Anti – diabetic properties of water and ethanolic extracts of Balanites aegyptiaca fruits flesh in senile diabetic rats.

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Abstract

The present study was designed to evaluate the role of a medicinal plant for management of diabetes instead of manufactured drugs, which led to many complications. Medicinal plants would be highly useful for this purpose because they are considered to be effective and non-toxic and safer than manufactured drugs.

Water and ethanolic extracts of Hegleg (Balanites aegyptiaca) fruits were investigated for their hypoglycemic and hypolipidimic effect in normal senile diabetic rats in addition to some hormones related to diabetes mellitus. It has been recently known that leptin and insulin are involved in the regulation of energy balance and body weight in addition to reduction of blood glucose level.

The extract induced significant reduction in serum glucose, glucagon, total lipids, total cholesterol, triglycerides level and transaminases (AST, ALT and γGT) activities. Liver glycogen, serum insulin, leptin and testosterone concentrations significantly increased in treated animals compared to control. The present data revealed insignificant changes in the serum total protein, albumin and globulin level during the experimental period. The obtained data suggest the beneficial role of Balanites aegyptiaca fruit as a hypoglycemic, hypolipidimic agent and as a protective agent of liver from damage or injury. These results suggest that the anti-diabetic effect of Balanites aegyptiaca fruit flesh may be attributed at least in part to increased glucose metabolism and produces an increase in serum insulin concentration.

Introduction

At least 90 million people throughout the world suffer from diabetes mellitus (Swanston-Flatt et al 1991).

Lowering the concentration of glucose in blood is the best defense against the late complications and negative outcomes of diabetes mellitus such as blindness, renal failure and limb amputation (Will and Byer, 1996). Although insulin therapy is the primary treatment for lowering blood glucose, the first approach to diabetes mellitus treatment generally involves increasing physical activity, reducing weight and improving the diet (Fertig et al., 1995 and Marles 1995).

Medicinal plants have been also used to prevent and control the complications associated with diabetes mellitus. Insulin and the other drugs which are used to control diabetes are chemical compounds that may result in many complications. On the other hand, the medicinal plants are supposedly

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safe, effective and better oral hypoglycemic agents. (Lotlikar and Rajarama Rao, 1996).

Medicinal plants have been used for centuries by diabetic patients in India, Iraq, Unani, Russia, Emirates, Egypt and many other countries. They are considered to be effective and non-toxic (Puri et al., 1994, Bhat, 1997).

More than 400 traditional plant treatments for diabetes mellitus have been recorded. Onion (Allium cepa) (Swanson-Flatt et al., 1991) and garlic, Allium sativum (Rawi et al., 1996). They have long been used as dietary supplement for the traditional treatment of diabetes in Asia, Europe and Middle East (Day 1984). The seeds of Trigonella foenum graecum are more widely recommended for non-independent diabetes mellitus patients. (Ajabnoor and Tilmisany, 1988 and Shani et al., 1994). The essential oil of Nigella sativa was reported to exhibit hypoglycemic effect. (Abdel-Salam et al., 1992 and Al-Hader et al., 1993).

Artemisia herba alba and cuminum nigrum seeds are also widely used in Egyptian folk medicine for the treatment of diabetes mellitus (Akhtar and Ali, 1985, Al-Shamanaony et al., 1994, Houghtton 1995 and Subramanian et al., 1996). Zizyphus is, one of the plants commonly used in Egyptian folk medicine has been reported for the treatment of diabetes (Glombitza, et al., 1994).

The leaves of Mongifera indica are also used as an antidiabetic agent in Nigerian folk medicine (Aderibigbe et al., 1999). Oral administration of the ethanolic extract of rhizome of Nelumbo nucifera markedly reduced the blood sugar level of normal, glucose-fed hyperglycemic and streptozotocin induced diabetic rats, when compared with control animals (Mukherjee et al., 1997). The extract of Azadirachta indica, Gymnema sylvestre, catharanthus roseus and Ocimum sanctum was found to decrease the blood sugar level in varying degrees (Chattopadhyay, 1999). Oral administration of 2.5 and 5g/kg body weight of the aqueous extract of the Syzigium cumini known as jamun is widely used in Indian folk medicine by diabetic patients (Prince et al., 1998). In normal rats, both the aqueous and 50% ethanolic extracts of Caesalpinia Bonducella Fleming seeds were reported to have and diabetic activity (Sharma et al., 1997). The same results were observed by Amed et al. 1998 when they examined the effect of Monordica charantia fruit juice on islet of pancreas of diabetic rats.

