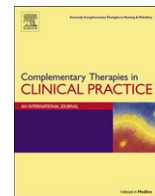




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Complementary and alternative medicine use amongst Palestinian diabetic patients

Mohammed S. Ali-Shtayeh^{a,b,*}, Rana M. Jamous^a, Rania M. Jamous^a^a Biodiversity & Environmental Research Center, BERC, Til, Nablus, Palestine, Israel^b Department of Biology, An-Najah University, Nablus, Palestine, Israel

A B S T R A C T

Keywords:

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Objectives: To measure the frequency of herbal medicine use among patients with diabetes mellitus in Palestine; to determine demographic characteristics that may increase the likelihood of Complementary and Alternative Medicine (CAM) use and to find out how benefits, if any, were perceived by patients.

Method: Cross-sectional survey of patients attending the outpatient diabetes departments at 7 Governmental Hospitals. The method was based on semi-structured questionnaires.

Results: A total of 1883 patients with diabetes were interviewed. Of the participants, 51.9% ($n = 977$) reported taking herbs primarily bought from Palestine (98%) and used in crude form mainly as decoctions (44.1%). The five most common herbal products used were: *Trigonella berythea* (Fabaceae) ($n = 191$, 19.6%), *Rosmarinus officinalis* (Lamiaceae) ($n = 132$, 13.5%), *Olea europaea* (Oleaceae) ($n = 131$, 13.4%), *Teucrium capitatum* (Lamiaceae) ($n = 111$, 11.4%), and *Cinnamomum zeylanicum* (Lauraceae) ($n = 105$, 10.8%). Most CAM users were above 40 years old 79.6% ($n = 778$), predominantly female (53.2%) and residents of refugee camps and rural areas (59.3, and 53.5, respectively). The recommendations of a family member or friend was the main factor prompting the use of CAM (40.2 and 37.1%). Most CAM users (71.7%) were satisfied with the perceived effects. Interestingly, 68% of patients recruited in the study did not disclose CAM use to their physicians or pharmacists.

Conclusion: Use of herbal therapies in diabetes is highly prevalent in Palestine. More than 70% of those using CAM (977, 51.9%) reported positive benefits including a feeling of slowing down disease progression, symptom relief, disease resolution or a reduction in the side effects of allopathic medication. Use of CAM should be explored with patients before clinical decisions are made. There is a need for health education relating to herbal use in conjunction with conventional medicines in diabetes.

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1. Introduction

Diabetes Mellitus (DM) is a metabolic disorder and one of the most common chronic diseases affecting millions of people globally.¹ It continues to increase both in numbers and in the impact upon quality of life, as changing lifestyles lead to reduced physical activity and increased obesity. In 2000, DM affected more than 170 million people around the world. In 2010, 285 million adults worldwide were estimated to have DM (approaching 7% of the adult population). It is anticipated that by 2030, the number of DM patients will exceed 438 million people, almost 8% of the adult population. The greatest relative increase is expected to occur in

Africa, followed by the Eastern Mediterranean and Middle East (EMME).² The regional prevalence of DM in the EMME countries is 7.7%; ranging from 3% (in Yemen) to 18.7% (United Arab Emirates UAE). At 8.6%, Palestine has the fourteenth highest prevalence of diabetes in this regional group of countries.¹

DM and associated complications arising from the disease are considered among the leading causes of morbidity and mortality, and therefore constitutes a major public health problem.³

In Palestine (Palestinian Authority, PA), as with many developing countries, medicinal plants play an important role in primary health care. They are widely used in Traditional Arabic Palestinian Herbal Medicine (TAPHM), for health maintenance and to treat various illnesses including chronic diseases.^{4–6}

The use of complementary and alternative medicines (CAM) such as plant-based medicines and dietary supplements for the treatment of diabetes is widespread and increasingly practiced worldwide.^{7–11} Herbal medicines are the most common form of

* Corresponding author. Biodiversity & Environmental Research Center, BERC, Til, Nablus, Palestine, Israel. Tel.: +972 9 2536 406; fax: +972 9 2536 147.

