enzymes activities

1. Introduction

Hyperlipidemia greatly increases the development of coronary heart disease and arteriosclerosis. Worldwide atherosclerosis is the most

common cause of death **(Marzyieh *et al*., 2007)** Development of heart disease is caused by hyperlipidemia due to high cholesterol diet. In civilized societies; ischemic stress of the heart is the major cause of death **(Hexeberg *et al*., 1993**). Although numerous factors, such as family history, age, life style, hypertension and diet high in cholesterol and saturated fats play a significant role leading to heart failure, the high levels of cholesterol particularly triglyceride, low LDL-C and total cholesterol is mostly responsible for the start of cardiovascular diseases **(Marzyieh *et al*., 2007).** The use of herbs and different parts of plants to treat diseases has been common since ancient times in public health. Using herbal medicines and natural remedies is beneficial cost-effective method for treating diseases **(Ghasemi Pirbalouti, 2009); (Tang and Halliwell, 2010).**

Among these herbs can point to fennel (*Foeniculum vulgare Mill*) which is of great importance and is used in the food, pharmaceutical, healthcare industries and cosmetic **(Abe and Ohtani, 2013)**. Fennel is one of the oldest spice plants which widely grow in arid and semi-arid. The stalk, seeds and leaves are edible part **(Cosge *et al*., 2008).** It is one of the world's most medicinal herbs based on pharmaceutical industry usage and economic importance **(Jamshidi *et al*., 2012).** Since ancient times, fennel seeds have been known as aromatic and medicinal herbs, widely used in the flavor of fish, bread, cheese and salads **(Kaur and Arora , 2010).**This herb contains phenolic compounds such as phenolic acids, flavonoids, coumarin, tannin and hydroxycinnamic acids **(Rahimi and Ardekani, 2013).**

Recently, fennel seeds were found to have possess pain reliever in primary dysmenorrhoea **(Modaress and Asadipour, 2006),** antidementia **(Joshi and Parle, 2006)**, antispasmodic activities **(Ostad *et al*., 2001),** a hypotensive effect **(El Bardai, 2001)**, antiplatelet and antithrombotic **(Tognolini *et al*., 2007)**, anticancer **(Celik and Isik, 2008)**, antioxidant **(Barros *et al*., 2009),** hepatoprotective **(Ozbek *et al*., 2003)**, antihirsutism

(Javidnia *et al.*, 2003), anti-inflammatory **(Choi and Hwang, 2004)**, immunomodulatory **(Kaileh *et al.*, 2007)** and potential in the treatment of glaucoma **(Celik and Isik, 2008)**. Fennel herb could be used for controlling cardiovascular disorders **(Oulmouden *et al.*, 2014).**

Dill with the scientific name of *Anethum graveolens* is a plant from the Apiaceae family, having quercetin and flavonoids such as coumarin, vicenin, kaempferol and myristicin that are known phytoestrogens **(Monsefi and Gramifar, 2013)**. In traditional medicine, dill is used as an antiseptic, relieve bloating, stomach tonic, indigestion, carminative, anti-vomiting and spasms, laxative, reducing blood lipids and pain soothing **(Setorki *et al.*, 2013).** Dill has pharmacological effects such as cancer chemo-preventive effects **(Zheng *et al.*, 1992),** antibacterial activity **(Delaquis *et al.*, 2002**), antihypercholesterolemic and antihyperlipidemic effects **(Yazdanparast and Alavi, 2001).** Therefore, the present study aimed to examine the effect of fennel and dill seeds on serum lipid profile of rats feeding high fat diet**.**

2. Materials and Methods

2.1. Materials

Fennel and dill seeds were purchased from Agricultural Seed, Spices and Medicinal Plants Co. (Harras), Cairo, Egypt.

2.2. Chemicals and solvents

All chemicals and solvents were analytical grade; vitamin and salt mixtures components used for rats feeding were purchased from Techno-Gene, Chemical Co., El Doki, Egypt. Casein was obtained from Morgan Chemical Co., Cairo, Egypt.