A single oral administration of the water extract of Equisetum myrioc haetum aerial parts at doses of 7 and 13 mg/kg and of the butanol extract at doses of 8 and 16 mg/kg from on streptozotocin-diabetic rats (Andrade Cetto et al., 2000). Oral administration of aqueous: ethanolic (50% v/v) extract of Punica granatum flowers led to significant blood glucose lowering effect in normal, glucose-fed hyperglycemic and alloxan-induced diabetic rats (Jafri et al., 2000).

Oral administration of the ethanolic extracts of Luffa aegyptiaca (seeds) and Carissa edulis (leaves) on blood glucose levels both in normal and streptozotocin diabetic rats led to significant decrease of blood glucose level (El-Fiky et al., 1996). Oral administration of oil of Eruca sativa seeds led to hypoglycemic, lypolipidimic and lowering of the concentration of hypotriglyceridimic and total hypcholesterolimic (El-Missiry and El-Gindy, 2000). An alcoholic extract of Picrorrhiza kurroa was found to lower blood glucose in basal conditions and after a heavy glucose load in normal rats. (Joy and Kuttan, 1999). Aqueous
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extract of Morus alba leaves was reported as hypoglycemic as well as hypolepidimic agent (Kim et al., 1999 and El-Eraky and Yassin, 2001). Balanites aegyptiaca, a data like fruits called hegleg data is known in folk medicine for its hypoglycemic effect.

Ten percent Smallantus sonch - ifolius (yacon) decoctio produced a significant decrease in plasma glucose levels in normal and streptozotocin induced diabetic rats when administered by intraperitoneal injection or gastric tube (Ayber et al., 2001).

Intraperitoneal administration of some medicinal plants significantly diminished the hyperglycemia in mildly diabetic mice (Alarcon- Aguilar et al., 2002). Medicinal plants in India have shown varying degree of hypoglycemic and anti-hyperglycemic activity (Grover et al., 2002).

Treatment of the diabetic rats with the aqueous suspension of some herbal plants (Lupinus albus, Lupinus termis, Halfa barr and Zygophyllum coccineum) restored the activities of the AST, ALT, ALP and LDH to their normal level in plasma, liver and testes in alloxan induced diabetic rats (Mansour et al., 2002).

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Medicinal plants act as a tonic for the islets of pancreas making it naturally secrete insulin. Some medicinal plants contain an insulin-like substance produced by the pancreas. The medicinal plants make the body cells more sensitive to insulin naturally. The medicinal plants control the release of glucose form the liver (Grover et al., 2002).

Treatment of the diabetic rats with the aqueous suspension of some herbal plants (Lupinus albus, Lupinus termis, Halfa barr and Zygophyllum coccineum) restored the activities of the AST, ALT, ALP and LDH to their normal level in plasma, liver and testes in alloxan induced diabetic rats (Mansour et al., 2002). Insulin resistance may link disorders of metabolic homeostasis such as diabetes and obesity with disorders of hemodynamic homeostasis (Chen et al., 2003).

The present work was therefore planned to study the effects of both aqueous and ethanolic extracts of Balanites aegyptiaca on serum glucose level, and on glycogen content of liver and on serum glucagon, leptin and testosterone levels of hyperglyc senile rats. It was also aimed to find out the changes in liver function parameters.

Material and Methods

Materials:

1. Animals: Male senile diabetic albino rats (Rattus norvigicus) weighing about (250 - 300 g) were obtained from the laboratory Unit of Egyptian Organization for Biological and Vaccine production. Dokki, Egypt. All rats were examined for diabetic or not and the diabetic ones (10 rats) were selected for glucose tolerance curve, also the same number were used for young rats. They were acclimatized to laboratory conditions with a 12 hours light for a period of 10 days before the experiment. Animals were
fed ad libitum with standard laboratory diet composed of soybean (15%) corn (50%), cotton seed oil (15%), meat powder (5%), limestone (1%), vitamins (1%), sodium chloride (3%) and cellulose (10%). They were allowed free excess to water.