E-mail addresses: msshtayeh@yahoo.com, shtayeh@najah.edu (M.S. Ali-Shtayeh).

treatments.^{12–18} Other CAM modalities (e.g., spiritual healing) are also known to be used.¹⁹

Studies on the simultaneous use of herbal medicines with the conventional therapy are limited.^{3,20–24} These studies indicate that DM patients turn to complementary therapies mainly for symptomatic relief of the disease, to inhibit disease progression or to reduce the side effects associated with anti-diabetic agents.

When concurrently used with pharmaceutical drugs, biochemical interactions may increase or decrease the pharmaceutical or toxicological effects of either component.^{25,26} This could result in potential risks to human health from simultaneous use of multiple herbal and conventional medicines.²⁷

Although there are quite few studies focused on the general CAM use in Palestine,⁶ there has been no particular study focused upon patients with DM in Palestine.

2. Aims and objectives

The present study aims to evaluate the prevalence and factors related to the use of herbs by patients living with diabetes while concurrently undergoing conventional medical treatment. The aim is to determine demographic details of those patients who may be more likely to use CAM and to identify any perceived benefits from herbal therapy use. The study also sought to identify sources of information recommending the use of particular herbal therapies and patients rationales underlying their decision to use herbal therapy. A main objective was to ascertain whether patients had discussed their use of CAM with their physicians. To date, no previous studies have studied this topic in Palestine.

3. Methods

The study employed a cross-sectional survey of patients attending outpatient departments at Governmental Hospitals in 7 towns in the Palestinian territories (Jenin, Nablus, Tulkarm, Qalqilia, Tubas, Ramalla, and Hebron). To ensure a representative cross-sectional sample of people attending diabetes outpatients, interviews were conducted on different days and times. The study included both males and females across different age groups.

Ethical approval was obtained prior to the study from the Institutional Review Board (IRB) at the Ministry of Health in Nablus. Patients expressing an interest in participating in the study were requested to sign this document. Interviews were conducted by trained researchers from the Faculty of Sciences at An-Najah University, Nablus (ANU), and the Biodiversity and Environmental Research Center (BERC), Nablus. The researchers were trained in questionnaire administration and interviewing skills. Researchers clearly explained to participants that this was research exploring their use of herbal medicine in combination with their prescribed medications. They were assured that all information provided would remain confidential and only be used for research purposes. Where patients were younger than 16 years of age or unable to interact, next of kin (NOK) were interviewed. The study took place from August 2010 until May 2011. The vast majority of the questions had pre-formulated answers. The main themes addressed by the questionnaire are represented in Table 1.

3.1. Research sample

To evaluate the questionnaire, a pilot study was conducted with 50 randomly selected diabetic patients. In the present study, a total of 1883 patients diagnosed with Diabetes Mellitus were randomly selected at Outpatient departments and participated in the study. The findings from the pilot study have not been included in the analysis of data for the present study.

Table 1
Main themes addressed by the study questionnaire.

1 Demographic details of the patient or next of kin (NOK) if the patient is <16 years of age	– Gender, age group, marital status, education level, area of residence (city, village, refugee camp)
2 Disease details (obtained from patient file)	– Type of diabetes: Type I, type II, – Other medical problems: Hypertension, asthma,, others. – Current treatment (s) of the patient:
3 Information about use of CAM (herbs or herbal preparation, other CAM practices)	– Plant Part used, Forms of use (Raw, Cooked, Infusion, Decoction, paste, juice), Mode of Preparation, Administration, Dose, period of use, – Origin of the herbs (local, imported)
4 Source of information	– Friends, family member, physician, pharmacist, herbalist, media (TV, radio, hardcopy), other (e.g. internet, advertisements, text messages, etc)
5 Purpose of the use of CAM	Disease resolution, inhibiting disease progression, symptom relief, a reduction in side effects from prescribed medication.
6 Outcomes	Did the patient achieve the sought effect and was CAM use discussed with the physician?

3.2. Data analysis

Responses were coded and entered into SPSS for Windows, version 16, for statistical analysis. Multivariate analysis and 2x2 contingency tables were used to compare groups. Chi-square and Fisher exact tests were used to test for significant differences between groups. An a priori level of significance was set at 0.05.

