

Full Length Research Paper

Herbal medicine use among diabetes mellitus patients in Northern Cyprus

Dudu Özkum^{1*}, Ömrüm Akı² and Hale Zerrin Toklu^{3,4}¹Department of Pharmaceutical Botany, Faculty of Pharmacy, Near East University, Nicosia, Northern Cyprus (TRNC).²Faculty of Pharmacy, Near East University, Nicosia, Northern Cyprus (TRNC).³Department of Pharmacology, Faculty of Pharmacy, Near East University, Nicosia, Northern Cyprus (TRNC)⁴Department of Pharmacology, School of Pharmacy, Marmara University, Istanbul, Turkey.

Accepted 5 November, 2012

Diabetes mellitus (DM) is a chronic, metabolic disease which may result in further complications. Traditional herbal medicines are used all over the world by diabetic patients. It is estimated that more than 1000 plant species are used against diabetes as folk medicine. Medical authorities such as World Health Organization encourage research on herbal medicines to come up with alternatives for treatment of diabetes, since oral antidiabetic agents have side effects in the long term. To date, a vast number of plants have been evaluated for their antidiabetic activity. Although, Northern Cyprus has a rich flora and an approximately 11% incidence of diabetes mellitus, few ethnobotanical studies were carried out against diabetes. The aim of this study was to provide a list of plants that are used as folk medicine for the treatment of diabetes mellitus in Northern Cyprus. A survey was conducted between November and December of 2011 with 100 diabetic patients who consented to participate in the study. The use of 18 plants by 32 diabetic patients was documented. These patients used a variety of plants along with their conventional antidiabetic medicines to control their blood glucose levels. Ethnobotanical studies are crucial in terms of revealing the traditional use of medicinal plants and guiding research on new drugs. However, further investigations are needed.

Key words: Diabetes, patients, herbal medicine, Cyprus, hypoglycemic plants.

INTRODUCTION

Diabetes mellitus (DM) is a chronic, metabolic disease of the endocrine system characterized by hyperglycemia. High blood glucose level may be a result of several factors such as insufficient insulin production of pancreas, or resistance of the body to the action of insulin. Uncontrolled blood glucose levels may result in microvascular complications such as retinopathy, nephropathy, and neuropathy. It may also lead to vascular

complications such as coronary artery disease resulting in strokes and myocardial infarcts (Ghosh and Collier, 2012). Thus, it is aimed to lower elevated blood glucose levels to prevent morbidity and mortality resulting from diabetes. It is estimated that there are 300 million people suffering from diabetes in the world. This number keeps increasing as a result of insulin resistance triggered by unhealthy eating habits and sedentary lifestyles (Aslan

Table 1. The sociodemographical data of diabetic patients who use herbal medicines (n = 32).

Parameter	%	
Age	18-25	0
	26-35	0
	36-45	6
	46-55	16
	55+	78
Sex	Male	47
	Female	53
Education	Primary school	56
	Secondary school	12
	High school	16
	University	16
Occupation	Self employed	22
	Retired	38
	Housewife	34
	Other	6

land Orhan, 2010). In modern medicine, insulin and/or oral agents such as sulfonylureas, biguanides, meglitinides, alpha-glycosidase inhibitors, thiazolidinediones and incretin mimetics are used for the treatment of diabetes. On the other hand, traditional herbal medicines are used all over the world by diabetic patients. It is estimated that more than 1000 plant species are used against diabetes as folk medicine (Marles and Farnsworth, 1995). Research on herbal medicines are encouraged to come up with alternatives for treatment of diabetes since oral antidiabetic agents have side effects in the long run (Samad et al., 2009). To date, a vast number of plants have been evaluated for their antidiabetic activity. Plants are considered to be the basis for deriving natural or semi-synthetic constituents that can be used against diabetes (Aslan and Orhan, 2010). The antidiabetic activity of some herbal medicines is attributed to the presence of compounds such as flavonoids, terpenoids, coumarins, and phenolic compounds, among others (Jarald et al., 2008; Rao et al., 2010). Investigations must be carried out to identify the chemical constituent(s) responsible for the antidiabetic activity of the medicinal plants, and to elucidate their mechanism of action.

Some researchers have reviewed the antidiabetic medicinal plants in Turkey (Parildar et al., 2011). However, little knowledge exists on the medicinal use of some plants within the Cypriot culture (Georgiades, 1987, 1992; Della et al., 2006; Lardos, 2006; Ozan, 2011). The

aim of this study was to provide a list of plants that are used as folk medicine for the treatment of diabetes in Northern Cyprus.

METHODOLOGY

This research is based on a survey conducted between November and December, 2011 with 100 diabetic patients who consented to participate in the study. Type I and type II diabetic patients who visited the Diabetic Center of the Burhan Nalbantoğlu Hospital in capitol, Nicosia (Turkish Republic of Northern Cyprus) were asked to answer a face to face questionnaire. The purpose of the study was explained and each diabetic patient was questioned on socio-demographical characteristics, disease condition and medicines used, and whether or not they use plants or plant parts to lower their blood glucose levels. If so, more information was obtained on the plants that are used, such as the name, used part, preparation method, frequency of administration, and their general opinions on the use of herbs. The survey consists of 3 different sections and a total of 26 questions (Appendix 1). Statistical data obtained from the survey was evaluated using the Statistical Package for Social Sciences (SPSS) program version 17.0 for Windows. It was requested that the patients bring samples of the used medicinal plants. The specimens were identified using the 'Flora of Cyprus' (Viney, 1994; Viney, 1996; Meikle, 1977; Meikle, 1985) and the International Plant Names Index (IPNI, 2012). The data collected indicate the use of 18 plants for the treatment of diabetes; most of which are available locally (Table 3). Some of the plants that were not of local origin were secured by users from local herbs and spice seller. The chemical constituents of the corresponding plants were obtained from 'Pharmacognosy, Phytochemistry and Medicinals' (Bruneton, 1995) and 'Tedavide Kullanılan Bitkiler-FFD Monografları' (Demirezer, 2007).