2.3. Animals

Forty adult male albino rats, weighting (200 ±7g) were purchased from Research Institute of Ophthalmology, Medical Analysis Department, Giza, Egypt. Rats were housed (2 per cage) and maintained on a12 h light: 12 h dark cycle in a temperature (20±5) and humidity– controlled atmosphere and were fed on standard diet for one week to acclimatize at animal research laboratory, Faculty of Home Economics, Menoufia University, Egypt.

2.4. Methods

2.4.1. Plant parts preparation

Fennel and dill seeds were powdered by electric grinder (Moulinex, France) and kept stored at 4°C until used.

2.4.2. Basal diet

The basic diet prepared according to the following formula as mentioned by **AIN (1993)** as follow: protein (10%), corn oil (10%), vitamins mixture (1%), mineral mixture (4%), choline chloride(0.2%), methionine (0.3%), cellulose (5%), and the remained is corn starch (69.5%). The used vitamin mixture component was that recommended by **Campbell (1963**) while the salts mixture used was formulated according to **Hegsted *et al*. (1941).**

2.4.3. High fat diet

The composition and preparation of high fat diet as were described by **Reed *et al*., (2000).**

2.4.4. Biological experimental design

Rats were divided into eight equal groups of 5 animals each, one was kept as a control(-Ve) group, while the other 7 groups were fed on high fat diet (HFD), group (2) were left as a control (+Ve) fed on HFD only all experiment period (28 days), groups (3,4) fed on HFD+ 2.5%and 5% of dill seeds, respectively while groups (5,6) fed on HFD+ 2.5%and 5% of fennel

seeds respectively, the last groups (7,8) fed on dill and fennel seeds mix (50/50 w/w) with 2.5%and 5%, respectively. At the end of experiment serum glucose level, liver enzymes activities, kidney functions and lipid profiles were examined**.**

2.4.5. Blood collection

After 4 weeks, blood was obtained via heart puncture after an overnight fasting; rats were anesthetized with diethyl ether. Blood samples were collected into a dry clean centrifuge glass tubes. Serum was separated by centrifugation at 4000 rpm for 15 minutes at room temperature .Serum was carefully aspirated and transferred into clean cuvette tubes and kept frozen at (-20 °C) until analysis **(Malhotra, 2003).**

2.4.6. Biochemical analysis

Different tested parameters in serum were determined using specific methods as follow: Serum glucose was estimated according to **Rojas *et al*. (1999).** Urea and creatinine levels were determined in serum according to the method described by **Houot (1985).** Serum total cholesterol, triglyceride (TG) and high density lipoprotein (HDL-c) were determined by using methods of **Allain *et al*. (1974), Fossati and Prencip (1982) and Lopez-virella (1977),** respectively. The determination of low density lipoprotein cholesterol (LDLc) and very low density lipoprotein cholesterol (VLDLc) were carried out according to the methods of **Lee and Nieman (1996).** Serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were assayed by the methods of **Moss and Herderson (1999).**

2.4.7. Statistical analysis

The data were statistically analyzed using a computerized cost at program by one-way ANOVA. The results are presented as mean ± SD. Differences between treatments at $p \leq 0.05$ were considered significant.

3. Results

3.1. Effect of fennel and dill seeds at different levels on serum glucose level of rats feeding high fat diet

Serum glucose level of rats treated with fennel and dill seeds at different levels are tabulated in Table (1). Data indicated that treatment with either fennel seeds or dill seeds resulted in significant ($p \leq 0.05$) decrease in serum glucose level compared to negative control and positive control groups. It's clear from the table that the increasing of fennel seeds or dill seeds concentration resulted in reduction of serum glucose level. Also, the table revealed that dill seeds have a better effect than fennel seeds on serum glucose level. It is observed from the table that mixture of fennel seeds with dill seeds at different levels showed significant ($p \leq 0.05$) lower serum glucose level than negative control or positive control groups.