2. **Blood glucose tolerance curve:** Oral glucose tolerance test (OGTT) was performed on normal senile diabetic and young rats (120-150g). Blood samples were obtained from retro-orbital plexus of overnight fasted rats (10-12 hours). Successive blood samples were then taken at 30, 60, 90, 120 and 150 minutes following the administration of glucose solution (1g/kg. b.wt) via gastric intubation. Rats with serum glucose level ranging from (200-300 mg/100ml) blood were used, as indicated in figure (1).

3. **Preparation of fruit flesh:** *Balanites aegyptiaca:* *Balanites aegyptiaca* fruit flesh can be obtained from palm trees that grow in desert of the southern valley of Egypt (Halaeib and Shelateen area). *Balanites aegyptiaca* has a wide ecological distribution and it belongs to family Balanitaceae and is also known as Hegleg or Balah El-Abeed. The date is dark brown in colour; and the fleshy pulp of both unripe and ripe fruits is edible and eaten dried or fresh. Fruit flesh were sliced and weighed and the seeds were discarded. The flesh portions were dried at 110°C for one hour, then the temperature was decreased to 70°C for 48 hrs.

4. **Extraction of the fruit flesh:** Fruit flesh was extracted either with water or with absolute ethanol, in a soxhlet apparatus for 10 hours according to the Association of Official Analytical Chemists (AOAC, 1970) procedure.

5. **Design of the experiment:** The animals were administered *Balanites aegyptiaca* extracts by stomach tube and they were divided into three groups with equal number of animals (10 rats/group) according to the following scheme:

- **Control (senile diabetic male albino rats)** fed control diet and drinking water supplemented with 0.2 ml ethanol/rat for 30 days.
- **Second group of rats** were drenched 2 ml/rat daily of aqueous extract of *Balanites aegyptiaca* (80 mg/kg b.wt), 100 gm. dissolved in 10 ml water for 30 days.
- **Third group of rats** received a daily dose of 2 ml/rat of ethanolic extract of *Balanites aegyptiaca* (80 mg/kg b.wt), 100 gm. dissolved in 10 ml ethanol for 30 days.

6. **Blood sampling and handling:** Blood samples were collected using capillary tubes from retro-orbital plexus of rats (Schmer, 1967) into clean centrifuge tube. The blood samples were allowed to coagulate and centrifuged at 4000 rpm for 20 minutes to separate blood serum. Separated serum was stored at -20°C for subsequent biochemical analyses.

7. **Liver glycogen:** Liver samples were removed immediately after decapsulation of the rats, cooled and homogenized in saline solution for evaluation of liver glycogen content.

**Methods:**

Serum glucose level was estimated enzymatically according to the method of Trinder (1969). The glycogen content of the liver was determined by an throne method as described by Carrol et al., (1955). Serum insulin was measured by radio immunoassay (Reeves 1983) in Gamma Trade Company. Serum glucagon was
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...determined by using the method of Nishino (1981). Serum leptin levels were estimated with a recently described radio immunoassay (Ahren et al., 1997b). Serum testosterone level was measured according the method of Hill et al., (1985). Serum total lipids level was determined using the method of Knight et al., (1972). Serum total cholesterol level was estimated according to Sidle et al., (1983) method. Serum triglycerides level was measured using Van Handle and Zilversmit (1957). Serum total protein concentration was estimated using the method of Doumas (1975). Serum albumin level was measured according to the method of Doumas et al., (1971). Serum globulin was calculated by subtracting albumin from total protein. Serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities were measured according to the method of Reitman and Frankel (1957). Serum γ-GT was estimated using the method of Szassz (1969).

Statistical analysis

The obtained data were statistically analyzed using student’s "t" test (Snedecor and Cochran 1971). Results were expressed as mean ± standard error (S.E) and values of P≤ 0.05 were considered statistically insignificant, while values of P≤ 0.05 were considered statistically insignificant.

