C Effects of herb Cinnamon to control blood sugar and fat

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ABSTRACT

Background: Diabetes mellitus is one of the most important health problem in many countries, especially in Iran. This disease is actually caused disorder of metabolism in carbohydrates, fats and proteins of the body. This research is to study the efficacy of plant sticks of cinnamon (CinnamomumZelianum) on laboratory diabetic rabbits. Materials and Methods: In this experimental study, 30 Wistar male rabbits weighing between 200 to 250 g. were randomly divided into 5 groups (two groups of healthy rabbits, the other three groups were sick rats). At first, three groups became diabetic by using intra-peritoneal mg/kg 60 Streptozotocin and to a group of diabetic rabbits were daily given about mg/kg600 aqueous extract of cinnamon for 35 days. One group of diabetic rabbits were observed without special treatment, and the group were daily taken NPH insulin. A group of healthy rabbits were daily taken mg/kg600 aqueous extract of cinnamon and another group of rabbits received normal saline (physiological serum) over the same period. Finally, glucose and lipids were measured by routine methods. Results: In this study it was found that the aqueous extract of cinnamon stick caused a significant decrease in glucose concentration (P<0.01), cholesterol (P<0.05), triglycerides (P<0.01) and LDL (P<0.05) and significant increase in HDL (P<0.05) levels in diabetic rabbits in comparison with diabetic rabbits which were under no special treatment. Applicable and industrial recommendation: The results show that the aqueous extract of cinnamon sticks won't alter the blood glucose and lipid levels in healthy rabbits, but it will decrease the amount of glucose and lipids in diabetic rabbits. And, if the optimal clinical results are proved, in regard with the plenty amount of wood, the plant may contribute to the industrial production of drugs to reduce blood sugar.

INTRODUCTION

Diabetes is clinically the most common endocrine disorder( disease) that is predicted will be growing in human society in the future. This disease can be diagnosed with symptoms such as hyperglycemia, polydipsia, polyuria, weight loss, delay in healing the wounds, blurred vision, increasing the sugar in the urine and other symptoms. The lack of properly controlling the disease causes disorders such as nephropathy, neuropathy and heart disease - vascular. This disease is made as a result of a defect in insulin secretion or insulin function or both. From another effect of this disease is lipid disorders that has an important role in making and developing the coronary lesions - Vascular problems. (American Diabetes Association (A.D.A).

Although there are chemical anti-diabetic drugs in the pharmaceutical market, diabetes and its problems is still a complicated medical issue. Recently, reports about certain herbs for diabetes treatment and their effects on treating this disease have been discussed in the medical world and as a kind of anti-diabetic and anti-hyperlipidemia healers have been experimentally identified. So far, more than 400 plant species have been reported which reduce the blood sugar (Gleck man &Mory). However, research continues to discover new, antidiabetic herbal drugs, since it is believed that most plants contain substances like, alkaloids, Flavonoids, Carotenoids, etc., which are more effective and have fewer side effects than synthetic drugs. So, the World Health Organization think it is necessary to research the herbal drugs to use them to control the diabetes.
**Plant cinnamon (Cinnamomum zeylanicum):**

Cinnamon is a small evergreen tree of the height of 5 to 7 meters that the pleasant scent from all its parts is smelt. Flowers blossom between the months of February to early March. This tree has dark green leaves and white flowers. The scientific name of the plant is Cinnamomum zeylanicum. Cinnamon essence of cinnamon is the only part of the tree that is in one percent in the bark and can be obtained by distillation. The essence is bright yellow if it is fresh, but it can be turned into golden yellow then to reddish brown over the time due to oxidation.

Cinnamon, English word, is derived from the Arabic word used in Jewish ceremonies. Cinnamon had been used in the world since ancient times. In Egypt, it had been used to cure the different diseases before making Egyptian pyramids. Cinnamon is the bark of tree whose stem is up to 10 meters deep. The leaves of this tree are dark green with white flowers. The bark of the stump of the tree is usually dried and used as food or as a tea.

**Medicinal Properties:**

Cinnamon is the secret to youth and if it is used daily, it keeps people healthy and young. Cinnamon is used to improve and recover sex ability. It heats kidneys and destroys the weakness of waist and legs, and cure anemia....