Table (1): Effect of fennel and dill seeds at different levels on serum blood glucose level of rats feeding high fat diet

Groups / Parameter	Glucose (ml/dl)
Negative control	$185.3^{b} \pm 3.51$
Positive control	$211.3^{a} \pm 3.21$
Dill seeds 2.5%	$120.8^{e} \pm 3.82$
Dill seeds 5%	$105.8^{f} \pm 3.55$
Fennel seeds 2.5%	$161.0^{c} \pm 3.61$
Fennel seeds 5%	$157.7^{c} \pm 2.52$
Fennel &dill seeds mix 2.5%	$146.5^{d} \pm 3.97$
Fennel &dill seeds mix 5%	$143.3^{d} \pm 2.08$
LSD	5.781

Values are expressed as means ±SD; mean in the same raw with different letters are significantly different at $P \leq 0.05$.

3.2. Effect of fennel and dill seeds at different levels on serum lipid profile of rats feeding high fat diet

Lipid profile was determined in serum of male rats treated with fennel and dill seeds at different levels and the data are shown in Table (2). Data revealed that treatment with fennel and dill seeds significantly ($p \leq 0.05$) decreased serum very low-density lipoprotein (VLDL), low-density lipoprotein (LDL), triglyceride (TG) and cholesterol, while increased high-density lipoprotein (HDL) compared to positive control group. It's observed from the table that the increasing of fennel seeds or dill seeds concentration resulted in significant ($p \leq 0.05$) decreased of serum VLDL, LDL, triglycride and cholesterol. Also, the table revealed that fennel seeds have a better effect than dill seeds on HDL level. It's clear from the table that mixture of fennel seeds with dill seeds at 5% of mixture group resulted in significant ($p \leq 0.05$) enhanced the level of HDL and decrease the levels of VLDL, triglyceride and cholesterol compared to 2.5% mixture group. It is concluded that high fat diet supplemented with dill and fennel seeds at different levels significantly ($p \leq 0.05$) decreased serum levels of cholesterol, LDL-C, VLDL-C and triglyceride, and significantly ($p \leq 0.05$) increased serum HDL-C level compared with feeding rats with high fat diet.

Table (2): Effect of fennel and dill seeds at different levels on serum lipid profile of rats feeding high fat diet

parameters / Groups	VLDL (mg/dl)	LDL (mg/dl)	HDL (mg/dl)	T.G (mg/dl)	T.C (mg/dl)
Negative control	$21.23^{c} \pm 2.41$	$64.07^{e} \pm 2.32$	$37.33^{b} \pm 3.21$	$114.7^{d} \pm 2.08$	$123.0^{d} \pm 3.61$
Positive control	$41.73^{a} \pm 2.48$	$95.67^{a} \pm 3.21$	$37.33^{b} \pm 2.08$	$165.3^{a} \pm 3.06$	$162.7^{a} \pm 2.31$
Dill seeds 2.5%	$27.30^{b} \pm 2.17$	$65.90^{c} \pm 3.60$	$37.33^{b} \pm 2.52$	$135.3^{b} \pm 3.51$	$123.3^{d} \pm 3.79$
Dill seeds 5%	$16.67^{d} \pm 2.05$	$40.80^{e} \pm 2.40$	$37.33^{b} \pm 2.08$	$93.3^{e} \pm 2.31$	$102.3^{e} \pm 3.21$
Fennel seeds 2.5%	$27.90^{b} \pm 3.30$	$64.88^{c} \pm 3.99$	$46.0^{a} \pm 2.0$	$140.0^{b} \pm 3.61$	$140.0^{b} \pm 2.65$
Fennel seeds 5%	$22.60^{c} \pm 2.11$	$52.70^{d} \pm 2.70$	$45.33^{a} \pm 3.79$	$123.7^{c} \pm 3.21$	$132.7^{c} \pm 3.56$
Fennel &dill seeds mix 2.5%	$27.63^{b} \pm 2.75$	$73.17^{b} \pm 3.41$	$41.0^{ab} \pm 3.46$	$129.0^{c} \pm 3.95$	$141.3^{b} \pm 2.08$
Fennel &dill seeds mix 5%	$16.30^{d} \pm 2.50$	$62.43^{c} \pm 2.42$	$44.67^{a} \pm 3.79$	$111.0^{d} \pm 2.65$	$137.3^{bc} \pm 2.52$
LSD	4.330	5.303	5.120	5.379	5.241

