Traditional use of medicinal plants for the treatment of diabetes mellitus in Basra

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Abstract

Ethno pharmacological importance: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 our current knowledge of plant medicine in Iraq and other Mediterranean countries.

Materials and methods:This study was conducted during the period from February to April, 2015. 127 diabetic patients aged between 20 and 65 years were included in this study, 72 patients were females and 55 were males. In addition, the relative importance of each medicinal plant species reported as use value (UV) and informant consensus factor (FIC) was calculated for the medicinal plants included in the study.

Results: We report the medicinal uses of 14 plants, species belonging to 14 families. The most commonly used plant species are BoswelliaCorterri, CitrullusColocynthis and Oleaeuropaea.

Conclusions: 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 that may otherwise be lost to future generations.

Key wards: medicinal plants, diabetes mellitus, BoswelliaCorterri, CitrullusColocynthis.

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 (*Trigonellafoenumgraecum*) 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 (Cinnamomumzeylanicum), 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.

Subjects and Methods

Study area

Basra city is located in the south-eastern part of Iraq (Fig.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

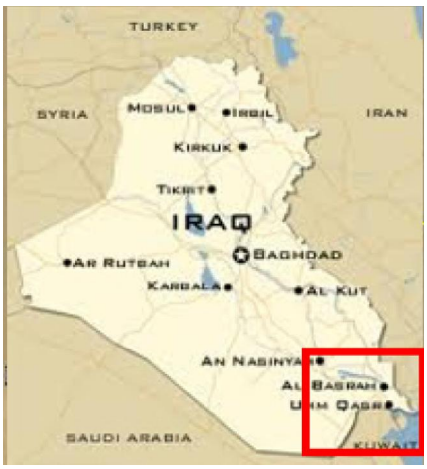

Figure 1. Basra city, south-eastern of Iraq

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-MawaneeJeneral Hospital in Basra. 127diabetic patients aged between 20 and 75 years were included in this study, 72 patients were females and 55 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-MawaneeJeneral 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;
N: number of informants.

Informant consensus factor (Fic) was working to deduce the similarity of the information about a specific medicinal plant used to treat a certain category of ailments. The product of this factor ranges from 0 to 1. High value indicates that the species are, relatively, used by a large proportion of people indicating a more consistent use of the medical resources. While a low value indicates that informants disagree on the species

to be used in treatment within a category of illness. Informant consensus factor (Fic) is calculated as in the following formula (25):

$$Fic = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Where
n_{ur}: number of use reports per each category;
n_t: number of taxa used.

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, one –way ANOVA and the unpaired Student's t-test were used. Results with $P < 0.05$ were considered significantly different.

Results

A total of 127 diabetic patients were included in this study, 55 were males and 72 were females. Sixty patients were reported using herbs for their diabetes, 25 of which were females and 35 were males and also, twenty six of them were under 55 years old, sixteen patients complaining from more than two concomitant diseases and sixteen 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.

Table 1: Socioeconomic characteristics of the study sample

Characteristics No. of patients (%)	Used herbs 60 (47.2)	Not used herbs 67 (52.8)	Total 127	*P* value
Sex (%)				
Male	25 (45.5)	30 (54.5)	55 (43.3)	0.8578[A]
Female	35 (48.6)	37 (51.4)	72 (56.7)	
Age (%)				
< 45	12 (34.3)	23 (65.7)	35 (27.6)	0.6302[B]
45-64	37 (48.7)	39 (51.3)	76 (59.8)	
≥ 65	11(68.8)	5 (31.2)	16 (12.6)	
Marital status (%)				
Unmarried	2 (28.6)	5 (71.4)	7 (5.5)	0.1917 [B]
Married	54 (48.2)	58 (51.8)	112 (88.2)	
other	4 (50)	4 (50)	8 (6.3)	
Level of education (%)				
Primary school or less	23 (45)	28 (55)	51 (40.2)	0.5938 [B]
High school or Diploma	21(42.9)	28 (57.1)	49 (38.6)	
Bachelor degree or more	16 (59.3)	11(40.7)	27 (21.3)	
Concomitant disease (%)				
0-2 diseases	44 (44)	56 (56)	100 (78.7)	0.7513 [B]
> 2 diseases	16 (59.3)	11(40.7)	27(21.3)	
Concomitant drugs (%)				
0-2 drugs	40 (41.7)	56 (58.3)	96 (75.6)	0.8262 [B]
> 2 drugs	20 (64.5)	11(35.5)	31(24.4)	
Duration of herb use (%)				
< 3 months	26 (43.3)	-	-	
3 months – 1year	14 (23.3)	-	-	
> 1year	20 (33.4)	-	-	
HbA1C (%)				
< 6.3	9 (50)	9 (50)	18 (14.2)	0.6547 [B]
6.3 – 8	10 (32.3)	21 (67.7)	31 (24.4)	
> 8	41 (52.6)	37 (47.4)	78 (61.4)	

[A]Chi-square, [B] Paired t test, all not significant (significance *P*<0.05).

