Journal of Population Therapeutics & Clinical Pharmacology

The Effect Of Borage Plant Extract On Liver Enzyme Levels In Patients With Type 2 Diabetes

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Abstract

Considering the importance and high prevalence of type 2 diabetes, it is very necessary and important to pay attention to this disease and its complications. The aim of this study was to investigate the effect of borage plant extract on liver enzymes in people with type 2 diabetes. This study was conducted as a clinical trial. In this study, 81 people with type 2 diabetes were randomly divided into two study groups and a control group. After consuming 25 drops of borage plant extract (containing about 1.5 mg of polyphenols per 100 ml of extract, calculated on the basis of epigallocatechin gallate) in combination with 125 ml of water after lunch and dinner for 1 week, the anthropometric indices and the amount of Hba1c in both groups were evaluated before and after the intervention, and the data were analyzed using SPSS software. The comparison between the study group and the

control group showed that in the case group (which were treated with the extract), the amount of liver enzymes after the intervention was lower than the control group (p-value < 0.05).

Keywords: borage extract, type 2 diabetes, level of liver enzymes, SPSS software

Introduction

Diabetes is one of the chronic diseases of the world that continues to increase rapidly. This disease is related to the disruption of the regulation of blood glucose levels in the body and has far-reaching effects on the health of affected individuals and society. On the other hand, diabetes is associated with an increased risk of serious complications such as heart disease, stroke, visual impairment and a lower quality of life. Therefore, a thorough knowledge of diabetes and the strategies to treat it is essential.

Diabetes is a metabolic disorder in the body that causes several problems and complications related to blood sugar. There are two main types of diabetes: type 1 and type 2 diabetes. Type 1 diabetes is related to the function of endocrine glands such as the pancreas, so the body of people with this type of diabetes is unable to produce insulin or the cells have a resistance to insulin. Insulin plays an important role in lowering blood glucose levels through various mechanisms. Most people with diabetes suffer from type 2 diabetes. Insufficient activity during the day and an inappropriate lifestyle are among the factors that influence this disease.

In recent decades, the number of diabetes cases has increased dramatically. Statistics from the World Health Organization show that in 2000, around 200 million people worldwide had diabetes, and it is predicted that this number will rise to 380 million by 2025. It is also estimated that the number of people with type 2 diabetes in Iran will rise to over 6.4 million by 2030.

Complications caused by inadequate blood sugar control in people with diabetes include neuropathy (nerve disorders), nephropathy (kidney disorders) and retinopathy (eye disorders). These complications can form the basis for the occurrence of vascular problems in people.

In the past, people have used herbal medicines or the roots of some plants to lower their blood sugar, and sometimes good results have been achieved with this type of medicine. and it has increased to the extent that researchers have started special studies to determine whether the effect of these plants was as stated or not. In one such study by Akram Eidi and colleagues, entitled The effect of ethanol extract of

licorice root, liver enzyme activity was measured in healthy and alloxan-treated diabetic rats. Oral treatment with licorice root extract (50, 200 and 400 mg/kg body weight) and glybenclamide (600 μg/kg body weight) as a standard antidiabetic drug for 30 days. The activity of the enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT) was then investigated in healthy and diabetic rats. The results showed that oral treatment with licorice plant extract significantly decreased the activity of ALT and AST in the serum of diabetic rats, but did not cause any significant change in healthy rats. (19).

Mohammad Hassan Golzari and his colleagues conducted a study in which they investigated the effects of basil intake on blood glucose levels in type 2 diabetics. The study was conducted using the cross-over type clinical trial method on 16 volunteer patients who were not being treated with blood glucose-lowering medication. In four phases, starting at 4, 6 and 10 weeks, the concentration of fasting serum glucose and serum glucose was measured 2 hours after eating a standard breakfast and the difference between each group was determined using the paired t-test and between the two groups using the t-test. The results showed that the consumption of basil along with the diet reduced the concentration of serum glucose in type 2 diabetics. It is recommended that a similar study be conducted on the effect of this plant on blood lipids, glycosylated hemoglobin, minerals and vitamins, as well as the long-term effect of anthocyanins. 20).

