

Prevalence and correlates of complementary and alternative medicine use among diabetic patients in a resource-limited setting

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ABSTRACT

Background: The use of Complementary and Alternative Medicine (CAM) among diabetic patients is rising to manage diabetes mellitus (DM) and its complications. The burden of DM in developing countries coupled with a high prevalence of CAM use and its associated risks among diabetic patients. Therefore, this study aimed to assess the prevalence and predictors of CAM use among DM patients.

Methods: Diabetic patients visiting the diabetic clinics of Debre Tabor governmental hospital were invited to participate in a cross-sectional study. Interview guided self-administered questionnaire was used for data collection. Descriptive statistics like, frequency, percentage, mean, standard deviation, and median were conducted for each of the questions entered in order to detect outliers and validate data entry. Independent sample 't' test and ANOVA were used to test continuous variables and Chi-square test was used to compare categorical variables. Univariate and multivariate logistic regression were computed to identify associated factors (sex, age, religion, marital status, residence, employment status, educational level, monthly income, duration of DM, presence of DM complication, and family history of DM) of CAM use.

Results: Out of 422 diabetic patients invited to participate in this study, a total of 395 completed the survey questionnaire with a response rate of 93.6%. The use of CAM was reported by 73.7% of diabetic patients. Patients' average age was 48.7 ± 12.6 years, with 53.2% females and 52.4% married. The odds of CAM use among older diabetic patients were higher compared to younger diabetic patients (AOR: 1.92; CI: 1.75–3.17). Compared to not married, married diabetic patients had higher odds of using CAM (AOR: 2.01; CI: 1.36–4.25). The odds of CAM use among respondents who develop diabetic complications were higher than patients without diabetic complications (AOR: 1.94; CI: 1.50–4.36). The odds of CAM use among respondents with a family history of DM were higher than participants without a family history of DM (AOR: 2.53; CI: 1.27–2.75). Among CAM users, 54.3% used CAM as a complementary treatment along with conventional medicine. Traditional healers (38.8%) were the most frequently reported source of recommendation about CAM use. The majority of CAM users 172 (59.1%) didn't disclose CAM use for their health care professionals.

Conclusion: The prevalence of herbal medicine use among diabetic patients was high. Age, marital status, residence, family history of DM, presence of diabetic complications, and duration of DM were found to be strong predictors of CAM use among diabetic patients. A rigorous struggle by the government, healthcare professionals, and educational institutions is required to increase the safe use of CAM by diabetic patients and to integrate modern diabetic treatment modalities with CAM therapies.

1. Background

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both [1]. The increasing prevalence of chronic diseases such as DM and its complications may trigger patients to use CAM either alone or in combination with conventional medicines [2]. The term CAM is used interchangeably with traditional medicine in some countries. It refers to

a wide set of healthcare practices that aren't integrated into the healthcare system and aren't part of that country's tradition. It includes professionally unregulated and regulated practices such as acupuncture, yoga, osteopathy, naturopathy, siddha, faith healing, ayurveda, homeopathy, reiki, unani, aromatherapy, biological based therapies (herbal medicine, animal products diet, honey, and natural products like minerals and vitamins), manipulative and body-based therapies (exercise, relaxation and massage), and mind/body interventions (fasting,

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prayers, holy water, and listening to music [3]. Alternative medicine is used as an alternative to modern medicine, but complementary medicine is used along with modern medicine [4].

According to the International Diabetes Federation (IDF) report, there are 451 million (age 18–99 years) people with diabetes worldwide. These figures were expected to increase to 693 million by 2045. It was estimated that almost half of all people (49.7%) living with diabetes are undiagnosed. Moreover, there were an estimated 374 million people with impaired glucose tolerance (IGT) and it was projected that almost 21.3 million live births to women were affected by some form of hyperglycemia in pregnancy. In 2017, approximately 5 million deaths worldwide were attributable to diabetes in the 20–99 years age range [5]. Several studies reported the prevalence of diabetes mellitus complications varying from 20 to 90.5% [6–10]. Previous studies in Ethiopia revealed that visual disturbance, neuropathy, nephropathy, and hypertension were the highest four chronic complications diagnosed in diabetic patients [11–14].

