The Effect of Hydroalcoholic Extract of Artemisia (Artemisia herba-alba) and Markers of Liver Damage Compared with Metformin in Streptozotocin-Induced Diabetic Rats

Kouhpeyma Farhad, Kargar Jahromi Hossein, Zahiri Shahla, Azhdari Sara, Farzam Mohammad, Mahmoudi Teimourabad Saeid

ABSTRACT

Introduction: Studies indicate that Artemisia extract caused a significant decrease in glucose levels in diabetic animals. The aim of this study was to investigate the effect of Artemisia plant extracts to improve diabetes complications and markers of liver damage, it is. Materials and Methods: 40 rats, adult female Wistar rats randomized to the following groups for 56-day treatment groups (control, sham, diabetic (streptozotocin 55mg/kg), diabetic + extract of Artemisia (200 and 300 mg/kg), diabetic + metformin 250 mg/kg control and extract Artemisia (200 and 300 mg/kg). beginning and end of the experiment, body weight and blood glucose in rats was measured, and then to measure ALT and AST of mice were bled after dissection, the liver removed and fixed in 10% formalin and cutting and preparing for special studies were conducted respectively. Data editing and analysis performed using SPSS version 15 and Duncan test were analyzed. The results indicate an increase in blood sugar, necrosis, granulation and inflammatory lymphocytes in the liver and increased liver enzymes ALT and AST in the diabetic group and decreased in the diabetic group treated with Artemisia extract a significant increase in ALT levels was observed compared to controls (p ≤ 0.05). Conclusion: The results of this study show that hydroalcoholic extract of Artemisia can significantly reduce the complications of diabetes brought on liver but its use is not recommended for the average person that is because in some cases it has harmful effects on consumers should receive careful consideration.

Key words: Diabetes, Liver, Rat, Artemisia, histopathology, ALT and AST.

Introduction

Diabetes is one of the most common diseases of the endocrine system of the body by increasing blood glucose, liver function is impaired [19]. Currently 6/6% worldwide [22], and about 4 million people in India have diabetes mellitus or are prone to it [4]. The main symptoms of hyperglycemia, polyuria, poly Dipsi bridge and Glicozavery phage and its common complications of metabolic acidosis is dangerous and may lead to shock [16]. Liver regulate blood sugar through carbohydrate metabolism Glicozhenz and Glicozhenoliz plays an important role in the metabolic homeostasis of glucose with impaired liver function is impaired [34,17], increased oxidative stress and changes in antioxidant levels play an important role plays in the pathogenesis of diabetes mellitus [9,8]. Several studies have shown that the adverse effects on liver and kidney of streptozotocin [15]. Malfunction of the liver enzymes AST and ALT levels are determined by [39]. Traditional medicine to treat a range of inflammatory diseases of various plants, diabetes mellitus and impaired liver and kidney of use [30,16]. There are flavonoids as antioxidants in the diet may have protective effects in diabetic patients [24,3]. The scientific name of the plant Artemisia Artemisia herb-alba contains mainly flavonoids are very strong plants Scavengers and can be a good source of antioxidants for medicinal and commercial use should be considered [11]. Recent research shows the herb Artemisia is hypoglycaemic effects [1,35].

Metformin is a combination - Govanidi lowering of blood glucose that is used in the treatment of diabetes. The drug works by a series of reactions in various organs and tissues can be achieved that they...
include: decreased gluconeogenesis in liver hepatocytes and Lipozhenz and Gelicozhenz increased, decreased glucose uptake by muscle and fat cells [33,10]. Some studies have shown that metformin gastrointestinal side effects such as nausea, vomiting, abdominal pain, flatulence, unpleasant metallic taste is sweet and anorexia [7]. The purpose of this study is to improve the complications of diabetes on liver tissue by the hydroalcoholic extract of Artemisia and comparison with metformin.

