Journal of Nutrition and Food Security
Shahid Sadoughi University of Medical Sciences
School of Public Health
Department of Nutrition
Nutrition & Food Security Research Center

eISSN: 2476-7425 pISSN: 2476-7417 JNFS 2019; 4(3): 161-169 Website: jnfs.ssu.ac.ir

Knowledge, Attitude, and Practice of Diabetic Patients toward Herbal Products in Iran: A Cross-sectional Study

Behrouz Talaei; PhD[1,2], Golaleh Asghari; PhD[2], Parvin Mirmiran; PhD[*2], Fereidoun Azizi; PhD[3] & Shohreh Bahreini; MSc[4]

[1] *Department of Nutrition, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran.*
[2] *Nutrition and Endocrine Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.*
[3] *Endocrine Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.*
[4] *School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.*

ARTICLE INFO

ORIGINAL ARTICLE

Article history:
Received: 24 Jun 2018
Revised: 20 Sep 2018
Accepted: 26 Dec 2018

Corresponding author:
mirmiran@endocrine.ac.ir
Nutrition and Endocrine Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Postal code: 19395-4741
***Tel*:** +98- 21 22357484

ABSTRACT

Background: Considering that herbal medicines are commonly used for treatment or management of type 2 diabetes, the aim of this study was to determine the knowledge, attitude, and practice (KAP) of patients with diabetes regarding herbal products. ***Methods:*** A cross-sectional study was conducted on 421 patients with diabetes who referred to the Iran Diabetes Association in Tehran, Iran in 2014. The KAP of participants on herbal products were determined by a pre-designed questionnaire containing close ended questions. ***Results:*** The participnats' age Mean ± SD was 38.0 ± 20.6 years. Of 421 participants, 163 used some type of herbal products during the past year for controlling diabetes. Of these patients, 40 to 60% did not have knowledge about the possibility and desirability of using herbs along with or instead of the anti-diabetic chemical drugs. However, 71% of patients believed that they could not use herbal products without physician's prescription. Participants had a negative attitude towards using herbal products instead of conventional drugs, especially without the physician's prescription (40–60% of patients). Among users of herbal products, 53.0% believed that these products caused no side effects. One-third of patients used herbal products at least once a month for controlling or treating their disease. Most participnats (64.4%) informed their physiciens about consumingherbal drugs and 15.8% had self-prescribed use of these herbal products. ***Conclusion:*** Our findings indicated that nearly a third of patients with diabetes used herbal remedies and most of them considered these products safe. However, more than half of the patients informed their physician about using herbal medicines.

Keywords: *Herbal Products; Diabetes; Knowledge; Attitude; Practice*

Introduction

Diabetes mellitus is an important multifactorial public health disease with increasing incidence and prevalence worldwide. It afects the quality of life, leads to considerable complications,

This paper should be cited as: Talaei B, Asghari G, Mirmiran P, Azizi F, Bahreini SH. ***Knowledge, Attitude, and Practice of Diabetic Patients toward Herbal Products in Iran: A cross-sectional study.*** *Journal of Nutrition and Food Security (JNFS)*, 2019; 4 (3): 161-169.

and impacts morbidity and mortality rates both in the developed and developing countries (Ebrahim and Smith, 2001, Larijani and Zahedi, 2002). National data show that the prevalence of diabetes in Iran is about 10%, which has increased over time (Esteghamati *et al.*, 2007). The presence of a chronic illness such as diabetes has been documented as a reason for seeking out alternative medicines. Alternative medicine has a heterogeneous nature, and its use from hypnosis to herbal remedies / products (Ernst, 2000).