RESULTS AND DISCUSSION

Of the 100 patients contacted, all agreed to participate in the survey (response rate 100%). From the 100 respondents who participated in the study, 32 of them declared that they used herbal medicine. Age, sex, education, and occupation of patients who use herbal medicines against diabetes are shown in Table 1. Information about the use of medicinal plants is given in Table 2. The details about medicinal plants used against diabetes are given in Table 3. Table 4 illustrates the mixtures of plants used against diabetes and their preparation method. Figure 1 shows how patients provide medicinal herbs they use against diabetes. Figure 2 illustrates the sources from which patients obtain information on the use of medicinal herbs. Figure 3 shows the general opinions of patients about plants.

Figure 4 illustrates the percentage of patients who experienced any other chronic disease. Figure 5 shows the percentage of each medicinal group that make up the total 388 medicines used by the diabetic patients.

Average age is 58.66 ± 12.34 (female: 58.61 ± 12.11 ; male: 58.98 ± 12.57). The age of patients varied between 23 and 100. 60% of the patients were over 56 years of age.

Table 2. Information on the use of medicinal plants (n = 32).

Parameter	No. of patients	%
Herbal medicine use		
Alone	21	65.6
Mixed with other herbs	11	34.4
Preparation method		
Directly	3	9.4
Infusion	12	37.5
Decoction	15	46.9
Other	2	3.1
Time of use		
Preprandial	7	21.9
Postprandial	25	78.1
Duration of use		
8 weeks	1	3.1
Continuous	31	96.9

Majority of the patients (94%) have type II DM whereas only 6% of them have type I DM. From Figure 4, it can be deduced that around 78% of the diabetic patients also suffer from hypertension. In addition, nearly half of the diabetic patients experience dyslipidemia. One quarter of the patients suffer from hypothyroidism. Figure 5 illustrates that antidiabetics make up around 40% of all medicines consumed by diabetic patients, while this number is reduced to around 21% for antihypertensives and 11% for hypolipidemics. Of the 32 patients who use herbal medicines against diabetes, 97% of them use one or more herbal medicines throughout the course of their disease. The medicinal plants used belong to the flora of Cyprus. However, the provided list contains five non-native taxa and three cultivated, which occasionally escape from cultivation. Only one of the patients provides volatile oil of *Myrtus communis* from an herb and spice seller. Approximately 66% of the patients use a single medicinal plant, while 34% prefer to prepare a mixture from the medicinal plants. 46.9% of the medicinal plants are prepared as decoction, while 37.5% are prepared as infusion. Majority of the patients take the medicinal plant after food. All of the patients (n = 32) claim to experience positive effects as a result of herbal medicine they used. None of the patients claim to experience any adverse effects due to these herbal medicines.

In this study, the use of 18 plants by 32 diabetic patients was documented. This indicates that most patients rely on herbal remedies to bring down their blood glucose levels. These diabetic patients use a variety of plants along with their conventional antidiabetic

medicines to control their blood glucose levels. A recently conducted ethnobotanical study in Cyprus indicates the use of plants or plant parts, either alone, or in combination with other plants for the treatment of diabetes (Ozan, 2011; Özkum and Ozan, 2011). Similarly, use of several different combinations of herbal medicines by 11 diabetic patients is documented in this study. For example, one diabetic patient uses decoction of the leaves of *Olea europaea* and *Origanum syriacum* to lower his blood glucose levels. Another patient consumes infusion of the leaves of *Salvia fruticosa* and *M. communis* regularly for the same purpose, while two other patients consume infusion of seeds of *Foeniculum vulgare* and leaves of *O. syriacum*.

Antidiabetic activity of several plant families from Cyprus such as Apiaceae, Fabaceae, Malvaceae, Myrtaceae, Punicaceae and Zingiberaceae has been scientifically validated (Jarald et al., 2008). This points out to the efficacy of medicinal plants in reducing blood glucose levels. Nevertheless, use of herbal medicines may interfere with conventional drugs or result in adverse effects. Traditional use of diuretic plants such as *Urtica urens*, *Nigella sativa*, *Petroselinium crispum*, and *S. fruticosa* by diabetic patients was documented (Demirezer, 2007; Kraft, 2004). Committee on Herbal Medicinal Products functioning under European Medicines Agency (EMA) states that diabetic patients should consult their physician before using *Urtica urens* or *Urtica dioica*. Also, the use of diuretic drugs is not recommended while taking either herbal preparations or aerial parts of *Urtica species*. Concomitant use of other

Table 3. Plants used for the treatment of diabetes in Northern Cyprus and their active principles.

Botanical name	Family	Parts used	Traditional use	Active compounds (References)	Local name	Common name
<i>C. siliqua</i> L.	Fabaceae	Fruit	Decoction is prepared for drinking.	Galactomannan, tannins, lipids, proteins (Bruneton, 1995)	Harnup	Carob
<i>Cinnamomum</i> species	Lauraceae	Bark	Bark decoction or infusion is prepared for drinking.	Essential oil, flavonoids (Bruneton, 1995)	Tarçın	Cinnamon
<i>C. oxycantha</i> L.	Rosaceae	Fruit and flower	Decoction is prepared for drinking.	Proanthocyanidins, phenolic acids, flavonoids (Bruneton, 1995)	Alıç	Hawthorn
<i>F. vulgare</i> Mill.	Apiaceae	Seed	Infusion is used regularly.	Essential oil, coumarins, phenolic compounds (Demirezer, 2007)	Rezene	Fennel
<i>Hibiscus sabdariffa</i> L.	Malvaceae	Flower	Infusion is consumed	Polysaccharides, phenolic compounds (Bruneton, 1995)	Bamya	Roselle
<i>M. sylvestris</i> L.	Malvaceae	Leaves	Cooked by boiling in water and consumed daily.	Phenolic compounds, flavonoids, mucilage (Bruneton, 1995)	Gömeç	Mallow
<i>M. communis</i> L.	Myrtaceae	Essential oil and leaves	Essential oil mixed with water and taken orally. Decoction of leaves used.	Essential oil (Bruneton, 1995)	Mersin	Myrtle
<i>N. sativa</i> L.	Ranunculaceae	Seed	Decoction of seed is consumed.	Thymoquinone (Randhawa and Alghamdi, 2011)	Çörekotu	Black cumin
<i>O. europaea</i> L.	Oleaceae	Leaves	Decoction taken daily.	Secoiridoids, triterpenes, flavonoids (Bruneton, 1995)	Zeytin	Olive
<i>O. syriacum</i>	Lamiaceae	Leaves	Decoction taken orally.	Essential oil (thymol, carvacrol) (Lukas et al., 2009)	Kekik	Thyme

Table 3. Contd.