We report 14 medicinal plants used by patients for their diabetes, species belonging to 14 families. The most frequently used plant species were BoswelliaCorterri, CitrullusColocynthis and Oleaeuropaea. Four herbs only from these 14 were reported

by literatures to be used in diabetes. These include Coriandrumsativum (Kwzbarah), CinnamomumZeylanicum (Darseen), Trigonellafoenum-graecum (Hulbah) and Nigella sativa (Habba soda) (table 2).

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
BoswelliaCorterri	Burseraceae	Luban	Resin	Gum chewing	0.38	treatment of gout, ulcers, oral health and for production of plasters (26)
Artemisia herba-alba	Asteraceae	Shaih	Aerial parts and roots	Decoction	0.13	Digestive system (13), cough, stomach and intestinal pain, antipyretic and for eye diseases (14)
CitrullusColocynthis	Cucurbitaceae	Handal	Seeds	Decoction	0.23	Rheumatism, arthritis (13), diuretic, cathartic and abortive (15)
Salvia triloba	Lamiaceae	Meirameieh	Leaves	Decoction	0.12	Astringent, antidandruff (15), colic pain, oral infection female sterility (14)
VitisVinifera	Vitaceae	Grape	leaves	Decoction	0.08	Not reported
Commiphoramyrrha	Burseraceae	Mormaky	Resin	Infusion	0.17	Anti-inflammatory (16)
Allium sativum	Alliaceae	Thom	Bulbs	Bulbs are eaten or juice taken orally	0.15	Skin and circulatory system (13), whooping cough, antirheumatic and corn-killer (15)
Oleaeuropaea	Oleaceae	Zaitoon	Oil and leaves	Decoction	0.2	Urinary system and stones (13), laxative (15), astringent, hypotensive, antidiabetic, diuretic, antibacterial, hepatic troubles, antidote against poisons, hair tonic (14).
Asian ginseng	Araliaceae	Tanko	Root	Decoction	0.02	Not reported
Coriandrumsativum	Apiaceae	Kwzbarah	Seeds and aerial parts	Decoction	0.07	Diabetes and stomach ache (17)
CinnamomumZeylanicum	Lauraceae	Darcien or Kerfah	Bark	Decoction	0.05	Diabetes (20- 23)
Citrus limon	Rutaceae	Lemon	Fruit	Fruit extract	0.03	Not reported
Trigonellafoenum-graecum	Fabaceae	Hulbah	Seeds	Infusion	0.03	Reduces sugar, diuretic (17- 20).
Nigella sativa	Ranunculaceae	Habba soda	Seeds	Decoction	0.02	Dizziness and blood sugar reduction (17)

Discussion

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 our current knowledge of plant medicine in Iraq and other Mediterranean countries. The traditional uses of 14 medicinal plants belonging to 14 families are reported in this study and the most-used plant species are BoswelliaCorterri (Luban), CitrullusColocynthis (Handal) and Oleaeuropaea (Zaitoon). Four herbs only from these 14 were reported by literatures to be used in diabetes. These include Coriandrumsativum (Kwzbarah), CinnamomumZeylanicum (Darseen), Trigonellafoenum-graecum (Hulbah) and Nigella sativa (Habba soda).

The stated use of frankincense (Boswelliacarteri) 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 (26). This species of plant is known to contain plant chemical constituents including acetyl-alpha-boswellic acid, acetyl-beta-boswellic acid, lup-20(29)-ene-3 alpha-acetoxy-24-oic acid, alphaboswellic acid, beta-boswellic acid and acetyl-11-keto-betaboswellic acid (27). However, the use of this plant for diabetes not reported in the literatures. It seems to be the most well-known herb to the locals, as indicated by its high UV.

While the uses of plants showed considerable similarity between Basra and other Mediterranean countries, we reported some different medicinal uses for the first time in the studied area, for example the useof BoswelliaCorterri (Luban), CitrullusColocynthis (Handal) and Oleaeuropaea (Zaitoon) for diabetes. However, there was no significant difference in the glycated haemoglobin (HbA1C) level between the diabetic patients using and not using herbs. Several unusual uses and believes were recorded e.g. Citrulluscolocynthis, a well-known toxic plant, isreported 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.

Conclusions

This study allowed collecting for the first time information about traditional uses of medicinal plants for diabetes in Basra. 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.

BoswelliaCorterri (Luban), CitrullusColocynthis (Handal) and Oleaeuropaea (Zaitoon) plants need further investigations for their use in diabetes.

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