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Research Article
Effect of Complementary and Alternative Medications (CAM) on Diabetic Control among Type 2 Diabetes Mellitus Patients

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Abstract

Background and Objectives: Diabetes mellitus is a chronic illness which leads to disability, hospitalization and eventually death. There is an emerging trend worldwide for patients to use complementary and alternative medications (CAMs) in an attempt to improve the outcomes of their illnesses as well as general well-being. This study aimed to assess the attitude and the popularity of using complementary and alternative medications and its perceived effect in diabetic control among Libyans adult who were diagnosed with type-2diabetes mellitus. **Materials and Methods:** A cross-sectional quantitative study was conducted among 192 adult diabetic patients, who are still under follow-up in two medical centers, Libya. Descriptive statistic and bivariate analysis were performed to assess all the included variables and to identify the association between all variables and the outcome. **Results:** The mean age of the participants was 46.21 ± 11.87. Most of the respondents were males (56.8%). The majority used CAM (64.6%) and the most common CAM used was cinnamon (41.9%). Factors associated with perceived sugar control were type of pharmaceutical drugs used, perceived health condition, satisfaction with CAM, types of CAM used and frequency of CAM consumption ($p<0.05$). **Conclusion:** CAM is used commonly among most of the Libyan in Zliten city as more than 60% use CAM to control glucose level. Most of the participants were satisfied with CAM and had good attitude toward it.

Key words: Attitude, satisfaction, diabetes mellitus control, complementary and alternative medicine

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Throughout the years, diabetes mellitus (DM) has risen as an essential clinical and public medical issue throughout the world. DM is considered as one of the main 10 leading causes of death in the world[1]. It was reported that there is an increasing rate of type-2 diabetes and its associated complications in the Arabic countries (East Mediterranean, Arabic Peninsula and Northern Africa)[2]. To accomplish ideal glucose control, complex treatment anticipates individuals with type-2 diabetes may include day by day blood glucose testing and checking, fittingly endorsed solutions, for example, oral hypoglycemic agents and/or insulin infusion, nutrition treatment and standard exercise[3-5]. A good control of sugar level can be difficult for some patients because not only they have to change their dietary patterns with strict self-monitoring blood sugar, but also keeping up an optimum body weight by practicing some exercises frequently[6].

Uncontrolled diabetes prompts numerous chronic complications such as visual impairment, renal failure and heart failure[7]. Individuals with type-2 diabetes work proactively to optimize their conditions and well being as well as to reduce complications by using herbs and supplements which are known as complementary and alternative medicine (CAM) treatments[8]. The Food and Drug Administration (FDA) in United of states do not consider these treatments as "safe prescriptions" since they are not completely effective in controlling. DM studies have shown that there are numerous substances appeared to enhance the insulin sensitivities[8], whilst on the contrary, other studies fail to discover any advantages for glucose control or in bringing down A1C levels[9].

Some CAM treatments are well accounted for, for instance, aloe vera, alpha-lipoic acid (spinach, broccoli, potatoes), chromium, cinnamon, garlic, ginseng, gymnema sylvestre, magnesium (entire grains, nuts, green, verdant vegetables), omega-3 greasy acids (salmon, walnuts, soybeans), polyphenols, thorny pear prickly plant and vanadium[9]. Only few epidemiology studies in the Libyan Arab Jamahiriya were found that DM is one of the major health problems and was considered a priority in health planning in the country. A national committee for DM has existed since 1984 and all cases are registered and treated in diabetic centers and clinics free of charge including diagnostics facilities and medications[10]. It was reported that diabetes and its complications were recently upgraded to be the fourth leading cause of death in Libya[11]. Hence, this study investigates the extent and patterns of CAM usage among people with type-2 diabetes living in Zliten, Libya. In addition, study was aimed to verify the prevalence of CAM intake aiding the sugar control with its associated factors.

MATERIALS AND METHODS

Study location and population: This study was conducted in Zliten general hospital (ZGH) and Kadosh Diabetic Center (KDC) in Zliten city located in Misrata, Libya. Target population included the list of all Libyan patients who have DM in Zliten City. The study population included 192 adult diabetic patients from Endocrine ward of Zliten general hospital (ZGH) and Kadosh Diabetic Center (KDC). This number of participants was used in the descriptive part for all diabetes cases. Then 124 participants were included in the bivariate analysis to find the associated risk factors for those who are using the CAM only.

