**DOI: 10.5455/msm.2023.35.256-263**
Received: Nov 20 2023; Accepted: Dec 15, 2023



**ORIGINAL PAPER** Mater Sociomed. 2023; 35(4): 256-263

# Use of Complementary and Alternative Medicines (CAMs) Among Diabetic Patients in Al Ahsa, Saudi Arabia: A Cross-Sectional Study

**Abdullah Almaqhawi[1], Elham Al Hayim[2], Fatima Ali Al Amer[2], Sukainah Almuhanna[2], Nurah Abdullatef Al Khteeb[2], Shatha Hamed Al Khwajah[2]**

[1]Department of Family and Community Medicine, College of Medicine, King Faisal University, Al-Ahsa, Saudi Arabia

[2]Medical Intern, Collage of Medicine, King Faisal University, Al-Ahsa, Saudi Arabia

**Corresponding author:**
Elham Abdullah Al Hayim, Medical Intern, Collage of Medicine, King Faisal University, Al-Ahsa 31982, Saudi Arabia, E-mail: 218020366@student.kfu.edu.sa. ORCID ID: https://orcid.org/0000-0001-6035-1230.

**ABSTRACT**

**Background:** Complementary and Alternative Medicine (CAM) is a popular practice among Saudis. CAM refers to drugs and medical procedures that doctors do not typically employ. **Objective:** The study's goal was to determine the prevalence of CAM and the most prevalent form used among patients with diabetes in Al Ahsa, Saudi Arabia. **Methods:** This cross-sectional study enrolled individuals with diabetes mellitus (DM) in Al Ahsa, Saudi Arabia. Online questionnaires were employed between March to July 2023 to collect data on sociodemographic characteristics, information about diabetes, knowledge and use of CAM, and the different types of herbal supplements used. **Results:** Of the 386 patients, 54.1% were males, 45.9% were aged between 46 and 60 years old, and 45.9% had heard of CAM. The most popular CAM treatment for diabetes was biologically based, and the most common reason for using CAM was its accessibility (27.1%). The majority (82.1%) of diabetic patients reported using CAM as a treatment. Independent predictors of CAM use were diabetes complications, having heard of CAM, and social media. **Conclusion:** CAM use has a high prevalence in the treatment of diabetes. Independent predictors of CAM use were a shorter disease duration, diabetes complications, having heard of CAM, and social media. To avoid negative and unnecessary side effects, patients must be informed about CAM use.

**Keywords: Diabetes, Complementary and Alternative Medicine, Al-Ahsa, Saudi Arabia.**

## 1. BACKGROUND

Complementary and alternative medicine (CAM) comprises two distinct concepts; however, the two are frequently used synonymously (1). These terms refer to therapies that are employed in addition to or instead of conventional medical therapy (2). Patients are increasingly turning to CAM therapies to enhance both the course of their disease and their overall health (3). Several factors are associated with CAM use, including a lack of basic medical facilities, dissatisfaction with conventional treatment, perceived side effects of conventional medicines, benefits of herbal remedies, family traditions, and a desire to incorporate religion or spirituality into treatment (4, 5). Herbal medicine use is just one component of CAM; acupuncture, massage therapy, hijama, moxibustion, music therapy, faith healing, and hypnosis are examples of other modalities (6).

Worldwide, approximately 643 million adults (20 to 79 years old) will have diabetes by 2030. By 2045, this number is expected to surpass 783 million. The highest prevalence of diabetes among adults aged 20 to 79 (18.1%) is seen in the Middle East and North Africa. By 2045, this statistic is projected to rise to 20.4% (7). In KSA in 2022, the highest prevalence of DM (49.2%) was found in patients under 60 years old, followed by those between 45 and 64 years old (38.9%), and the

| Study variables | N (%) |
|---|---|
| Age group | |
| 18 – 45 years | 159 (41.2%) |
| 46 – 60 years | 177 (45.9%) |
| 61 – 75 years | 46 (11.9%) |
| >75 years | 04 (01.0%) |
| Gender | |
| Male | 209 (54.1%) |
| Female | 177 (45.9%) |
| Residence | |
| City | 319 (82.6%) |
| Village | 67 (17.4%) |
| Educational level | |
| Illiterate | 06 (01.6%) |
| Primary school | 26 (06.7%) |
| High school | 100 (25.9%) |
| Bachelor/University | 226 (58.5%) |
| Postgraduate | 28 (07.3%) |
| Occupation | |
| Employed | 168 (43.5%) |
| Retired | 91 (23.6%) |
| Student | 64 (16.6%) |
| Unemployed | 63 (16.3%) |
| Marital status | |
| Single | 87 (22.5%) |
| Married | 277 (71.8%) |
| Divorced | 22 (05.7%) |
| Smoking | |
| Current smoker | 59 (15.3%) |
| Non-smoker | 300 (77.7%) |
| Ex-smoker | 27 (07.0%) |

