RESEARCH ARTICLE

Medicinal Plants as Powerful and Efficient Sources of Diabetes Treatment Compared to Medicinal Insulins : Case Study Dukagjin Region in Kosovo

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ABSTRACT
The use of medicinal plants is a promising resource for the treatment of diabetes in Kosovo. In traditional medicine, a healthy lifestyle is the best way to prevent diabetes. The research of the study is the treatment of diabetes mellitus type 1 and 2, the role of insulin therapy and an overview of the use of medicinal plants used in the treatment of diabetes.The method is based on the collection of data on the number of patients with DM type 1 and 2, obtained from the protocols of the Regional Hospital of Peja and Family Medicine Centers in the municipality of Dukagjin. Also, data on the treatment of patients with insulin were obtained from scientific research in medical journals published in academic databases such as: (Scopus Web of Science, Elsevier., etc.). Number of samples in the study 154 patients.Statistics show that the treatment of patients with insulin such as Linagliptin and Steglujan results in the adequate treatment of (87.5%) of patients. The lowest insulin failure rate of Glyxambi, Soliqua, Ertugliflozin and Xultofia is up to (70%) in some patients. Treatment of patients with phytotherapeutic medicinal plants such as: Rosa Canina, Viccinium Berrica, Urtica etc., the results show a better and higher treatment effect, ranging from (85.71% - to 91.43%). The use of medicinal plants for antidiabetic treatment has an advantage of (4.81%) compared to insulin treatment.The results of the study are really promising in finding the solution for the prevention of diabetes, especially the orientation of patients with DM, in the use of antidiabetic herbs.
Keywords: Diabetes, metabolism, glucose, insulin, medicinal plants.
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INTRODUCTION

These medicinal plants have antidiabetic effects by changing the mechanism in the body, including the regeneration of pancreatic β cells, insulin secretion, inhibition of α-amylase, inhibition of intestinal glucose absorption and hepatic glucose production, antioxidant stress, limiting the degradation of glycogen, anti-inflammatory ability [1]. Many medicinal plants in Kosovo contain natural insulin. Therefore, the purpose of this research is to analyze the health effects of patients with DM, who are treated with Insulin and the effects of patients who are treated with medicinal plants [2]. After the study of patient samples, based on the analytical results, a statistical comparison of the advantages of the treatment of diabetes mellitus with medicinal plants is made. As the world population grows, so does the number of people with DM [3]. According to the WHO, in 1982 it reached 109 million, while in 2015 the number of people with DM was 423 million.

About 50% of people with type 1 DM are diagnosed before the age of 16. DM tip 2 is caused by the typical peripheral action of insulin and the incomplete response of the pancreas to insulin secretion. Therefore, mothers with type 1 diabetes mellitus before the disease (pre-T1DM), are 3-5 times more likely than non-diabetic mothers to give birth to children with heart problems. Hyperglycemia is thought to be the main factor negatively affecting fetal heart health. Substances that activate opioid receptors in the central and peripheral nervous system are peptide-1 receptor (GLP-1) which interacts with glucagon (peptide hormone). They help the pancreas release more insulin when glucose levels are high . In this study, patients with DM, who use antidiabetic tablets and injections and patients who have chosen DM are treated with phytotherapy[4]. The poor management of this disease and the poor economy are the main factors that have influenced the high mortality rate in Kosovo. Due to the bad economic situation on the one hand and the rich flora in Kosovo, and the access to these natural medicines on the other hand, diabetics have started to be treated with phytotherapy. According to the Statistics Agency of Kosovo, over 75% of medicinal plants are used by the diabetic population. The main goal of this research is to have a better perception, understanding and insight both in the clinical and public health aspects of how to influence the prevention and reduction of the occurrence of this disease. Based on all these data, it turns out that a lot of research has been done in different institutes to find a solution to this big global problem and some research is really quite promising in finding the solution to prevent diabetes.