Study design and sampling methods: A cross sectional quantitative study was designed and carried out between the periods of August, 2017-October, 2017. Patients who fulfilled the inclusion criteria were identified and selected by the interviewer. Convenience sampling was used to collect the eligible respondents.

Instruments: The questionnaires developed by the researcher was based on the available factors taken from the literature review. The questionnaire was validated by using content and expert validity. Pilot study was conducted before data collection. The questionnaire included six sections. The first section included socio-demographic characteristics, duration of diabetic mellitus and types of medication. The second section assessed the perceived health condition and it consisted of one question with answers rating from 1-10 with higher score means better health. The participants would have very good health if they scored 8-10, good health if they scored 5-7 and not feeling good if they scored[12] <5.

The third section included question about CAM use, frequency of CAM use and types of CAM used. SAM use was defined as using any herbal products without medical prescription. The fourth section was based on attitudes towards CAM[13]. This was based on 10 statements related to attitude towards CAM usage. The statements were answered 'yes' or 'no' with a positive attitude equal to one and a negative attitude equal to zero. The total maximum score was 10. A higher score indicated a more positive attitude towards CAM usage.

A score of ≥ 6 was considered 'good attitude'. The fifth section assessed the perceived improvement in sugar control due to CAM use. The question ranked from 0-10 in which higher score means higher control. A score of ≥ 6 was considered 'improved' and a score of <6 was considered 'not improved'. The sixth section assessed the

satisfaction with CAM use and the question was ranked from 0-10 in which higher score means higher satisfaction. A score of ≥ 6 was considered 'satisfied' and a score less than 6 was considered 'not satisfied'

Statistical analysis: Face-to-face interview with patients based on a structured questionnaire format was opted in this study. All questions were constructed to ensure that each independent variable whether continuous or categorical was properly and thoroughly analyzed and independently accounted for.

Data was collected and analyzed by using IBM SPSS Statistics (Statistical Package for the Social Sciences) version 23. Descriptive statistics were used to describe all the included variables that have been used in this study. Mean±standard deviation described the numerical variables while frequency and percentage described the categorical variables. Independent sample t-test and chi square test were used in the bivariate analysis to identify the association between all included variables and our outcomes.

Ethical consideration: This study was approved by the Research committee in the medical faculty and Ethics Committee of Lincoln University College. Patients were informed about the purpose of this research. Verbal agreement and consent form were given by the patients before any sample collection or interview after ensuring the confidentiality to the participants. Participation was voluntary and the participants had the right to withdraw from the study at any time. Confidentiality was assured.

RESULTS

Descriptive analysis related to demographical factors, using type 2 treatments and using complementary medicine: The mean age±SD of the participants was 46.21±11.87 as shown in Table 1. Most of respondents were males (56.8%), married (71.4%) with tertiary education (37.6%) and their families' income was in between 500-1000 D.L. Table 2 showed that the most of the participants were having diabetes for <40 years (53.1%), take tablet medication (60.9%), using CAM with medicine (64.6%) and about 49.5% good perceived their health.

Table 3 showed that out of 192 participants, 61.3% consumed CAM daily and the cinnamon was the most common CAM consumed (41.9%) followed by okra (13.7%), garlic and onion (7.3%), ginger (5.6%), green tea (4.8%) and other plants (28.6%). Furthermore, 71.8% of the participants

Table 1: Descriptive analysis of socio-demographic factors (n = 192)

Variables	Mean±SD	Frequency	Percentage
Age* (Mean±SD)	46.21±11.87		
Gender			
Male		109	56.8
Female		83	43.2
Marital status			
Single		28	14.6
Married		137	71.4
Divorce/widow		27	14.0
Educational status			
Illiterate		30	15.6
Primary		40	20.8
Secondary		50	26.0
Tertiary		72	37.6
Income (DL) **			
<500		38	19.8
500-1000		94	49.0
>1000		60	31.2

*Numerical variable described by Mean±SD, **DL: Dinar Libya

Table 2: Descriptive analysis of other related factors with diabetic mellitus (n = 192)

Variables	Frequency	Percentage
Age of having diabetes		
<40 years	102	53.1
>40 years	90	46.9
Type of pharmaceutical drugs used		
Insulin injection	32	16.7
Tablets	117	60.9
Both	43	22.4
Type of diabetes' treatment		
Use complementary with medicine	124	64.6
Use medicine only	68	35.4
Perceived health condition		
Very good (scale from 8-10)	58	30.2
Good (scale from 5-7)	95	49.5
Not feeling good (scale from 1-4)	39	20.3

Table 3: Descriptive analysis of factors related to people using CAM (n = 124)