Results

Oral administration of aqueous extract from Balanites aegyptiaca fruit flesh for 30 days to normal senile diabetic rats induced a highly significant decrease (P≤ 0.01) of serum glucose level compared to control group (normal senile diabetic rats non treated with the extract) as indicated in table (1) and figure (2). Drenching ethanolic extract for the same period exerted a highly significant decrease (P≤ 0.01) in blood glucose level compared to that of the control as shown in table (1) and figure (2).

Concerning liver glycogen content, there was highly significant increased (P≤ 0.01) due to oral administration of either aqueous or ethanolic extract of Balanites aegyptiaca fruit flesh compared to control as shown in table (1) and figure (3).

Oral administration of aqueous extract of Balanites aegyptiaca fruit flesh to normal senile diabetic rats for 30 days induced significant increase (P≤ 0.05) of serum insulin level. Also a highly significant increase (P≤ 0.01) of serum insulin level was observed after 30 days of oral administration with ethanolic extract as in indicated in table (1) and figure (4) in comparison to control.

The serum glucagon hormone level of normal senile diabetic rats treated with either aqueous or ethanolic extracts revealed highly significant decrease (P≤ 0.01) compared to normal senile diabetic rats (control), as indicated in table (1) and figure (5).

Results revealed that administration of aqueous extract from Balanites aegyptiaca fruits induced a significant increase (P≤ 0.05) in leptin hormone level. The ethanolic extract induced a higher significant value (P≤ 0.01) after 30 days compared to the normal senile diabetic rats as indicated in table (1) and figure (6). As shown in table (1) and figure (7) aqueous or ethanolic extract of Balanites aegyptiaca fruit flesh given to normal senile diabetic rats significantly raised serum testosterone level (P≤ 0.01).

Normal senile diabetic rats treated with aqueous extract from Balanites aegyptiaca fruit induced a significant decrease (P≤ 0.01) in serum total lipids, total cholesterol and triglyceride level after 30 days compared to those
corresponding values of control or normal senile diabetic rats. Similar decreases in serum total lipids, total cholesterol and triglycerides were also observed in normal senile rats treated with ethanolic extract of *Balanites aegyptiaca* fruit as illustrated in table (2) and figures (8, 9 and 10). Aqueous or ethanolic extract of *Balanites aegyptiaca* fruit flesh induced in significant change of serum total protein, albumin and globulin of senile diabetic rats after 30 days of treatment compared to that corresponding control value as illustrated in figures (11, 12 and 13).

Table (2) and figures (14, 15 and 16) illustrate that the activities of transaminases (ALT and AST) are significantly decreased ($P < 0.01$) in normal senile diabetic rats given the aqueous or ethanolic extract of *Balanites aegyptiaca* fruits or after 30 days of treatment compared to control: Similar decrease in $\gamma$GT activity was observed in senile diabetic rats drenched either aqueous or ethanolic extract of *Balanites aegyptiaca* for 30 days.