**Table 1. Sociodemographic characteristics of the patients (n=386).**

| Study variables | N (%) |
|---|---|
| Type of diabetes | |
| Type 1 | 105 (27.2%) |
| Type 2 | 191 (49.5%) |
| I don't know | 90 (23.3%) |
| Duration of diabetes | |
| 1 – 3 years | 99 (25.6%) |
| 4 – 10 years | 121 (31.3%) |
| 11 – 20 years | 91 (23.6%) |
| >20 years | 47 (12.2%) |
| I don't know | 28 (07.3%) |
| Type of treatment | |
| Do not use any prescription medications for diabetes | 42 (10.9%) |
| Oral or injectable hypoglycaemia agents | 198 (51.3%) |
| Insulin Injection | 98 (25.4%) |
| Both | 48 (12.4%) |
| Complications of diabetes † | |
| None of the mentioned | 177 (45.9%) |
| Nephropathy | 47 (12.2%) |
| Retinopathy | 97 (25.1%) |
| Neuropathy | 48 (12.4%) |
| Cardiovascular disease | 40 (10.4%) |
| Diabetic foot | 41 (10.6%) |
| I don't know | 53 (13.7%) |
| Associated comorbidities † | |
| None of the mentioned | 151 (39.1%) |
| Hypertension | 160 (41.5%) |
| Dyslipidemia | 137 (35.5%) |
| Thyroid disorder | 46 (11.9%) |
| Recent HbA1c reading | |
| <7 to 8% | 194 (50.3%) |
| 9 – 10% | 93 (24.1%) |
| >10% | 24 (06.2%) |
| I don't know | 75 (19.4%) |

**Table 2. Diabetes-related characteristics (n=386).**

youngest age group (under 40 years old) had the lowest prevalence (15.3%) (8). Previous studies have measured the use of CAM in patients with diabetes. According to a global 2021 study, 51% of patients with diabetes used CAM (9). In addition, several studies in different regions have been conducted on CAM prevalence in KSA. One was conducted in Al Qassim, Saudi Arabia, and showed that most CAM users (51.06%) had diabetes rather than other chronic diseases (10). Another recent study in Al Riyadh revealed that CAM use was prevalent in people with type 2 DM (T2DM) (67.5%) and type 1 DM (T1DM) (32.5%) (11). Almogbel ES et al. conducted a study in Al Qassim and found that herbal products were the most common type of CAM in patients with diabetes. The four most popular herbal remedies were ginger (47.3%), cinnamon (41.9%), myrrh (31.1%), and black seeds (30.2%) (12). On the other hand, body–mind therapy, such as ruqyah (a healing approach based on the Quran, was the most common type of CAM used (53.93%) in patients with diabetes (11). Other studies have indicated that gender and employment characteristics are significant predictors of CAM use in patients with diabetes (13,14).

## 2. OBJECTIVE

Because of the lack of research in this field in Al-Ahsa, our study investigated the prevalence of CAM and the forms used by patients with diabetes in Al-Ahsa, Saudi Arabia.

## 3. PATIENTS AND METHODS

***Participants***

A total of 386 patients with diabetes were recruited; males and females aged 18 years or older who were diagnosed with T1DM or T2DM and lived in Al-Ahsa were included, and patients without a DM diagnosis or who did not live in Al-Ahsa were excluded.

***Procedure and ethical considerations***

The ethical committee of the Faculty of Medicine, King Faisal University in Al-Ahsa approved the project (KFU-REC-2023-MAR-ETHICS684). Each participant informed about the purpose of the study. Furthermore, all participants were informed that obtained information will be used for research purpose and they had their rights to refuse to participate.

***Measures***

This cross-sectional study was conducted between March and July 2023 through an online questionnaire administered to patients with diabetes in Al-Ahsa, Saudi Arabia.