<i>Petroselinum crispum</i> Mill.	Apiaceae	Leaves and stem	Consumed daily on its own.	Essential oil (Bruneton, 1995)	Maydanoz	Parsley
<i>Punica granatum</i>	Punicaceae	Fruit	Fruit is consumed directly.	Flavonoids, anthocyanins (Aviram et al., 2002), (Hernandez et al., 1999)	Nar	Pomegranate
<i>Prunus species</i>	Rosaceae	Stalk	Infusion is drunk daily.	Quercetin (Melichacova et al., 2010)	Kiraz	Cherry
<i>Rosmarinus officinalis</i>	Lamiaceae	Leaves	Decoction of leaves is consumed daily.	Essential oil, phenolic compounds (Bruneton, 1995)	Lazmarin	Rosemary
<i>S. fruticosa</i> Miller	Lamiaceae	Leaves	Decoction taken orally.	Caffeic acid derivatives, diterpenes, essential oil, flavonoids (Demirezer, 2007)	Adaçayı	Sage
<i>U. urens</i>	Urticaceae	Leaves	Decoction is consumed.	Flavonoids, phenolic compounds, carotenoids, essential oil, histamine (Demirezer, 2007)	Isırgan	Nettle
<i>Viscum album</i> L.	Loranthaceae	Leaves	Infusion is taken orally.	Triterpenoids, phenolic compounds (Bruneton, 1995)	Ökse otu	Mistletoe
<i>Zingiber officinalis</i>	Zingiberaceae	Rhizome	Infusion prepared from grated rhizome.	Oleoresin, essential oil, mono and sesquiterpenes (Demirezer, 2007)	Zencefil	Ginger

diuretic plants with diuretics and diuretic-containing antihypertensives may result in unwanted herb-drug interactions. In this survey, it was observed that 6 patients consume herbal medicines along with their diuretic containing antihypertensive drugs. This places them under risk for potential herb-drug interactions. *Allium sativum*

is one of the most commonly used edible plant in Cypriot cuisine. It is highly possible that a majority of the diabetic patients consume *A. sativum* as condiment and feel it is unnecessary to mention its use, since it is widely used in various recipes of Cypriot cuisine. *A. sativum* is accepted to be a scientifically validated antidiabetic medicinal plant

(Jarald et al., 2008). This in turn may interfere with antidiabetic medicines and result in disregulation of blood glucose levels of patients. Patients who use anticoagulants such as warfarin or clopidogrel and aspirin as an anti-platelet agent should be notified that concomitant consumption of some medicinal plants such as ginkgo biloba, ginseng,

Table 4. Plants used in combination for the treatment of diabetes in Northern Cyprus and their preparation method.

Botanical name	Mixture											
	1	2	3	4	5	6	7	8	9	10	11	
<i>C. siliqua</i> L.						x						
<i>Cinnamomum</i> species	x	x		x		x				x	x	
<i>C. oxycantha</i> L.												
<i>F. vulgare</i> Mill.								x				
<i>Hibiscus sabdariffa</i> L.			x									
<i>M. sylvestris</i> L.												
<i>M. communis</i> L.						x	x		x			
<i>N. sativa</i> L.						x						
<i>O.a europaea</i> L.					x	x						
<i>Origanum syriacum</i> L.	x	x			x	x		x				
<i>Petroselinum crispum</i> Mill.												
<i>Punica granatum</i>												
<i>Prunus</i> species			x									
<i>Rosmarinus officinalis</i>												
<i>S. fruticosa</i> Mill.							x		x	x	x	
<i>U. urens</i> L.						x						
<i>Viscum album</i> L.			x									
<i>Zingiber officinalis</i> L.			x	x								
Preparation method	Decoction	Decoction	Infusion	Infusion	Decoction	Decoction	Infusion	Infusion	Infusion	Infusion	Infusion	Infusion

garlic and ginger may either increase their risk of bleeding or increase the effectiveness of their medicines (Samuels, 2005).

One patient who uses *Crataegus oxycantha*, which is a cardiotoxic plant, also takes isosorbide mononitrate, ramipril, atorvastatin, spirinolactone, furosemide, aspirin and omeprazole. It was documented that *C. oxycantha* may interfere with cardiovascular drugs and reduction may be required in the dose of anti-hypertensives and lipid-lowering medications (*C. oxycantha* Monograph, 2010).

On the contrary, another study reported that the extract of this plant exerts hypotensive effects on type II diabetics with no herb-drug interactions when taken with modern hypoglycaemic, hypolipidemic and/or hypotensive drugs (Walker et al., 2006). Diabetic patients taking anti-hypertensives and other cardiovascular drugs along with their oral hypoglycemic medicine, should consult their doctors before using any medicinal herbs.

Besides, it was seen that most patients who participated in the survey did not consult pharmacists before herbal medicine use. It can be

deduced that the majority recognizes neither the education pharmacists have on medicinal plants nor their knowledge on the use of medicinal plants for the treatment of diseases. Commonly used important medicinal plants with antidiabetic potential are subsequently discussed.