Previous studies around the world revealed that the use of CAM by diabetic patients has notably different findings ranging from 17 to 72.8% [15]. Previous findings revealed a varying range of CAM use rates among diabetic patients depending on the geographic or country region such as in the UK (17%) [16], Canada (25%) [17], Mexico (62%) [18], Taiwan (61%) [19], India (67.7%) [4], Jordanian (16.6%) [20], Palestinian (51.9%) [21], Saudi Arabia (30.1%) [22], Lebanon (38%) [23], Turkey (41%) [24], Egypt (41.7%) [25], Mumbai (63%) [26], Bahrain (63%) [27], United Arab Emirates (39.3%) [28], and Germany (18.4%) [16] of patients with DM were used a type of CAM therapy. The prevalence of herbal medicine use among chronic disease patients in Cambodia (44.5%) [29], Vietnam (43.6%) [30], Malaysia (24.9%) [31], Lao PDR (21.3%) [32], and Myanmar (53.2%) [32].

In developing countries, many patients with chronic diseases such as DM are reliant on CAM use because of its perceived efficacy, low cost, and safety. However, studies on the prevalence and correlates of CAM use among diabetic patients are lacking. The results of this study will provide supporting evidence that could guide decision making at the system, institutional, and individual level regarding complementary and alternative medicine use by patients with diabetes mellitus in Ethiopia, and provide an opportunity for future investigations on the effectiveness of these modalities in the management of diabetes mellitus. Therefore, the present study aimed to assess the prevalence and predictors of CAM use among diabetic patients in a resource-limited setting.

2. Methods

2.1. Study setting, design, and period

Institutional based cross-sectional study was conducted from August 1 to September 28, 2020 in the diabetic clinic of Debre Tabor governmental hospital, located in Debre Tabor town, South Gondar zone, Northwest Ethiopia, 99 km away from Bahir Dar, and 667 km far from Addis Ababa. Diabetic care service is one of the hospital's outpatient department clinics that gives service for many patients with diabetes mellitus.

2.2. Study participants and sample size determination

Diabetic patients with a duration of DM of less than one year, pregnant women, and with mental problems were excluded from the study. The sample size was calculated based on a single population proportion formula with the assumption of 50% as a proportion (p) of patients with CAM use, at 95% confidence level and Margin of error (d) = 5%.

The source population (N) = 1050, then.

So, estimated sample (n) = $\frac{(Z_{\alpha/2})^2 \times P \times (1-P)}{d^2}$, n = 384.

Then, corrected estimated sample size = $\frac{N \times n}{N+n} = \frac{1050 \times 384}{1050+384} = 281$

Finally, by adding 10% contingency, a total of 309 samples were included in the study. However, to increase the power of the study, the sample size was extended to 395.

2.3. Data collection process

Several previous studies assessing the use of CAM were reviewed to prepare the data collection tool for the present study [23,28,33,34]. An interview-directed self-administered questionnaire was used for data collection. Initially, the questionnaire was prepared in English and translated into the local language (Amharic) then back to the English language to ensure consistency. A pre-test was done two weeks before the actual data collection on 30 participants who were not included in the final analysis. Finally, completed questionnaires were collected. The questionnaire comprised of 2 core sections. The first section contains questions about the socio-demographic characteristics (age, sex, religion, marital status, education, residence, monthly income, educational level, and occupation status) and clinical status of the patients such as complication, duration of the disease, and family history of diabetes mellitus. The second part intended to evaluate the level of CAM use, information source, and discussion with healthcare professionals regarding CAM use, and the regimen and specific drugs used to treat diabetic patients. The type of CAM modalities was grouped as biological-based therapies such as herbal medicines, animal products diet, and natural products like minerals and vitamins; manipulative and body-based therapies like exercise, relaxation, and massage; and mind/body interventions such as fasting, prayers, "Tsebel" (holy water), and listening to music. The data collectors were appropriately skilled on the data collection tool before data collection. The collected data were cleared and checked every day for completeness and consistency before processing. During data gathering, two trained health professionals were recruited and supervised by two MSc graduate health professionals. Finally, the completeness and fulfillment of all questions were checked by the principal investigator and data collectors.