Cinnamon is the best medicine for muscular pain. Recently, new creams that are made up of Cinnamon have come out in the North America and Canada, to relieve pain. Cinnamon opens blood vessels and has a good effect on blood circulation.

Cinnamons has another strange characteristic (quality) and strengthen body immunity against diseases and even it can be said it has, to a large degree, penicillin and antibiotics effect. If you feel weak and you are likely to be sick, do not forget cinnamon tea. And If you have a cold and feel weak Cinnamon is the best remedy to illness. Cinnamon cleans stomach, and makes it strong sand quiet. So if you have stomach problems, you must use cinnamon. Cinnamon has a good flavor in addition to its many properties.

Even if you drink common tea, mix it with some cinnamon powder to give it better taste. Another important effect is to lower fever and even today cinnamon is used in the form of tablet and capsule as a refrigerant. Cinnamon opens blood vessels and has a good effect on blood circulation.

**The necessity and the importance of research:**

This study showed that, diabetic patients who added one gram of cinnamon to their daily diet for 40 days the amount of their blood sugar, cholesterol and blood lipids fell to 30% so, this decrease in cholesterol levels, blood sugar in the diabetic patients had beneficial effect to their health. When the body loses its sensitivity to the insulin hormone, diabetes type II occurs. Insulin carries sugar from the blood into cells so as to be used as energy, but when the body does not respond to insulin, glucose, or blood sugar level rises which then leads to fatigue and blurred sight. The long term increase in the blood sugar can increase the risk of heart disease, kidney deficiency and blindness. Using cinnamon sticks resulted in lowering blood sugar in diabetic rabbits under the AloXan. This study shows that the amount of triglyceride significantly decreases in diabetic rabbits. Since no study on the effects of hypoglycemic and anti-lipid of cinnamon has been done so far, the effects hypoglycemic and anti lipidic of cinnamon sticks on male rabbits which became diabetic with Streptozotocin have been studied in this essay.

Diabetes Mellitus, which is one of the commonest metabolic disease in the world, occurs due to the disorder of insulin secretion, insulin resistance and increase in the hepatic glucose production (1,2). Atherosclerosis is one of the chronic complications of diabetes that affects many organs and causing morbidity and mortality of diabetes. (1)

Epidemiological observations reveals that the prevalence of diabetes has grown by changing the dietary and the culture of assumption from traditional to industrial life style (3). Today, because of growing chronic diseases, using complementary and alternative therapies with standard therapy or as a replacement is rising. However, it has grown from 33.8% to 1.2% from 1990 to 97. In the United States, complementary medicine was used in treating about 4.85% of the outpatients (4, 5) Another report shows that more than 15 million people in the United States use herbal supplements(6) growing chronic diseases result in using more and more complementary medicine in recent years. Recent studies show that complementary therapies used by diabetic patients includes diet and life style, herbal remedies containing anti-diabetic agents, magnetic therapy, physical and mental exercises laughter therapy, massage and music therapy(5). Some patients use several herbal remedies to control their blood sugar levels (7, 8). Using traditional medicine in treating disease dated back to 2,000 years ago. So far, the effects of more than 20 types of plants on controlling the blood sugar have been studied(9).Concerns about the side effects of chemical drugs has caused drug abuse, and it also caused the patients not to trust the available remedies then which has disturbed in controlling the disease. That’s the reason why there is a new view about the herbal plants and more studies are being done. The several studies have shown that people prefer using complementary therapy because they want to be healthy both physically and mentally, control or cure the muscular or skeleton disorders, allergies, respiratory disorders, cancer, chronic
diseases as Diabetes Mellitus, and weight loss (4). Among the other reason for using the herbal remedies, we can name the epidemic of obesity, chronic diseases and pain syndromes, anxiety and depression, general desire to health, preventing the diseases, the high cost of chemical drugs, and finally traditional belief in the fact that the herbal medicines are more effective and don’t have side effects (6).