Another study was conducted by Seyed Mehdi Banan Khojaste and colleagues in spring 2016.

The aim of this study is to investigate the effect of ethanolic extract of mountain nasturtium on reducing the adverse effects and improving the symptoms of diabetes in terms of histophysiology and liver enzyme levels. The results showed that treatment with the alcoholic extract of nasturtium caused a significant decrease in liver enzymes in the extract-treated groups compared to the diabetic group, indicating the protective effects of the alcoholic extract of nasturtium on liver tissue from the damage caused by diabetes (21).

The study "Medicinal effects of borage plant" was published by Singh et al. in 2012. In this study, the pharmacological effects of borage leaves on anti-inflammatory and antimicrobial properties have been investigated (16).

So far, limited research has been done on the effects of borage extract on liver enzymes in people with type 2 diabetes. In the studies that have been conducted, some results have shown that the use of borage extract may help reduce liver

enzymes in people with type 2 diabetes. But it should also be noted that the results of this research are not final and definitive and need more and more detailed research.

In addition, the effect of borage on liver enzymes may vary between different people and depends on various factors such as the dose used, the duration of use, the internal compounds of the plant and the reaction of each individual. Also, it is recommended to consult your doctor to check the possible effects and side effects and make the right decision, for using marigold or any other new supplement or treatment.

research method

This clinical study by Palini was conducted under the title Effect of borage plant extract on hemoglobin A1c levels in patients with type 2 diabetes. The statistical population of this study consists of people with type 2 diabetes who go to comprehensive health centers in Zabul city. None of these people had a history of surgery, and except for blood glucose-lowering drugs, metformin 500 mg tablets from Aria Pharmaceutical Company, they did not take any other medication twice a day. Diabetic patients contacting the city's comprehensive health centers are invited to voluntarily participate in this study. To determine the sample size, considering the confidence level of 95% and significance of 80%, the standard deviation of Ast before and after intervention of 46.46 and the mean before intervention of 2.41 and after intervention of 79.39 (Kalvandi R et al, 2020) using formula number 1, the number of samples was calculated to be 23, which was considered to be 24, and 12 people were selected in each group by random sampling.

$$n = \frac{\left(Z^2_{1-\frac{\alpha}{2}} + Z_\beta\right)^2 (S_1^2 + S_2^2)}{(\mu_1 - \mu_2)^2}$$

Formula number 1

The minimum age for participation in the study was 45 years and the maximum age was 75 years, and the blood glucose level of the test subjects was at least 126 mg/dl. After a certain number (24 people) of these subjects had been selected to take part in the study, all the steps involved in carrying out the work and the procedure were explained to them. Initially, 2 people from the case group (under

treatment) and 4 people from the control group refused to continue and were excluded from the study. They will use the blood glucose. After completing the questionnaire on demographic and anthropometric indicators, all individuals in the two groups were led to the laboratory in a coordinated manner. First, the participants filled out the informed consent form and their personal data. The method of blood collection was such that each person sat on a chair for 5 minutes after entering the laboratory and a specialist took 5 ml of blood from the middle vein of the forearm. This procedure was carried out using the same method for the other people in the group. To determine the hemoglobin A1c level in the laboratory, 2 ml of blood from each person was first poured into the tube containing the anticoagulant and then 20 ml of blood was removed from the tube using a pipette. The Italian-made BT3000 device (Dialb brand) was inserted into the kit and the result of each test was recorded. To measure liver enzymes, 3 cc of the remaining blood in the syringe was poured into the tube and centrifuged for 15 minutes at room temperature at 2500 rpm. The sample was stirred every 5 minutes with a test tube stick until the serum was separated. The separated serum sample was then poured into the appropriate beaker and analyzed using the BT3000 instrument from Italy, and the amount of liver enzymes displayed was recorded.