Ceratonia siliqua

C. siliqua has been used as a laxative and

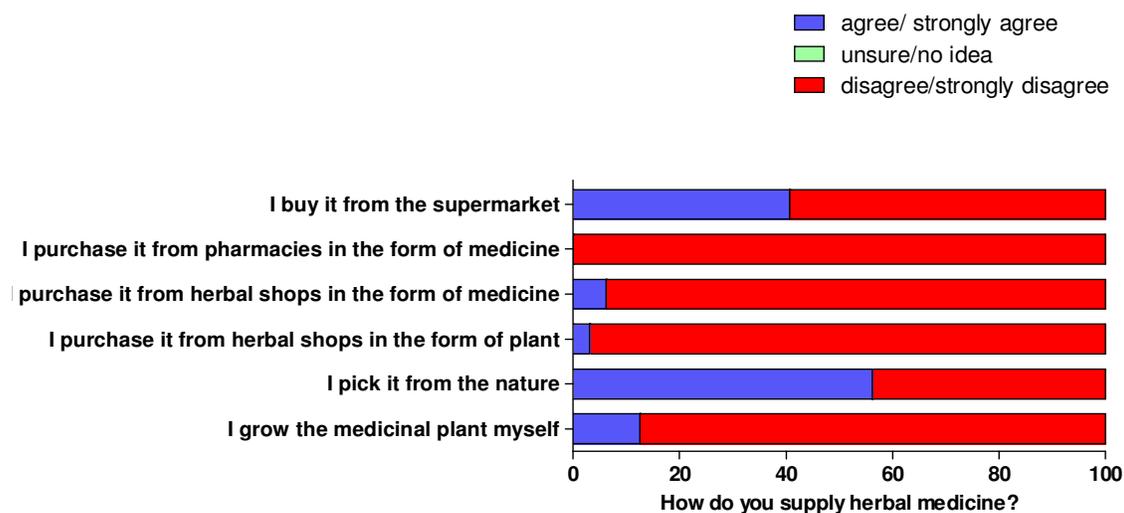


Figure 1. Statements of patients about how they provide herbal medicines they use against diabetes (n = 32).

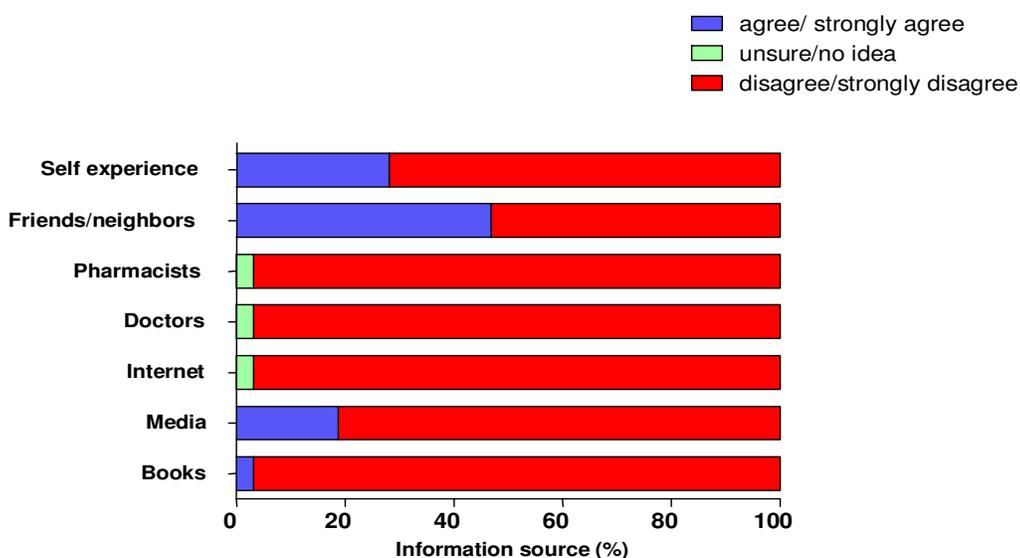


Figure 2. Statements of patients about how they obtain information on herbal medicines (n = 32).

expectorant traditionally in Cyprus (Özkum and Ozan, 2011). Similarly, *C. siliqua* is traditionally used by tribal people in Israel (Jarald et al., 2008). Hydro-alcoholic extract of the seeds of *C. siliqua* was demonstrated to lower the blood glucose level of diabetic rats, this effect is attributed to the presence of phytosterols such as stigmasterol, campesterol and beta-sitosterol (Mokhtari et al., 2011).

Cinnamomum cassia

C. cassia does not belong to the native flora of Cyprus.

Users in Cyprus obtain the bark of this medicinal plant from supermarkets or herb and spice seller. A study carried out in Pakistan on 60 type II diabetic patients stated that 1 to 6 g cinnamon powder filled in capsules consumed orally each day over a period of 60 days reduced not only blood glucose but also lipid levels (Khan et al., 2003). Another study conducted in the United States on 109 type II diabetic patients indicated that use of 1 g of cinnamon powder daily in the form of capsules over a period of 90 days reduced HbA_{1c} by 0.83% (Crawford, 2009). It has been shown that powdered bark of *C. cassia* is more effective in reducing blood glucose levels than infusion or decoction of the bark, which is the

manner in which Cypriots traditionally use the bark (Aslan and Orhan, 2010).

However, a more recent study conducted in the United States concluded that cinnamon powder administered no significant change in fasting blood glucose levels to type II diabetic patients at a dose of 1 g daily for 3 months produces. Blevins (2007) recommended that further studies should be conducted to investigate how variables such as ethnicity, body mass index (BMI), diet and concurrent antidiabetic medications affect cinnamon use. It is advised that patients taking anticoagulant or anti-platelet aggregatory drugs should refrain from consumption of powdered *C. cassia* bark since it can interact with their medicines. Also, users of *C. cassia* bark should watch out for tachycardia, insomnia and depression (Aslan and Orhan, 2010).

Malva sylvestris

Traditionally in Cyprus, this plant is cooked in various ways and consumed at meal times. In traditional medicine of Cyprus, it is used in various ways such as treatment of dermatological disorders, depression, diabetes, gastrointestinal disorders, respiratory tract infections and as an immune stimulant (Ozan, 2011). Recently, a study showed that *M. sylvestris* decoction, which is rich in phenolic compounds, possesses antioxidant properties and can therefore be beneficial in diabetic patients in terms of preventing nephrotoxicity (Marouane et al., 2011).

Myrtus communis

Traditionally, decoction or infusion of *M. communis* leaves is consumed against hypertension, dyslipidemia and diabetes in Cyprus (Ozan, 2011). The extract of phenolic compounds from the leaves of *M. communis* have been demonstrated to have antihyperglycemic effects on diabetic rats (Fahim et al., 2009). In addition, volatile oil obtained from the *M. communis* leaves demonstrated hypoglycaemic effect on alloxan-diabetic rabbits (Sepici et al., 2004).