**Table (1):** Effect of water and ethanolic extract from *Balanites aegyptiaca* fruits flesh on some biochemical parameters in senile diabetic rats for 30 days administration.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Criteria</th>
<th>Normal senile diabetic rats (control)</th>
<th>Senile diabetic rats treated with aqueous extract</th>
<th>Senile diabetic rats treated with ethanolic extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum glucose mg/dl</td>
<td>Mean ± S.E. probability</td>
<td>225.5 ± 2.15</td>
<td>137.6 ± 3.20</td>
<td>131.8 ± 4.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Liver glycogen mg/g.tissue</td>
<td>Mean ± S.E. probability</td>
<td>8.42 ± 0.24</td>
<td>12.8 ± 0.63</td>
<td>12.0 ± 0.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Insulin μiu/ml</td>
<td>Mean ± S.E. probability</td>
<td>58.4 ± 1.37</td>
<td>64.2 ± 1.16</td>
<td>70 ± 1.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.05</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Glucagon Pg/ml</td>
<td>Mean ± S.E. probability</td>
<td>268.50 ± 3.69</td>
<td>238.80 ± 3.34</td>
<td>225.20 ± 4.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Leptin ng/ml</td>
<td>Mean ± S.E. probability</td>
<td>13.30 ± 0.18</td>
<td>14.40 ± 0.16</td>
<td>15.20 ± 0.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Testosterone ng/dl</td>
<td>Mean ± S.E. probability</td>
<td>490 ± 8.50</td>
<td>560 ± 8.10</td>
<td>540 ± 4.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.01</td>
</tr>
</tbody>
</table>
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Table (2): Effect of water and ethanolic extract from *Balanites aegyptiaca* fruits on liver function in senile diabetic rats for 30 days administration.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Criteria</th>
<th>Normal senile diabetic rats (control)</th>
<th>Senile diabetic rats treated with aqueous extract</th>
<th>Senile diabetic rats treated with ethanolic extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total lipids mg/dl</td>
<td>Mean ± S.E. probability</td>
<td>452.2 ± 2.20</td>
<td>420.6 ± 3.25</td>
<td>399.2 ± 3.07</td>
</tr>
<tr>
<td>Total cholesterol mg/dl</td>
<td>Mean ± S.E. probability</td>
<td>161.4 ± 2.44</td>
<td>148.8 ± 2.01</td>
<td>133.4 ± 2.01</td>
</tr>
<tr>
<td>Triglycerides mg/dl</td>
<td>Mean ± S.E. probability</td>
<td>120.10 ± 3.16</td>
<td>93.2 ± 3.33</td>
<td>91.2 ± 2.78</td>
</tr>
<tr>
<td>Total protein g/dl</td>
<td>Mean ± S.E. probability</td>
<td>5.56 ± 0.38</td>
<td>6.80 ± 0.10</td>
<td>6.42 ± 0.25</td>
</tr>
<tr>
<td>Albumin g/dl</td>
<td>Mean ± S.E. probability</td>
<td>3.38 ± 0.31</td>
<td>3.78 ± 0.40</td>
<td>4.18 ± 0.65</td>
</tr>
<tr>
<td>Globulin g/dl</td>
<td>Mean ± S.E. probability</td>
<td>2.14 ± 0.08</td>
<td>2.62 ± 0.05</td>
<td>2.40 ± 0.06</td>
</tr>
<tr>
<td>AST u/ml</td>
<td>Mean ± S.E. probability</td>
<td>35.80 ± 1.59</td>
<td>28.40 ± 0.98</td>
<td>25.80 ± 0.79</td>
</tr>
<tr>
<td>ALT u/ml</td>
<td>Mean ± S.E. probability</td>
<td>38.90 ± 1.01</td>
<td>30.85 ± 1.59</td>
<td>29.5 ± 1.80</td>
</tr>
<tr>
<td>γGT u/l</td>
<td>Mean ± S.E. probability</td>
<td>28.68 ± 1.70</td>
<td>18.42 ± 1.40</td>
<td>22.84 ± 1.60</td>
</tr>
</tbody>
</table>
Fig. (1): Blood glucose tolerance curve of young and senile rats.
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Fig. (2)

Fig. (3)

Fig. (4)

Fig. (5)

Effect of aqueous and ethanolic extract from *Balanites aegyptaca* fruits in senile diabetic rats for 30 day administration
Effect of water and ethanolic extracts from fruit flesh of *Balanites aegyptiaca* in senile diabetic rats for 30 days of oral administration.
Anti-diabetic properties of water

Effect of aqueous and ethanolic extract from *Balanites aegyptaca* fruits in senile diabetic rats for 30 day administration
Effect of water and ethanolic extracts from fruit flesh of *Balanites aegyptiaca* in senile diabetic rats for 30 days of oral administration.
Anti – diabetic properties of water......

Discussion

Diabetes mellitus is a syndrome initially characterized by a loss of glucose homeostasis (Wolff, 1993). In the present study, some aspects of carbohydrate, protein and fat metabolism and liver function parameters were studied in the normal senile diabetic rats treated with either aqueous or ethanolic extract of *Balanites aegyptiaca* fruit flesh at a dose of 800 mg/kg body weight.

The administered extract of *Balanites aegyptiaca* fruit flesh produced significant lowering in the serum glucose level. It was reported (Abdel-Moneim, 1998) that *Balanites aegyptiaca* induced a stimulation of islet insulin release and also, it potentiated the glucose stimulation to insulin secretion. It was suggested that the hypoglycemic activity may be generally mediated through enhancement of peripheral metabolism of glucose and an increase in insulin release (Skim et al., 1999) or may be due also to an intestinal reduction of the absorption of glucose (Aderibigbe et al., 1999).

