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Traditional Use of Medicinal Plants for the Treatment of Diabetes Mellitus in Basra

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ABSTRACT

This study aimed to document traditional use of medicinal plants for the treatment of diabetes mellitus in Basra city, south-eastern of Iraq and to compare this information with current knowledge of plant medicine in Iraq and other Mediterranean countries, to preserve valuable information about the traditional plants used for treatment of type 2 diabetes mellitus and also to discover new treatment for diabetes. This study was conducted during the period from February to April, 2015. 199 diabetic patients aged between 20 and 80 years were included in this study, 117 patients were females and 82 were males. In addition, the relative importance of each medicinal plant species reported as use value (UV). This study reported the medicinal uses of 16 plants, species belonging to 16 families. The most commonly used plant species are Boswellia Carterii, Commiphora myrrha, Citrullus Colocynthis, Olea europaea and Trigonella foenum-graecum. Some plants are used for medicinal purposes both in Basra and in other parts of Mediterranean countries, either for the same or for different purposes. This paper helps to preserve valuable information about the traditional plants used for treatment of type 2 diabetes mellitus and also to discover new treatment for diabetes.

Keywords: Ethno botany, Boswellia Carterii, Commiphora myrrha, Citrullus Colocynthis, type 2 diabetes mellitus, Basra, Iraq.

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INTRODUCTION

Diabetes mellitus (DM) is a progressively prevalent metabolic disease affecting hundreds of millions of people in the world and costing the healthcare billions of dollars[1]. In the period between 1995 and 2025, diabetes is predictable to increase by 48% in the developing countries and 27% in developed countries[2]. The whole number of people with T2DM is predicted to increase to 526 millions in 2030[3]. Diabetes considered as one of the leading cause of death and may cause a major health complication, such as renal failure, macro-and micro vascular dysfunctions, heart disease, and blindness[4]. A study published in 2008, revealed that the prevalence of T2DM in Basra estimated as 7.43%[5]. It is well known that a traditional medicinal use of plants is the basis for the most important pharmaceutical products[6]. In general, the use of traditional medicinal plants rose significantly over the last two decades[7-10]. Fenugreek (*Trigonella foenum graecum*) is the most widely used herb by diabetic patients. The Fenugreek seeds are widely used in South Asia and Europe and commonly used in Middle Eastern countries as a spice, it has been revealed in animal studies to have anti-diabetic properties[11, 12]. The second most widely used herb by diabetic patients is cinnamon (Cinnamomum zeylanicum), many clinical tests in diabetic patients established its hypoglycemic effects. Furthermore, most patients used a mixture of herbs either alone or in combination with antidiabetic treatments. This study aimed to document traditional use of medicinal plants for the treatment of diabetes mellitus in Basra and to compare this information with our current knowledge of plant medicine in Iraq and other Mediterranean countries.

MATERIALS AND METHOD

Study area

Figure 1: Basra city, south-eastern of Iraq

Basra city is located in the south-eastern part of Iraq (Figure 1), on the border with Kuwait and Iran. It is considered having a subtropical hot desert climate with the poor reservoir of plant diversity. However, it is hosting the main port in Iraq, Um Qasr, which is the only shipping hub in the country, so it is an administrative and commercial center for Iraq, with a population of about 1.5 million (according to a 2002 estimate). A lot is to be gained from a better knowledge of traditional plant medicines used in Basra.

Study Design

This study was conducted during the period from February to April, 2015 and the patients were selected during their visit to Diabetes Endocrine and Metabolism Centre in Al-Mawanee Jeneral Hospital in Basra. 199 diabetic patients aged between 20 and 80 years were included in this study, 117 patients were females and 82 were males. Patients were excluded from the study if they were type 1 diabetic or if they have any cognitive problems. A questionnaire was asked to the patients to know if they are using herbs for their diabetes or no. Also, the questionnaire were including information such as: age, sex, marital status, education level, disease history, drug history, herb history and the duration of herb use. Also, the patients were asked about any experienced side effects from herbs and the action of the patient to that effect e.g. stopping the herb intake or reducing the amount used. Ethics approval was obtained from Basra Health office, Ethics Committee for Human Research and from Al-Mawanee Jeneral Hospital in Basra. Relative importance of each medicinal plant species identified locally to be used as herbal medicine was reported as use value (UV) which is calculated as follows[24]

$$UV = \frac{\sum U}{N}$$

Where, UV: use value of a species; U: number of uses per species and N: number of informants.

Laboratory investigations

Glycated hemoglobin (HbA1C) was measured by D-10 Dual Program Bio-Rad Laboratories, Inc., Hercules, CA 94547, 220-020, California; USA. D-10 Dual Program is based on chromatographic separation of the analytes by ion-exchange (HPLC).

Statistical Analysis

Statistical analysis was performed using GraphPad Prism software (version 5.0, GraphPad Software, Inc., San Diego, CA). Pearson Chi square test was used and the results with $P < 0.05$ were considered significantly different.