How to prepare borage plant extract and use it by the treated group:

Diamed drops of Iran Daruk Pharmaceutical Company, which are standardized in 100 ml bottles based on the active ingredient polyphenol in terms of epigallocatechin gallate (about 1.5 mg per 100 ml drop), were used to prepare the boqnaq plant extract. To this end, each person was instructed to mix 1 ml of the solution (equivalent to 25 drops in 125 ml of plain water) and drink it immediately after lunch and dinner, and it was emphasized that they should take their medication as prescribed. The doctor instructed each person to take the desired solution for at least 8 weeks, and it was emphasized that they should take the same amount of the desired solution every 10 weeks during this period according to the instructions. The subjects' daily routine was monitored during a telephone call and any questions were answered. The second group used the same amount of the corresponding placebo (distilled water in special dropper doses in the same shape and size available to the group). After the end of the 8th week, the anthropometric indices in both assessment groups and the blood indices were tested again. For this purpose, each person was called to the laboratory at a certain time and first sat on a chair for 5 minutes. Then 5 ml of blood was taken from the middle vein of the forearm. To determine the hemoglobin A1c level in the laboratory, 2 ml of each

person's blood was first poured into a tube containing an anticoagulant and then 20 ml of the blood was removed from the tube with a pipette and placed in the BT3000 kit from Italy. The result of each test was then recorded. To measure liver enzymes, 3 cc of the remaining blood from the syringe was poured into the tube and centrifuged at room temperature at 2500 rpm for 15 minutes. Every 5 minutes, the sample was stirred with a test tube rod to separate the serum. Then the separated serum sample was poured into the appropriate beaker and analyzed using the Italian-made BT3000 instrument, and the indicated amount of liver enzymes was recorded. The indicators at the beginning and end of the study were evaluated by summarizing the corresponding tests.

Analysis method

Information by SPSS software. Ver19 and related tests were analyzed.

Discussion

The data and information collected in this research were actually raw sources that should be used with appropriate tools

be analyzed and described so that they can transfer their useful information load. On this basis, the most appropriate

The means to analyze the obtained information and data are statistical tests. with statistical tests

The research will find the relationship between different variables and the research hypotheses will be answered.

Gender: According to chart 1, in the control samples, 5 people (55.6%) were female and 4 people (44.4%) were male, and in the case samples, 7 people (70%) were female and 3 people (30%) were from the sample of men.

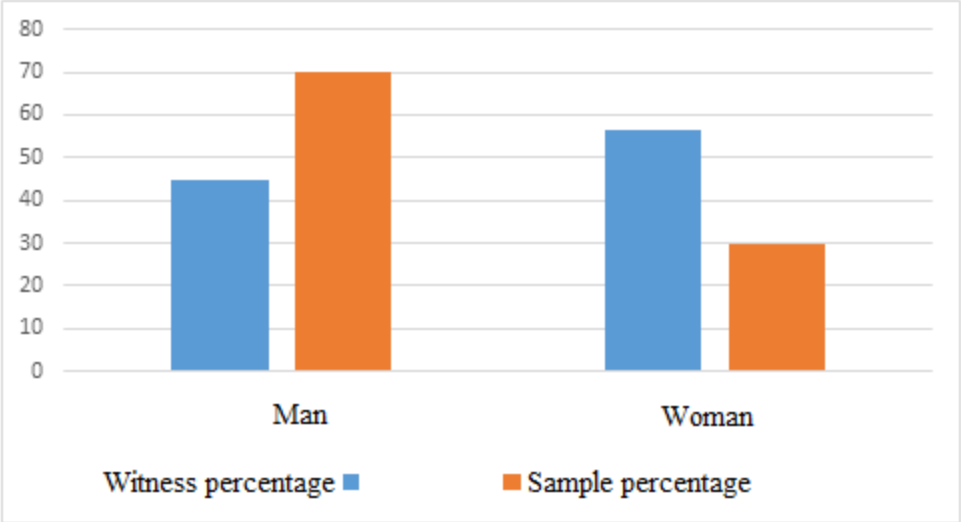

Chart 1 Distribution of respondents by gender

Educational level: According to chart 2, the highest frequency related to education belongs to the diploma group in the case and control samples.