N. sativa

The infusion or decoction of *N. sativa* seed was prepared and used against diabetes, dyslipidemia and gastrointestinal disorders (Ozan, 2011). A recent study conducted on type II diabetic patients concluded that *N. sativa* seed powder administered to patients at a dose of 2 g/day had hypoglycaemic effects (Bamosa et al., 2010). According to this study, it may be beneficial to administer

Nigella sativa seed powder in conjunction with oral hypoglycemic agents. Another study demonstrated that an extract obtained from the maceration of *N. sativa* seed produced hypoglycemia when administered orally to diabetic patients for three months at a dose of 1 ml/kg/day (Bnouham et al., 2002).

O. europaea

Traditionally, the seed oil of *O. europaea* is combined with the leaves of *U. urens* and *M. sylvestris* and is applied externally as an anti-rheumatoid agent on achy joints (Özkum and Ozan, 2011). Decoction or infusion of the leaves is consumed regularly to lower blood cholesterol levels as part of folk medicine in Cyprus (Ozan, 2011). A study concluded that the alcoholic extract of the leaves of *O. europaea* had hypoglycemic effects in diabetic rats (Eidi et al., 2009). A recent study conducted on alloxan-diabetic rats concluded that ethanolic extract of leaves of *O. europaea* has hypoglycaemic effects (Chandak and Shrangare, 2010). Another study showed the effect of the decoction of the leaves of *O. europaea* on reduction of blood glucose levels as part of folk medicine practice in Morocco (Bnouham et al., 2002).

O. syriacum

It has been documented that in Cyprus, the decoction or infusion of this medicinal plant in combination with *S. fruticosa* and/or *Mentha piperita* was consumed internally as a hypolipidemic and a spasmolytic agent and also against throat aches, colds and upper respiratory tract infections (Özkum and Ozan, 2011). Our investigation showed that 7 patients used the plant against diabetes in this study. Similarly, a study conducted in Morocco revealed that infusion of the leaves of *Origanum* species was used against diabetes (Ziyyat et al., 1997). In addition, a study showed that 50% alcoholic extracts of clonal *Origanum* inhibited porcine pancreatic amylase activity, this effect was attributed to the phenolic antioxidant-rich content, which may mean that *Origanum* may become a part of functional foods for the dietary control of diabetes and contribute to the management of type II diabetes in the future (McCue et al., 2004).

S. fruticosa

In folk medicine of Cyprus, *S. fruticosa* is used either on its own or in combination with other herbal medicines against various cases such as depression, upper respiratory tract infections and hyperlipidemia. Its use as a diuretic, stomachic and spasmolytic agent was also recorded

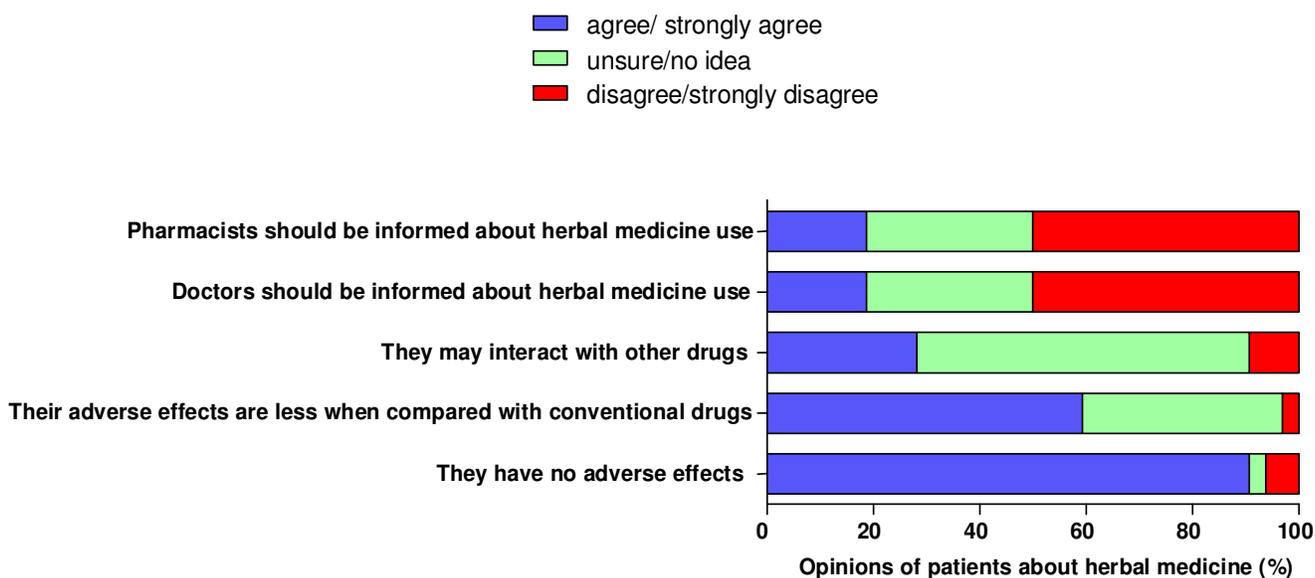


Figure 3. Statements of patients about herbal medicine use (n = 32).