The questionnaire comprised four major sections

| Variables | N (%) |
|---|---|
| Heard of CAM | |
| Yes | 177 (45.9%) |
| No | 199 (51.6%) |
| Refused to say | 10 (02.6%) |
| Use of CAMs for the treatment of diabetes | |
| Yes | 317 (82.1%) |
| No | 69 (17.9%) |
| Type of CAM being used for diabetes (n=317) † | |
| Mind-body | 108 (34.1%) |
| Biologically-based | 178 (56.2%) |
| Manipulative | 58 (18.3%) |
| Others | 05 (01.6%) |
| What is the frequency of CAM used (n=317) | |
| 4 Times/week | 32 (10.1%) |
| One month at the beginning of the diagnosis | 67 (21.1%) |
| Daily | 84 (26.5%) |
| Once per week | 45 (14.2%) |
| Monthly | 89 (28.1%) |
| In your opinion, did the use of CAM help in improving diabetes? (n=317) | |
| Yes | 48 (15.1%) |
| No | 30 (09.5%) |
| Somewhat | 105 (33.1%) |
| I don't know | 134 (42.3%) |
| Reason for using CAM in diabetes treatment (n=317) † | |
| Refused to say | 89 (28.1%) |
| Affordability | 51 (16.1%) |
| Accessibility | 86 (27.1%) |
| Acceptability | 75 (23.7%) |
| Effectiveness | 36 (11.4%) |
| All of the above | 49 (15.5%) |
| Ever told the doctor about the use of CAM? (n=317) | |
| Yes | 103 (32.5%) |
| No | 214 (67.5%) |
| Plan to recommend CAM being used to other diabetic patients (n=317) | |
| Yes, all complementary and alternative medicine methods are safe | 67 (21.1%) |
| Yes, but after consulting a specialist doctor | 98 (30.9%) |
| Perhaps I would recommend the alternative medicine used by me and I noticed the good effect with it | 57 (18.0%) |
| No | 95 (30.0%) |
| Do you use (currently or previously) the above chosen in addition to medical treatment with medicines for diabetes? | |
| Yes | 175 (45.3%) |
| No | 211 (54.7%) |
| Did social media, in particular, such as WhatsApp, Twitter, Snapchat, etc., affect your use of complementary and alternative medicine? | |
| Yes | 129 (33.4%) |
| No | 138 (35.8%) |
| Sometimes | 119 (30.8%) |

**Table 3. Prevalence of CAMs used among diabetic patients (n=386). † Variable with multiple response answers.**

based on the literature (11, 16). The first section gathered sociodemographic information on the participants, including age, gender, marital status, education status, employment status, and living area. The second section was related to information about diabetes, such as type of diabetes, duration since diagnosis, type of treatment, diabetic complications, associated comorbidities, and most recent HbA1C level. The third section assessed the knowledge and attributes of CAM use through questions about the pateints' knowledge of CAM, frequency of CAM use, source of CAM information, informing physicians, and motivations for CAM use. The fourth section gathered data on various forms of herbal supplements.

***Statistical analysis***

All categorical data are described as frequencies and proportions (%). The relationships between CAM use for diabetes treatment and the sociodemographic and clinical characteristics of the patients were conducted with the Chi-square test. Significant findings were then applied to a multivariate regression model to determine the significant independent predictors of CAM use with corresponding odds ratios and 95% confidence intervals (CIs). Results were considered statistically significant at $p < 0.05$. The statistical data were tabulated and analyzed with SPSS version 26 (Statistical Packages for Social Sciences, IBM Corp., Armonk, NY, USA).

## 4. RESULTS

A total of 386 patients with diabetes were enrolled. As shown in Table 1, 45.9% were between 46 and 60 years old, and over half (54.1%) were male. Most patients lived in the city (82.6%). Patients with bachelor's degrees constituted 58.5% of the sample; 43.5% were employed, 71.8% were married, and 15.3% were current smokers.

As shown in Table 2, approximately half of the participants (49.5%) were diagnosed with T2DM. Approximately one-third of the patients (31.3%) had a diabetes duration of 4 to 10 years. More than half of the patients (51.3%) were taking oral or injectable hypoglycemic agents as diabetes treatment. Retinopathy was the most common complication (25.1%). Hypertension (41.5%) and dyslipidemia (35.5%) were the most common comorbidities, and half of the patients (50.3%) reported less than 7% to 8% as their most recent HbA1c reading.

As shown in Table 3, the proportion of patients who had heard of CAM was 45.9%. Most patients used CAM for diabetes treatment (82.1%), and the most prevalent type of CAM utilized was biologically based (56.2%), with 28.1% using it monthly. Among the patients who had heard of CAM, 15.1% were of the opinion that CAM use helps improve diabetes, and accessibility (27.1%) was the most common reason for CAM use. Moreover, 30.9% of patients planned to recommend CAM to other patients with DM after consulting a specialized doctor. Nearly half (45.3%) of patients were using CAM along with their prescribed medication. In addition, 33.4% indicated that social media affected their decision to use CAM.