Values are expressed as means ±SD; mean in the same raw with different letters are significantly different at $P \leq 0.05$. T.C: Total cholesterol; T.G; Triglycerides; HDL: High density lipoprotein; LDL: Low density lipoprotein; VLDL: Very Low density lipoprotein.

3.3. Effect of fennel and dill seeds at different levels on uric acid, creatinine and urea of rats feeding high fat diet

Effects of fennel and dill seeds at different levels on uric acid, creatinine and urea of rats feeding high fat diet were determined and the data are tabulated in Table (3). Data showed that treatment with fennel seeds or dill seeds at different levels caused significant ($p \leq 0.05$) decrease in uric acid, creatinine and urea levels compared to positive control group. In the mixture group at level of 5% fennel seeds with dill seeds resulted in significant ($p \leq 0.05$) decrease in uric acid, creatinine and urea levels compared to positive control group.

Table (3): Effect of fennel and dill seeds at different levels on uric acid, creatinine and urea of rats feeding high fat diet

Parameters / Groups	UA (ml/dl)	Creatinine (ml/dl)	Urea (ml/dl)
Negative control	$4.40^{b} \pm 0.62$	$0.60^{ab} \pm 0.05$	$24.50^{a} \pm 1.80$
Positive control	$5.43^{a} \pm 0.15$	$0.63^{a} \pm 0.09$	$24.67^{a} \pm 1.53$
Dill seeds 2.5%	$3.32^{cd} \pm 0.75$	$0.51^{b} \pm 0.03$	$23.33^{ab} \pm 1.53$
Dill seeds 5%	$3.02^{d} \pm 0.62$	$0.56^{ab} \pm 0.07$	$21.0^{b} \pm 1.73$
Fennel seeds 2.5%	$3.87^{bcd} \pm 0.25$	$0.57^{ab} \pm 0.04$	$17.67^{c} \pm 1.53$
Fennel seeds 5%	$3.80^{bcd} \pm 0.36$	$0.59^{ab} \pm 0.05$	$23.70^{ab} \pm 1.47$
Fennel &dill seeds mix 2.5%	$4.13^{bc} \pm 0.32$	$0.63^{a} \pm 0.04$	$24.0^{ab} \pm 2.65$
Fennel &dill seeds mix 5%	$3.80^{bcd} \pm 0.72$	$0.56^{ab} \pm 0.11$	$23.33^{ab} \pm 1.53$
LSD	0.903	0.108	3.045

Values are expressed as means ±SD; mean in the same raw with different letters are significantly different at $P \leq 0.05$, UA: Uric acid.

3.4. Effect of fennel and dill seeds at different levels on albumin level and ALT and AST activities of rats feeding high fat diet

Table (4) indicated the effect of fennel and dill seeds at different levels on albumin level, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities of rats feeding high fat diet. The table showed that treatment with fennel and dill seeds caused increase in albumin

level compared to positive control group. There no significant differences between the groups in albumin level. Also, it was observed that the activities of ALT of fennel and dill seeds groups showed significant ($p \leq 0.05$) decreased compared to positive control group. In the same line, the activities of AST of fennel and dill seeds groups resulted in significant ($p \leq 0.05$) decreased compared to positive control group. It is observed that there was significant ($p \leq 0.05$) difference between mixture groups at different levels and positive control group in ALT and AST activities. It's observed from the table that the increasing of fennel seeds or dill seeds concentration resulted in significant ($p \leq 0.05$) decreased of ALT and AST activities. Also, it's clear from the table that high level of dill and fennel (5%) in mixture groups resulted in lower the activities of ALT and AST than low level of dill and fennel (2.5%).