RESULTS AND DISCUSSION

A total of 199 diabetic patients were included in this study, 117 were females and 82 were males. 132 patients were reported using herbs for their diabetes, 80 of which were females and 52 were males and also, 107 of them were under 65 years old, 30 patients complaining from more than two concomitant diseases and 45 patients were in high education levels (table 1). There was no significant difference in the glycated haemoglobin (HbA1C) level between the diabetic patients using and not using herbs. Sixteen medicinal plants were reported to be used by patients for their diabetes, species belonging to 16 families. The most frequently used plant species were Boswellia Carterii, Commiphora myrrha, Citrullus Colocynthis, Olea europaea and Trigonella foenum-graecum. Six herbs only from these 16 were reported by literatures to be used in diabetes. These include Olea europaea (Zaitoon), Trigonella foenum-graecum (Hulbah), Coriandrum sativum (Kwzbarah), Cinnamomum Zeylanicum (Darseen), Nigella sativa (Habba soda) and Teucrium polium (Jeada) (table 2).

Table 1: Socioeconomic characteristics of the study sample

Characteristics **No. of patients (%)**	Used herbs **132 (66.3)**	Not used herbs **67 (33.7)**	Total **199**	*P* value
Sex (%)				0.4660 *
Male	52(39.4)	30 (44.8)	82 (41.2)	
Female	80 (60.6)	37 (55.2)	117 (58.8)	
Age (%)				0.0325 *
Less than 65	107(81.1)	62 (92.5)	169 (84.9)	
65 years and over	25 (18.9)	5 (7.5)	30 (15.1)	
Marital status (%)				0.0194 *
Unmarried	23 (17.4)	5 (7.46)	28 (14.0)	
Married	90 (68.2)	58 (86.6)	148 (74.4)	
other	19 (14.4)	4 (5.97)	23 (11.6)	
Level of education (%)				0.1047 *
Primary school or less	47 (35.6)	28 (41.8)	75 (37.7)	
High school or Diploma	45 (34.1)	28 (41.8)	73 (36.7)	
Bachelor degree or more	40 (30.3)	11(16.4)	51 (25.6)	
Concomitant disease (%)				0.2984 *
0-2 diseases	102 (77.3)	56 (83.6)	158 (79.4)	
> 2 diseases	30 (22.7)	11(16.4)	41(20.6)	
Concomitant drugs (%)				< 0.0001 *
0-2 drugs	66 (50)	56 (83.6)	122 (61.3)	
> 2 drugs	66 (50)	11(16.4)	77 (38.7)	
Duration of herb use (%)				
< 3 months	51 (38.6)	-	-	
3 months – 1year	38 (28.8)	-	-	
> 1year	43 (32.6)	-	-	
HbA1C (%)				

< 6.3	18 (13.6)	9 (13.43)	27 (13.6)	0.1755 *
6.3 – 8	26 (19.7)	21 (31.34)	47 (23.6)	
> 8	88 (66.7)	37 (55.22)	125 (62.8)	

Bold indicates statistical significance ($p < 0.05$).

* Pearson Chi-square test

Table 2: List of medicinal plants used in traditional medicine for diabetes in Basra

Botanical name	Family	Arabic Name	Parts used	Methods	UV	Reported literature uses
Boswellia Carterii	Burseraceae	Luban	Resin	Gum chewing	0.39	Rheumatoid arthritis and Anti-inflammatory (26), treatment of gout, ulcers, oral health and for production of plasters (27)
Commiphora myrrha	Burseraceae	Mormaky	Resin	Infusion	0.2	Anti-inflammatory (16), respiratory catarrh, fasciolopsis, furunculosis, and ulcers (34 - 40)
Citrullus Colocynthis	Cucurbitaceae	Handal	Seeds	Decoction	0.2	Rheumatism, arthritis (13), diuretic, cathartic and abortive (15)
Olea europaea	Oleaceae	Zaitoon	Oil and leaves	Decoction	0.15	Urinary system and stones (13), laxative (15), astringent, hypotensive, antidiabetic, diuretic, antibacterial, hepatic troubles, antidote against poisons, hair tonic (14).
Trigonella foenum-graecum	Fabaceae	Hulbah	Seeds	Infusion	0.13	Reduces sugar, diuretic (17- 20).
Artemisia herba-alba	Asteraceae	Shaih	Aerial parts and roots	Decoction	0.12	Digestive system (13), cough, stomach and intestinal pain, antipyretic and for eye diseases (14)
Allium sativum	Alliaceae	Thom	Bulbs	Bulbs are eaten or juice taken orally	0.11	Skin and circulatory system (13), whooping cough, antirheumatic and corn-killer (15)
Salvia triloba	Lamiaceae	Meirameieh	Leaves	Decoction	0..08	Astringent, antidandruff (15), colic pain, oral infection female sterility (14)
Vitis Vinifera	Vitaceae	Grape	leaves	Decoction	0.07	Not reported
Coriandrum sativum	Apiaceae	Kwzbarah	Seeds and aerial parts	Decoction	0.05	Diabetes and stomach ache (17)
Cinnamomum Zeylanicum	Lauraceae	Darcien or Kerfah	Bark	Decoction	0.05	Diabetes (20- 23)
Citrus limon	Rutaceae	Lemon	Fruit	Fruit extract	0.03	Not reported
Nigella sativa	Ranunculaceae	Habba soda	Seeds	Decoction	0.02	Dizziness and blood sugar reduction (17)
Asian ginseng	Araliaceae	Tanko	Root	Decoction	0.02	Not reported
Teucrium polium	Lamiaceae	Jeada	Aerial parts	Infusion	0.008	Digestive system (13), antispasmodic, antidiabetic, kidney stones (15)
Punica granatum	Lythraceae	Ruomman	Cortex of fruits	Decoction	0.008	Diarrhea (17)