Figure 1 demonstrates that media/social media was the most widely used source of CAM information (50.5%), followed by family and friends (38.6%) and published

| Factor | CAM used | | P-value § |
|---|---|---|---|
| | Yes N (%) (n=317) | No N (%) (n=69) | |
| Age group | | | |
| 18 – 45 years | 135 (42.6%) | 24 (34.8%) | 0.490 |
| 46 – 60 years | 142 (44.8%) | 35 (50.7%) | |
| >60 years | 40 (12.6%) | 10 (14.5%) | |
| Gender | | | |
| Male | 170 (53.6%) | 39 (56.5%) | 0.662 |
| Female | 147 (46.4%) | 30 (43.5%) | |
| Residence | | | |
| City | 265 (83.6%) | 54 (78.3%) | 0.289 |
| Village | 52 (16.4%) | 15 (21.7%) | |
| Educational level | | | |
| High school or below | 100 (31.5%) | 32 (46.4%) | 0.019 ** |
| Bachelor or higher | 217 (68.5%) | 37 (53.6%) | |
| Occupation | | | |
| Student | 54 (17.0%) | 10 (14.5%) | 0.766 |
| Unemployed | 124 (39.1%) | 30 (43.5%) | |
| Employed | 139 (43.8%) | 29 (42.0%) | |
| Marital status | | | |
| Unmarried | 95 (30.0%) | 14 (20.3%) | 0.106 |
| Married | 222 (70.0%) | 55 (79.7%) | |
| Smoking | | | |
| Current/Ex-smoker | 69 (21.8%) | 17 (24.6%) | 0.603 |
| Non-smoker | 248 (78.2%) | 52 (75.4%) | |
| Type of diabetes ‡ | | | |
| Type 1 | 90 (37.5%) | 15 (26.8%) | 0.131 |
| Type 2 | 150 (62.5%) | 41 (73.2%) | |
| Duration of diabetes | | | |
| ≤10 years | 192 (65.8%) | 28 (42.4%) | <0.001 ** |
| >10 years | 100 (34.2%) | 38 (57.6%) | |
| Complication of diabetes | | | |
| Yes | 180 (56.8%) | 29 (42.0%) | 0.026 ** |
| No | 137 (43.2%) | 40 (58.0%) | |
| Associated comorbidities | | | |
| Yes | 198 (62.5%) | 37 (53.6%) | 0.176 |
| No | 119 (37.5%) | 32 (46.4%) | |
| Recent HbA1c reading ‡ | | | |
| ≤8% | 229 (72.2%) | 58 (84.1%) | 0.042 ** |
| >8% | 88 (27.8%) | 11 (15.9%) | |
| Heard of CAM ‡ | | | |
| Yes | 163 (52.9%) | 14 (20.6%) | <0.001 ** |
| No | 145 (47.1%) | 54 (79.4%) | |
| Social media influences the use of CAM ‡ | | | |
| Yes | 124 (58.5%) | 05 (09.1%) | <0.001 ** |
| No | 88 (41.5%) | 50 (90.9%) | |
| Factor | CAM used | P-value § | |
| | Yes N (%) (n=317) | No N (%) (n=69) | |
| Age group | | | |
| 18 – 45 years | 135 (42.6%) | 24 (34.8%) | 0.490 |
| 46 – 60 years | 142 (44.8%) | 35 (50.7%) | |
| >60 years | 40 (12.6%) | 10 (14.5%) | |
| Gender | | | |
| Male | 170 (53.6%) | 39 (56.5%) | 0.662 |
| Female | 147 (46.4%) | 30 (43.5%) | |
| Residence | | | |
| City | 265 (83.6%) | 54 (78.3%) | 0.289 |