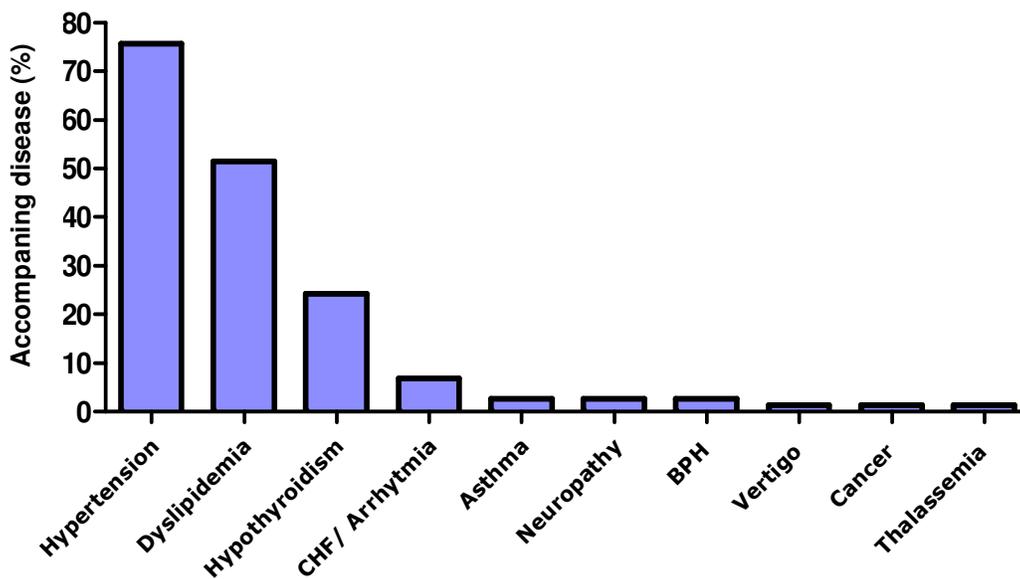


Figure 4. Accompanying disease of the interviewed 100 diabetic patients (n = 74).

(Özkum and Ozan, 2011). Traditional use also includes its utilization as a hypoglycaemic agent. Research revealed that the administration of 10% infusion of the leaves of *S. fruticosa* at an oral dose of 0.25 g/kg produced a reduction in blood glucose levels in alloxan-hyperglycemic rabbits, but not in normoglycemic ones (Perfumi et al., 1991). Other studies pointed out that several other species of the genus *Salvia* produced hypoglycemic activity through different mechanisms in alloxan

or streptozotocin-induced diabetic rats (Huang et al., 2012; Bnouham et al., 2006).

U. urens

U. urens is the most widely used medicinal plants in Cyprus. The seeds of this plant are powdered and mixed with honey and is consumed internally as an anti-tumor

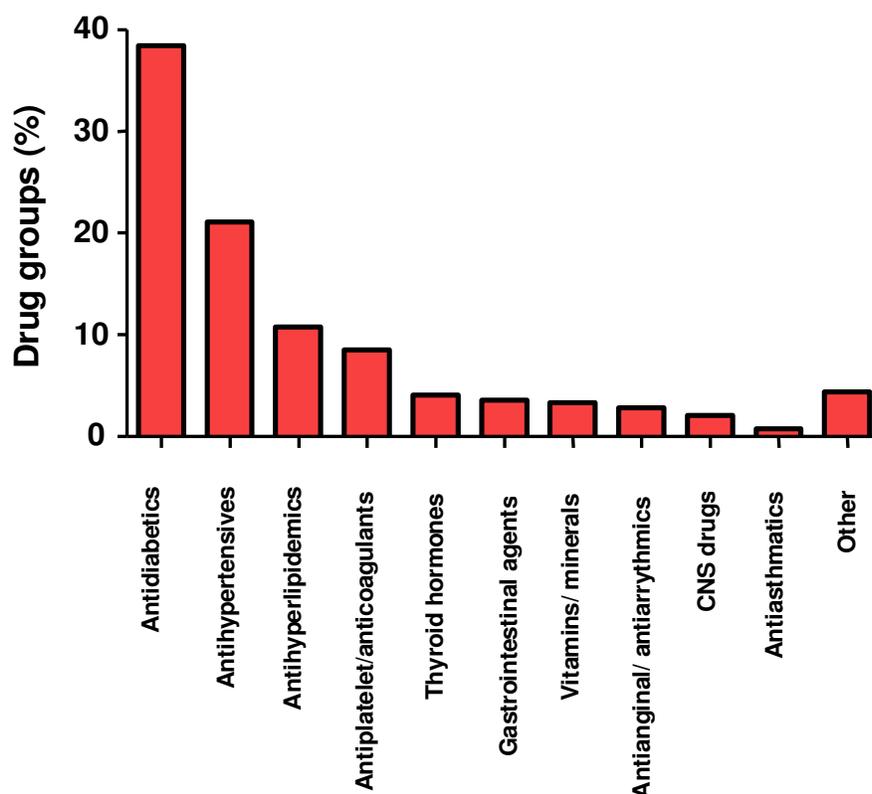


Figure 5. The medication use of the interviewed 100 diabetic patients (n = 388).

agent (Özkum and Ozan, 2011). It is used against various diseases such as diabetes, hypertension, inflammation, dermatological and gastrointestinal disorders as part of folk medicine in Cyprus (Ozan, 2011). It is also used as a medicinal plant in folk medicine of Morocco to lower blood glucose levels (Bnouham et al., 2002). A study revealed that the aqueous extract of *U. urens* produced hypoglycemic effects on rats in an oral glucose tolerance test (Demirezer, 2007).

Conclusion

Ethnobotanical studies are crucial in terms of revealing the traditional use of medicinal plants and guiding research on new drugs. An attempt has been made to complete the ethnobotany of other areas of the Cyprus and to develop evidence-based complementary medicine to cure diabetes. Age, sex, and education can be influencing factors in herbal medicine use. However, we could not evaluate the relation due to the small number of patients that participated in the study. However, further investigations must be carried out with a larger population to identify and elucidate the mechanism of action of these medicinal plants.

ACKNOWLEDGEMENTS

the authors would like to thank Mr. Mertdoğan Soyalan, who gave us the idea of working with diabetic patients; Dr. Hasan Sav, endocrinologist at the Dr. Burhan Nalbantoğlu Hospital for his support to the survey; Prof. Rümeyza Demirdamar, founding Dean of Near East University, Faculty of Pharmacy for her valuable contribution and all the diabetic patients who participated in the study.