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Table 1: Number of diabetes cases in Peja Regional Hospital, according to municipalities, 2021-2023

Municipality	Cases											
	Year 2021				Year 2022				Year 2023			
	Diabetes 1		Diabetes 2		Diabetes 1		Diabetes 2		Diabetes 1		Diabetes 2	
	M	F	M	F	M	F	M	F	M	F	M	F
Peja	11	5	81	89	12	7	80	92	16	8	109	93
Deçan	7	4	58	78	7	4	57	77	7	4	77	79
Istok	6	7	60	79	7	8	66	80	7	7	68	89
Klina	5	3	67	79	6	4	77	89	6	5	79	91
Junik	5	4	23	35	5	4	27	39	6	4	37	39
	34	23	289	281	37	27	307	377	42	28	370	391
Total	627				748				831			

MATERIALS AND METHODS

Sample Collection and Identification of DM Patients

The research included patients with type 1 and type 2 diabetes in the region of Peja during 2021/2023. The method is based on the use and analysis of data from the protocols of the Peja Regional Hospital and Family Medicine Centers in the municipalities, presented in (Table 1). Pooled data including all patients with DM, regardless of their age and gender, were used [5]. Also, data on studies and treatment of insulin patients were obtained from scientific research published in medical journals from academic databases such as: (Google Scholar, WorldCat, Scopus Web of Science, Elsevier, etc.), as shown in (Table 2) [6].

In this article, the number of DM, patients in 5 municipalities of the Peja region is investigated. Namely, a large number of diabetic patients who were treated with natural phytotherapy at home have been analyzed. Information on medicinal plants was obtained from the Statistics Agency of Kosovo. Normal blood glucose values range from 4.0 mmol/L to 5.9 mmol/L [7].

Increased blood glucose is a consequence of diabetes and is a disease that causes damage to the human body, nervous system, kidneys, liver and blood vessels [8]. According to the WHO, by 2030 this disease will be the 7th most important cause of death in the world population [9]. Statistical results according to the WHO in 2014 during the 18-year monitoring, about 8.5% of the population had DM [10]. Studies in Kosovo show that type 1 diabetes and other variants of diabetes are mainly caused by malnutrition, ignorance, urbanization and lack of access to quality health care.

Methods

Patients (n=96), who are treated with insulin (Novorapid, Novomix, Insuman), and medicinal plants in (Table 3 and Table 5). laboratory analyzes of these diabetics were tested at the "Alpha AME Polyclinic and Laboratory" - Peja. Analyzes were performed on patients. with diabetes with the following equipment: [BIOCHEMICAL ANALYZER ROCHE Cobas Integra 400 Plus EXCELLENT CONDITION (Second Hand - Refurbished)]. The number of patient samples was taken from the database "Alpha AME Polyclinic and Laboratory" – Peja.

Ethical Statements of Approval and Consent to Participation in the Study

This study was conducted according to the Declarations of Helsinki. All study participants signed a written informed consent form. Confidential patient classification information was obtained. All inclusion criteria for