2.4. Data analysis

Statistical Package for the Social Sciences (SPSS) software version 24.0 was used for data analysis. Descriptive statistics like, frequency, percentage, mean, standard deviation, and median were conducted for each of the questions entered in order to detect outliers and validate data entry. In addition, a few cross-checks among the questions were done to warrant the validity of the data. Independent sample 't' test and ANOVA were used to test continuous variables and Chi-square test was used to compare categorical variables. To describe the characteristics of the study participants, continuous variables were presented as means \pm SD while categorical variables were presented as frequencies and their respective magnitudes. The main outcome variable in the analysis was CAM use. Moreover, the Univariate and multivariate logistic regression analyses were computed to assess the predictors of CAM use in the study participants. Variable to be contained within the multiple regression model, it must be significantly correlated with the main outcome (CAM use) in the univariate analysis. Odds ratios and their corresponding 95% confidence intervals were determined. Statistical significance was set at a 95% confidence interval using a p-value of ≤ 0.05 as a cutoff point.

3. Results

3.1. Socio-demographic characteristics and determinants of complementary and alternative medicine use

Out of 422 diabetic patients invited to participate in this study, a total of 395 completed the survey questionnaire with a response rate of 93.6%. Table 1 shows the patient and disease-related characteristics of the respondents. Patients' average age was 48.7 ± 12.6 years, with 210 (53.2%) females and 207 (52.4%) married. The majority of the

Table 1
Patient characteristics and factors associated with CAM use among diabetic patients.

Variable	Frequency (%)	CAM use (n = 395)		COR (95% CI)	P-Value	AOR (95% CI)	P-Value
		Yes(n)	No(n)				
Age							
<30	68 (17.2)	39 (57.4)	29 (42.6)	1		1	
31–45	147 (37.2)	97 (66.0)	50 (34.0)	1.56 (0.85–3.91)	0.081	1.03 (0.61–2.87)	0.191
>45	180 (45.6)	155 (86.1)	25 (13.9)	3.01 (1.29–2.48)	0.007	1.92 (1.75–3.17)*	0.019
Sex							
Male	185 (46.8)	126 (68.1)	59 (31.9)	1		1	
Female	210 (53.2)	165 (78.6)	45 (21.4)	0.65 (0.73–3.72)	0.057	0.84 (0.61–1.83)	0.201
Religion							
Orthodox	232 (58.7)	171 (73.7)	61 (26.3)	2.05 (1.33–2.96)	0.021	1.07 (0.70–2.81)	0.095
Muslim	112 (28.4)	79 (70.5)	33 (29.5)	0.86 (0.69–2.51)	0.060	0.62 (0.55–3.15)	0.152
Protestant	51 (12.9)	21 (41.2)	30 (58.8)	1		1	
Marital status							
Married	264 (66.8)	195 (73.9)	69 (26.1)	4.11 (1.82–3.85)	0.006	2.01 (1.36–4.25) *	0.010
Unmarried	131 (33.2)	57 (43.5)	74 (56.5)	1		1	
Residence							
Urban	248 (62.8)	160 (64.5)	88 (35.5)	1		1	
Rural	147 (37.2)	121 (82.3)	26 (17.7)	3.01 (1.34–4.04)	0.008	1.89 (1.53–2.89)*	0.024
Employment status							
Unemployed	219 (55.4)	161 (73.5)	58 (26.5)	1		1	
Employed	176 (44.6)	130 (73.9)	46 (26.1)	2.81 (1.63–4.20)	0.014	0.93 (0.71–4.38)	0.235
Educational level							
Illiterate	101 (25.6)	74 (73.3)	27 (26.7)	1		1	
Primary and secondary school	189 (47.8)	134 (70.9)	55 (29.1)	1.20 (0.61–2.78)	0.089	0.66 (0.49–2.84)	0.301
Above	105 (26.6)	83 (79.0)	22 (21.0)	0.89 (0.73–3.61)	0.109	1.14 (0.88–3.90)	0.172
Monthly income							
<1500 ETB	158 (40.0)	116 (73.4)	42 (26.6)	1		1	
1501-2500 ETB	134 (33.9)	94 (70.1)	40 (29.9)	1.66 (1.31–3.83)	0.010	0.83 (0.48–3.01)	0.133
>2500 ETB	103 (26.1)	81 (78.6)	22 (21.4)	2.41 (1.35–2.89)	0.004	0.61 (0.55–4.03)	0.089
Regimen							
Insulin	78 (19.7)	51 (65.4)	27 (34.6)	1		1	
Oral hyperglycemic	252 (63.8)	208 (82.5)	44 (17.5)	1.33 (0.73–4.03)	0.081	0.83 (0.48–2.71)	0.107
Insulin and oral hypoglycemic	65 (16.5)	32 (49.2)	33 (50.8)	0.93 (0.83–3.50)	0.062	0.62 (0.51–3.81)	0.241
Duration of DM							
<5	188 (47.6)	119 (63.3)	69 (36.7)	1		1	
>5	207 (52.4)	172 (83.1)	35 (16.9)	3.11 (1.80–4.02)	0.007	2.25(1.04–3.06)*	0.008
Presence of DM complication							
Yes	215 (54.4)	187 (87.0)	28 (13.0)	2.91 (1.03–5.83)	0.011	1.94 (1.50–4.36)*	0.013
No	180 (45.6)	104 (57.8)	76 (42.2)	1		1	
Family history of DM							
Yes	189 (47.8)	152 (80.4)	37 (19.6)	3.89 (1.56–4.32)	0.001	2.53 (1.27–2.75)*	0.005
No	206 (52.2)	139 (67.5)	67 (32.5)	1		1	