Materials and Methods

In this study of 40 female Wistar rats, obtained from the animal house of Shiraz University of Medical Sciences, and by 10 weeks of age were used. All animals at 2 ± 22 °C with free access to food and water at standard conditions of 12 hours light, 12 hours dark was maintained. In order to reach a compromise with the state testing was performed 2 weeks after the rats. To induce diabetes in rats injected intraperitoneally dissolved streptozotocin as a single dose or dose 50mg / kg on 9/0% Nacl, 100 mM sodium citrate buffer with 5/4 PH = solutions were used [6]. After 4 days of STZ passed blood sugar with glucometer in all rats Czech made (prior to glucose for 12 hours feeding of rats was used) and diabetic They (300 mg / dl) grouped them this way was done (control, sham (received solvent metformin the water was normal), diabetic, diabetic + extract of Artemisia (200 and 300 mg/kg), diabetic + metformin (250 mg / kg) and the group just extract of Artemisia with dose (200 and 300 mg/kg) received) treatment for 12 weeks starting at the end of the experiment, body weight and blood glucose Czech then the rats with diethyl ether anesthesia and blood samples of their blood collected into sterile plastic tubes and held for 20 minutes at room temperature, then centrifuged for 15 min at 3000 rpm and the serum was separated and stored at - 30 °C to measure the enzyme activity of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were stored so the enzyme assay test kit company (AST) and (ALT) were used. Histopathological studies of liver of all animals were removed and washed with 10% formalin in saline was after fixation required and the passage of tissue sections subsequently with a thickness of 5 microns and prepared every 10 cut a cross in total from each of three sections prepared and stained with H & E prepared and studied [25]. The microscopic examination of cell necrosis, lymphocyte influx, swelling of hepatocytes, cloudy or ballooning of the cell, the cytoplasm Henin grain, texture done hyperemia [21].

Data analysis:

Results using SPSS version 15 software and ANOVA tests (one way ANOVA) and Duncan's test, were analyzed (P ≤0/05). Mean and standard deviations were calculated.

Results:

Weight of mice:

Average body weight at the beginning of the plateau of the experimental group compared with the group of diabetic drug metformin extract of Artemisia 200 mg / kg had received in a significant decrease in mean body weight than body weight at the beginning we tested. However, in mice that had received only a single plant in a significant increase in weight we mean (P ≤0/05) (Table 1).

Blood Sugar:

Mean blood glucose in diabetes secondary to other groups showed a significant increase (p < 0/001) that the amount of glucose in the treated group showed a significant decrease. It should be noted that although the plant Artemisia extract and metformin were able significant reduction in blood glucose diabetic blood sugar was high, but they control groups showed no significant differences were found between the other groups (Table 1). Results The mean serum enzymes, aspartate aminotransferase (AST):

Mean AST levels in diabetics receiving metformin group, Artemisia 200 and 300 mg/kg decreased significantly as compared to the diabetic group shows. We do not see significant changes in the other groups (P ≤0/05)(Table 2). Results: The mean serum enzyme alanine aminotransferase (ALT): Mean serum ALT enzymes in diabetic rats were significantly increased compared to the entire group show (p < 0/001) significantly lower in the diabetic group treated diabetic group as compared to the mean ALT levels can be observed. Furthermore, a significant increase in mean serum ALT enzymes in normal rats receiving the extract of Artemisia 200 & 300 mg / kg, compared with the sham and control groups are (Table 2).
Table 1: Comparison of changes in blood glucose and body weight in groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Initial blood glucose (mg / dl) ± SE</th>
<th>Secondary blood glucose (mg / dl) ± SE</th>
<th>Initial weight (g) ± SE</th>
<th>Secondary weight (g) ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>44 ± 92 ± 1</td>
<td>177 ± 96 ± 1</td>
<td>26 ± 178 ± 1</td>
<td>82 ± 169 ± 1</td>
</tr>
<tr>
<td>Sham</td>
<td>39 ± 84 ± 1</td>
<td>221 ± 96 ± 1</td>
<td>24 ± 178 ± 1</td>
<td>8 ± 169 ± 1</td>
</tr>
<tr>
<td>Diabetic</td>
<td>70 ± 467 ± 1</td>
<td>394 ± 469 ± 1</td>
<td>89 ± 221 ± 1</td>
<td>43 ± 195 ± 1</td>
</tr>
<tr>
<td>Diabetic + metformin</td>
<td>18 ± 247 ± 1</td>
<td>17 ± 207 ± 1</td>
<td>34 ± 221 ± 1</td>
<td>91 ± 17 ± 1</td>
</tr>
<tr>
<td>Diabetes + Artemisia 200mg/kg</td>
<td>73 ± 202 ± 1</td>
<td>45 ± 247 ± 1</td>
<td>86 ± 196 ± 1</td>
<td>82 ± 196 ± 1</td>
</tr>
<tr>
<td>Diabetes + Artemisia 300mg/kg</td>
<td>38 ± 195 ± 1</td>
<td>74 ± 199 ± 1</td>
<td>65 ± 140 ± 1</td>
<td>11 ± 95 ± 2</td>
</tr>
</tbody>
</table>

