Research Article
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Alfalfa Leaves Replace Insulin as A Hypoglycemic, Antidiabetic and Insulinotropic

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ABSTRACT

In this study, the effect of alfalfa leaves with the scientific name *Medicago sativa L*. from the Bean family on reducing blood sugar was investigated. The key is to find a suitable alternative to insulin with easy-to-use, no-side, low-cost features. The main result of the research is to find a suitable sample and introduce it. Numerous plants have previously been introduced with relatively similar medicinal effects, even for regulating blood sugar, but this is the first time in the world that alfalfa leaves have been used safely in clinical trials without the usual research complexities; it is proposed as an alternative to insulin by presenting laboratory and human clinical results.

The result of the plan; It has a medicinal application and is required by the medical sector of the country. Sample in the form of oral capsules in three comparative daily meals (blood sugar level before consumption and one hour after consumption of oral capsules) on eleven type 1 diabetic patients and volunteers with glucometer and one healthy volunteer in a specialized laboratory Pathobiology was studied and after laboratory and clinical examinations on eleven volunteer patients and a healthy person and registered results, it can be concluded that this plant has shown optimal activity in terms of reducing blood sugar. According to the experiments, the median of non-fasting blood sugar was 52.57 for the morning meal, 53.54 for the noon meal and 53.82 for the evening meal per mg/dl for 11 volunteer patients as randomized. And the exact amount of hypoglycemia in the morning for a healthy person 55 mg/dl obtained and the role of effective compounds in alfalfa leaves in a significant reduction and significantly confirmed blood sugar.

Keywords: *Leaves, Alfalfa, Medicago Sativa L, Diabetes, Insulin*

Introduction

Natural remedies have been the mainstay of treatment for many years, and in some cases the only raw materials used in the pharmaceutical industry have been used. Until the last few decades, medicines were obtained mainly from plants and natural resources, with the rapid advancement of new sciences

and synthetic medicines, the use of medicinal plants was gradually reduced and synthetic medicines were replaced in many cases (Kovar *et al*., 1987). Today, the return to the use of medicinal plants has been considered. The emergence of microbial resistance to some antibiotics has led researchers to evaluate the use of plant resources (Voirin *et al*., 1990). Medicinal plants throughout history have always had a special affinity with humans and its medicinal effects and uses are not hidden from anyone. Although the use of medicinal plants is limited by the development of the chemical industry (Ulubelen *et al*., 1994), but the outlook for the use of plants in the future is increasing (Gupta, 2010).

Alfalfa is rich in minerals because it contains many minerals and is very useful for children who are growing up and do not have strong bones. Even today, the powder of this plant is sold in pharmacies, which can be used for infants. Many enzymes are found in alfalfa, including invertase and pectinase. Alfalfa contains about 20% protein. In addition, it contains carbohydrates, diastases, a type of saponin with a sneezing effect, columns, two pigments, phosphoric acid and various vitamins. Its ash contains a lot of lime, potash, phosphoric acid, a little magnesium, iron and to a lesser extent "arsenic" and "silica" (Melanitou *et al*., 2003).

Diabetes characteristic symptom is high blood sugar above 120 mg/dl in fasting state and other symptoms are overeating and binge drinking. Diabetes is caused by a decrease in the body's production of insulin or a decrease in the effect of insulin on the metabolism of sugars (insulin causes the sugar or the most important source of energy in the body to be used, which is produced in the pancreas).

In Iran, Sedigheh Asgari and her colleagues studied the effects of alfalfa consumption on lipoproteins and the formation of fat streaks in hypercholesterolemia rabbits. Although the study was performed on alfalfa, it had nothing to do with blood sugar (Melanitou *et al*., 2003). In 2014, Also, Seyyed Ebrahim Hosseini and his colleagues have studied the effects of medicinal plants on lowering blood sugar in which the name of alfalfa plant is not mentioned (SO *et al*., 2007). In a 2000 article on the effects of herbs, AMG *et al*. Noted that people in parts of Nigeria used alfalfa to treat diabetes (Sharma *et al*., 1994).

Material and Methods

Plant samples were collected in 3 developmental stages. The first harvest was done in the germination stage (3 days) and the second harvest was done in the vegetative stages (20 days) and the third harvest was done in the flowering stage (5 months after sowing the seeds). Epidermal cells have a thick, quadrangular wall (Nick *et al*., 1994). The cells of the lower epidermis look more irregular than the upper epidermis. The upper surface cuticle is thicker than the lower surface. The stomata are flush with the epidermal cell at both the lower and upper levels. Mesophilic parenchyma tissue consists of two rows

of ladder parenchyma and one row of spongy parenchyma. In this research, only digital blood glucose measuring devices with milligram display unit per deciliter of electric mill have been used to prepare leaf powder with a suitable mesh score. In the case of clinical specimens of the volunteer patient, we did not insist on the similarity of the devices in terms of manufacturer and measurement accuracy because the range of recorded changes, for example, between 40 and 60 mg/dl is such that the percentage of possible error in the received result means it is not. This ease in choosing a measuring device has also been in order to reduce the costs of research and streamline the research process. In order to measure the healthy clinical sample of the volunteer by the laboratory, a more accurate instrumental method has been used (Rodiek *et al*., 1991).