MATERIALS AND METHODS


Method of preparing plant extracts and chemicals:
The amount of 200 grams of Sticks of cinnamon, after the systematic verification, and drying at 100 °C was boiled in 3 ml of distilled water for one hour, and the obtained extract was filtered and then at 40 -50 °C in the rotary under pressure evaporated and the obtained material was dried into a powder. Streptozotocin medicine made by, in the form of Sigma NPH in one gram vial and insulin injection in the vials of 100 units per ML was purchased from pharmacies.

Animals, Experimental groups and making them diabetic:
In the experimental recent study, at first 30 rabbits weighing approximately 200 to 250 g were randomly divided into 5 groups of 6 rabbits were kept in the same conditions with 23 degree Celsius heat and the 12 hour light / dark period of time in animal laboratory. In order to make the rabbits diabetic, 60 mg per kg Streptozotocin were subcutaneously injected between the two ears of the three groups of rabbits and after 7 days the blood sugar of rabbits were measured to be sure that the blood sugar of rabbits that is above 250 mg per dl became diabetic and a healthy group (control group) remained. A group of rabbits with diabetes were eaten aqueous extract of stick cinnamon with a dose of 600 mg per kg. orally by using gavage method at 10 a.m per day for 35 days but another diabetic rabbit was daily injected 4 units of NPH insulin, thus the groups examined by NPH insulin were as follows:

- Group I: normal rabbit + saline, Group II: normal rabbit + 600 mg per kg of aqueous extract of cinnamon sticks, Group III: diabetic rabbits without special treatment
- Group IV: diabetic rabbits + 600 mg of aqueous extract of cinnamon sticks, Group V: diabetic rabbits + four units of insulin

Biochemical investigation:
After treatment period, the LDL and HDL, glucose, triglycerides, cholesterol, were measured by taking venous blood samples by using special methods. Serum glucose levels were measured by using biochemical and enzymatic kit (glucose oxidase methods). The amount of cholesterol and triglycerides (Trinder, 1969) were measured by using biochemical kits relevant and based on HDL and also through using the relevant LDL guidelines. (Freidwald’s et al, 1972) Those results based on this formula was determined as follows.

\[
\text{LDL-Cholesterol} = \frac{\text{Total Cholesterol} - \text{HDL-Cholesterol}}{(\text{Triglycerides} \div 5)}
\]

RESULTS AND DISCUSSION

Analyzing the data:
Analyzing data done by using SPSS 21 and Excel 2010 software explains as follows: This study has proved that cinnamon extract is effective on curing the diabetic disease and by studying the effect of Cinnamon extract on laboratory animals we find out that it helps to lower the blood sugar considerably. Using medicines that destroys the pancreas the laboratory animals have become artificially diabetic and by studying the effect of cinnamon extract on them, the positive effect of cinnamon on diabetic animals has become clearer. On the other hand, despite the common belief, we found that using cinnamon in people with no diabetes disease has no negative effect on the blood sugar. The results of the study shows that the average rate of serum glucose in two groups of diabetic rabbits + extract and diabetic rabbits + insulin were respectively 179.67±68.9 and 125.33±7.04 mg per DL. The difference of diabetic rabbits was 319.67±16.16. The average rate of glucose among the groups was significant (p<0.01) (table 2) There is no significant difference of the rate of serum between the healthy rabbits (table 1). The average rate of total cholesterol serum in two groups of diabetic rabbits + extract and the diabetic rabbits + insulin was respectively 79.67±4.16 and 86.83±5.17 and in the diabetic group 106±5.89 mg in DL. The difference of the average of cholesterol between the groups was considerable (p<0.05) (table 2). The average of the rate of triglyceride in the diabetic rabbit groups was 179.5±16.62 and this rate in the group of diabetic rabbits + extract and diabetic rabbits + insulin was 107.63±6.58 and 100.33±5.48 mg. Per DL. The
different average of triglyceride among the groups (p<0.01) was considerable. (table2) The average rate HDL in the diabetic rabbits 17.5 ± 2.24 and in the diabetic rabbits + extract and the diabetic rabbits + insulin was respectively 28.27 ± 3.16 and 37.33 ± 2.22 mg in DL which were considerably different (respectively (p<0.05) and (p<0.01) from diabetic rabbits (table 2).