Abbreviations:- AOR: Adjusted odds ratio, COR: Crude odds ratio, CAM: Complementary and alternative medicine, CI: Confidence interval, DM: Diabetes mellitus, ETB: Ethiopian birr.

respondents were Orthodox Christians (58.7%), married (62.8%), and permanent residents of urban areas 62.8%. The study participants included subjects from all levels of education ranging from illiterate 101 (25.6%) to university level 105 (26.6%). A considerable percentage of 158 (40.0%) diabetic patients reported a monthly income less than <1500 ETB. About 189 (47.8%) of the participants reported a positive family history of DM and the existence of complications as a result of DM 215 (54.4%).

Using bivariate logistic regression, factors such as age, marital status, residence, family history of DM, presence of diabetic complications, and duration of DM were associated with CAM use in the study participants. The findings revealed that older diabetic patients (>45 years) had higher odds of using CAM as compared to younger diabetic patients (<30 years) (AOR: 1.92; CI: 1.75–3.17). Compared to not married, married diabetic patients had higher odds of using CAM (AOR: 2.01; CI: 1.36–4.25). The odds of CAM use among diabetic patients with rural residence were higher compared to participants with urban residence (AOR: 1.89; CI: 1.53–2.89). The odds of CAM use among participants with >5 years duration of DM were higher compared to diabetic patients with <5 years duration of DM (AOR:2.25; CI: 1.04–3.06). The odds of CAM use among respondents who develop diabetic complications were higher than patients without diabetic complications (AOR: 1.94; CI: 1.50–4.36). The odds of CAM use among respondents with a family history of DM were higher than in participants without a family history

of diabetes mellitus (AOR: 2.53; CI: 1.27–2.75) (Table 1).

3.2. The regimen and specific drugs used to treat diabetic patients

Among the regimen, oral hyperglycemic agents were prescribed for the majority of diabetic patients 252 (63.8%), followed by both insulin and oral hypoglycemic agents 65 (16.5%), and insulin 78 (19.7%). Concerning specific medication used by diabetic patients for DM management, Metformin and Glibenclamide oral hyperglycemic agents were the most utilized medication 96 (15.6%) followed by Metformin alone 85 (14.3%) and NPH insulin 78 (34.5%) (Table 2).