4. Results

4.1. Demographics

Of the total 1883 patients interviewed, 988 were female (52.5%) and 893 were male (47.4%) patients (Table 2). Table 2 summarizes the demographic characteristics of participants in this study. The majority of interviewees were above 40 years of age ($n = 778$, 79.6%). A large percentage of individuals of the study population were married ($n = 1408$, 74.8%). Approximately 24.9% ($n = 469$) had obtained high school degrees with 365 (19.4%) achieving university degree level.

4.2. Pattern of herbal preparation use among participants

Of the 1883 participants, 51.9% ($n = 977$) used plant-based products. All values and percentages from here onwards refer to this group of patients. This group consisted predominantly of females ($n = 519$, 53.1%). The majority of herbal medicine users obtained their supply from Palestine ($n = 951$, 98%) and preferred to use a crude extract in the form of a herbal decoction ($n = 777$, 79.5%), raw ($n = 199$, 20.4%), infusion ($n = 78$, 8%), cooked ($n = 40$, 4.1%), and juice ($n = 19$, 1.9%) (Table 3).

The main sources of recommendations for herbal products were from family ($n = 387$, 40.2%) and friends ($n = 357$, 37.1%), followed by herbalists ($n = 158$, 16.4%) or media ($n = 118$, 12.3%). Herbal remedies recommended by physicians or pharmacists were last in the list ($n = 72$, 7.5%).

More than 45% of herbal medicine users ($n = 433$, 45.7%) believed that the herbal preparations would play the role of slowing down the progression of their disease. Other reasons included relieving symptoms of the disease ($n = 331$, 35%), disease

Table 2

Socio-demographic data of the diabetic patients participating in the study ($n = 1883$) and those using herbs ($n = 977$).

Variable	Using CAM				p value*
	Yes		No		
	n	%	n	%	
Gender					
Male	457	51.2	436	48.8	0.557
Female	519	52.5	469	47.5	
Age group ($n = 1881^a$)					
<25	81	55.9	64	44.1	0.262
25–50	332	53.7	286	46.3	
>50	564	50.4	554	49.6	
Marital status ($n = 1881$)					
Single	113	57.1	85	42.9	0.370
Married	727	51.6	681	48.4	
Divorced	41	53.2	36	46.8	
Widowed	96	48.5	102	51.5	
Educational level ($n = 1874$)					
Illiterate	218	46.8	248	53.2	0.094
Primary school	309	53.8	265	46.2	
Secondary school	248	52.9	221	47.1	
University	196	53.7	169	46.3	
Residence ($n = 1864$)					
City	347	48.5	369	51.5	0.034
Village	565	53.5	491	46.5	
Camp	55	59.8	37	40.2	
Chronic diseases presence ($n = 1883$)					
No chronic Disease	557	71.6	221	28.4	0.126
Other chronic disease	420	38	685	62	
Presence of other diabetic member in the family ($n = 1883$)					
Yes	373	31.5	810	68.5	0.349
No	604	86.3	96	13.7	
Diabetes Type ($n = 1883$)					
Type I	114	57.9	83	42.1	0.201
Type II	847	51.1	809	48.9	
Gestational Diabetes	16	53.3	14	46.7	
Duration of diabetes ($n = 1858$)					
< 5	341	51.2	325	48.8	0.874
6–10	260	51.5	245	48.5	
>11	361	52.5	326	52.5	

*p value was determined by chi-square.

^a Numbers do not add up to the total population size, as some data were missing.

resolution ($n = 217$, 22.9%), or facilitated a reduction in the side effects of prescribed medications ($n = 119$, 12.6%).

The majority of herbal medicine users ($n = 689$, 71.7%) claimed to have obtained the sought effect from taking these herbs; however the majority of them ($n = 674$, 68%) did not report this fact to their physicians (Table 3).