Traditional medicine is an accessible and affordable health care resource for many countries including countries of the Eastern Mediterranean region (World Health Organization, 2010). World Health Organization (WHO) recommendes use of traditional medicine / complementary and alternative medicine (TM / CAM) therapies among the public and consumers (World Health Organization, 2011). Application of TM / CAM in the management of chronic diseases is well known in the developing countries; people commonly use herbal medicine products in self-care. Herbal medicines are also used in varying degrees with an increasing trend in industrialized countries (Al Saeedi *et al.*, 2003, Barnes, 2003, Dutta *et al.*, 2003, Zollman and Vickers, 1999). Increased use of TM / CAM has led to an increasing interest in how health professionals view these therapies (Bent and Ko, 2004, Calixto, 2000, Naidu *et al.*, 2005). This can be due to the wide usage and low cost of these medicines as well as the fact that many physicians believe in the usefulness of alternative medicine (Hasan *et al.*, 2000). Over 400 traditional herbal remedies were fund for diabetes, although limited scientific evaluations were conducted to evaluate their efficacies (Poss *et al.*, 2003).

The hypoglycemic effect of some herbal products was assessed in human and animal models with type 2 diabetes (Yeh *et al.*, 2003). Studies show that 50% of patients do not inform their physicians about their herbal supplement usage (Elder *et al.*, 1997). Due to the adverse reactions and interactions between herbs and conventional drugs (Ernst and Pittler, 2002, Pinn, 2001), it is important to identify the perception of specific populations regarding consumption of herbal products and to determine if herbal products users routinely inform their primary care physicians about using these drugs. A previous review investigated the diabetic patients' knowledge regarding the potential side effects of herbal medicines and their reasons to inform their physician about using this kind of drugs (Thomson *et al.*, 2012a).

The present study was designed to determine the prevalence of herbal product usage and assess the related knowledge, attitude, and practice among patients with diabetes in Tehran, Iran.

Material and Methods

Participants: A total of 421, men (n = 157) and women (n = 244) aged ≥ 20 years were recruited in a period of five months during november 2014 to march 2015 from the Iran Diabetes Association in Tehran, Iran. All selected participants had diabetes under insulin or oral anti-diabetic drug therapy with modification in their diet for at least two months prior to the study based on the physician's prescription. Type 2 diabetes was defined according to the criteria set by the American Diabetes Association: individuals with fasting blood glucose levels of 7.0 mmol/L or higher or with 2-h post-75 g glucose loads of 11.1 mmol/L or higher as well as those under therapy for a definite diagnosis of diabetes were considered to have diabetes (Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Measurements: We designed and used a self‐administered questionnaire to collect the required data, including participnats' socio-demographic and knowledge, attitude, and practice (KAP) towards using herbal products. Data were collected from each participant under the supervision of trained nutrition experts. The KAP questionnaire included five sections: 1) socio-demographic information (gender, age, material status, and education) and smoking status; 2) type, duration, presence of complications, and treatments of diabetes; 3) participants' knowledge on herbal products comprised of familiarity with various specific herbal products, effective and adverse effects of herbal products based on the physician's order or self-decision, substitution of conventional drugs with herbal medicines; 4)

[DOR: 20.1001.1.24767417.2019.4.3.2.4]
[DOI: 10.18502/jnfs.v4i3.1307]

attitudes toward and beliefs about use of herbal products' consumption, and patients' consulting with their physician about herbal products' intake; 5) participants' practice such as frequency of herbal products use, sources and reasons of their use, the person who prescribed the medications, its side effects, patient satisfaction with the medications, concomitant use with a prescribed medicine, and if the patient informed his/her physician regarding the use of herbal treatment were investigated.

Data analysis: Data extracted from completed questionnaires were statistically analyzed using SPSS (version 15.0; SPSS, Chicago, IL, USA). We assessed the variables' normality using histogram charts and a Kolmogorov–Smirnov analysis, indicating that all variables had a normal distribution. Characteristics of the study paricipants were presented as mean ± SD for continuous variables and percentages for categorical variables. Chi-square was used to compare qualitative variables between participants based on gender. P-values < 0.05 were considered as statistically significant.

Ethical considerations: The study protocol was approved by the ethics committee of the Research Institute for Endocrine Sciences, affiliated to the Shahid Beheshti University of Medical Sciences, Tehran, Iran. Written informed consent was obtained from all participants.