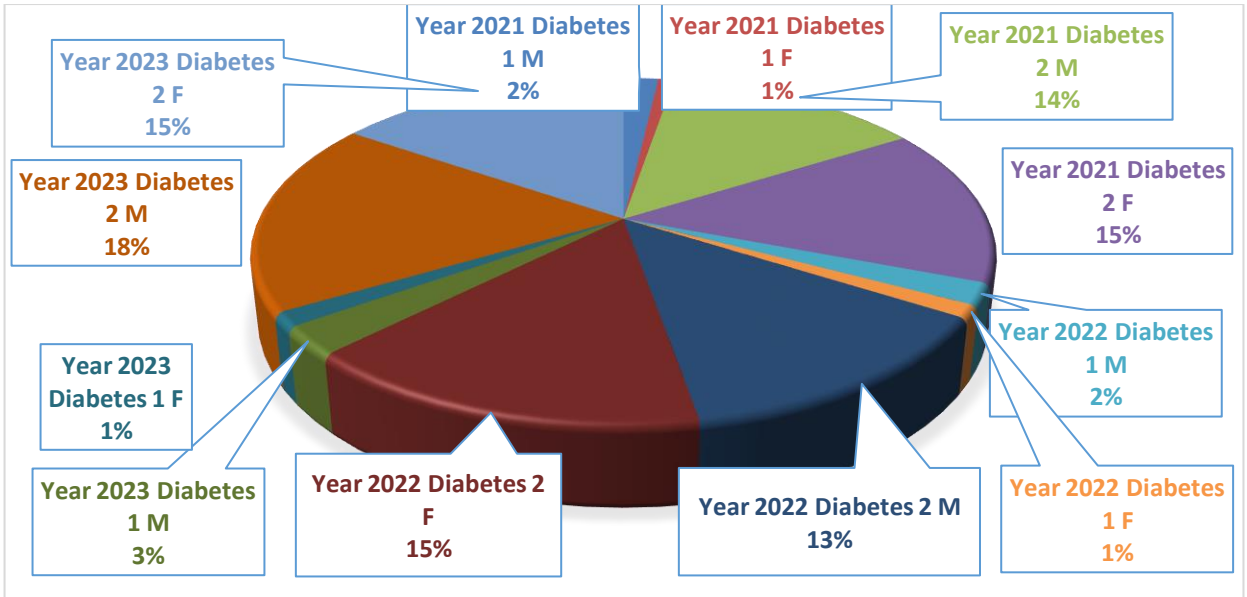

Figure 1: Graphic presentation of the number of diabetes cases in % in Peja Regional Hospital according to municipalities during 2021-2023

determining the enrollment of patients in the observation with DM disease were applied.

RESULTS AND DISCUSSION

The average age of the patients included in the study is 46.7 years. Suffice to note that a study done in the Kosovar population showed that the highest prevalence of DM tip 2 was found in women. In this study patients treated with phytotherapy alone and the results of keeping DM, under control with phytotherapy have been analyzed. The data in (Table 1), show that in 2022, 121 cases of DM, were diagnosed, while in 2023, 83 patients were diagnosed with this disease, with an average of 102 patients per year in the five municipalities studied. The level of self-care of patients with type 1 and 2 diabetes treated by family doctors in health centers was evaluated. Possible factors and obstacles affecting self-management and self-care for the disease have also been identified. Out of 831 patients with diabetes mellitus in five regional municipalities, 154 patients have chosen to be treated with phytotherapy in (Figure 1).

Table 2: Treatment of patients with diabetes [tablets and injections (Insulin)], in clinical centers (American, Danish, German, Dutch, and Asian)

Oral tablets (Insulin) DM 1,2		Injections (Insulin) DM 1,2	
Xigduo XR *Treatment* The role of these tablets is to block some of the glucose in the body from re-entering the blood through the kidneys. The maximum daily dose for use is 10 mg dapagliflozin / 2000 mg metformin HCl extended-release. *Number of patients 7*	Analysis / Result In a clinical study in a hospital in Germany, patients who were diagnosed with type 2 diabetes in the age group of (39-41) years (male), with an A1c of 6.8. Patients with A1c up to 11.9. treatment with this drug was started with Xigduo XR tablets. The results showed a decrease in glucose to (6 mmol/L). Then (71.42%) of positive results kept diabetes close to the normal value. (28.57 %) of these patients had no success with Xigduo XR insulin treatment [9,11].	Tresiba *Treatment* Patients treated with Tresiba insulin medication (insulin degludec) injection (100 U/mL, 200 U/mL) . *Number of patients 28*	Analysis / Result Clinical trial (6 months) with China State Hospital compared Tresiba with sitagliptin: Insulin Tresiba reduced HbA1c in patients significantly more than sitagliptin. Tresiba reduced HbA1c by an average of (1.52%), while sitagliptin reduced HbA1c by an average of (1.09%). An HbA1c of less than (7%) was achieved in 40.9% of those who received Tresiba. In comparison, (27.9%) of those taking sitagliptin achieved an HbA1c of less than (7%)[12].
Glyxambi *Treatment* Treatment with this diabetic insulin therapy combines the drugs linagliptin and empagliflozin. Patients are treated with this Glyxambi tablet therapy even if their blood sugar is less than (250 mg/dL). *Number of patients 5*	Analysis / Result In a study at a university clinical center in America, over 58% of people taking glixambi were able to achieve an A1C of less than 7.0. The results showed that (40%) of the patients were positive, keeping their diabetes near the normal value. (60%) of these patients had no success with Glyxambi insulin treatment[13].	Basaglar *Treatment* Basaglar insulin treatment (insulin glargine injection (100 units/mL), long-acting basal insulin. *Number of patients 10*	Analysis / Result The research focused on rabbits as an experiment, doses of (0.072 mg/kg/day) were administered during organogenesis. The dose is approximately 2 times the recommended starting human subcutaneous dose of 10 units/day (0.008 mg/kg/day), based on (mg/m2). The results showed that (70%) of the sample were positive results keeping the diabetes close to the normal value. (30%) of these samples (analysis) did not succeed with insulin treatment[14].
Linagliptin *Treatment* Linagliptin blocks the release of some hormones in the body, so the pancreas can produce enough insulin in the body. The usual dose is one 5 mg tablet once a day.	Analysis / Result The results showed that fasting plasma glucose was significantly improved with linagliptin compared with placebo (-1.3 mmol/L; P < 0.0001). Linagliptin significantly reduced 2-hour postprandial glucose by 3.2 mmol/L (P < 0.0001). out of 19. The results showed (87.5%) were positive	Toujeo *Treatment* Treatment with Toujeo (insulin glargine injection) 300 Units/mL The results showed improved treatment in these patients.	Analysis / Result The study results showed that the HR was 1.07 (95% CI: 1.00-1.17) for a daily dose of 10 IU, 1.17 (95% CI: 1.10-1.20) for a daily dose of 30 IU, and 1.30 (95% CI: 1.20 -1.42) for a daily dose of 50 IU. The number needed to treat was 100 patients treated over 18 months. The treatment was performed on Asian men. The