3.3. Prevalence and characteristics of CAM use

The prevalence and characteristics of CAM use are summarized in Table 3. The use of complementary and alternative medicine was reported by the majority of 291 (73.7%) diabetic patients. Among CAM users, 158 (54.3%) used CAM as a complementary treatment along with conventional medicine, while 57 (19.6%) used CAM as an alternative treatment along with conventional medicine. Traditional healers 113 (38.8%) was the most frequently reported source of recommendation about CAM use followed by families and friends 96 (33.1%), patients who used CAM 49 (16.8%), health care professionals 21 (7.2%), and media 12 (4.1%) (Fig. 1). Most of the CAM users 101 (34.7%) reported

Table 2
The regimen and specific drugs used to treat diabetic patients (n = 395).

Variable	Frequency (%)	CAM use (n = 395)	
		Yes [n (%)]	No [n (%)]
Regimen			
Insulin	78 (19.7)	51 (65.4)	27 (34.6)
Oral hyperglycemic	252 (63.8)	208 (82.5)	44 (17.5)
Insulin and oral hypoglycemic	65 (16.5)	32 (49.2)	33 (50.8)
Specific drugs			
Glibenclamide	71 (10.4)	55 (77.5)	16 (22.5)
Metformin	85 (14.3)	61 (71.8)	24 (28.2)
Metformin and Glibenclamide	96 (15.6)	76 (79.2)	20 (20.8)
Metformin and NPH Insulin	65 (25.2)	48 (73.8)	17 (26.2)
NPH insulin	78 (34.5)	51 (65.4)	27 (34.6)

Abbreviations:- CAM: Complementary and alternative medicine, NPH: Neutral protamine Hagedorn.

Table 3
Prevalence and characteristics of complementary and alternative medicine use among participants.

Variables	Frequency (%)
CAM use since diagnosis (n = 395)	
Yes	291 (73.7)
No	104 (26.3)
How do you use CAM? (n = 291)	
Complementary to modern medicine	158 (54.3)
Alternative to modern medicine	57 (19.6)
Both	76 (26.1)
Who recommended you to use CAM? (n = 291)	
Families and friends	96 (33.1)
Traditional herbalist	113 (38.8)
Patients who used CAM	49 (16.8)
Health care professionals	21 (7.2)
Media	12 (4.1)
Reasons for CAM use (n = 291)	
The tradition in the resident area encourages CAM use	68 (23.4)
Belief in advantages of CAM	52 (17.9)
Accessibility (availability)	45 (15.5)
For the treatment of other medical conditions	9 (3.1)
Dissatisfaction with modern medicine	101 (34.7)
Others	16 (5.5)
Reasons for not using CAM among nonusers (n = 104)	
Additional burden	15 (14.4)
Afraid of side effect	51 (49.0)
The doctor did not recommend	29 (27.9)
Lack of belief in its effectiveness	9 (8.7)
Disclosure for HCPs (n = 291)	
Yes	119 (40.9)
No	172 (59.1)
Reason for not disclosing (n = 172)	
Fear of response of HCPs	96 (55.8)
Not necessary	60 (34.9)
Insufficient information on CAM	16 (9.3)
Side effects (n = 291)	
Yes	22 (10.8)
No	182 (89.2)
Satisfaction (n = 291)	
Satisfied	155 (53.4)
Average	97 (33.3)
Dissatisfied	39 (13.4)

Abbreviations:- CAM: Complementary and alternative medicine, HCPs: Health care professionals.

dissatisfaction with modern medicine as the main reason for using CAM followed by the tradition in the resident area encourages CAM use 68 (23.4%), belief in advantages of CAM 52 (17.9%), accessibility 45 (15.5%), and for the treatment of other medical conditions 9 (3.1%). Similarly, the main reason for not using CAM among nonusers was because of being afraid of side effects 51 (49.0%) followed by doctor did not recommend 29 (27.9%), additional burden 15 (14.4%), and lack of belief in its effectiveness 9 (8.7%). The majority of CAM users 172 (59.1%) didn't disclose CAM use for their health care professionals due

to fear of their health care professionals 96 (55.8%), believed that it is not necessary to disclose 60 (34.9%) and lack of suitable information about CAM use 16 (9.3%). Only 22 (10.8%) of CAM users were reported side effects interrelated to CAM use, and 155 (53.4%) of the participants were satisfied with the effect of CAM use (Table 3).