Results

Socio-demographic and other characteristics of the study population: A total of 421 individuals participated in the study. Mean of age population was 38.0 ± 20.6 years. Of all paticipants, 55.4% were married, almost 35% had academic education, and approximately 52.2% of paticipants were employed (**Table 1**). Our findings indicated that most participants obtained their necessary medical information from books and media (54.60%) and their physicians (34.87%). Men and women did not differ significantly according to age, educational levels, marital status, source of obtaining medical information, type of diabetes, type of medications used for diabetes (anti-diabetic drugs or insulin injection), and history of diabetes. However, smoking was higher among males compared to females.

Knowledge of participants about using herbal products: Participants' knowledge about using herbal products as a treatment for controlling diabetes and its difference with conventional treatments is presented in **Table 2**. Half of the participants did not have any knowledge about herbal medicine as a treatment of diabetes. Of all participants, 42.7% declared that using herbal products as a treatment, instead of conventional anti-diabetic drugs, was not suitable; however, 43.4% of them did not have knowledge on this topic. Overall, most participants (62.2%) were not aware of about probable complications of concomitant use of herbal products with conventional anti-diabetic drugs. However, 71.6% of participants stated that using herbal products, without physician's prescription was not permissible. In addition, most participants (67.6%) did not have knowledge about the following question: "is the sale of herbal products in pharmacies with industrial packaging legally allowed by the ministry of health?"

Compared to females, males responded more positively than females to this question: "Can herbal products be used instead of conventional anti-diabetic drugs?" (20.3% in males vs. 10.3% in females, P = 0.001). Furthermore, compared to females, more males reported that they did not have knowledge about the possibility of using herbal products, without physician's prescription (33.3% in males vs. 21.2% in females, P = 0.008).

Participants' attitude toward herbal products: Almost 33.8% of participants disagreed that herbal products were more effective than conventional anti-diabetic drugs, while 47% had no idea about this issue (**Table 3**). Considering complications of herbal products, 60% of participnats mentioned that herbal products had lower complications in comparison to conventional anti-diabetic drugs. Furthermore, most participants (53.0%) believed even herbal products did not have benefits, at least they were harmless. However, most participants (59.3%) disagreed to use herbal products without physician prescription.

A significant difference was observed between male and female respondents regarding some aspects of the herbal products' application (**Table 3**). Our

[DOR: 20.1001.1.24767417.2019.4.3.2.4]
[DOI: 10.18502/jnfs.v4i3.1307]

results indicated that males, more than females, agreed with greater effectiveness of herbal drugs in comparison to conventional anti-diabetic drugs (25.0% in males vs. 15.4% in females, P = 0.004). Moreover, more males agreed that herbal products had less complications than conventional anti-diabetic drugs (69.1% in males vs. 55.8% in females, P = 0.004). However, compared to men, women disagreed with the idea that "even if the herbal products do not have benefits, at least they are harmless" (23.0% in women vs. 8.6% in men, P = 0.003). Women also disagreed more with using herbal products instead of conventional anti-diabetic drugs (45.9% in women vs. 30.3% in men, P = 0.023). Finally, more women believed that using herbal products, without a physician's prescription was incorrect and inappropriate (64.0% in women vs. 52.7% in men, P = 0.023).

Participants' practice regarding herbal products:

Table 4 shows the participnats' practices regarding use of herbal products in the study population. Results showed that over two-thirds of participants used herbal medicines rarely (70.9%) and participants who consumed herbal products daily or weekly were rare (8.4%). No difference was found between men and women regarding the frequency of consuming herbal products. More than half of th participants used herbal products with physician's prescription (57.8%), while self‑decision making was the weakest reason in consuming herbal products among the particinats (15.8%). Females, more than males, used herbal products according to the physician's prescription (65% in females vs. 45.5% in males, P < 0.001). Over 75% of particinats used only conventional anti-diabetic drugs therapy to treat or control their diabetes (80.4%) and only less than 2% of the participants used herbal products as a treatment for controlling diabetes. Nearly 90% of all individuals declared that they did not use herbal products without physicians' prescription for the treating or controlling diabetes or other chronic diseases such as hypertension. Most participants informed their physicians if they decided to use herbal products (64.4%) and no significant difference was found among males and females. Furthermore, more than 65% of all participants did not use the herbal products along with the conventional anti-diabetic treatments.