This study was designed to document traditional use of medicinal plants for the treatment of diabetes mellitus in Basra and to compare this information with current knowledge of plant medicine in Iraq and other Mediterranean countries. The traditional uses of 16 medicinal plants belonging to 16 families were reported in this study and the most-used plant species were Boswellia Carterii, Commiphora myrrha, Citrullus Colocynthis, Olea europaea and Trigonella foenum-graecum (fenugreek). There are a number of studies in Mediterranean countries documented traditional use of medicinal plants for different diseases including diabetes. A previous study carried out in Jordan revealed that among the medicinal plants used for different diseases, the fewest number of plant species was used for treatment of diabetes, for examples of the highest UV plants were Artemisia judaica, Teucrium polium, Salvia triloba, Trigonella foenum-graecum (fenugreek) and Paronychia argentea as the plants most used for diabetes[28]. Another study conducted in Saudi Arabia revealed that the most frequent type of herbs used among the diabetic patients included in their study were Commiphora myrrha, black seed, helteet and fenugreek[29]. Furthermore, in Morocco fenugreek was the first between the top 10 antidiabetic plants[29]. Also, further studies in Morocco and Algeria, confirmed that infusion or decoction of Centaurium erythraea Rafn (family Gentianaceae) and Artemisia herba-alba Asso (family Asteraceae) are used orally in the treatment of diabetes[30-33]. Fenugreek (Trigonella foenum graecum) seems as well known herb in many Mediterranean countries. It is the most widely used herb by diabetic patients. The Fenugreek seeds are widely used in South Asia and Europe and commonly used in Middle Eastern countries as a spice, it has been revealed in animal studies to have anti-diabetic properties[11, 12]. Artemisia herba-alba also known herb in Mediterranean countries, as mentioned in the studies but, its use for diabetes not reported in the literatures. Commiphora myrrha plant appears to be the most well-known herb in Saudi Arabia and Basra, as indicated by its high UV, and also, its use for diabetes not reported in the literatures. While the uses of plants showed considerable similarity between Basra and other Mediterranean countries, this study reported some different medicinal uses for the first time in the studied area, for example the use of Boswellia Carterii (Luban) and Citrullus Colocynthis (Handal) for diabetes. However, there was no significant difference in the glycated haemoglobin (HbA1C) level between the diabetic patients using and not using herbs. The Boswellia species (Burseraceae) are trees inhabitant to Ethiopia, Somalia, India, and the Arabic peninsula, produces a gum resin known as olibanum (frankincense). It is revealed that the resin of Boswellia carteri and Boswellia serrata has been used in the traditional medicine in many countries for the treatment of rheumatoid arthritis and other inflammatory diseases[26]. The stated use of

frankincense (Boswellia carterii) dates back to 3000 B.C. primarily used as an incense until the year 200 AD, where its use expanded to medicinal purposes for the treatment of gout, ulcers, oral health and also for the production of manufactured plasters[27]. However, the use of this plant for diabetes not reported in the literatures. It seems to be the most well-known antidiabetic herb in Basra, as indicated by its high UV. Several unusual uses and believes were recorded e.g. Citrullus colocynthis, a well-known toxic plant, is reported to be used by patients internally for the treatment of diabetes. Increasingly, traditional methods are being replaced by modern technology and the active and safe constituents can be separated.

CONCLUSION

This study allowed collecting for the first time information about traditional uses of medicinal plants for diabetes in Basra. This could be a starting point to develop standardized anti-diabetic herbal preparation and discover new chemical entities for the development of future diabetic medicine. Our interviews with patients in the study area revealed that plants are still commonly used for medicinal purposes by people in their daily lives. However, there is a gradual loss of traditional knowledge about these plants as the inter-generational transmission of knowledge is declining. Boswellia Carterii, Commiphora myrrha, Citrullus Colocynthis and Olea europaea plants need further investigations for their use in diabetes.

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