The use of CAM differed significantly between residents of refugee camps versus residents of urban or rural areas ($p = 0.034$). However, no statistically significant association was identified between users and non users of CAM in terms of gender ($p = 0.557$), age ($p = 0.262$), marital status ($p = 0.370$), educational level ($p = 0.094$), presence of other chronic diseases ($p = 0.126$), presence of other diabetic family members ($p = 0.349$), type of diabetes type ($p = 0.201$) or duration of diabetes ($p = 0.874$).

From examination of medical files, all patients with DM who used CAM were also on conventional therapies.

With regard to the most common types of diabetes in CAM users (Table 3), Type II diabetes was the predominant diabetes type among CAM users ($n = 847$, 86.7%), followed by Diabetes type I ($n = 114$, 11.7%) and gestational diabetes ($n = 16$, 1.6%).

4.3. Herbs used as CAM in patients with diabetes in Palestine

One hundred different plant taxa, belonging to 44 botanical families, were used by these diabetic patients with Lamiaceae,

Table 3

Pattern of use of medicinal herbs by diabetes patients ($n = 977$).

Characteristic	Number of patients ^a	%
In which form do you use herbs?	Total 977	
Cooked	40	4.1
Decoction	777	79.5
Infusion	78	8.0
Juice	19	1.9
Raw	199	20.4
Where do you obtain this remedy?	Total 970	Missing 7
Palestine	951	98
Abroad	20	2
Who recommended this remedy to you?	Total 962	Missing 15
Friend	357	37.1
Family member	387	40.2
The physician, The pharmacist	72	7.5
The herbalist	158	16.4
Media (TV, radio, hardcopy)	118	12.3
Other (e.g. internet, advertisements, text messages, etc)	54	5.6
Why do you take this remedy?	Total 947	Missing 30
Cure of disease	217	22.9
Slow down progression of disease	433	45.7
Relieve symptoms of disease	331	35
Reduce side effect of medication	119	12.6
Did you get the sought effect?	Total 961	Missing 16
Yes	689	71.7
No	272	28.3
Don't know		
Did you discuss using such remedies with the doctor?	Total 952	Missing 25
Yes	305	32
No	647	68

^a The total number here was more than 977, because some patients reported more than one answer.

Rosaceae, and Asteraceae (9 species each) being the most common. Of these plants, 58 species (belonging to 30 families) were cited by ≥ 3 patients (Table 4) and 42 species were mentioned by < 3 patients and therefore were excluded from further discussion. The most commonly used plants were: *Trigonella berythea* (Fabaceae) ($n = 191$, 19.6%), *Rosmarinus officinalis* (Lamiaceae) ($n = 132$, 13.5%), *Olea europaea* (Oleaceae) ($n = 131$, 13.4%), *Teucrium capitatum* (Lamiaceae) ($n = 111$, 11.4%), and *Cinnamomum zeylanicum* (Lauraceae) ($n = 105$, 10.8%). Only 12 ($n = 12$, 1.2%) patients reported using a herbal mixture in dosage form.

4.4. Other CAM modalities used by patients with diabetes

Five other types of CAM practices were identified among the 977 diabetes patients. These included: prayer ($n = 684$, 70%), vitamins and minerals ($n = 97$, 9.9%), exercise ($n = 90$, 9.2%), honey ($n = 8$), kefir grain ($n = 2$) and milk ($n = 1$) (Table 4).

5. Discussion

CAM is widely used among diabetes patients throughout the world.¹⁹ The present study is the first attempt to identify and quantify the prevalence of the use of herbal medicines among a sample of diabetic patients in Palestine.

In 2010, the diabetes incidence rate in the West Bank (PA) was 174.2 per 100,000 of the Palestinian population.²⁸ After heart disease (25.4%), cerebrovascular disease (12.4%), malignant neoplasm (10.8%), pneumonia and other respiratory diseases (8.4%), diabetes (5.7%) was the fifth most frequent cause of death.

In the PA, it is reported that a vast majority of the population still uses herbal medicine, indicating a deep rooted belief in the healing potential of plants.^{4,5,22,29,30} Several population-based studies, have demonstrated widespread use of herbal medicine as the most

Table 4
Most frequently used CAM herbal preparations in descending order by number of informants (quoted by ≥ 3 patients).