- SE Mean ± are shown as points.
- Mark * indicates a significant difference before and after treatment.
- Letters a, b and c indicate significant differences.

Table 2: Comparison of liver enzymes in group.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Serum ALT (IU / L) ± SE</th>
<th>Serum AST (IU / L) ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>70 ± 68 ± 2</td>
<td>4 ± 67 ± 2</td>
</tr>
<tr>
<td>Sham</td>
<td>4 ± 67 ± 2</td>
<td>39 ± 441 ± 6</td>
</tr>
<tr>
<td>Diabetic</td>
<td>45 ± 213 ± 1</td>
<td>8 ± 202 ± 6</td>
</tr>
<tr>
<td>Diabetic + metformin</td>
<td>10 ± 199 ± 6</td>
<td>3 ± 144 ± 4</td>
</tr>
<tr>
<td>Diabetes + Artemisia 200mg/kg</td>
<td>6 ± 144 ± 4</td>
<td>12 ± 228 ± 8</td>
</tr>
<tr>
<td>Diabetes + Artemisia 300mg/kg</td>
<td>10 ± 199 ± 6</td>
<td>3 ± 144 ± 4</td>
</tr>
</tbody>
</table>

Discussion:

In this study, a significant decrease in blood glucose levels in the treated group compared to the diabetic group soon found that the results Tasteckin [35] and colleagues in 2006, Jouad [20] and colleagues in 2001, Eddouks [13] and colleagues in 2002 is consistent with most species of the genus Artemisia contains flavonoids Sskvyy terpene lactones, especially derivatives 11 and Persian date Dey 13 Hydvsskvyy terpenes, are [1] the current use of medicinal plants containing flavonoids, due to their therapeutic properties and pharmacological treatment and prevention researchers have focused on diabetes complications [1]. Flavonoid, polyphenols are a diverse biological activities such as nitric oxide and reduced performance of low-density lipoprotein and an increase in plasma antioxidant body [1]. So given the above it can be said that the mechanism of the plant Artemisia extract on blood glucose levels of insulin in the diabetic group receiving the extract is another mechanism that can be considered for these extracts are likely to reduce the absorption of glucose from the intestine and inhibiting the absorption of glucose by the kidney tubules or by decreases glucagon lowers blood glucose [35]. Another possible mechanism of increased sensitivity to insulin receptors and can also be considered such a mechanism similar to that of second-generation sulfonyleureas such a mechanism from the plant Artemisia pallens has shown [1]. Although the mechanism of action of metformin is Metformin decreases hepatic glucose production by inhibiting gluconeogenesis which no direct effect on insulin resistance or reduced insulin effectively reduce serum glucose levels [33,10]. In this study, reduction in body weight in diabetic rats treated groups except diabetic + Artemisia 300mg / kg were since most of the body work energy metabolism of sugars and fats is anything that affects the metabolism of glucose, fat metabolism, indirectly, will have an adverse effect on [26]. Lipoprotein lipase enzyme activity in adipose tissue of diabetic patients, the enzyme that rapid exchange between plasma polyunsaturated fatty acids and triglyceride fatty acids in adipose tissue is established, reduced due to insulin deficiency leads to reduced degradation of lipoprotein lipids compounds because renal excretion is and lipoprotein in the short term is to reduce body weight in diabetic rats, therefore, the results seem to be that the plant extract reduced blood lipids, increased lipoprotein lipase activity and lipid uptake into the cells, they can prevent diabetes and renal excretion thus, weight loss, fat mass loss and frequent urination (polyuria) in mice. The mechanism of action of metformin on weight is