The average rate of LDL in diabetic rabbit 39.5 ± 7.5 and in the diabetic rabbits + extract and diabetic rabbits + insulin was respectively 22.6 ± 3.83 and 27.5 ± 3.17 mg per DL, which the different average of LDL between the groups was (p<0.05) (table 2). This study doesn’t show no significant difference in lipid profile among the healthy rabbits.

Table 1: The average rate of glucose and cholesterol in the blood of the healthy rabbits

<table>
<thead>
<tr>
<th>Group</th>
<th>glucose (mg/dl)</th>
<th>Cholesterol (mg/dl)</th>
<th>Triglyceride (mg/dl)</th>
<th>HDL (mg/dl)</th>
<th>LDL (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Rabbit</td>
<td>104.5±5.04</td>
<td>75.33±5.43</td>
<td>68.17± 9.29</td>
<td>36.33±3.29</td>
<td>25.5±3.17</td>
</tr>
<tr>
<td>Healthy rabbit + extract</td>
<td>1011.67±5.13</td>
<td>64.67±6.05</td>
<td>83.33±8.96</td>
<td>31.5±2.54</td>
<td>16.25±2.33</td>
</tr>
</tbody>
</table>

Table 2: The average rate of glucose and cholesterol in the blood of the diabetic rabbits

<table>
<thead>
<tr>
<th>Group</th>
<th>glucose (mg/dl)</th>
<th>Cholesterol (mg/dl)</th>
<th>Triglyceride (mg/dl)</th>
<th>HDL (mg/dl)</th>
<th>LDL (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic rabbit</td>
<td>39.5±7.5</td>
<td>17.5±2.24</td>
<td>179.5±16.62</td>
<td>106±5.89</td>
<td>319.67±16.16</td>
</tr>
<tr>
<td>Diabetic rabbit + extract</td>
<td>22.5±3.38</td>
<td>28.27±3.16*</td>
<td>107.63±6.58*</td>
<td>79.67±3.16*</td>
<td>179-67±8.9****</td>
</tr>
<tr>
<td>Diabetic rabbit + insulin</td>
<td>27.5±3.17*</td>
<td>37.33±2.22*</td>
<td>100.33±5.48*</td>
<td>86.83±5.17*</td>
<td>125.33±7.04***</td>
</tr>
</tbody>
</table>

Comparing the results of studying the rate of glucose and lipid profile with the results of the diabetic rabbits treated with insulin indicates that the therapeutic properties of aqueous extract of cinnamon sticks, to a great extent, is comparable to insulin effect. In addition, this study shows that the aqueous extract of cinnamon sticks has no effect on glucose levels and lipid profiles in healthy rabbits treated with aqueous extract of cinnamon sticks. In another study done by the comparative effect of the Hypoglycemic and anti-hyper lipidemic, four plant extract on the rabbits, was studied and showed that prescription and using the aqueous extract of cinnamon sticks, has significantly lowered the glucose and triglyceride levels in diabetic rabbits in comparison with the control group, that is similar to these results of this study. In another study the hypoglycemic effect of the root of the skin Egyptian cinnamon was examined on the rabbits which had become diabetic with Streptozotocin, and proved that the rate of glucose and lipid peroxidase enzymes have decreased, but the rate of plasma insulin increased in the rabbits under the treatment with extract in comparison with the diabetic rabbits. The reduction of glucose has confirmed the results of this study, but it doesn’t refer to the lipid profiles.

Conclusions:

In all, with regard to the previous studies and the results of this study, the evidence suggests the aqueous extract of cinnamon sticks has anti-hyper lipidemic and hypoglycemic effects, but it hasn’t been clear that which kind of the plant compound has such an effect, although most evidence indicates that it is because of the property of anti-oxidant compounds, specially flavonoids in the sticks of cinnamon. It is recommended that the next study should be done to find the effective substance in cinnamon and also, it is better to do the clinical studies on diabetic patients with lipid disorders.

Recommend:

It is recommended that some accurate and useful information should be presented to diabetic patients at the Center for Diabetes, to control the taking herbal drugs and increase the supervising the medical staff through doing instruction courses

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REFERENCES