Table 1. Participants' demographic characteristics based on gender group classification

Variables	Total (n = 421)	Males (n = 157)	Females (n = 244)	*P*-value
Age (years)	38.0 ± 20.6[a]	36.8 ± 22.8	38.8 ± 26.1	0.354
Education level	N (%)	N (%)	N (%)	
< 12-y	167 (39.7)	62 (39.2)	97 (39.9)	0.544
12-y	106 (25.2)	36 (22.9)	66 (26.9)	
12-y <	148 (35.1)	59(37.9)	81 (33.2)	
Current smoking	62 (14.7)	43 (27.2)	17 (6.9)	<0.001
Type medication of diabetes				
Oral agent therapy	95 (22.7)	38 (23.5)	55 (22.4)	0.545
Insulin therapy	246 (58.5)	94 (59.6)	143 (58.5)	
Use of both	74 (17.7)	24 (15.5)	47 (19.3)	
Employed	220 (52.2)	113 (71.9)	69 (28.1)	<0.001
Married	233 (55.4)	82 (52.3)	138 (56.6)	0.164
Family history of diabetes	183 (43.4)	59 (37.7)	115 (47.0)	0.177
Source of medical information				
Book and media	230 (54.6)	79 (50.2)	137 (56.2)	0.175
Physicians	147 (34.8)	57 (36.4)	85 (34.6)	
Family and friends	44 (10.5)	21 (13.2)	22 (8.9)	

[a] : Mean ± SD

[DOR: 20.1001.1.24767417.2019.4.3.2.4]
[DOI: 10.18502/jnfs.v4i3.1307]

Table 2. participats' knowledge regarding consumption of herbal products

Questions	Total (n = 421)			Males (n = 157)			Females (n = 244)			P-value
	Yes	No	I don't know	Yes	No	I don't know	Yes	No	I don't know	
Are herbal products appropriate for treatment and control of diabetes?	36.8[a]	13.2	50.0	41.0	9.6	49.4	34.2	15.4	50.4	0.157[b]
Conventional anti-diabetic drugs can be replaced by herbal products?	14.0	42.7	43.4	20.3	30.7	49.0	10.3	49.6	40.1	0.001
Concomitant use of herbal products with conventional anti-diabetic drugs can be lead to complications?	26.6	11.2	62.2	24.0	10.7	65.3	28.1	11.5	60.4	0.596
Is it possible to use herbal products, without a physician's prescription?	2.5	71.6	25.8	0.7	66.0	33.3	3.7	75.1	21.2	0.008
Are the sales of herbal products in pharmacies with industrial packaging legally allowed by the ministry of health?	19.2	13.3	67.6	20.4	9.2	70.4	18.4	15.7	65.9	0.175

[a] :Data are presented by percentage for all variables; [b:] P-values are for the comparisons across two groups, with the use of Chi – square test.

Table 3. participats' attitude regarding consumption of herbal products

Questions	Total (n = 421)			Males (n = 157)			Females (n = 244)			*P*-value
	Agree	No idea	Disagree	Agree	No idea	Disagree	Agree	No idea	Disagree	
I think that herbal products are more effective than conventional anti-diabetic drugs.	19.1[a]	47.1	33.8	25.0	51.3	23.7	15.4	44.6	40.0	0.004[b]
I think that the herbal products have lower complications in comparison to conventional anti-diabetic drugs.	60.0	31.3	8.0	69.1	26.3	4.6	55.8	34.2	10.0	0.004
I think that even if the herbal products have no benefits, at least they are harmless.	53.0	29.6	17.5	62.5	28.9	8.6	47.1	30.0	23.0	0.003
I think it is possible to use herbal products instead of conventional anti-diabetic drugs	20.4	39.6	40.1	26.3	43.4	30.3	16.7	37.4	45.9	0.023
I think that the herbal products can be used without physician's prescription.	15.1	25.2	59.3	16.0	31.3	52.7	14.3	21.7	64.0	0.023

[a] :Data are presented by percentage for all variables; [b:] P-values are for the comparisons across two groups, with the use of Chi – square test.