REFERENCES

- Aslan M, Orhan N (2010). Diyabet tedavisinde kullanılan bitkisel ürünler ve gıda destekleri. MISED 23-24:27-38.
- Aviram M, Dornfeld L, Kaplan M, Coleman R, Gaitini D, Nitecki S, Hofman A, Rosenblat M, Volkova N, Presser D, Attias J, Hayek T, Fuhrman B (2002). Pomegranate juice flavonoids inhibit low-density lipoprotein oxidation and cardiovascular diseases: studies in atherosclerotic mice and in humans. *Drugs Exp. Clin. Res.* 28:49-62.
- Bamosa A, Kaatabi H, Lebda F, Al Elo A, Al-Sultan A (2010). Effect of *Nigella sativa* seeds on the glycemc control of patients with type II diabetes mellitus. *Ind. J. Physiol. Pharmacol.* 54(4):344-354.
- Blevins SM, Leyva MJ, Brown J, Wright J, Scofield RH, Aston CE (2007). Effect of *Cinnamon* on glucose and lipid levels in non-insulin-dependent type 2 Diabetes. *Diabetes Care* 30(9):2236-2237.
- Bnouham M, Mekhfi H, Legssyer A, Ziyat A (2002). Medicinal plants used in the treatment of diabetes in Morocco. *Int. J. Diabetes Metab.*

- 10:33-50.
- Bnouham M, Ziyat A, Mekhfi H, Tahri A, Legssyer A (2006). Medicinal plants with potential antidiabetic activity – A review of ten years of medicine research (1990-2000). *Int. J. Diabetes Metab.* 14:1-25.
- Bruneton J (1995). *Pharmacognosy, Phytochemistry and Medicinals*. Lavoisier Publishing, Paris, France.
- Chandak R, Shrangare G (2010). Evaluation of antidiabetic activity of *Olea europaea* in Wistar Albino Rats. *IJABPT* 1(3):952-956.
- Crataegus, *oxycantha*, Monograph (2010). *Altern. Med. Rev.* 15(2):164-167.
- Crawford P (2009). Effectiveness of *Cinnamon* for lowering hemoglobin A1C in patients with type 2 diabetes: A randomized, controlled trial. *J. Am. Board Fam. Med.* 22:507–512.
- Della A, Paraskeva-Hadjichambi D, Hadjichambis A (2006). An Ethnobotanical Survey of Wild Edible Plants of Paphos Countryside of Cyprus. *J. Ethnobiol. Ethnomed.* 2:34.
- Demirezer O. (2007). *Plants used in the treatment Monographs on-FFD*. Ankara, Turkey: Nobel Medical Bookstores
- Eidi A, Eidi M, Darzi R (2009). Antidiabetic effect of *Olea europaea* L. in normal and diabetic rats. *Phytother. Res.* 23(3):347-350.
- Fahim AB, El-Ghaithi M, Ramesh S, Dhayabaran D (2009). Biochemical studies on the effect of phenolic compounds extracted from *Myrtus communis* in diabetic rats. *Tamilnadu J. Vet. Anim. Sci.* 5(3):87-93.
- Georgiades CC (1987). *Flowers of Cyprus, Plants of Medicine*. Nicosia, Cyprus. 1:103.
- Georgiades CC (1992). *Flowers of Cyprus, Plants of Medicine*. Nicosia, Cyprus. 2:99.
- Ghosh S, Collier A (2012). *Churchill's Pocketbook of Diabetes*. 2nd edition. Elsevier Health Sci.
- Huang M, Xie Y, Chen L, Chu K, Wu S, Lu J, Chen X, Wang Y, Lai X (2012). Antidiabetic effect of the total polyphenolic acids fraction from *Salvia miltiorrhiza* Bunge in diabetic rats. *Phytother. Res.* 26(6):944-948.
- Hernandez F, Melgarejo P, Tomas-Barberan F, Artes F (1999). Evolution of juice anthocyanins during ripening of new selected pomegranate (*Punica granatum*) clones. *Eur. Food Res. Technol.* 210:39-42.
- International Plant Names Index (IPNI) (2012). NEWS - July 2012 <http://www.ipni.org/>.
- Jarald E, Joshi SB, Jain DC (2008). Diabetes and herbal medicines. *Iranian J. Pharmacol. Ther.* 7(1):97-106.
- Khan A, Safdar M, Khan M, Khan N, Anderson R (2003). *Cinnamon* improves glucose and lipids of people with type 2 diabetes. *Diabetes Care* 26(12):3215-3218.
- Kraft K, Hobbs C (2004). *Pocket Guide to Herbal Medicine*. Ludwigsburg, Germany: Druckhaus Götz.
- Lardos A (2006). The botanical *materia medica* of the *latrosophikon-A* collection of prescriptions from a monastery in Cyprus. *J. Ethnopharmacol.* 104:387-406.
- Lukas B, Schmiederer C, Franz C, Novak J (2009). Composition of essential oil compounds from different syrian populations of *Origanum syriacum* L. (Lamiaceae). *J. Agric. Food Chem.* 57(4):1362-1365.
- Marles R, Farnsworth N (1995). Antidiabetic plants and their active constituents. *Phytomedicine* 2:137-189.
- Marouane W, Soussi A, Murat J, Bezzine S, El Feki A (2011). The protective effect of *Malva sylvestris* on rat kidney damaged by vanadium. *Lipids Health Dis.* 10 (65):1-8.
- McCue P, Vatter D, Shetty K (2004). Inhibitory effect of clonal oregano extracts against porcine pancreatic amylase *in-vitro*. *Asia Pac. J. Clin. Nutr.* 13 (4):401-408.
- Meikle RD (1977). *Flora of Cyprus*. The Bentham-Moxon Trust Publishers. Kew London.
- Meikle RD (1985). *Flora of Cyprus, Volume 2*. The Bentham-Moxon Trust Publishers. Kew, London.
- Melichacova S, Timoracka M, Bystricka J, Vollmannova A, Cery J (2010). Relation of total antiradical activity and total polyphenol content of sweet cherries (*Prunus avium* L.) and tart cherries (*Prunus cerasus* L.). *Acta Agric. Slovenica* 95(1):21-28.
- Mokhtari M, Sharifi S, Shahamir TM (2011). The Effect of hydro – alcoholic seeds extract of *Ceratonia siliqua* on the blood glucose and lipids concentration in diabetic male rats. *Inter. Conf. Life Sci. Technol.* 3:82-86.
- Ozan Ç (2011). Kuzey Kıbrıs'ta kullanılan tıbbi bitkiler. [An Investigation on the Medicinal Plants of Northern Cyprus.]. Master of Science thesis, Near East University Institute of Health Sciences Department of Pharmaceutical Botany/ Pharmacognosy, Nicosia. Turkish Republic of Northern Cyprus.
- Özkum D, Ozan Depreli Ç (2011). Combinations of medicinal plants used as traditional medicine in Northern Cyprus. *Near East Med. J.* 1(2):60-68.
- Parildar H, Serter R, Yesilada E (2011). Diabetes mellitus and phytotherapy in Turkey. *J. Pak. Med. Assoc.* 61(11):1116-1120.
- Perfumi M, Arnold N, Tacconi R (1991). Hypoglycaemic activity of *Salvia fruticosa* Mill. from Cyprus. *J. Ethnopharmacol.* 34:135-140.
- Randhawa M, Alghamdi M (2011). Anticancer activity of *Nigella sativa* (black seed) – a review. *Am. J. Chin. Med.* 39 (6):1075-1091.
- Rao M, Sreenivasulu M, Chengaiah B, Reddy K, Chetty C (2010). Herbal medicines for diabetes mellitus: A review. *Int. J. Pharm. Tech. Res.* 2(3):1883-1892.
- Samuels N (2005). Herbal remedies and anticoagulant therapy. *Thromb. Haemost.* 93:3-7.
- Samad A, Shams MS, Ullah Z, Wais M, Nazish I, Sultana Y, Aqil M (2009) Status of herbal medicines in the treatment of diabetes: a review. *Curr. Diabetes Rev.* 5(2):102-111.
- Sepici A, Gurbuz I, Cevik C, Yesilada E (2004). Hypoglycaemic effects of myrtle oil in normal and alloxan-diabetic rabbits. *J. Ethnopharmacol.* 93:311-318.
- Viney DE (1994). *An Illustrated Flora of North Cyprus, Vol 1*. Koenigstein: Koeltz Scientific Books p. 697.
- Viney DE (1996). *An Illustrated Flora of North Cyprus, Vol 2*. A.R.G. Gantner Verlag K.-G. Vadus/Liechtenstein. p. 167.
- Walker A, Marakis G, Simpson E, Hope J, Robinson P, Hassanein M, Simpson H (2006). Hypotensive effects of hawthorn for patients with diabetes taking prescription drugs: a randomized controlled trial. *Br. J. Gen. Pract.* 56:437-443.
- Ziyat A, Legssyer A, Mekhfi H, Dassouli A, Serhrouchni M, Benjelloun W (1997). Phytotherapy of hypertension and diabetes in oriental morocco. *J. Ethnopharmacol.* 58(1):45-54.