Table 2: Treatment of patients with diabetes [tablets and injections (Insulin)], in clinical centers (American, Danish, German, Dutch, and Asian)

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Number of patients 8	keeping diabetes close to the normal value. (12.5%) had no success with insulin treatment[15].	*Number of patients 100*	results showed (90%) were positive keeping the diabetes close to the normal value. (10%) of these samples had no success with insulin treatment[16].
Steglujan *Treatment* Steglujan tablets I combined with insulin tablets ertugliflozin and sitagliptin. Steglujan (5 mg/100) mg tablets: contain ertugliflozin (5 mg and sitagliptin 100 mg). *Number of patients 8*	Analysis / Result The results showed an approximately 2-fold increase in sitagliptin plasma AUC in patients with moderate renal impairment with an eGFR of 30 to less than (45 ml/min/1.73). The results showed (87.5%) to be positive keeping the diabetes close to the normal value. (12.5%) of these patients did not have success with insulin treatment[17].	Xultofia *Treatment* This drug combines insulin degludec, a long-acting insulin, and liraglutide, a GLP-1 agonist. Xultophy 100 units/ml insulin degludec (3.6 mg). *Number of patients 10*	Analysis / Result The results of the study showed the Danish public hospital in patients with type 2 diabetes, mainly as secondary prevention, with an (HR = 0.86, 95%0, CI [0.77; 0.96]. The results showed 70% to be positive keeping the diabetes close to the normal value. (30%) of these patients had no success with insulin treatment[18].
Ertugliflozin *Treatment* Insulin tablets were shown to work by the same mechanism as insulin empagliflozin. *Number of patients 10*	Analysis / Result The percentages of participants with (HbA1c < 7.0%) at week 52 were (25.6%) and (28.5%), respectively. The results of oral administration of Ertugliflozin showed a decrease in fasting plasma glucose. The results showed that (70%) were positive keeping the diabetes close to the normal value. (30%) of these patients had no success with insulin treatment[19].	Soliqua *Treatment* Insulin Soliqua combines the drug insulin glargine with lixisenatide, a GLP-1 receptor agonist. *Number of patients 10*	Analysis / Result The trial results showed that there was a significant reduction in A1C levels from baseline to week 30 of treatment with iGlarLixi (-1.1%) compared with insulin glargine (-0.6%), with a mean change of -0.52% (95 % CI, −0.63 to −0.40; P < 0.0001). The results showed that 70% were positive keeping the diabetes close to the normal value. (30%) of these patients did not have success with sufficient treatment with this insulin[20].

For comparison, 196 patients were selected from the Internet (sample), who are treated with insulin tablets, and then the results of the treatment between the two groups were compared and analyzed. In 2022, new drugs were discovered that mimic a growth hormone called GLP-1[21,22]. These injectable drugs are: dulaglutide (Trulicity), liraglutide (Victoza), and semaglutide (Ozempic). The latter is also available as a pill called Rybelsus[23,24]. The newest addition to this family of drugs combines (GLP-1) and another incretin mimic such as (GIP). Metformin is the usual drug of first choice for people with type 2 diabetes[25,26]. Treatment begins after 2 to 3 months of lifestyle modification depending on the clinical circumstances of each patient in (Table 2).Shows the combination of drugs with insulin for the treatment of type 2 diabetes: (DPP-4 inhibitors, GLP-1 analogs, SGLT2 inhibitors, thiazolidinediones, DPP 4 inhibitors/metformin, SGLT2 inhibitors/metformin). In this way, drug prescribers may derive additional clinical benefits beyond a glucose-lowering effect for (SGLT2 inhibitors and GLP-1 receptor agonists) [9,27].