[DOR: 20.1001.1.24767417.2019.4.3.2.4]
[DOI: 10.18502/jnfs.v4i3.1307]

Table 4. Participats' practice regarding consumption of herbal products

Questions	Total (n =4 21)	Males (n = 157)	Females (n = 244)	*P*-value
How often do they take herbs ?				0.292
Daily	8.4	9.6	7.7	
Weekly	8.4	9.6	7.1	
Monthly	12.4	7.8	14.8	
Annually or rarely	70.9	73.0	70.3	
The basis of information for using herbal products?				0.001
Self- decision	15.8	23.6	11.2	
Physicians	57.8	45.5	65.0	
store herbal product dealer	26.4	30.9	23.8	
Type of treatment and controlling of diabetes ?				0.121
Herbal products	1.1	0.0	1.1	
Conventional anti – diabetic drugs	80.4	77.7	82.0	
Herbal products & Conventional anti – diabetic drugs	18.5	22.3	16.3	
Do you use herbals products for controlling diabetes without a physician's prescription?				0.982
Yes	13.8	13.9	13.8	
No	86.2	86.10	86.2	
Do you use herbals products for the treatment or controlling other health problems other than diabetes (e.g. hypertension) without a physician's prescription?				0.701
Yes	10.9	10.1	11.4	
No	89.1	89.9	88.6	
Do you inform your doctor if you are taking the herbals products?				0.058
Yes	64.4	57.3	68.5	
No	35.6	42.7	31.5	
Do you use the herbal products along with your conventional anti-diabetic treatments?				0.438
Yes	32.1	34.0	31.0	
No	77.9	66.0	69.0	

[a] :Data are presented by percentage for all variables; [b:] P-values are for the comparisons across two groups, with the use of Chi – square test.

Discussion

The current study was conducted to investigate KAP regarding consumption of herbal products among diabetic adults in Tehran, Iran. According to our results, participnats' knowledge about various aspects of consuming herbal products was relatively poor. However, most patients knew that replacing routine treatment of diabetes with herbal products was not appropriate. Patients had a negative attitude towards the usefulness of herbal products, especially if these products were used instead of theconventional medications without the physician's prescription. In addition, nearly 30% of patients used herbal products for controlling diabetes; most patients informed their physiciens before using herbal products.

Several studies indicated that consuming herbal products was beneficial and effective in preventing complications of diabetes, including diabetic vascular disease, nephropathy, retinopathy, neuropathy, gastropathy, foot ulcers, atherosclerosis, and endothelial dysfunction due to antioxidant compounds such as polysaccharides, terpenoids, flavonoids, sterols, and alkaloids, and etc. (Li *et al.*, 2004, Nasri and Rafieian-Kopaei, 2014, Omar *et al.*, 2010). It was also observed that various herbal products had a therapeutic role in treating and controlling diabetes through decreasing insulin resistance, Beta-cell dysfunction, increased insulin secretion, and maintenance of glycemic homeostasis (Chang *et al.*, 2013, Li *et al.*, 2012). Evidences show that various natural products or herbal medicinal products are commonly used among patients for treating diabetes or controlling blood glucose (Chang *et al.*, 2013, Shapiro and Gong, 2002). It was also reported that most people used

[DOR: 20.1001.1.24767417.2019.4.3.2.4]
[DOI: 10.18502/jnfs.v4i3.1307]

herbal products without seeking advice from their physician about using herbs and their possible adverse effects on health (Thomson *et al.*, 2012b). It may be concluded that excessive use of herbal products, especially without the physician's prescription can have detrimental effects on body health (Ernst and Pittler, 2002, Rush *et al.*, 2003). Quality, safety, and efficacy of herbal products have been assessed in previous studies and these products were found to have toxic chemicals. Herbal products can cuase contamination by affecting the organ systems and having negative interaction with conventional anti-diabetic drugs prescription (Ernst and Pittler, 2002, Rush *et al.*, 2003). Given that male diabetic patients had poorer knowledge on using herbal medicine, it is necessary to provide the patients with the required information about the various aspects of using herbal products. For example, patients need to know the appropriate dosage and possible side effects of herbal products; patients, especially men, should know about the necessity of physician's prescription in applying these products; patients should also avoid replacing the conventional anti-diabetic drugs with herbal products,.