Scientific name (Family) ^a	Common name	Arabic name	No of informants	Parts used ^b	Mode of use ^c
<i>Trigonella berythea</i> Boiss. & Blanche (<i>T. foenum-graecum</i> L.) (Fabaceae)	Fenugreek Seed	Hilbeh	191	SD	B, D, R
<i>Rosmarinus officinalis</i> L. (Lamiaceae)	Rosemary	Hassalban	132	ST, FL, LE, SD	B, D, I
<i>Olea europaea</i> L. (Oleaceae)	Olive	Zaitoun	131	LE, FR	B, D, I, R
<i>Teucrium capitatum</i> L. (<i>T. polium</i> L.) (Lamiaceae)	Cat Thyme	Jedeh Subian	111	LE, AP	B, D
<i>Cinnamomum zeylanicum</i> Blume. (Lauraceae)	Cinnamon Tree	Qerfeh	105	BA	B, D, I, R
<i>Nigella ciliaris</i> DC. (Ranunculaceae)	Nigella, Black Cumin	Qezha	96	SD	B, D, I, R
<i>Lupinus albus</i> L. (Fabaceae)	Lupine	Turmos	87	SD	B, D, I, R
<i>Zingiber officinale</i> Rose. (Zingiberaceae)	Ginger	Zanjabeel	63	RT	B, R, D
<i>Salvia fruticosa</i> Mill. (Lamiaceae)	Common Sage,	Mariamieh	58	LE, ST	B, D
<i>Crataegus aronia</i> (L.) Bosc. ex DC. (Rosaceae)	Hawthorn	Za'roor	55	LE, FL, ST	B, D, I, R
<i>Allium sativum</i> L. (Liliaceae)	Garlic	Thoum	47	BL, AP	C, D, I, J, R
<i>Matricaria aurea</i> (L.) Sch. Bip. (Asteraceae)	Golden Cotula	Babounej	43	ST, FL, LE	B, D
<i>Allium cepa</i> L. (Liliaceae)	Onions	Basal	29	RT, LE, BL	B, R, C
<i>Punica granatum</i> L. (Punicaceae)	Pomegranate	Rumman	25	SD, FR	B, C, D, J, R
<i>Anisum vulgare</i> L. (Apiaceae)	Anise	Yansoon	24	SD, FL, LE	B, D, R
<i>Morus nigra</i> L. (Moraceae)	Mulberry	Toot	23	LE, FL	B, D, R
<i>Hordeum vulgare</i> L. (Poaceae)	Barley	Shaer	21	SD	B, C, D, I
<i>Arum palaestinum</i> Boiss. (Araceae)	Palestinian Arum	Lufe	20	LE, SD	B, C, I
<i>Majorana syriaca</i> (L.) Rafin. (Lamiaceae)	Wild Thyme	Za'tar Barri	20	LE	B, D, I, R
<i>Origanum majorana</i> L. (Lamiaceae)	Sweet-Marjoram	Mardaquoush	20	LE, SE	B, C, D
<i>Triticum aestivum</i> L. (Poaceae)	Wheat	Qamh	20	SD	B, C, D
<i>Psidium guajava</i> L. (Myrtaceae)	Guava	Guava	18	LE, ST	B, D
<i>Brassica oleracea</i> L. (Brassicaceae)	Cabbage	Malfof	16	LE, RT	C, D, R
<i>Lepidium sativum</i> L. (Brassicaceae)	Cress	Rashad	14	SD, LE	B, C, D, R
<i>Coridothymus capitatus</i> (L.) Reichb. (Lamiaceae)	Capitate Thyme	Za'tar Farsi	13	LE, FL	B, D, R
<i>Laurus nobilis</i> L. (Lauraceae)	Laurel, Sweet Bay	Ghar	13	LE	R
<i>Phoenix dactylifera</i> L. (Palmae)	Date Palm	Tamer	13	FR	B, R
<i>Hibiscus sabdariffa</i> L. (Malvaceae)	Roselle	Karkadaih	12	FL, SD, ST	B, D, I, R