Diet

The consumption of plant-based foods is very important so the use of fruits and vegetables is preferred. It is recommended not to consume foods that contain a lot of carbohydrates and fats, fermented food products, palm oil, etc[28,29].

Physical Activity

Regular physical activity has a very good effect on the improvement of the patient's health condition and in certain cases can even normalize the level of glucose in the blood. It has been proven that physical activity plays an important role in reducing obesity and diabetes[30,31]. On the other hand, some studies have shown the connection of human behaviors such as: watching “TV” for a long time increases the possibility of obesity and then the occurrence of type 2 diabetes[31,33].

Treatment of DM Patients with Phytotherapy

The number of DM, patients studied was obtained from hospital protocol lists, which were analyzed during the years 2021-2023. After identifying patients with diabetes mellitus from the protocol list and starting insulin treatment, some patients voluntarily withdrew from insulin treatment[34,35]. These patients begin to be treated with

phytotherapy in which they are from rural areas[36,37]. Natural medicine intake and blood glucose measurements were closely monitored [37]. According to the recommendations of family doctors, they also perform blood glucose control tests[37].

Table 3: Treatment of patients with (DM) using medicinal plants
(10 plants with the best effect in the treatment of diabetes that grow in Kosovo and the Region)

Name	Use	Preparing	Analysis / Result
Taraxacum officinale L.	The leaves of the taraxacum officinale L. plant are used for the treatment of diabetes mellitus, they help the work of the kidneys and liver, stimulate the appetite, protect against rheumatism, etc.	Fresh leaves have vitamin C, minerals, etc. Used as a salad, 4-5 g of herbs or roots are taken as an infusion or tincture 3 times a day.	After 6 months of treatment with this plant (3x250 ml) per day, the results showed all 15 patients in the Municipality of Istog (sample). The results showed that glucose decreased from an average of (11.8 mmol/L) to a low of (5-7 mmol/L). The results showed (86.67%) to be positive keeping the diabetes close to the normal value. (13.33%) do not have a positive effect with phytotherapy.
Vaccinium myrtillus L.	The leaves are used to cure cough and diabetes, while the fruit has many anthocyanins that have an antioxidant effect, against bleeding, in the treatment of the mucous membrane of the mouth, throat, throat, etc.	1g of dried leaves are taken per day, scalded with boiling water, and drunk as tea 3 times a day.	After 6-8 months of treatment with this plant(3 x 250 ml) per day, the results showed that 5 patients in the sample showed that the glucose decreased from an average of (12.0 mmol/L) to a low level of (6-7 mmol/L). The results showed (80%) of positive market results keeping diabetes near the normal value. (20%) of treated patients did not have glucose reduction due to comorbidities and were treated with insulin.
Teucrium montanum	It was used as a medicine by the ancient Illyrians to cure diabetes. Since then, it has been used as a medicinal product and has found application in traditional medicine.	Take 4-5 g of the herbal medicinal plant, boil it as a decoction in 150 ml, and use it 3 times a day.	After a 5-month treatment of (3x50ml), 7 sample patients have had a remarkable improvement, and diabetes has dropped close to normal value. In these patients, the food used had low glucose levels and was monitored at (6 mmol/L). The results showed (85.71%) were positive keeping diabetes close to the normal value. (14.29%) of patients did not result in glucose reduction due to other concomitant diseases.
Teucrium chamaedrys	Since ancient times, it has been used as a medicine in traditional medicine due to its good value against diabetes.	4-5 g of herbs are taken, boiled as a decoction in 150 ml, and used 3 times a day.	After 12 months of treatment with 3x50ml, 9 sample patients had a remarkable improvement, diabetes decreased to close to normal value. Some of these patients did not need to use insulin tablets because the glucose level was (5-7 mmol/L). The results showed (88.89%) were positive keeping the diabetes close to the normal value. (11.11%) of these patients did not succeed with traditional treatment due to other co-morbidities.
Mania	The plant Mania is used for healing the liver, against intestinal ulcers, for healing from diabetes, against inflammation of the mouth and throat, etc.	Take 50 g of dried plant leaves or 100 g of fresh leaves and boil them in two liters of water. The container is closed and left to stand for two hours. Once drained it can be used to cure sugar disease (diabetes)	This root is also useful for people who are in the early stages of diabetes and need to reduce the amount of sugar consumed and lose weight. The sugar value in this case was (6-7 mmol/L). The results showed that in 11 patients, (90.91%) helps eliminate fat cells in the liver and muscles, but also improves insulin secretion. (9.09%) of these patients did not succeed with traditional treatment due to other concomitant diseases.
Nettle (Urtica) Dioica	Scientists have discovered that nettle leaves can heal the prostate and also treat diabetes. Nettles have many positive effects on the human body, as they help stimulate the lymphatic system.	To prepare the tea, you need a spoonful of the dried and crushed plant. This mass is poured into a glass of hot water and left alone for 15 minutes. Then strain and drink 3 times a day from a glass.	The results showed in 30 patients that if you take medication for diabetes and drink nettle juice, then the level of heart rate, blood pressure, and blood sugar will decrease significantly. Today, in Germany nettle is sold as a medicinal plant for prostate diseases. It is widely used in the preparation of many medicines against inflammation and diabetes. The sugar value in this case is (6-7 mmol/L). The results showed (90%)