No chemicals were used except water, salt and apple cider vinegar for washing, preparation of plant samples and processing operations.

After leaf picking and selection of healthy and green leaves, alfalfa leaf samples were thoroughly and frequently washed with water and salt, and finally with vinegar, and the final washing was performed. Then, the drying operation was performed in the shade and using newspaper pages for ten days so that the effective compounds of the sample did not undergo structural changes in the light.

In the next step, the dried leaves in the shade were powdered by an electric mill with a suitable contact surface to speed up the process of digestion and absorption in the stomach.

At the stage of loading the sample into the capsule, appropriate drug capsules prepared from the pharmacy were used with strict observance of hygienic points to prepare the samples for oral use and to start the process of measuring blood sugar changes. Samples were stored in the refrigerator until measurement.

Blood sugar level is literally the amount of blood glucose that is sometimes called serum glucose level. This is usually expressed in mill moles per liter (mmol/l) or milligrams per deciliter, and in non-diabetics it is about 4-8 mill moles per liter or less than 100 milligrams per deciliter.

Blood sugar levels usually peak after eating and peak during fasting (usually early in the morning). Blood sugar fluctuates more in people with diabetes.

For most healthy people, normal blood sugar levels are as follows:

When fasting: Blood sugar levels between 4 and 5.4 mmol/l (mmol/l) or 72 to 99 mg/dl (mg/dl) Two hours after a meal: up to 7.8 mmol/L or 140 mg/dl.

Random blood sugar test: This test is done at any time and does not require planning. It can be used to diagnose type 1 diabetes.

Fasting blood sugar test: This test is done after eight hours of not eating and usually in the morning. Oral Glucose Tolerance Test (OGTT): The oral glucose tolerance test involves taking a sample of fasting blood and then consuming a very sweet drink containing 75 grams of glucose. After taking this drink, another blood sample should be taken after 2 hours (Gray *et al*., 2000) (Table 1).

Table 1: Blood sugar levels.

Time	Blood sugar levels
fasting	between 4 and 5.4 mmol / l (mmol / l) or 72 to 99 mg / dl (mg / dl)
Two hours after a meal	up to 7.8 mmol / L or 140 mg / dl

Result and Discussions

The samples loaded in the capsule after consumption by the patient at the specified times according to the results in the tables and diagrams below show that for each capsule containing dried alfalfa leaf powder, can be between 40 to 60 mg per Deciliter of blood sugar. The mean non-fasting blood glucose for morning meal (Table. 2) was 52.27, for lunch was 53.54 and for night meal was 53.82 mg/dl for 11 volunteers and the exact amount of hypoglycemia per meal (Fig. 1,2 and Fig. 3). In the morning for a healthy person (the result of the pathobiology laboratory of Hazrat Ali Ibn Abitaleb (AS) Hospital in Qom) 55 mg/dl was obtained (Fig. 4).

Table 2: Non-fasting blood glucose for morning meal.

Sample No.	Age	measuring blood sugar		
		Before	After	Difference
		mg/dl	mg/dl	mg/dl
1	56	146	99	47
2	64	187	136	51
3	78	163	121	42
4	70	188	127	61
5	68	196	140	56
6	59	210	158	52
7	55	156	104	52
8	76	176	133	43
9	71	170	119	51
10	62	183	131	52
11	84	192	146	46

Figure 1: Comparative charts for measuring blood sugar in patients with type 2 diabetes mellitus in the morning by glucometer (after breakfast): green curve before use and blue curve after medication (administration mg/dl according to the number of each sample).

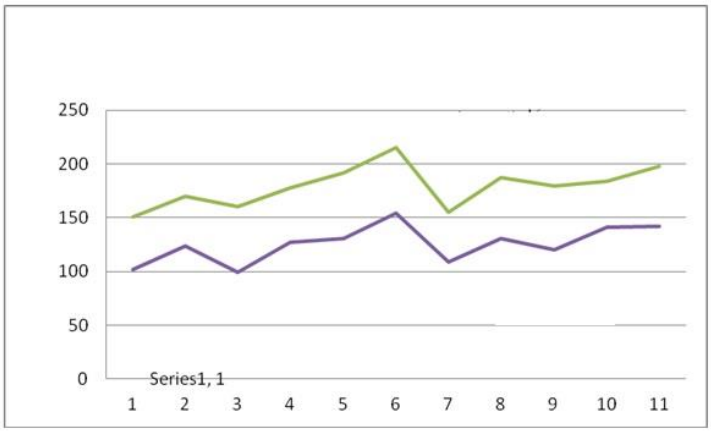

Figure 2: Comparative charts for measuring blood sugar in patients with type 2 diabetes at lunch with a glucometer (after lunch): green curve before consumption and blue curve after drug administration mg/dl according to the number of each sample.