APPENDIX 1



DEPARTMENT OF PHARMACEUTICAL BOTANY
 FACULTY OF PHARMACY
 NEAR EAST UNIVERSITY
 SURVEY ABOUT FOLK MEDICINES USED IN NORTHERN CYPRUS AGAINST DIABETES

“This survey aims to increase the quality of health services. Your contribution solely serves this purpose and does not place you in a liable position.”

***Would you like to participate in our survey about the herbal medicine use against diabetes?

Yes No

Code:

Date:

A. PERSONAL INFORMATION

1. Name-Surname :.....

2. Age:.....

3. Sex: Female Male

4. Education status:
Primary school Secondary school High school University Postgraduate (MSc, PhD)

5. Occupation:.....

6. Type of diabetes? Type 1 Type 2 ...

7. Do you have any other chronic disease?

No Yes (define here).....

8. What are the medicines do you use on a regular basis?

Name	Dosage	Usage
.....		
.....		
.....		
.....		
.....		
.....		

9. Do you use any herbal remedies against diabetes?

No Yes

10. Where do you obtain herbal remedies? (You may select more than one answer)

(5)Absolutely yes (4)Yes (3)I have no idea (2)No (1)Absolutely no

I grow the herbs myself.	5	4	3	2	1
I pick the herbs from the neighborhood.	5	4	3	2	1
I buy the herbs from the spice seller.	5	4	3	2	1
I buy the herbal supplement as a medicinal product from the spice seller.	5	4	3	2	1
I buy the herbal supplement as a medicinal product from the pharmacy.	5	4	3	2	1
Other (Explain.....)	5	4	3	2	1

11. Sources from which I obtain information on herbal medicines:

Books	5	4	3	2	1
Magazines/ Newspapers/TV/Media	5	4	3	2	1
Internet	5	4	3	2	1
Doctors	5	4	3	2	1
Pharmacists	5	4	3	2	1
Relatives, neighbors, friends	5	4	3	2	1
Own experience	5	4	3	2	1
Other (Explain.....)	5	4	3	2	1

12. Herbal medicines/supplements used against diabetes.....

Do not have any side effects	5	4	3	2	1
Have less side effects when compared with prescription medicine	5	4	3	2	1
May interact with other medicines.	5	4	3	2	1
Pharmacists must be informed of their use.	5	4	3	2	1
Doctors must be informed of their use.	5	4	3	2	1

B. INFORMATION ABOUT HERBAL MEDICINES

*Name of herbal medicine:.....
 Purpose of use:.....
 Method of use:.....
 *Other.....

C. HERBAL MEDICINE USED

Herbaryum No:

1. Local name of medicinal plant:.....
 Scientific name of medicinal plant:.....
 2. Parts used:
 3. Aim for the use of medicinal plant:.....
 4. Use of medicinal plant: Alone In a mixture
 5. Method of use/preparation :Directly Infusion Decoction Other
 6. Route of administration : Internal use External use
 7. Dose/day :
 8. Time of administration :
 - a. Before food After food
 - b. Morning Lunch Dinner
 9. Duration of use: days weeks continuous use
 10. Effect: Positive Negative
 11. Side effects: No Yes
- (If yes, please explain:.....)

Herbal medicine in the treatment of diabetes mellitus Norah A. Al-Rowais, MSc, KSF. ABSTRACT Objectives: The use of herbs is common among Results: Two hundred and ninety six diabetic patients diabetics. The aim of this study is to determine the out of 300 were interviewed giving a response rate of prevalence of the use of herbs among diabetics and which 98.6%. Fifty-one subjects (17.4%) reported using some herbs are used.