| | | | |
|---|---|---|---|
| Village | 52 (16.4%) | 15 (21.7%) | |
| Educational level | | | |
| High school or below | 100 (31.5%) | 32 (46.4%) | 0.019 ** |
| Bachelor or higher | 217 (68.5%) | 37 (53.6%) | |
| Occupation | | | |
| Student | 54 (17.0%) | 10 (14.5%) | 0.766 |
| Unemployed | 124 (39.1%) | 30 (43.5%) | |
| Employed | 139 (43.8%) | 29 (42.0%) | |
| Marital status | | | |
| Unmarried | 95 (30.0%) | 14 (20.3%) | 0.106 |
| Married | 222 (70.0%) | 55 (79.7%) | |
| Smoking | | | |
| Current/Ex-smoker | 69 (21.8%) | 17 (24.6%) | 0.603 |
| Non-smoker | 248 (78.2%) | 52 (75.4%) | |
| Type of diabetes ‡ | | | |
| Type 1 | 90 (37.5%) | 15 (26.8%) | 0.131 |
| Type 2 | 150 (62.5%) | 41 (73.2%) | |
| Duration of diabetes | | | |
| ≤10 years | 192 (65.8%) | 28 (42.4%) | <0.001 ** |
| >10 years | 100 (34.2%) | 38 (57.6%) | |
| Complication of diabetes | | | |
| Yes | 180 (56.8%) | 29 (42.0%) | 0.026 ** |
| No | 137 (43.2%) | 40 (58.0%) | |
| Associated comorbidities | | | |
| Yes | 198 (62.5%) | 37 (53.6%) | 0.176 |
| No | 119 (37.5%) | 32 (46.4%) | |
| Recent HbA1c reading ‡ | | | |
| ≤8% | 229 (72.2%) | 58 (84.1%) | 0.042 ** |
| >8% | 88 (27.8%) | 11 (15.9%) | |
| Heard of CAM ‡ | | | |
| Yes | 163 (52.9%) | 14 (20.6%) | <0.001 ** |
| No | 145 (47.1%) | 54 (79.4%) | |
| Social media influences the use of CAM ‡ | | | |
| Yes | 124 (58.5%) | 05 (09.1%) | <0.001 ** |
| No | 88 (41.5%) | 50 (90.9%) | |

**Table 4. Relationship between CAM used for the treatment of diabetes among the socio-demographic and clinical characteristics of the diabetic patients (n=386). ‡ Patients who said "I don't know" were excluded from the analysis.§ P-value has been calculated using Chi-square test.** Significant at p<0.05 level.**

medical research (14.5%).

Figure 2 presents the five most common herbs used to improve diabetes; these were black cumin/black seed (46.4%), cinnamon (28.8%), green tea (21.8%), garlic (21.8%), and frankincense (21.8%).

Table 4, presents the results of the Chi-square test used to determine the relationships between socio-demographic and clinical characteristics of the patients and CAM use for diabetes treatment. The prevalence of patients using CAM was significantly higher among those who had a higher education level ($p = 0.019$), those who had a shorter duration of diabetes ($p < 0.001$), those who had diabetes complications ($p = 0.026$), those with high HbA1c levels above 8% ($p < 0.001$), those who had heard of CAM ($p < 0.001$), and those were influenced by social media to use CAM ($p < 0.001$).

The multivariate regression model (Table 5) revealed that diabetes complications, having heard of CAM, and social media were the independent predictors of increased CAM use, whereas a long duration of diabetes was an independent predictor of decreased CAM use. This suggests that with to patients without diabetes complications, patients with diabetes complications were at least 2.4 times more likely to use CAM (adjusted odds ratio [AOR] = 2.404; 95% CI = 1.110–5.206; $p = 0.026$). Patients who had heard of CAM were 2.3 times more likely to use CAM than those who had not heard of it (AOR = 2.302; 95% CI = 1.006–5.266; $p = 0.048$). In addition, patients who were influenced to use CAM by social media were 11.7 times more likely to use CAM for the treatment of diabetes (AOR = 11.735; 95% CI = 4.310–31.955; $p < 0.001$). By contrast, patients with a longer duration of diabetes had a 70% lower likelihood of CAM use b (AOR = 0.303; 95% CI = 0.141–0.653; $p = 0.002$).

## 5. DISCUSSION

This study evaluated CAM use among diabetic patients in Al-Ahsa, Saudi Arabia. This study revealed a high prevalence of CAM use among patients with DM. Approximately 82.1% employed CAM to treat diabetes. Several other studies have found that patients with DM use CAM at a high rate (6,17,18). By contrast, previous

studies in Saudi Arabia have reported a lower prevalence of CAM use, ranging from 17% to 45% (10-14). According to a comprehensive review and meta-analysis, the pooled prevalence of CAM use among patients with diabetes was 51% (7). Furthermore, nearly half (45.3%) of our population used both CAM and DM medications. These results are similar to those reported in a study by Meraya et al. (16), in which 34% of patients were using CAM along with modern medicine for DM control. Patients with chronic conditions such as diabetes are particularly likely to seek CAM. Healthcare practitioners should be aware of their patients' use of CAM, as some CAM therapies may directly interact with prescribed DM drugs. Thus, proper health education is necessary to avoid drug–herb interactions, and compliance with conventional DM medications should be upheld.