3.4. Patterns of complementary and alternative medicine use

The type of CAM was classified as biological-based therapies, manipulative & body-based therapies, and mind/body intervention. Hence, the most frequent biological-based CAM products reported by diabetic patients were herbal medicine 148 (50.9%), followed by diet 115 (39.5%), natural products like minerals and vitamins 95 (32.6%), and animal products 27 (9.3%). Exercise was the most frequently reported manipulative and body-based therapies 124 (42.6%) followed by massage 35 (12.0%), and relaxation 29 (10.0%). Similarly, Tsebel (holy water) was the most frequently reported mind/body intervention 95 (32.6%) followed by prayers 87 (29.9%), fasting 53 (18.2%), and listening to music 15 (5.2%) (Table 4).

4. Discussion

The use of complementary and alternative medicine for the management of DM and other chronic diseases is reported worldwide [35, 36]. In the current study, the proportion of self-reported diabetes patients who were using CAM for the management of DM either alone or in combination with modern system of medicine, the various factors that were associated with the use of CAM, the regimen and specific drugs used by diabetic patients, and the pattern of CAM use were assessed. The current study showed that 73.7% of surveyed diabetic patients attending diabetes clinics in Debre Tabor general hospital have used CAM therapies since diagnosis with DM. Previous studies around the world revealed that the use of CAM by diabetic patients has notably different findings ranging from 17 to 72.8% [15]. Previous findings revealed a varying range of CAM use rates among diabetic patients depending on the geographic or country region. This finding is higher than previous similar studies done in Canada (25%) [17], Jordanian (16.6%) [20], Palestinian (51.9%) [21], Saudi Arabia (30.1%) [22], Turkey (41%) [24], Egypt (41.7%) [25], Korea 65% [4], Mumbai (63%) [26], Lebanon (38%) [23], Mexico (62%) [18], Taiwan (61%) [19], United Arab Emirates (39.3%) [28], Germany (18.4%) [16], Bahrain (63%) [27], and UK (17%) [16]. The higher use of CAM in our study might be due to the non-availability of regular and free anti-diabetic medication in the public health system, lack of perceived side effects, variation in cultural perceptions of CAM use, and acceptability of CAM. In addition, poor adherence to conventional medicine by diabetic patients in the study area could be another reason for the higher use of CAM. The variations in CAM use by geographic region could be in part contributed to differences in the accessibility and availability of modern medicine and sociocultural perceptions of CAM use among participants. In addition, differences in the definitions of CAM study designs could have also attributed to the variation in the prevalence of CAM use by diabetic patients in these countries.

The plant-based medicines have been experimentally studied and findings suggested that they could have significant antidiabetic activities [37–40]. Medicinal plants that are rich in secondary metabolites like flavonoids, coumarins, terpenoids, and other phytoconstituents have shown antidiabetic activity [41]. The antihyperglycemic effect of herbal medicines could be due to different mechanisms such as cAMP stimulation, stimulation of glycogenesis, initiate insulin release, β -cell K^+ channel blocking, inhibition of glycogenolysis and gluconeogenesis, reduction in insulin resistance, stimulation of glycolysis, promotion of regeneration of the β -cells, preventing oxidative stress, inhibition of α -glucosidase and β -galactosidase [42–44]. The findings of this study revealed that the most commonly used type of CAM was herbal medicines (biological-based therapies) followed by diet (biological-based