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Name	Use	Preparing	Analysis / Result
			to be positive keeping the diabetes close to the normal value. (10%) of these patients did not have success with traditional treatment due to other co-morbidities.
Vaccinium berries	Vaccinium berries can heal the prostate and treat diabetes as well. In Kosovar society, it has found a great use for the treatment of diabetes.	Take 2 liters of boiling water, and throw in a packet (bag) of the herbal mixture. Let it boil for 1-2 minutes. Drain after 10 minutes. It is used warm or cold. Consume 3 glasses a day.	In the study at the Medical University of Cleveland, USA, individuals at high risk for heart disease saw a (4-6%) reduction in high blood pressure after consuming 50 grams of blueberries per day for eight weeks. A six-year study involving 35 elderly people found that blueberries and strawberries delayed aging by up to 2.5 years. The sugar value in this case was (6-7 mmol/L). In the samples of 35 patients, the results showed (91.43%) were positive keeping the diabetes near the normal value. (8.57%)of these patients did not succeed with traditional treatment due to other co-morbidities.
Sambucus nigra	The flower and berries of Sambucus nigra have been traditionally used against diabetes. Studies have confirmed that horsetail extracts stimulate glucose metabolism and insulin secretion, thereby lowering blood sugar levels.	Take 3 and a half glasses of cold water. 2 cups of dried fennel seeds. 1 tablespoon fresh or dried organic ginger. 1 teaspoon of cinnamon powder or 1 cinnamon stick. 1 cup of quality honey.	HIPPOCRATES: Sambucus nigra is a plant of God that can replace all medicines! *Number of patients 13* (92.31%) have succeeded in treating diabetes and some associated diseases.
Rosa canina	Herbalists in Turkey have often used wild roses to treat diabetes.	Doctors advise that patients drink a glass of tea obtained from the chopped fruits of the plant twice a day.	Scientists at Gazi University conducted several experiments on mice to examine the role of wild rose in preventing these symptoms and observed that the ethanol extract of wild rose served as an antioxidant, hypoglycemic, and antidiabetic. The results of the experiments made experts more optimistic about the components of wild rose and their antidiabetic value. The sugar value in this case was (6-7 mmol/L). In the samples of 11 patients, the results showed (90.91%) were positive keeping the diabetes close to the normal value (9.09%) of these patients did not succeed with traditional treatment due to other concomitant diseases.
Taraxacum	Biologists dealing with the treatment of medicinal plants in Turkey have often used dandelions to treat diabetes.	Place dandelions, dried or fresh flowers, and leaves, in a teapot. Pour water and put the kettle on the fire. For one cup of herbal coffee, you need 2 cups of tea with water.	Studies confirm that drinking dandelion tea every day can lower blood sugar levels. The sugar value in this case was (6-7 mmol/L). In the samples of 18 patients, the results showed (88.9%) were positive keeping the diabetes near the normal value. (11.11%) of patients required insulin therapy due to other concomitant diseases.