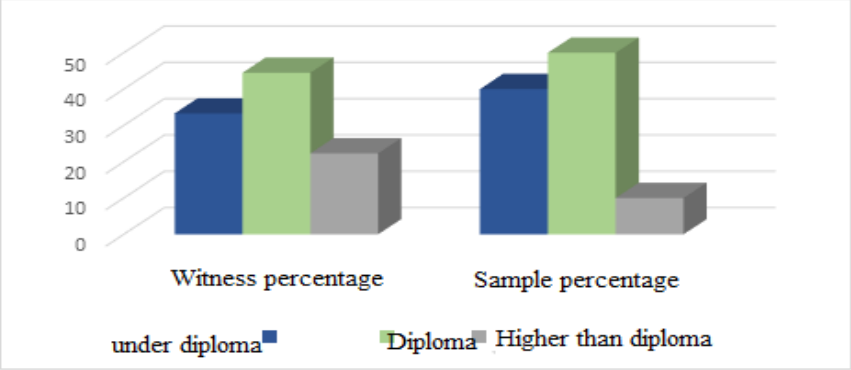

figure 2 . The percentage of subjects' educational level

Occupation: According to chart 3, the highest percentage was related to the housekeeper in the case and control samples.

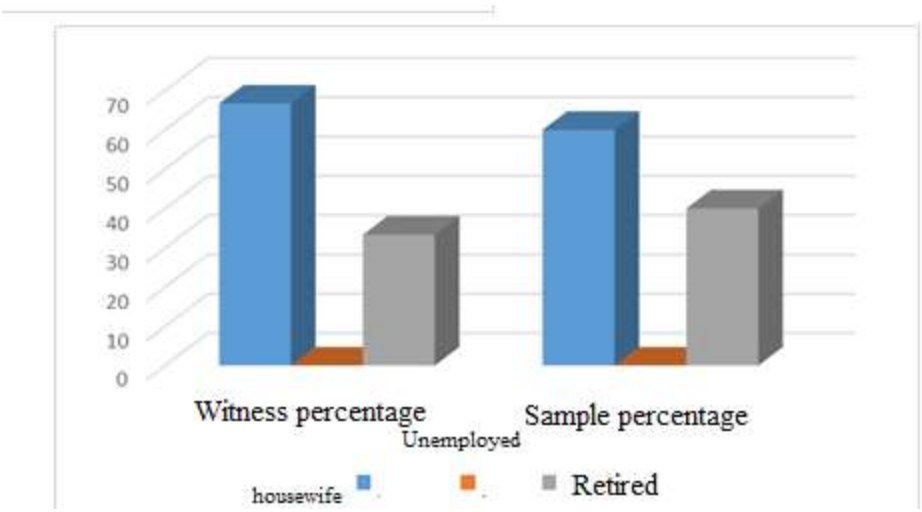

Figure 3. Employed percentage of subjects

Table 1. Frequency distribution of sports activity information and duration of diabetes in type 2 diabetes patients in case and control groups

	item		The witness		Variable
Percent	Abundance	Percent	Abundance		
0	0	0	0	Yes	
100	10	100	9	no	sports activity
20	2	11.1	1	3 years	
60	6	33.3	3	4 years	Duration of diabetes
20	2	55.6	5	5 years	

According to the results of Table 1, in both groups, the majority of participants were female, with a diploma. In terms of occupation, most of them were unemployed housewives. The longest duration of diabetes in the control group was 2 years and in the case group it was 4 years. All participants had no sports activities.