Variables	Frequency	Percentage
Frequency of CAM consumption		
Daily	76	61.3
Sometimes	48	38.7
Types of CAM used		
Okra	17	13.7
Cinnamon	52	41.9
Garlic and onion	9	7.3
Ginger	7	5.6
Green tea	6	4.8
Others	33	28.6
Sugar control with CAM		
Improved (scale from 6-10)	89	71.8
Not improved (scale from 1-5)	35	28.2
Satisfaction for CAM		
Satisfied (scale from 6-10)	90	72.6
Not satisfied (scale from 1-5)	34	27.4
Attitude toward CAM		
Good (scale from 6-10)	65	52.4
Not good (scale from 1-5)	59	47.6

Table 4: Attitude score of respondents towards people using CAM (n = 124)

Items	Yes	
	Frequency	Percentage
CAM is just as effective at treating physical ailments as medications prescribed by medical doctors	84	68
CAM is better for your body than pharmacological drugs	116	94
CAM has fewer side effects than conventional medicines	93	75
Physician who uses CAM will have more success with helping a patient's medical concern	88	71
Physicians should counsel patients on CAM to prevent and treat chronic illness	112	90
CAM should be used in conjunction with conventional medicines for the best patient outcome	105	85
Using natural products can improve psychological and physical health	108	87
Most CAM stimulate the body's natural therapeutic powers	95	77
CAM should be under the supervision of a physician	91	73
It feels good psychologically to use CAM	50	40

Table 5: Socio demographic factors associated with people using CAM (n = 124)

Variables	Sugar controlled with CAM					
	Improved		Not improved			
	Number	Percentage	Number	Percentage	χ^2	p-value
Age	45.48±11.77*		50.20±13.57*		1.92**	0.057
Gender						
Male	47	70.1	20	29.9	0.19	0.663
Female	42	73.7	15	26.3		
Marital status						
Single	15	78.9	4	21.1	0.90	0.637
Married	63	71.6	25	28.4		
Divorce/widow	11	64.7	6	35.3		
Educational status						
Illiterate	12	63.2	7	36.8	7.34	0.062
Primary	20	66.7	10	33.3		
Secondary	22	62.9	13	9.9		
Tertiary	35	87.5	5	12.5		
Income (DL)*						
<500	21	77.8	6	22.2	1.80	0.406
500-1000	39	66.1	20	33.9		
>1000	29	76.3	9	23.7		
Age of having diabetes						
<40 years	49	75.4	16	24.6	0.88	0.348
>40 years	40	67.8	19	32.2		

*Numerical variable described by Mean±SD, **t-test was used for this variable (age), ***DL: Dinar Libya

reported that their health condition was improved after using CAM along with their medication and 72.6% of them were satisfied by using CAM. The general attitude toward using CAM among the participants was good (52.4%). The frequency and percentage for attitude towards CAM are presented in Table 4. The highest percentage was presented for statements 'CAM is better for your body than pharmacological drugs" (94%) while the lowest percentage was presented for the statement 'It feels good psychologically to use CAM' (40%).

Factors associated with control sugar by using CAM: Independent sample t-test and chi squared test was performed on 124 participants who consumed CAM while controlling sugar level including socio demographic and other factors related to the medication for diabetes.

Factors associated significantly with perceived sugar control were type of pharmaceutical drugs used, perceived health condition, satisfaction with CAM, types of CAM used and frequency of CAM consumption (p<0.05). However, age, gender, marital status, educational status, income and age of having diabetes were not statistically significant with the sugar controlled by using CAM (p>0.05) (Table 5 and 6).

DISCUSSION

Diabetes mellitus is one of the most common and costly chronic conditions and reported that its global prevalence was approximately 366 million people by 2011 and expected to escalating to 552 million people[14-16] by the year 2030. From this study, it was identified the prevalence and some of the

Table 6: Other associated factors with people using CAM (n = 124)

| Variables | Sugar controlled with CAM | | | | | |
| | Improved | | Not improved | | | |
	Number	Percentage	Number	Percentage	χ^2	p-value
Type of pharmaceutical drugs used						
Insulin injection	11	61.1	7	38.9	9.58	0.008
Tablets	74	77.9	21	22.1		
Both	4	36.4	7	3.1		
Perceived health condition						
Very good	52	98.1	1	1.9	32.54	0.001
Good	33	54.1	28	45.9		
Not feeling good	4	40.0	6	60.0		
Frequency of CAM consumption						
Daily	70	92.1	6	7.9	40.10	0.001
Sometimes	19	34.5	29	60.4		
Types of CAM used						
Okra	11	64.7	6	35.3	25.59	0.001
Cinnamon	49	94.2	3	5.8		
Garlic and union	5	55.6	4	44.4		
Ginger	5	71.4	2	28.6		
Green tee	2	33.3	4	66.7		
Others	17	51.5	16	48.5		
Satisfaction with CAM						
Satisfied (scale from 6-10)	76	84.4	14	15.6	26.01	0.001
Not satisfied (scale from 1-5)	13	38.2	21	61.8		