Recent studies show an increase in the number of diabetics in Kosovo, most patients are treated with insulin. Lack of production of pharmaceutical drugs in Kosovo, especially insulin drugs, these pharmaceutical products are imported from European countries. Diabetes mellitus (DM), is a disease that causes major health problems and unfortunately, a large number of people worldwide suffer from this disease. Given that this disease is constantly increasing, it was paramount to think of a solution that would prevent the increase in the number of people affected by diabetes. DM is a chronic disease that, in the case of not keeping blood glucose values under control, risks the appearance of many complications that affect the well-being of patients to the point that sometimes can even endanger their lives. The treatment of diabetics with insulin "XigduoXR" reaches the treatment effect up to (71.42%), while (28.57%) of the samples (patients) did not have a high success of the treatment for maintaining the normal level of glucose. Treatment with Glaxambi insulin resulted in cure rates ranging from (40% to 60%). In diabetics treated with

"Liagliptin" insulin, the results in maintaining the normal value have been the best, which goes up to (87.5%). In the treatment of diabetics with "Steglujan" insulin, the results showed an increase in the effect of insulin in maintaining normal diabetes up to a value of (87.5%). The effects of insulin treatment "Ertugliflozin, Soliqua, Xultofia, Basaglar" are almost the same, blood glucose analyzes have shown that they have reached the value of up to (70%, while 30%) of diabetics have had problems with maintaining the normal value due to of accompanying diseases of these patients. The diabetic effects of "Toujero" insulin treatment have given extremely good results in the treatment of diabetes reaching up to (90%) in (Table 2). Patients treated with this insulin were advised to exercise regularly and consume quality food, and most patients had no comorbidities. Being a chronic disease, diabetes has high costs of treatment, affecting financially patients suffering from this disease. Namely, the results of the study showed that patients with DM treated with insulin have a higher economic cost compared to the treatment of patients with phytotherapy. Apart from this, the results of the study of treatment of patients with DM with phytotherapy prove that this treatment enables the preservation of the quality and the health of organs such as the heart, liver, prostate., etc.

However, the results of laboratory analyses in the treatment of diabetics with ten different insulins in some cases indicated that they were not very efficient. Phytotherapy treatment, based on this study, shows a large number of patients with better results compared to diabetics who received tablets or insulin injections. Treatment with antidiabetic plants has the following advantages: it is cheaper and has lower economic costs, it is easy to access medicinal products used for this treatment and more importantly, the diabetic results (analysis) with phytotherapy treatment showed minimal negative effects in (Table 3). The use of medicinal plants for the treatment of diabetes has given very good results in maintaining the normal value of diabetes. For example the use of the medicinal plant "Taraxacum officinale L." has a positive effect in(86.67%) of cases. The use of the medicinal plant "Vaccinium myrtillus L." antidiabetic has been successful in up to (80%) of cases, while the use of the medicinal plant "Teucrium montanum" has been successful in (85.71%) of patients. The results for the effects of the antidiabetic plant "Teucrium montanum" can be successful in up to (88.89%) of cases, while the use of the antidiabetic plant "Teucrium chamaedrys" has been successful in up to (88.89%). The result of treating diabetics with the antidiabetic plant "Mania" has been successful in up to (90.91%) of patients, while with the antidiabetic plant "Hitra (Urtica) Dioica" (90%) of cases have been successful. The success of the treatment of patients who used the antidiabetic plant "Vaccinium berries" is (91.43%) of the cases, while those who are treated with the medicinal plant "Sambucus nigra" reaches (92.31%). The effects of the antidiabetic plant "Rosa canina" are positive and successful in up to (90.91%) of patients, while the effects of the diabetic plant "Taraxacum" for the treatment of diabetes can be successful in up to (88.9%) of cases. Treatment of diabetes with Insulin has been successful in a maximum of (87.5%) of cases, while phytotherapeutic treatment is very effective in (92.31%) of cases. So it is evident that (4.81%) of diabetics treated with medicinal plants have better results compared to pharmaceutical insulin. However, it should be noted that more than (80%) of patients who have been treated with antidiabetic medicinal plants come from rural areas that have access to antidiabetic plants, are physically active, consume organic food, and receive antidiabetic plant treatment on a specific schedule. The results have proven without a doubt an advantage of (4.81%) of the treatment with medicinal plants compared to the treatment of diabetics with insulin in (Table 4). Treatments for diabetes mellitus in the studied municipalities use these three types of insulin "Novorapid", "Novomix", "Insuman", these drugs often do not work completely in Table 5. We have a tissue resistance to the action of insulin. So, cells that want to be fed, but even though there is a lot of sugar in the blood, they remain hungry, and may even die. From the total number (n=831), diabetics (n=154), treated with phytotherapy in (Table 3). From (n=677), diabetic patients (n=96), treated with insulin, dominated by the female gender (n = 58). The patients' disease history varies from 2 - 12 years after the diagnosis of diabetes mellitus. Every three months, these patients have a glycated hemoglobin test, known as the A1c test, which is a blood test that provides data on average blood glucose levels over the past three months. This analysis is also called hemoglobin A1c, HbA1c or glycated hemoglobin. The normal blood sugar value is 3.8-6.1 mmol/L. Insulins often do not give satisfactory results in the studied rates, even after treatment the results give us high values. Treatment of patients with Insulin "Novomix" in 24 cases of the sample study, the level