Table 2. Mean and standard deviation of information of type 2 diabetes patients in two groups of cases and controls

Maximum	At least	standard deviation	Average		Variable
76	45	9.99	57.8	Age	
175	155	2.29	163.5	height	
96	51.2	13.77	82.04	previous weight	Item group
95.6	50	14.52	80.92	Next weight	

5	3	0.67	4	Duration of diabetes	
0.62	42	5.78	52.11	Age	
178	149	11.05	163.78	height	
92	59	11.07	75.28	previous weight	control group
92	61	10.57	75.37	Next weight	
5	3	0.73	4.44	Duration of diabetes	

Table 3. The mean and standard deviation of liver enzymes (ALT, AST, and ALP) in diabetic subjects before and after the intervention in the case and control groups

p-value	t	Maximum	At least	standard deviation	Average		Variable
0.041	2.538	30	12	5.31	20.3	**ALT** Before intervention	Item group
		26	12	5.15	18.1	**ALT** After the intervention	
0.038	3.335	28	13	4.91	20.78	**AST** Before intervention	
		29	14.2	4.99	18.01	**AST** Before intervention	
0.002	4.765	269	111	89.46	230	**ALP** Before intervention	
			111	87.46	224.45	**ALP** Before intervention	
0.153	-1.765	26	18	6.36	21.56	**ALT** Before intervention	control group
		30	19	6.57	22.17	**ALT** Before intervention	
0.784	-0.284	34	18	8.57	21.9	**AST** Before intervention	
		38	19.6	6.62	22.36	**AST** Before intervention	
0.292	1.127	250	178	45.21	229.1	**ALP** Before intervention	
		306	176	62.78	227.99	**ALP** Before intervention	

In this study, the Kolmogorov-Smirnov test was used to assess the normality of the data in the groups studied. The results of this test showed that the p-value for liver enzymes (ALTT, AST and ALP) was greater than 0.05 in the diabetic patients. This result shows that the distribution of data in these groups is normal. Therefore, independent t, one-way analysis of variance and Pearson's correlation coefficient should be used for data analysis in addition to paired t-tests.

In addition, according to the associated table, the result of the paired t-test showed that in the case group (under treatment), liver enzymes (ALTT, AST, (ALP) before and after the intervention were statistically significantly related (p-value <lock><</lock> 0.05). This result shows that the average of the liver enzymes (ALTT, AST, ALP) before the intervention was higher than the average of the liver enzymes (ALTT, AST, ALP) after the intervention. In the control group, however, this correlation was not significant and the results showed that there was no statistically significant correlation between hemoglobin A1C before and after the intervention in this group (p-value <lock>></lock> 0.05).

When examining the results of the independent t-tests and the one-way analysis of variance in the case group and the control group, it was found that there was a significant difference between the mean value of the liver enzymes (ALTT, AST and ALP) in the diabetic subjects before and after the intervention, taking into account gender, education level, occupation and weight (p-value <lock>></lock> 0.05).

It can be concluded that the consumption of borage plant extract had a significant effect on lowering the average hemoglobin A1C in the group studied. This finding shows that in addition to the significant effects in the case group, no statistically significant changes were observed in the control group, and the result indicates a direct and specific effect of borage plant extract in regulating liver enzymes (ALTT, AST, (ALP) in diabetic patients.

Figure 4 graphically shows the changes in liver enzymes (ALTT, AST, ALP) in individuals before and after the intervention in the control and case groups.