<i>Camellia thea</i> Link. (Theaceae)	tea	Shai Akhdar	9	LE	B, D
<i>Foeniculum vulgare</i> Miller (Apiaceae)	Fennel	Shomar	9	SD, RT	B, D, R
<i>Aloe vera</i> (L.) Burm. f. (Xanthorrhoeaceae)	Aloe	Sabrah murray	9	LE	D
<i>Amygdalus korschinskii</i> Hand.-Mazz (Rosaceae)	Bitter almond	Louz Barri	8	FR, SD	B, R
<i>Citrus limon</i> (L.) Burm. Fil (Rutaceae)	Lime, Limon Tree	Laimoon	7	LE, FR	B, D, I, J
<i>Portulaca oleracea</i> L. (Portulacaceae)	Purslane	Baqleh	7	LE	B
<i>Quercus calliprinos</i> L. (Fagaceae)	Kermes Oak	Sendian	7	FR, SD	D
<i>Artemisia inculata</i> Delile (= <i>A. herba-alba</i> Asso) (Asteraceae)	White Wormwood	Sheeh	6	LE	B, D
<i>Cichorium pumilum</i> Jacq. (Asteraceae)	Dwarf Chicory	Hendba'	6	LE	C, D, I, J, R
<i>Commiphora myrrha</i> (Nees) Engl. Burseraceae	Gum Myrrh Tree	Morrah	6	LE, SD, RT	B, D, R
<i>Coriandrum sativum</i> L. (Apiaceae)	Coriander	Kozbareh	6	LE, SD	B, R
<i>Lactuca sativa</i> L. (Asteraceae)	Lettuce	Khus	6	LE	B, D, R
<i>Petroselinum sativum</i> Hoffm. (Apiaceae)	Parsley	Baqdoones	6	LE	B, D, R
<i>Urtica pilulifera</i> L. (Urticaceae)	Roman Nettle	Qurrais	6	ST, LE, SD	B, D, C, R
<i>Amygdalus communis</i> L. (Rosaceae)	Almond	Louz Hilo	5	FR	R
<i>Citrullus colocynthis</i> (L.) Schrader (Cucurbitaceae)	Colocynth	Hanthal	5	SD	R
<i>Pyrus malus</i> L. (Rosaceae)	Apple	Toffah	5	FR	J
<i>Ziziphus sativa</i> Gaetn. (Rhamnaceae)	Jujube	Inab	5	FR, LE	B, R
<i>Citrullus lanatus</i> (Thunb.) Matsun. & Nakai Cucurbitaceae)	Watermelon	Batteekh	4	FR	R
<i>Ficus carica</i> L. (Moraceae)	Fig Tree	Teen	4	LE	B
<i>Gymnema sylvestre</i> R. Br. (Asclepiadaceae)	Miracle fruit	Gymnema	4	LE	B
<i>Passiflora edulis</i> Sims (Passifloraceae)	Passion flower	Pasiflora	4	FR, LE	D, R
<i>Sinapis arvensis</i> L. (Brassicaceae)	Wild Mustard	Khaddal Barri	4	LE, SD	I, R
<i>Centaurea dumulosa</i> Boiss (Asteraceae)	Shrubby centaury	Murrar	3	AP	R
<i>Cucumis melo</i> L. (Cucurbitaceae)	Melon	Shamam	3	FR	R
<i>Eriobotrya japonica</i> L. (Rosaceae)	Medlar Tree	Askadenia	3	LE, SD, LE	B, I
<i>Phaseolus vulgaris</i> L. (Fabaceae)	Common Bean	Fasolia'	3	SD	B, D, R
<i>Sesamum indicum</i> L. (Pedaliaceae)	Sesame	Semsem	3	SD	J, R
<i>Syzygium aromaticum</i> (L.) Merr. and Perry. (Myrtaceae)	Clove	Kabsh Koronful	3	FL	B, D
<i>Ziziphus spina-christi</i> (L.) Desf. (Rhamnaceae)	Christ's Thorn Jujube, Nabk	Seder	3	LE	B