The observed hypoglycemic action accompanied by increased serum insulin in animals drenched *Balanites aegyptiaca* fruit extract may be due. The elevation of hepatic glycogen observed in treated animals, indicates increased glucose storage as a result of increased insulin glycogenesis induced by high level (Kamel et al., 1991, Rawi et al., 1996). The activation of β-cells of pancreatic islets, stimulation of insulin release or increase the number and/or affinity of insulin receptors on target cells and the post receptors of these cells (Abdel-Moneim 1998). Moreover, the hypoglycemic effect of either aqueous or ethanolic extract of *Balanites aegyptiaca* fruits may be attributed to increase in islet numbers and to its effect on the time course of glucose absorption from the intestine (Abdel-Moneim, 1998).

The decrease of serum glucagon in senile diabetic rats treated with either aqueous or ethanolic extract of *Balanites aegyptiaca* fruits may be attributed to the marked decrease of α-cells in the islets. This attribution was suggested by Begum and Bari (1985).

Leptin is one of the polypeptide hormones which is releases from adipocytes. Its production is controlled by the ob/gene. It reverses the symptoms of a rare form of diabetes (Anna and Jane DeMoury 2002). Leptin inhibits food intake and stimulates energy expenditure which lowers body weight (Caro et al., 1996, Havel 1996 and Auwerk and Staels (1998). It is known that leptin receptors are expressed in a variety of peripheral tissues. It is thought that the hormone has to be transported into the central nervous system to exert its food suppressing and body weight lowering action (Auwerk and Staels 1998).

Aqueous or ethanolic extract of *Balanites aegyptiaca* fruits increased serum leptin level compared to control or normal senile diabetic rats (Havel et al., 1996). Insulin and leptin correlated to each other. The increase in circulating leptin might contribute to the increase in circulating insulin, as circulating leptin has been shown to correlate to insulin secretion (Ahren et al., 1997).

The present study showed a decrease of serum total lipids, total cholesterol and triglyceride levels of senile diabetic rats after treatment with either water or ethanolic extract of *Balanites aegyptiaca* fruit flesh for 30 days compared to normal senile diabetic rats. The reduction of total lipids, cholesterol and triglycerides in senile diabetic rats of the present study may be
attributed to increased clearance and decreased production of the major transporters of endogenously synthesized total cholesterol and triglycerides (Rawi et al., 1998). All these observations indicated the hypolipidemic effect of Balanites aegyptiaca fruits (Rai, 1997). A similar effect was reported by Roa et al., (1999), Sharma et al., (1997), Pepato et al., (2001) and Chen et al. (2001).

Treatment of senile diabetic rats in the present study, with either water or ethanolic extract of Balanites aegyptiaca fruits produced marked decreases of serum total lipids total cholesterol and triglyceride concentration as compared with the normal senile rats (non treated ones). This may be due to the role of Balanites aegyptiaca in increase over mobilization of lipids from blood vessels to liver or decrease lipogenesis mechanism in liver and decrease the mobilization of lipids from liver to the blood vessels.

Cholesterol-lowering effects of Balanites aegyptiaca fruit extract either with water or ethanol, may be due to increased utilization of cholesterol for bile synthesis in the liver (Chautan et al., 1990). Another possibility is that the extract may effect cholesterol synthesis which seems to be decreased as a result of inhibition in hydroxy methyl glutaryl co-enzyme a reductase (Field et al., 1985), a rate limiting enzyme in the cholesterol biosynthesis path way. It is also possible that it exerts its effect on cholesterol esters of polyunsaturated fatty acids which are more rapidly metabolized by liver and other tissues, which might enhance their rate of turnover and excretion.