Table 4. Report of patients treated with Insulin and medicinal plants

[Tablets and injections (Insulin)]	Number of patients	%	Medicinal plants	Number of patients	%
Xigduo XR	7	3,571	Taraxacum officinale L.	15	9,740
Tresiba	28	14,28	Vaccinium myrtillus L.	5	3,246
Glyxambi	5	2,551	Teucrium montanum	7	4,545
Basaglar	10	5,102	Teucrium chamaedrys	9	5,844
Linagliptin	8	4,081	Mania	11	7,142
Toujeo	100	51,02	Nettle (Urtica) Dioica	30	19,48
Steglujan	8	4,081	Vaccinium berries	35	22,72
Xultofia	10	5,102	Sambucus nigra	13	8,441
Ertugliflozin	10	5,102	Rosa canina	11	7,142
Soliqua	10	5,102	Taraxacum	18	11,68
Total	196	100	*Total*	154	100

Table 5: Blood examination of diabetic patients (HbA1c), who are treated with Insulin

(n=96)	Mosha	Insulina			Gjina		HbA1c %
		Novorapid	Novomix	Insuman	M (n=38)	F(n=58)	
4	1966		X		X		5,7
5	1975	X				X	6.7
4	1958		X			X	5.4
3	1977		X		X		5.9
3	2004		X			X	5.6
5	2005	X			X		4.9
5	1943		X		X		7.5
3	1965		X	X	X		6.7
4	1970	X		X	X		6.2
4	1976		X		X		6.3
2	1969	X				X	7.0
5	1959		X			X	5.5
4	1981		X			X	5.9
3	1964		X			X	8.69
8	1988	X				X	7.6
5	1948		X			X	10.6
6	1960		X			X	8.6
5	1954	X			X		7.7
6	1968		X			X	7.6
7	1957	X				X	7.2
5	1954	X			X		6.6

of HbA1c varies from 7.5-10.6%. Treatment with "Novorapid" insulin, 51 patients, the results show a value of 7-7.7%, is more effective compared to "Novomix" insulin. The number of patients treated with "Insuman" insulin is smaller and the results show a better effect of maintaining the level of glucose in the blood, moving from 6.2-6.7%.

CONCLUSION

Almost every day we are facing an increase in the number of DM patients, it is very important to take preventive measures. These measures would be very necessary to achieve positive results against this disease, which tends to increase continuously. Therefore, due to the increasing incidence of DM with high treatment costs, the many complications it can cause and other problems, it has been deemed necessary to recommend the following preventive measures:

i. Educating the population about the disease of diabetes and providing very important and essential information to the population about the treatment of DM;
ii. Preparation of specialized personnel who would work in this direction;
iii. Provision of material and financial resources by the Ministry of Health of Kosovo, with a priority on health education for the prevention of diseases;
iv. Information about the disease through TV shows, school visits, brochures and other forms of information;
v. Information on the importance of the type of food we consume and physical activity;
vi. Education and help for all those affected by this disease about treatment methods and the easiest ways to get the necessary help;
vii. Updating medical personnel with new information and discoveries about the disease.

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