^a Total number of plant species reported in this study was 100, of which 58 were reported by 3 patients or above, and 42 were mentioned by 1–2 informants. Miscellaneous ($n = 23$): herbal mixture in dosage form ($n = 12$), honey ($n = 8$), kefir grain ($n = 2$), milk ($n = 1$).

^b AP, aerial parts; BA, bark; LE, leaves; FL, flowers; FR, fruits; SD, seeds; ST, stem; RT, roots.

^c C, cooked; D, decoction; I, infusion; J, juice; R, raw.

preferred CAM modality.^{19,23,31} The number of herbs used by DM patients in the present work (100 species of which 58 species were reported by 3 participants or above) was considerably higher than that reported previously in Palestine, Israel, and Jordan (52, 16, 12 species, respectively).^{3,4,30,32} In the present study herbs most commonly used included *T. berythea*, *R. officinalis*, *O. europaea*, *T. capitatum*, and *C. zeylanicum*. Recent studies have indicated the

anti-diabetic activity of these plants and therefore provide a basis for their legitimate health claims.^{33–38}

Based on the popularity of herbal medicine among Palestinians in the treatment of a large number of ailments and diseases, it was not unexpected that the percentage of herbal medicines users will also be high amongst patients with diabetes (about 51.9% in this study). Ease of accessibility, lower costs and social acceptability in

the use of medicinal herbs in Palestine, as well as the long history and experience of traditional use of these herbs encourage patients to believe in their healing effects.^{4,21} In this study, 35% of participants reported using herbal medicines to relieve disease related symptoms, to resolve the disease (22.9%) or to reduce the side effects of orthodox medications (12.6%).^{3,7} Interestingly, a large percentage of patients (45.7%) rationalized their use of herbal medicines as a means of slowing down disease progression.

Most CAM users (71.7%) were satisfied with the perceived effect. This percentage was found to be lower in other studies conducted in Turkey and India (52.7, and 42.2%), respectively,^{20,23} but was comparable to that reported in Jordan.³

The percentage of herbal medicine use among patients with diabetes in this study (51.9%) was higher than that reported in neighboring Jordan, and Saudi Arabia (16.6, 30%, respectively).^{3,31} The differences in the rate of CAM use between these studies may be attributed to differences in definitions of CAM, the research methodology used, cultural, geographical or socioeconomic variables, all of which can influence an individual's decision whether to use CAM.^{3,19,31}

The majority of CAM herbal remedies used by the study cohort were purchased locally. This also highlights the availability and acceptability of herbal therapies among the population.

Being a resident in a refugee camps or rural areas appeared to be associated with a higher likelihood of using CAM. Approximately 54–60% of DM patients were residing in refugee camps and in rural areas. Similarly, females with higher education levels were also associated with (though not significant) a higher likelihood of CAM use, a result consistent with previously recorded trends.^{3,20,39,40}

An alarming result was that 68% of patients had never discussed their herbal remedy use with their physicians. This indicates a lack of patient awareness of the dangers that may accompany the unsupervised use of drugs and or herbs concurrently. It also raises questions regarding whether physicians sufficiently explore their patients self-use of other forms of treatment. The self-administration of herbs use in conjunction with conventional medicines without disclosure of CAM use to health care professionals may result in ineffective diabetic management and adverse treatment side effects.^{19,25} Thus it is strongly recommended that, CAM information be incorporated into clinical practice as well as patient and professional education.¹⁹

6. Conclusions

In Palestine, herbal medicine use in patients with diabetes was previously unknown. Our survey confirms that there is an appreciable prevalence of herbal use in patients with diabetes in this country. More females than males use herbal therapies from 977 subjects, 519 (53.1%) were female, 458 (46.9%) male. Older patients (>40) residing in refugee camps or rural areas were also more likely to use CAM in form of herbal medicines. Although patients were satisfied with the outcomes of herbal therapy, the majority lacked an appropriate awareness of potential risks of pharmaceutical interactions between herbs and prescribed medicines. There is a need for greater information to be made available about possible adverse effects.

Conflict of interest statement

The authors have no conflict of interest.

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