The findings of the current study showed that individuals with diabetes had a negative attitude towards using herbal products instead of the conventional anti-diabetic drugs, especially without physician's prescription. However, they believed that herbal products were harmless and had lower complications in comparison to conventional anti-diabetic drugs. Patients had no idea about the higher effectiveness of these drugs in comparison to the conventional anti-diabetic drugs. Our study participants had favorable attitudes with regard to most aspects of using herbal products; whereas, their attitudes in some cases such as potential effectiveness or side effects of these products were incorrect. Despite the possible benefits of herbal products, uncontrolled use of these drugs can lead to adverse effects on the health of individuals with diabetes such as hypoglycemia. Furthermore, inappropriate use of theses products can decrease the pharmaceutical effects of the conventional anti-diabetic drugs, especially in the case of consuming without physician's prescription (Chavez *et al.*, 2006, Moolasarn *et al.*, 2005, Najm and Lie, 2010). Therefore, it is important for the diabetic patients to be trained and consult with their physician about the possible effects of herbal remedies before consumption. Male patients with diabetes who lack the appropriate attitude toward using herbal products should als increase their knowledge.

Regarding practice, one-third of the patients used herbal products at least once a month for controlling or treating their diabetes; however, most patients informed their physiciens before using herbal products. Furthermore, a very small number of participants had self-prescribed consumption of these herbal products and did not replace conventional anti-diabetic treatment with them. Therefore, the participants did not have inappropriate practice related to herbal products. However, our findings about participnats' practice may have been affected by the individuals' tendency to indicate more socially desirable results (Ahmad *et al.*, 2015). Diabetes mellitus is a major public health problem with an increasingly widespread trend and accelerated morbidity/mortality worldwide (Gregg *et al.*, 2014). Furthermore, Iran is one of the countries with the heaviest diabetes burden (7.7%) (Esteghamati *et al.*, 2008). Nearly 30% of patients in this study used complementary and alternative medicine, such as herbal products for controlling diabetes. Considering all the above-mentioned facts, the results of this study can help diabetes experts to increase their awareness about health behaviors of these patients by providing them with optimal therapeutic management.

The current study enjoys from the following strengths: it is the first study that assessed the KAP of diabetic patients regarding various aspects of herbal products. This surveyapplied a relatively large population and addressed consumption of herbal products in diabetic men and women, a subject on which limited data is available. However, one of the limitations of this study was application of self-reporting method of data collection through interviews, in which the participants' tendency to indicate more socially desirable results cannot be controled, which is a common limitation in

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knowledge and attitude investigations. Furthermore, individuals with diabetes were selected from Iran Diabetes Association using the convenience sampling approach, which may limit the generalizability of our findings.

Conclusion

Our findings revealed that patients with diabetes had poor knowledge regarding consumption of herbal products. They also had a negative attitude towards using herbal products, indicating that nearly a third of participants used herbal remedies and most of them considered these products safe. Most patients reported consumption of these herbal products to physician and did not substitute the conventional anti-diabetic treatment with herbal medicine products.

Acknowledgments

The authors express their appreciation to the participants in Tehran Lipid and Glucose Study and the staff of the Research Institute for Endocrine Sciences, Tehran Lipid and Glucose Study Unit for their enthusiastic support and valuable help. We also acknowledge Ms. N. Shiva for critical editing of English grammar and syntax of the manuscript. This work was funded by the Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran. All authors read and approved the final manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

Authors' contributions

Talaei B, Asghari G and Bahreini S contributed in conception, design, and analysis of data, contributed in data collecting and manuscript drafting. Mirmiran P and Azizi F supervised the study. All authors approved the final draft of the manuscript.

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[DOR: 20.1001.1.24767417.2019.4.3.2.4]
[DOI: 10.18502/jnfs.v4i3.1307]