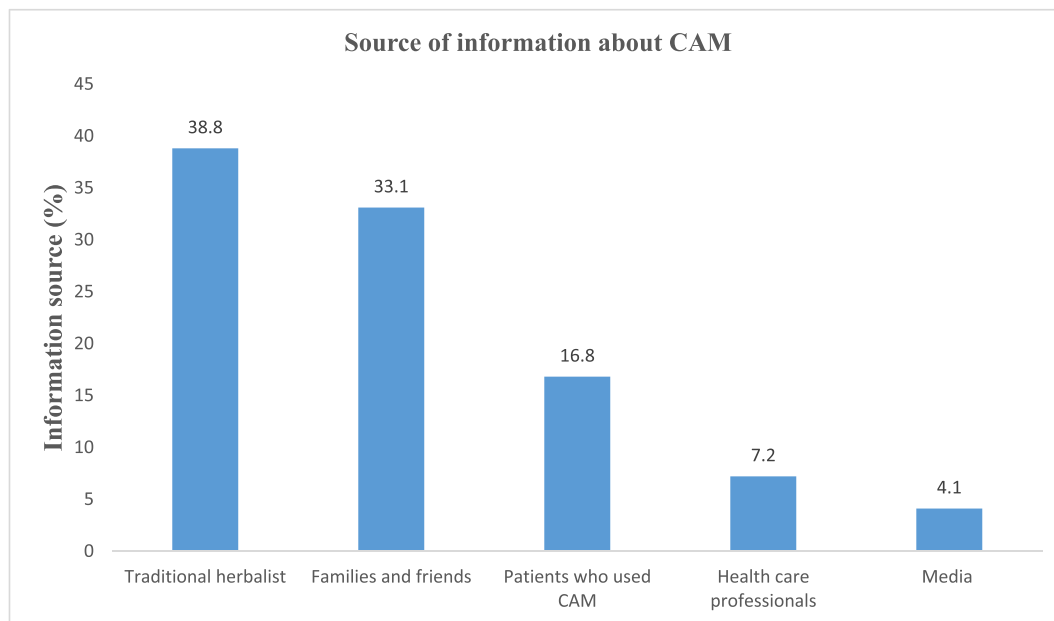


Fig. 1. Source of CAM use among diabetic patients.

Table 4

Types of complementary and alternative medicine utilized by participants.

Type of complementary and alternative medicine	Frequency (%)
Biological based therapies	
Herbal medicine	148 (50.9)
Animal products	27 (9.3)
Diet	115 (39.5)
Natural products like minerals and vitamins	95 (32.6)
Manipulative and body-based therapies	
Exercise	124 (42.6)
Massage	35 (12.0)
Relaxation	29 (10.0)
Mind/body intervention	
Fasting	53 (18.2)
Prayers	87 (29.9)
Tsebel (holy water)	95 (32.6)
Listening to music	15 (5.2)

therapies), natural products like minerals and vitamins, exercise (manipulative and body-based therapies), and holy water (mind/body intervention). The use of herbal medicine for the management of diabetes mellitus is reported worldwide [23,45–48]. The extensive use of herbal medicine by diabetic patients could be due to the availabilities of rich natural herbal medicines and has a very rich tradition in the use of herbal medicines for the management of different diseases. Another reason that could have attributed to the common use of herbal medicines is the fact that these remedies are freely and widely accessible by the study participants without regulatory control. This finding is in agreement with a previous similar study conducted in United Arab Emirates that herbal medicine and diet followed by spiritual and natural healing, and vitamins and mineral supplements were the most commonly used type of CAM by diabetic patients [28].

The majority of CAM users 172 (59.1%) didn't disclose CAM use for their health care professionals due to fear of their health care professionals, believed that it is not necessary to disclose, and lack of suitable information about CAM. This finding is higher than similar studies conducted in different countries that a lower pattern of reporting was reported [18,23]. These findings suggest that health care professionals play a significant role in regards to the use of CAM therapies by diabetic patients and that they persist mainly blinded to their patient's use of CAM despite the fact that some patients are using CAM on an alternative

basis to current treatment. Such a finding is alarming since a substantial number of diabetic CAM users either experienced at least one side effect 22 (10.8%) or found CAM therapies ineffective 39 (13.4%).