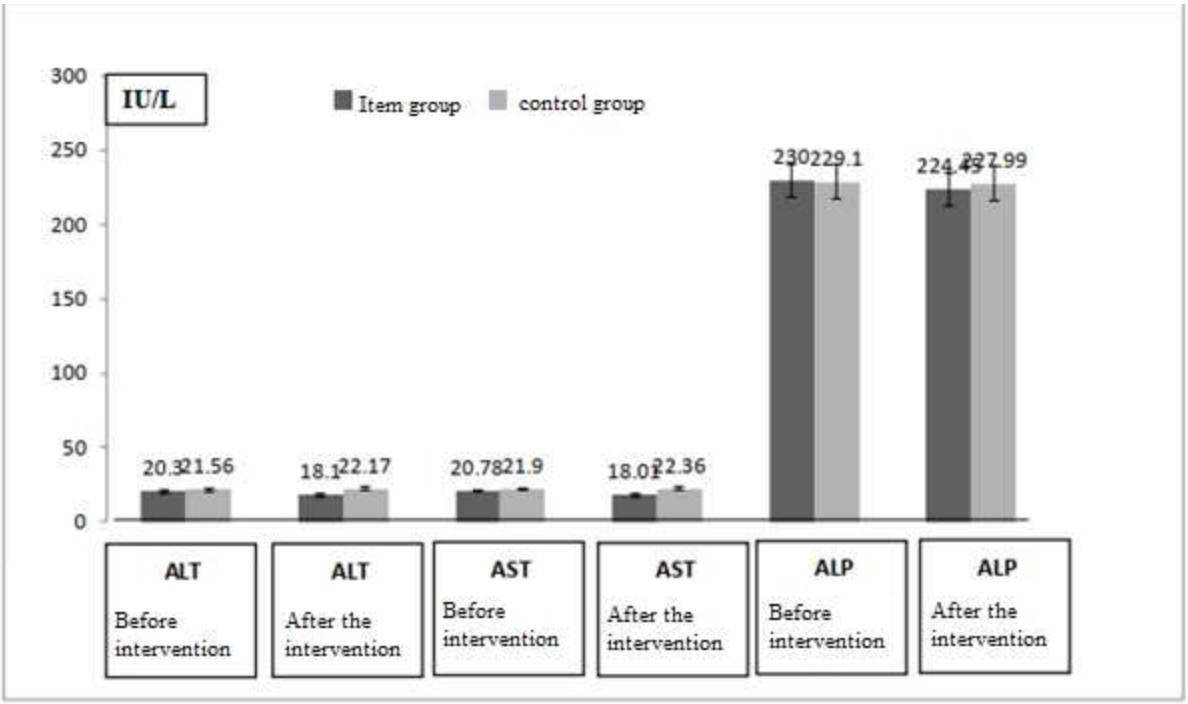

Figure 4. Comparison of the average changes of liver enzymes (ALT, AST, ALP) in two groups of cases (under treatment) and controls before and after the intervention

Conclusion

This study investigated the effect of borage plant extract intake in people with type 2 diabetes. The results showed that the consumption of borage plant extract after each lunch and dinner meal led to a significant decrease in the mean liver enzymes ALT, AST and ALP in the study group. This decrease represents an improvement in liver function in these people, and these changes are statistically significant, and the possibility that these changes are related to the consumption of borage plant extract (p-value <lock><</lock> 0.05).

Also, compared with the control group that was not prescribed borage plant extract, the mean liver enzymes ALT, AST and ALP in the case group were lower than the mean liver enzymes before the intervention, and this difference was statistically significant and the probability of occurrence These changes are related to the intake of borage plant extract (p value <lock><</lock> 0.05).

In addition, a further analysis showed that the changes in the average liver enzymes ALT, AST and ALP in the case group were related to other anthropometric factors such as weight loss and that these changes not only

contributed to an improvement in liver function, but could also lead to a reduction in complications caused by type 2 diabetes.

It can be concluded that consumption of borage plant extract in conjunction with positive anthropometric factors such as weight loss may improve liver function and reduce complications caused by type 2 diabetes, ultimately leading to an improvement in people's quality of life.

Acknowledgments

This article is taken from the master's thesis, which was ethically approved during the 39th session of the Research Ethics Committee of Payam Noor University of Mashhad, dated 2/19/1402. The authors of this article would like to express their gratitude to the honorable research assistant of Payam Noor University and those who helped in conducting this research.

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