Table (4): Effect of fennel and dill seeds at different levels on albumin (ALB) level, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities of rats feeding high fat diet

Parameters / Groups	ALB (g/dl)	ALT (U/L)	AST (U/L)
Negative control	$3.59^{a} \pm 0.49$	$175.7^{b} \pm 3.06$	$186.7^{a} \pm 2.08$
Positive control	$3.42^{a} \pm 0.25$	$190.0^{a} \pm 3.61$	$186.3^{ab} \pm 2.52$
Dill seeds 2.5%	$3.58^{a} \pm 0.50$	$175.3^{b} \pm 2.08$	$186.7^{a} \pm 2.08$
Dill seeds 5%	$3.59^{a} \pm 0.47$	$153.0^{c} \pm 3.61$	$182.0^{b} \pm 3.61$
Fennel seeds 2.5%	$3.58^{a} \pm 0.19$	$148.0^{cd} \pm 3.61$	$163.7^{d} \pm 2.52$
Fennel seeds 5%	$3.59^{a} \pm 0.48$	$141.7^{e} \pm 3.51$	$162.3^{d} \pm 2.08$
Fennel &dill seeds mix 2.5%	$3.87^{a} \pm 0.18$	$153.3^{c} \pm 3.06$	$172.3^{c} \pm 3.21$
Fennel &dill seeds mix 5%	$4.09^{a} \pm 0.37$	$143.0^{de} \pm 2.0$	$140.3^{e} \pm 2.08$
LSD	0.674	5.416	4.469

Values are expressed as means ±SD; mean in the same raw with different letters are significantly different at $P \leq 0.05$. ALB: Albumin; ALT: Alanineaminotransferase; AST: Aspartateaminotransferase.

4. Discussion

The obtained result of serum glucose level of fennel groups is consistent with the previous study by **Abou El-Soud *et al.* (2011)** who observed that there was a reduction in serum glucose level in diabetic rats

treated with essentiall oil of *Foeniculum vulgare Mill*. Fennel seeds contain from 3% to 6% of an essential oil and about 20% of a fixed oil composed of tocopherols, oleic acid and petroselinic acid **(Conforti *et al.*, 2006).** Fennel oil possessed antioxidant, pro-oxidant activities and antiinflamatory **(Miguel *et al.*, 2010)**. The obtained result of lipid profile of fennel groups is agreement with earlier findings by **Helal *et al*. (2011) and Dongare *et al*. (2012**) who mentioned that the use of fennel might be effective for improving lipid profile.

Delaram *et al*. (2011) reported that fennel oil extracted has capability to suppress lipid peroxidation due to antioxidant properties; also it has a protective excessive fat degradation, inflammation and toxicity. The obtained result of serum creatinine, urea and uric acid in fennel groups is agreement with previous report by **Alsalame *et al*. (2018)** who concluded that there was a significant decrease ($p \leq 0.05$) in the level of serum creatinine, urea and uric acid concentration of rabbits treated with alcoholic extract of fennel seed compared to cisplatin group.

Ayman *et al.* (2006) mentioned that the increase in uric acid might be disturbance or a dysfunction of the renal function as the results of the kidney damage, which led to necrosis in the renal tubules. The obtained result of serum uric acid of rats treated with fennel seeds is consistent with the previous finding by **Fan *et al.* (1999)** who concluded that the fennel seeds extract has a preventive role that prevents the formation of calcium oxalate crystals due to it contains efficient compounds such as flavonoids and phenols. **Ibrahim and El-Khateeb (2013)** reported that fennel seeds might have a protective activity of the kidney through decreasing damage to the cells of the urinary tubules led to reducing the level of uric acid.

Valko *et al.* (2007) mentioned that fennel plant has ability to decrease uric acid because it is contains a high amount of antioxidants. It is rich in ascorbic acid, alpha-tocopherol, has anti-inflammatory effects and acts as a diuretic. **Choi and Hwang (2004)** reported that fennel plant

contains the active plant estrogen constituents which have ability to be diuretic and has a protective effect on the glomeruli led to reduce the symptoms of renal injury. Also, **Bekhradi (2004)** concluded that fennel seeds contain active compounds, which have anti-oxidant and anti-inflammatory properties.