The results of this study suggest that complications of diabetes, having heard of CAM, and social media were significant independent predictors of CAM use. These findings are consistent with those of Abdullah et al. (14) and Kifle (18), both of which found that complications and duration of diabetes directly affected CAM use. Other studies have documented an association between CAM use and the patients' gender and age (10-14, 17). However, our study found no significant associations with these variables, which aligns with studies by Alzahrani et al. (7) and Chetty et al. (20). Interestingly, we found that a higher diabetes duration was inversely correlated with CAM use, whereas a shorter DM duration was positively associated with CAM use. Many factors could explain these results. First, patients with a shorter DM duration may have tried to use CAM because they were influenced by social media or because it was suggested by their friends or relatives. As Singh and Dixit (5) suggested, the CAM treatments used varied depending on several factors, such as personal factors, external facilitators, perceived treatment characteristics, and disease characteristics. On the other hand, a longer DM duration could lead to discontinuation of CAM use. This could be due to various circumstances, all of which contribute to possible adverse effects and ineffectiveness.

Having information about CAM could improve patients' perception of CAM use. In our study, nearly half of the patients (45.9%) had heard of CAM, and 33.4% of patients were influenced by social media. Furthermore, among CAM users, biologically based therapies were the most common (56.2%), and accessibility was the most common reason for CAM use (27.1%). The most common source of information for CAM users was media/social media (50.5%), followed by family and friends (38.6%). Only 32.5% of patients reported that they had informed their physicians about their CAM use. In comparison, a study conducted in India (6) found that 71% of patients with DM were aware of CAM, and most of those who used CAM learned about it from friends and neighbors; the need for rapid and additional relief was the most common reason for CAM use (86.8%). Spiritual therapy was the most common type of CAM in the Qassim Region (10), followed by herbal items, whereas in Taif City (14), 62.7% of patients used more than one type of CAM treatment, and nearly three-quarters (72.9%) believed that its use had no side effects. However, in the UAE (19), 80% of CAM users believed that using CAM could prevent disease progression, and folk foods and herbs, vitamin and mineral supplements, and spiritual and natural healing were the most commonly utilized types of CAM.

Although a high proportion of our respondents used CAM, only 15.1% of them believed in its effectiveness, and only 32.5% had notified their physicians about their CAM use. Only 30.9% of patients planned to suggest CAM to other patients after contacting their physicians, whereas 21.1% reported that they would recommend it without a physician's recommendation, believing in its safety. In Ethiopia (18), the vast majority of patients (59.1%) chose not to disclose CAM use because of fear that their healthcare professionals would not want them to use it. Overall satisfaction with CAM use was 53.4%. In Malaysia (21), the primary reason for using CAM was its effectiveness, and the harmful effects of conventional medicine were the least common reason. In addition, patients tended not to notify their physicians about using CAM.

***Limitation of the study***

The study was an online-based questionnaire, so the results may involve bias related to respondents' characteristics, such as older age, possible random responses from anonymous respondents, and recall bias. Additionally, the population may have been restricted to well-educated responders who knew how to use Google Forms online questionnaires.

## 6. CONCLUSION

The prevalence of CAM use among patients with diabetes was high. Social media influence, diabetes complications, and a shorter duration of diabetes greatly affected patients' CAM use. CAM consumption as a treatment method is a common practice, but clinical evidence supporting its effectiveness is lacking. Healthcare providers play a vital role in educating patients about CAM use to ensure safe and optimal treatment, decrease herb–drug interactions, and advocate for medication adherence. In addition to investigating patient use of CAM, researchers should examine the clinical effectiveness of CAM. Finally, many patients did not proactively disclose CAM use to their healthcare providers, and thus healthcare providers should counsel patients about their use of CAM. Moreover, it is highly recommended that the results of future research be disseminated to areas with different CAM practices and beliefs. Additional research should evaluate the potential impact of culture, ethnic diversity, and religious characteristics, as well as the best practices for communicating with patients. Furthermore, carrying out an evaluation under active observation should be considered to minimize any potential confounding effects associated with a remote online assessment.