Antioxidants can somewhat reduce the damage that can be said to have hypoglycaemic that the plant effects on the liver but the presence of compounds Artemisia, and you can see the controls, this suggests groups received the hydroalcoholic extract of Artemisia and obtained in this study suggests the diabetic rats decreased their activity was Metformin The results treatment plant and herb extracts significantly rats compared with the other groups was observed, and AST activities significantly increased in diabetes from the liver cytosol into the blood stream, probably due to the leakage of these enzymes from the liver cytosol into the blood stream has diabetes, in the present study, liver enzymes ALT and AST activities significantly increased in diabetic rats compared with the other groups was observed, treatment plant and herb extracts significantly decreased their activity was Metformin The results obtained in this study suggests the diabetic rats treated with hydroalcoholic extract of Artemisia and metformin could reduce levels of liver enzymes. We also significant increase in ALT levels in control groups received the hydroalcoholic extract of Artemisia, and you can see the controls, this suggests that perhaps there are chemicals that have harmful effects on the liver but the presence of compounds that can be said to have hypoglycaemic that the plant extract reduced blood glucose and increased levels of antioxidants can somewhat reduce the damage caused by diabetes on liver tissue. Histopathological changes in the liver of different groups, different parameters were investigated. In this study, degenerative changes and extensive areas of necrosis and hemorrhage were seen in lobular center. In this respect Larcan and colleagues have reported that liver necrosis in patients with diabetes are [23] and combine them to create free radicals in cells and cell membrane polyunsaturated fatty acids with molecular oxygen radical production, lipid to phospholipids in the endoplasmic reticulum and degraded and trigger the release of enzymes and reactions ultimately lead to cell death and necrosis are [29,28]. In this study, hepatocytes were shriveled and shrinking core and destruction of the cell wall of the cell damage that is caused by the effects of diabetes on liver so histopathological findings in the liver in this study reflect the direct effects of diabetes and significant returns. Histological evaluation of liver tissue in the treated groups show that liver damage induced by diabetes in this group was less so the degree of inflammation in these groups than in the diabetic group was significantly decreased liver histology results are compatible with the biochemical results suggest the effect of hydroalcoholic extract of Artemisia and metformin is to reduce the negative effects of diabetes on liver, following leakage of enzymes into the cytosol where it is reduced, this effect is probably due to the presence of antioxidant compounds in plant. Phenolic compounds are also eligible flavonoid-like activity in rats with diabetes are Hypoglisimi [38]. Polyphenolic compounds and flavonoids may protect against cellular glutathione depletion and capacity of antioxidant enzymes, glutathione, glutathione reeducates, glutathione peroxidase and catalase to protect [5]. Song et al. stated that the flavonoid quercetin inhibits glucose uptake in the intestine, which acts specifically on Glut2 vector is [31] it can be said that is probably one of the reasons for reducing diabetes complications on the liver to reduce glucose concentrations and subsequent reduction of free radicals.

Conclusions:

As the survey results indicate that Hydroalcoholic extract of Artemisia, which can significantly reduce the complications brought about by diabetes on liver but its use is not recommended for the average person, that is because in some cases it has harmful effects on consumers should receive careful consideration.

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References