Chi square was used for this analysis

related factors that could influence in blood sugar control by consuming CAM. As the incidence of diabetes in Libya was approximately 14.1%, which is one of the highest in the Arab world[17]. There are quite a number of people who consumed CAM together with their medications. Thus, we tried to highlight the factors related to diabetic patients with CAM consumption and their satisfactions towards the results. Investigations of the patients' opinions and approaches towards CAM treatments are unusual. It is broadly viewed among the specialists that the utilization of CAM treatments is just connected to a specific social or ethnic background a cross-sectional study, a designed questionnaire form to evaluate the spontaneous CAM consumption therapies among 192 type-2 diabetic patients (average aged 46.21±11.87 years) in Zliten city in Misrata, Libya. Similarly, there was a previous study carried out in Libya, found that the mean age for diabetic was 48.37±11.62 years[17].

This study also demonstrated that males were more prone to have diabetes compared to females and this data are keeping up with studies from different countries[10]. There are few common factors, found worldwide contributing to diabetes such as: people with low education background, low-income families and also high among the married couples. Our study demonstrated that most of the patients were having the diabetes when they aged <40 years-old.

In contrary, previous researchers showed that the cut-off points of having diabetes was above 40 years-old[17]. The discrepancy of age could be due to different sample sizes and their modern life style especially in the rich countries and gulf countries.

it was also found that the Libyans prefer to use both types of medicines (injections and tablets) at the same time as they want fast outcomes which explained that the majority of them were in a good health condition with 49.5% compared to other groups[18,19]. Moreover, it could be due to high percentage of using the CAM 64.6% together with medicines. Approximately 72.6% patients were able to control their blood sugar level and 71.8% of them are satisfied of the outcome. About 62.1% of them was shown not to have any symptoms after the CAM consumption and the association between CAM intake with health condition was statistically significant (p<0.001) and our results are in keeping with the previous studies[20].

Clinical trials studies on hypoglycaemic effects of cinnamon, bitter gourd, fenugreek and ivy gourd showed conflicting results. In this study, cinnamon, ginger, okra, garlic, onion, green tea and some others plants were included to see which of them are commonly used. Cinnamon (41.9%) was the reported to be most frequently used plant in this study followed by other plants (26.6%). It was demonstrated that

there was a significant reduction in HbA1c with cinnamon intake which is supported by previous study[21]. It was showed the types of CAM is associated with sugar controlled (p<0.001). Although there are many studies on effects of cinnamon on blood sugar levels, its effects on HbA1c levels remains unknown[9]. This study is limited by a relatively small sample size and by the fact that study sample may be not representative for the Libyan population. Another limitation is the self-reported sugar control which is not based on laboratory investigation. We recommend future studies with bigger and representative sample to be conducted. To assess the effect of CAM on blood sugar a proper study design should be performed.

CONCLUSION

CAM is used commonly among most of the Libyan in Zliten city as more than 60% use CAM to control glucose level. Most of the participants were satisfied with CAM and had good attitude toward it. The most common CAM used was Cinnamon. Most of the participants were satisfied with CAM and had good attitude toward it. Factors associated with perceived sugar control were type of pharmaceutical drugs used, perceived health condition, satisfaction with CAM, types of CAM used and frequency of CAM consumption.

ACKNOWLEDGMENT

SIGNIFICANCE STATEMENT

This study discovered that 64.6% of our participants who used the complementary medicine, mostly cinnamon, are in a good health. It was shown that 72.6% of them were highly satisfied in using CAM with good attitude 52.4%. Around 94% of the participants demonstrated that CAM has better effects on general well being than pharmacological drugs. The type of pharmaceutical drugs used, perceived general health condition, satisfaction with the effects of different types of CAM and frequency of CAM consumption were the most important factors associated with controlling blood sugar level by CAM. This study will help the future researchers to reveal the importance of CAM usage for general health well being and explore more possible factors that may contribute in the lowering of blood sugar level.

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