- **Acknowledgements:** The authors would like to thank all participants and King Faisal University for approving this research.
- **Patient Consent Form:** All participants were informed about subject of the study.

| Factor | AOR | 95% CI | P-value |
|---|---|---|---|
| Educational level | | | |
| High school or below | Ref | | |
| Bachelor or higher | 1.560 | 0.734 – 3.312 | 0.247 |
| Duration of diabetes | | | |
| ≤10 years | Ref | | |
| >10 years | 0.303 | 0.141 – 0.653 | 0.002 ** |
| Complication of diabetes | | | |
| Yes | 2.404 | 1.110 – 5.206 | 0.026 ** |
| No | Ref | | |
| Last reading of HbA1c ‡ | | | |
| ≤8% | Ref | | |
| >8% | 1.524 | 0.597 – 3.888 | 0.378 |
| Heard of CAM ‡ | | | |
| Yes | 2.302 | 1.006 – 5.266 | 0.048 ** |
| No | Ref | | |
| Social media influences the use of CAM ‡ | | | |
| Yes | 11.735 | 4.310 – 31.955 | <0.001 ** |
| No | Ref | | |

**Table 5. Multivariate regression analysis to determine the significant independent factors associated with CAM use for the treatment of diabetes (n = 386). ‡ Patients who said "I don't know" were excluded from the analysis.§ P-value has been calculated using Chi-square test.** Significant at p<0.05 level.**

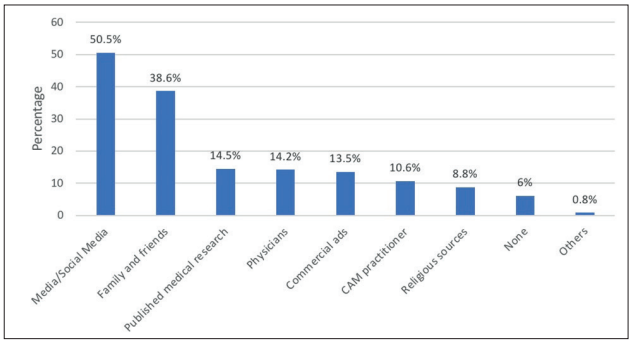


**Figure 1. Source of CAM information**

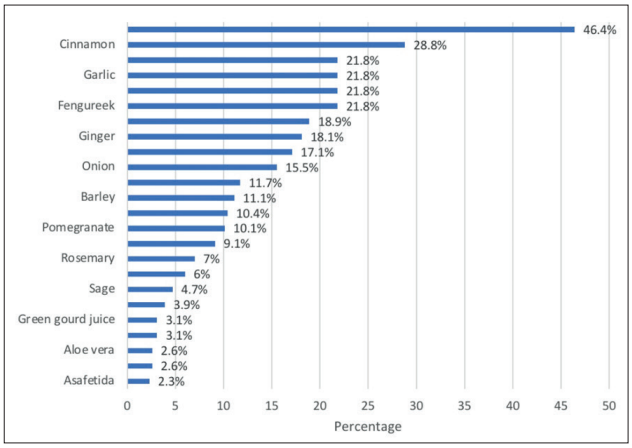


**Figure 2. Most common effective herbs used to improve diabetes, according to patients**


- **Author's Contribution:** Each author was included in all phases of preparation of this article.
- **Conflicts of interest:** There are no conflicts of interest.
- **Financial support and sponsorship:** None.


## REFERENCES


1. Complementary, Alternative, or Integrative Health: What's In a Name? | NCCIH [Internet]. Available from: https://www.nccih.nih.gov/health/complementary-alternative-or-integrative-health-whats-in-a-name
2. Complementary and Alternative Medicine | CDC [Internet]. Available from: https://www.cdc.gov/cancer/survivors/patients/complementary-alternative-medicine.htm
3. Medagama AB, Bandara R. The use of Complementary and Alternative Medicines (CAMs) in the treatment of diabetes mellitus: is continued use safe and effective? Nutr J [Internet]. 2014; 13(1). Available from: /pmc/articles/PMC4210501/
4. Farooqui M, Hassali MA, Abdul Shatar AK, Shafie AA, Seang TB, Farooqui MA. Complementary and Alternative Medicine (CAM) use by Malaysian oncology patients. Complement Ther Clin Pract. 2012 May 1; 18(2): 14–20.
5. Singh A, Dixit S. A study on the motivation of Indian patients to consult complementary and alternative medicine practitioners to treat coronary artery disease. Int J Health Plann Manage [Internet]. 2021 Mar 1; 36(2): 423–441. Available from: https://pubmed.ncbi.nlm.nih.gov/33197088/
6. Kumar D, Bajaj S, Mehrotra R. Knowledge, attitude and practice of complementary and alternative medicines for diabetes. Public Health. 2006 Aug 1; 120(8): 705–711.
7. IDF Diabetes Atlas 10th edition [Internet]. Available from: www.diabetesatlas.org
8. Alqahtani B, Elnaggar RK, Alshehri MM, Khunti K, Alenazi A. National and regional prevalence rates of diabetes in Saudi Arabia: analysis of national survey data. Int J Diabetes Dev Ctries [Internet]. 2022 Jun 7; 1–6. Available from: https://link.springer.com/article/10.1007/s13410-022-01092-1
9. Alzahrani AS, Price MJ, Greenfield SM, Paudyal V. Global prevalence and types of complementary and alternative medicines use amongst adults with diabetes: systematic review and meta-analysis. Eur J Clin Pharmacol [Internet]. 2021 Sep 1; 77(9): 1259–1274. Available from: https://link.springer.com/article/10.1007/s00228-021-03097-x
10. Farooqui M, Alreshidi H, Alkheraiji J, Abdulsalim S, Als-