The reason for triglyceride-lowering effect of water or ethanol extract of Balanites aegyptiaca fruits could be contributed to a reduced availability of free fatty acid for hepatic uptake and triglyceride synthesis release with subsequent hypotriglyceridemia. The obtained data indicated that water or ethanol extract of Balanites aegyptiaca fruits produced no-significant effect on serum total protein, albumin and globulin concentration of senile diabetic rats after 30 days. These results imply that administration of the extract might adversely interfere with glycemic control in senile diabetic rats. Extract of Balanites aegyptiaca fruit flesh slightly improved serum protein and albumin concentration in comparison with normal senile diabetic rats (control).

Administration of either water or ethanolic extract of Balanites aegyptiaca fruits revealed a significant decrease ($P<0.01$) in the activities of serum alanine aminotransferase (ALT), aspartate aminotransferase (AST) and gamma aminotransferase ($\gamma$GT) of senile diabetic rats compared to control group. The decrease of these transaminase activity with the treatments have been attributed to improved liver function (Werman et al., 1989 and Rawi, 1998).

References


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الخصائص المضادة لمرض السكر لمستخلص المشاني والكحولي للحم ثمرة بلج بليبيتيس إيجيبتيكاكا في المرف الورشة والمصابة بالسکر

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*قسم علم الحيوان - كلية العلوم - جامعة الأزهر بفيوم مدينة نصر
**قسم الбиولوجيا - كلية الطب - جامعة طنطا**

وضعت الدراسة الحالية لتقييم دور النباتات الطبية في علاج مرضى السكر كبدية للادوية المصنعة والتي ينتج عنها بعض المضاعفات. ولذا كان استخدام النباتات الطبية في علاج السكر فائدة جيدة لأنها مؤثرات وغير سامة وانتشار آمن من الأدوية المصنعة.

وقد تم اختبار تأثير المستخلص المائي أو الكحولي لثمرة بلج الهيلج (بليبيتيس إيجيبتيكاكا) في المرف الورشة والمصابة على إنخفاض معدل السكر ونسبة الدهون بالجسم بالإضافة إلى تأثيرها على بعض الهرمونات التي لها علاقة بالسمنة والبول السكري. لقد عرف من زمن قريب أن كل من هرمون الليبتين والإنسولين بلعب دوراً هاماً ومفيداً في تنظيم التوازن الطاقتي ووزن الجسم بالإضافة إلى تخفيض معدل السكر بالدم.

وقد أظهر المستخلص المائي أو الكحولي إنخفاضاً ذو دلالة معنوية لسکر الدم، هرمون الجلوكاگون والدهون الكلية والكوليسترول الكلي والدهون الثلاثية (الجليسريدات الثلاثية) ونشاط الإنزيمات الناقلة لمجموعة الأمين (GOT, AST, ALT). بينما أظهر محتوى الجلوكوجين الكبدى ومعدل الأنسولين وهرمون الليبتين وهرمون التستوسيزون في مصل الدم ارتفاعاً ذو دلالة معنوية. ومن ناحية أخرى لم تظهر النتائج أي تغير في المحتوى الكلي للألياف والبروتينات، الأليقلوبين والجلوكوبيلين في مصل الدم خلال فترة التجربة. وأوضحت الدراسة الدور الهام والمفيد لثمرة الهيلج (بليبيتيس إيجيبتيكاكا) في إنخفاض معدل السكر في مصل الدم وكذلك إنخفاض معدل دهنيات مصل الدم المرف الورشة والمصابة وكذلك حماية الكبد من التلف والتلف.

وقد استنتج أن ثمرة الهيلج (بليبيتيس إيجيبتيكاكا) لها تأثير فعال على إنخفاض معدل السكر وكذلك دهنيات فصل الدم. كما تؤدي إلى إنخفاض السكر من خلالا بيتا الموجودة في البكر بالبواsense كما تؤدي إلى تقليل إمتصاص السكر من الأمعاء كما تقلل فرصة استخدام الجلوكوز بواسطة الحجاب الحاجز للجرذ. كما يؤدي استخدام بليبيتيس إيجيبتيكاكا إلى إنخفاض عملية تخليل الجلوكوز المتمثلة في عملية الجليكوجينيبيس وعملية تحلل الجلوكوز (جليكوجينيبيس) المعروفة بعملية إنتاج الجلوكوز من الكبد وهي ضمن دور بلج الهيلج في إنخفاض معدل سكر فصل الدم.