In the present study, age, marital status, residence, family history of DM, presence of diabetic complications, and duration of DM were significantly associated with CAM use. The positive association found between CAM use and age is in line with previous similar studies, whereby older diabetic patients reported more frequent use of CAM when compared with younger diabetic patients [28,49–52]. Concerning gender and its correlation with CAM use, the evidence is inconclusive. It is supposed that diabetic patients turn to traditional, complementary, and alternative medicine more as the DM duration rises, the DM becomes tougher to control, and the diabetic complications raises. While the current finding revealed that gender is not a significant predictor of CAM use among diabetic patients [23,53–55]. However, a study conducted in United Arab Emirates showed that male patients were the predominant CAM users [28]. The odds of CAM use among respondents who develop diabetic complications were two times higher than in patients without diabetic complications. This may be due to there is likelihood that diabetic patients with diabetic complications may be afraid of the side effects of conventional drugs and perception of relatively feeling safe when taking CAM. This finding is in agreement with previous similar studies [23].

In this study, traditional healers were the most frequently reported source of recommendation about CAM use followed by families and friends, patients who used CAM, health care professionals, and media. However, a study conducted in United Arab Emirates and USA [28,56] revealed that the majority of CAM users encouraged or being referred to use CAM by family and friends, or social media influence. In contrast, in the present finding, a few diabetic patients were referred to use CAM by their health professionals and media. This finding is consistent with previous similar studies that health care professionals were negligibly involved in the use of CAM by diabetic patients [57–59]. The majority of CAM users didn't disclose CAM use for their health care professionals due to fear of their health care professionals, believed that it is not necessary to disclose and lack of suitable information about CAM use. A similar study also examined the explanations given by diabetic patients for not disclosing the use of CAM to the healthcare professionals and this is due to fear of a negative response from the healthcare professionals, fear that the health care professionals would not continue providing

them with healthcare, as the healthcare professionals didn't request about CAM use, their insight that the healthcare professionals did not want to know about CAM use, and fear that healthcare professionals would discourage CAM use [60]. Thus, healthcare professionals should increase the awareness of diabetic patients concerning the probable dangerous outcomes of unproven use of CAM with modern medicine. Moreover, the present study offers a suggestion to provoke a key role of health professionals in following their patients regarding self-use of different treatment modalities. Integration of medical education with CAM may allow the health professionals to be well aware of this widespread medicinal practice and train them with the desired familiarity to play a proactive role in the treatment choices of diabetic patients.

4.1. Limitation of the study

As the study is cross-sectional and depends on self-reported assessment, under-reporting is more likely to occur. Even though participants were requested to report their personal opinion and experience and were further guaranteed the privacy and confidentiality of their responses, data collection was finalized in the waiting class of the hospital; hence, participants could experience the social desirability bias and their responses are likely converted to satisfy their healthcare professionals. Thus, the prevalence of CAM use among diabetic patients might be underestimated.

5. Conclusions

The present study showed a high prevalence of CAM use among diabetic patients in Debre Tabor General Hospital, along with a very low rate of disclosure to healthcare professionals. Factors such as age, marital status, residence, family history of DM, presence of diabetic complications, and duration of DM were the independent predictors of CAM use among diabetic patients. Ministry of health and healthcare professionals are heartened to contemplate the possible benefits and risks of CAM use by diabetic patients, particularly in diabetic patients who were used CAM on an alternative basis. Special consideration should be devoted to educating diabetic patients, specifically for those who had the DM for a long period and those with a family history of DM, about the importance of disclosing the use of CAM to their healthcare professionals and the safe use of CAM by diabetic patients. A rigorous struggle by the government, healthcare professionals, and educational institutions is required to increase the safe use of CAM by diabetic patients and to integrate modern diabetic treatment modalities with CAM therapies.

Ethics approval and consent to participate

This study was approved by the ethical committee of the School of Pharmacy, University of Gondar. Informed verbal, as well as written consent, was obtained from study participants before data collection, and the purpose of the study was explained to the respondents in advance. The information collected from respondents was kept confidential.

Availability of data and materials

Most of the data is included in the manuscript. Additional can be found from the corresponding author based on reasonable request.

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CRediT authorship contribution statement

Zemene Demelash Kifle: Conceptualization, Data curation, Formal

analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The author declares that they have no competing interests.

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