hammari MS, Kassem L, et al. A Cross-Sectional Assessment of Complementary and Alternative Medicine (CAM) Use among Patients with Chronic Diseases (CDs) in Qassim, Saudi Arabia. Healthcare 2022; 10: 1728 [Internet]. 2022 Sep 8; 10(9): 1728. Available from: https://www.mdpi.com/2227-9032/10/9/1728/htm.

11. Aljulifi MZ, Alfhaid F, Alshahrani A, Albatil KA, Aljthalin RA, Alloboon F, et al. The Prevalence and Pattern of Using Complementary and Alternative Medicine in Saudi Patients With Diabetes: A Cross-Sectional Study. Cureus [Internet]. 2022 Oct 26;14(10). Available from: https://www.cureus.com/articles/109830-the-prevalence-and-pattern-of-using-complementary-and-alternative-medicine-in-saudi-patients-with-diabetes-a-cross-sectional-study
12. Almogbel ES, AlHotan FM, AlMohaimeed YA, Aldhuwayhi MI, AlQahtani SW, Alghofaili SM, et al. Habits, Traditions, and Beliefs Associated With the Use of Complementary and Alternative Medicine Among Diabetic Patients in Al-Qassim Region, Saudi Arabia. Cureus [Internet]. 2022 Dec 31; 14(12). Available from: https://www.cureus.com/articles/128607-habits-traditions-and-beliefs-associated-with-the-use-of-complementary-and-alternative-medicine-among-diabetic-patients-in-al-qassim-region-saudi-arabia
13. Moharram Kamal S, Fahd Aldosari Z, Turki Alotaibi S, Sulaiman Altamimi S, Abdullah Alqahtani M, Khalaf Alanazi A, et al. International Journal of Medicine in Developing Countries Use of alternative medications among diabetic patients in Al Kharj, Saudi Arabia: a survey study. Available from: https://doi.org/10.24911/IJMDC.51-1654031626
14. Abdullah RI, Allah AA, Mubarak AS, Abdullah RI, Alzhrani SH, Alsufyani MH, et al. Prevalence and predictors of using complementary and alternative medicine among diabetic patients in Taif city, Saudi Arabia. J Family Med Prim Care [Internet].9(4): 2092. Available from: /pmc/articles/PMC7346901/
15. Al-Ahsa Statistics–Al-Ahsa Chamber [Internet]. Available from: https://www.hcci.org.sa/ahsaa-statistics/
16. Meraya AM, Ahsan W, Albratty M, Alhazmi HA, Najmi A. Perception of Individuals with Diabetes about Efficacy and Safety of Complementary and Alternative Medicines (CAM) in the Jazan Region, Saudi Arabia. Evidence-based Complementary and Alternative Medicine. 2022;2022.
17. Medagama AB, Bandara R, Abeysekera RA, Imbulpitiya B, Pushpakumari T. Use of complementary and alternative medicines (CAMs) among type 2 diabetes patients in Sri Lanka: A cross sectional survey. BMC Complement Altern Med. 2014; 14(1).
18. Kifle ZD. Prevalence and correlates of complementary and alternative medicine use among diabetic patients in a resource-limited setting. Metabolism Open. 2021 Jun 1; 10: 100095.
19. Radwan H, Hasan H, Hamadeh R, Hashim M, AbdulWahid Z, Hassanzadeh Gerashi M, Al Hilali M, Naja F. Complementary and alternative medicine use among patients with type 2 diabetes living in the United Arab Emirates. BMC complementary medicine and therapies. 2020 Dec; 20(1): 1-2.
20. Chetty L, Govender N, Reddy P. Traditional Medicine Use among Type 2 Diabetes Patients in KZN. Advances in Public Health. 2022 Aug 22; 2022.
21. Baharom N, Rotina AB. Prevalence of complementary alternative medicine use among patients with type II diabetes in Negeri Sembilan, Malaysia. Medicine & Health. 2016; 11(2).