The obtained result of liver enzymes activities and albumin level in fennel groups is agreement with previous findings by **Qiang *et al.* (2011)** who observed that a significant decreased in AST and ALT activities and increased albumin (ALB) level in rats with hepatic fibrosis after fennel consumption. **Liu *et al.* (2009)** concluded that fennel might reduce inflammation in the liver and protect hepatocytes against liver damage. Also, **Mannaa *et al.* (2015)** indicated that fennel seed extract could significantly decrease serum AST and ALT due to hepato protective activity.

Jana and Shekhawat (2010) concluded that use the extractions of dill seed and leaf led to reduction in total cholesterol, very-low-density lipoprotein, low-density lipoprotein, triglycerides and glucose level, while HDL-C was increased and confirmed that dill has hypoglycemic and antioxidant activity. The antioxidant activity of dill is attributed to its phenolic proanthocyanidins and flavonoids constituents **(Yazdanparast and Bahramikia, 2008).** The main mechanism by which dill exerts its antidiabetic functions is inhibition of intestinal cholesterol absorption and increasing production of bile acids **(Jana and Shekhawa, 2010).**

The obtained result of serum cholesterol and triglycerides in dill groups is consistent with the previous report by **Yousofvand and Soltany (2015)** who concluded that the high concentration of dill extract (500 mg / lit) cause lower cholesterol and triglycerides level than low concentration (250 mg / lit), while in high concentration revealed a significant increase in high-density lipoprotein level. **Yazdanparast and Alavi (2000)** suggested that dill contains limonene, carvone and α-phellandrene which responsible for the hypolipidemic properties.

Kazemi *et al.* (2006) observed that there was a reduction in lipid profile, liver enzymes and inflammatory cytokines of New Zealand male rabbits treated with dill. Also, **Kojuri *et al.* (2007)** concluded that dill can be used as one of the most effective drugs in the treatment of hyperlipidemia in human. **Monsefi and Gramifar (2013)** reported that dill is rich source of antioxidants; it is contain quercetin and flavonoids. Antioxidant activity might be serum lipids-lowering agent. **Ahmed *et al.* (2013)** concluded that dill hydroalcoholic extract caused significant increase the level of HDL and decrease the level of triglycerides, total cholesterol, VLDL and LDL. **Yazdanparast and Bahramikia (2007)** confirmed that crude extracts of dill having strong anti-hyperlipidemic effects and improve the biological antioxidant status through reducing lipid peroxidation in liver of rats fed with high fat diet.

Ricardo *et al.* (2001) obtained that the levels of LDL and serum triglyceride decreases after using dill of hyperlipidemic mice. **Weggemans and Trautwein (2003)** indicated that dill contains phenolic compounds and flavonoids. In Hypercholesterolemic people, the presence of flavonoids cause increasing HDL-C and reducing LDL-C **(Asgary *et al.*, 2013). Yazdanparast and Bahramikia (2008)** reported that there was significant decrease in atherosclerosis index and lipid profile in hyperlipidemic patients which treated with dill leaf powder. **Hajhashemi and Abbasi (2008)** confirmed that a significant decrease in the levels of triglycerides and cholesterol and a significant increase in HDL-c level of hyperlipidemic rats treated with dill. Carvone and tannin are available in dill, which effective in reducing appetite in animals and reduction of serum lipids **(Yugarani *et al.*, 1993).**

5. Conclusion

The effect of fennel and dill seeds on serum lipid profile of rats feeding high fat diet was investigated. Serum glucose level, liver enzymes activities and kidney functions also were examined. The obtained results observed that fennel and dill seeds caused reduction on serum glucose level

and significant decreased serum lipid profile. Treatment with fennel seeds or dill seeds at different levels caused improvement in kidney functions and liver enzymes activities compared to positive control group. Therefore, the present study recommended for using fennel and dill seeds powder as hypo-lipidemic herbs.