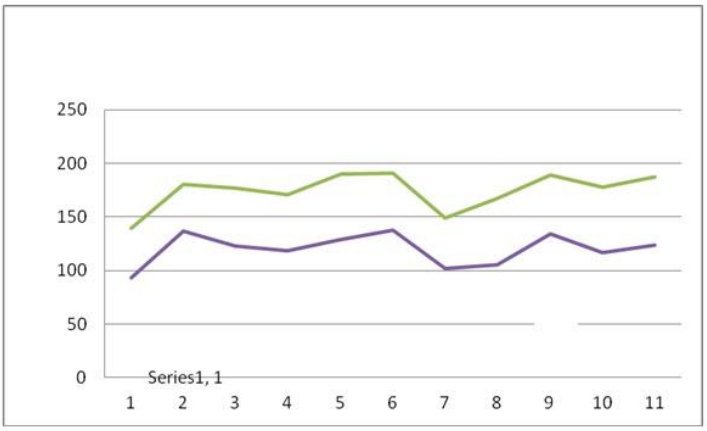

Figure 3: Comparative diagrams of blood glucose measurements of patients with type 2 diabetes at night by glucometer (after dinner): green curve before consumption and blue curve after drug administration mg/dl according to the number of each sample.

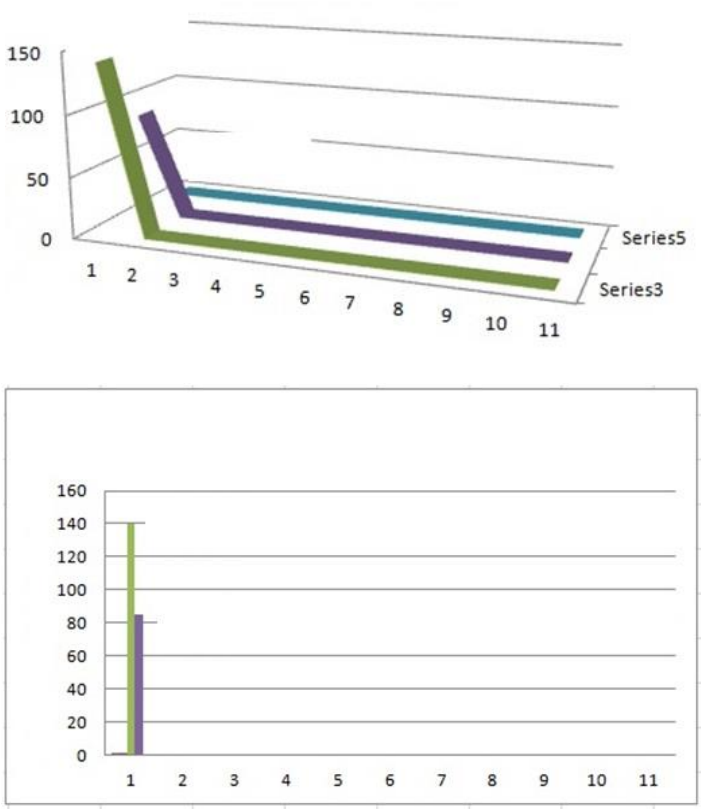

Figure 4: Comparative point charts for measuring healthy blood glucose in the morning by the pathobiology laboratory of Hazrat Ali Ibn Abitaleb Hospital in Qom (after breakfast) administration mg/dl according to the number of each sample.

It can be seen in Fig. 4 that the exact amount of hypoglycemia in the morning meal for a healthy person (the result of the pathobiology laboratory of Hazrat Ali Ibn Abitaleb (AS) Hospital in Qom) was 55 mg/dl.

Conclusions

Based on the studies conducted in this study, it can be said that the consumption of plants effective in the treatment of diabetes due to having fewer side effects and antioxidant effects and regulating insulin secretion have a significant role in the treatment of this disease. Although edible plants are unlikely to replace insulin, these natural resources are effective in controlling and even treating diabetes by stimulating biosynthesis and insulin secretion, as well as boosting insulin function. In this study, the mean non-fasting blood glucose for morning meal was 52.27, for lunch was 53.54 and for night meal was 53.82 mg/dl for each capsule containing powder. Dried alfalfa leaves were obtained for 11 patients and the exact amount of hypoglycemia in the morning for a healthy person was 55 mg/dl.

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