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تأثير بذور الشمر والشبت على صورة دهون سيرم الدم في الفئران التي يتم تغذيتها على وجبات عالية الدهون

وفاء أحمد رفعت[١]، دعاء السيد النساج [٢]

١- قسم التغذية وعلوم الأطعمة ـ كلية الاقتصادالمنزلي ـ جامعة المنوفية- مصر
٢- قسم الاقتصاد المنزلي- كلية التربية النوعية – جامعة الإسكندرية- مصر

المستخلص

بذور الشبت والشمر نباتات عشبية تزرع في مناطق مختلفة حول العالم ولها العديد من الآثار العلاجية كمضادة للالتهابات والفيروسات والجراثيم ومضادة لمرض السكر وخافضة للدهون. لذلك ، أجريت هذه الدراسة لتقييم تأثيرمسحوق بذورالشمروالشبت على صورة دهون سيرم الدم في الفئران التي يتم تغذيتها على وجبات عالية الدهون. حيث استخدم ٤٠ فأر من ذكور فئران الألبينو البيضاء البالغة تتراوح أوزانهم بين (٢٠٠±٧جرام) تم تقسيمها إلى ٨ مجموعات متساوية المجموعة الاولى استخدمت كمجموعة ضابطة سالبة وتم تغذية الفئران فى السبع مجموعات الأخرى على غذاء عالي في محتواه من الدهون واستخدمت المجموعة الثانية كمجوعة ضابطة موجبة ، المجموعة الثالثة والرابعة تم معاملتهما بإضافة مسحوق بذور الشبت بنسب ٢.٥ ، ٥% على التوالي، المجموعة الخامسة والسادسة تم معاملتهما بإضافة مسحوق بذور الشمربنسب ٢.٥ ، ٥% على التوالي ، المجموعة السابعة والثامنة تم معاملتهما بإضافة مخلوط مسحوق بذورالشبت والشمربنسب ٢.٥ ، ٥% على التوالي ، استمرت التجربة لمدة ٢٨ يوم وفي نهاية فترة التجربة تم ذبح الفئران وأخذت عينات من الدم لقياس مستوى الجلوكوز، نشاط انزيمات الكبد ، وظائف الكلى وكذلك صورة الدهون في سيرم الدم ، أشارت النتائج إلى أن زيادة تركيز بذور الشمر أو بذور الشبت أسفرت عن انخفاض معنوى ($p\leq0.05$) لمستوى الجلوكوز في الدم ، كذلك حدث انخفاض معنوى فى مستوى الجليسريدات الثلاثية والكوليسترول والليبوبروتينات المنخفضة الكثافة والليبوبروتينات المنخفضة الكثافة جدا، أيضا وضحت النتائج أن بذورالشمرلها تأثيرأفضل من بذورالشبت على مستوى الليبوبروتين المرتفع الكثافة. أدت المعاملة ببذور الشمرأوبذورالشبت بنسب مختلفة الى انخفاض معنوى ($p\leq0.05$) في حمض اليوريك ؛ مستويات الكرياتينين واليوريا مقارنة مع المجموعة الضابطة الإيجابية. أظهرت النتائج أيضًا عن عدم وجود فروق ذات دلالة إحصائية بين المجموعات في مستوى الألبيومين. كان هناك انخفاض معنوى ($p\leq0.05$) في نشاط الأنزيم الناقل لحمض الأسبرتيت (AST)، ونشاط الأنزيم الناقل لحمض الألانين (ALT) في مجموعات بذورالشمروالشبت مقارنة بالمجموعة الضابطة الإيجابية. لذلك ، لذا تخلص الدراسة الى أمكانية إدخال مسحوق بذورالشمروالشبت في الأطعمة والمشروبات اليومية كأعشاب خافضة لدهون الدم.

الكلمات المفتاحية: الشبت، الشمر، البذور، ، صورة دهون الدم، البيومين، نشاط انزيمات الكبد.