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Original Article

Prevalence of Complementary and Alternative Medicine Usage in Patients of Diabetes Mellitus in Mumbai Metropolitan Region

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ABSTRACT

Background: We surveyed the prevalence of Complementary and Alternative Medicine (CAM) usage in patients with chronic diseases like DM (Diabetes Mellitus). As CAM usage is very common in patients with chronic diseases like DM, it is because therapy for such diseases is lifelong. So, the current study might also illuminate the significance of establishing frameworks to control the introduction, standardisation, and usage of CAM. **Objectives:** The current study sought to explore the prevalence, identify predictors of CAM, and describe the preferred CAM therapy among diabetic patients in the Mumbai Metropolitan Region (MMR). **Materials and Methods:** An anonymous cross-sectional survey in MMR was conducted from March 1 to June 26, 2022. Among the total participants (n=105), 81% of patients were aware of CAM therapy, and from them, 55.2% of people were using CAM therapy. Most patients with the frequency of 43.1% preferred a combination of different types of CAM, rather than using any single CAM therapy. **Results:** The participants in the category of age group above 60 years were predominant (46.7%), having a duration of diabetes of 6-15 years. There was a significant association between the CAM users and non-CAM users in gender, education and place of residence (p=0.03, p=0.03 and p=0.01, respectively). Clinical characteristic like duration of diabetes was also associated with CAM use. The major population revealed that there is no change in the CAM therapy that they are using even after new symptoms have arisen. **Conclusion:** There is strong awareness of CAM among diabetic patients. The combination of two or more CAM therapies is prevalent in diabetic patients in metropolitan region and people also intentionally try and spend CAM therapy in their desperation for sugar control. A standard protocol of CAM therapies integrated with modern medicines is in need of an hour.

Keywords: Complementary and Alternative Medicine, Diabetic Patients, Modern Medicines, Mumbai Metropolitan Region, Prevalence.

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INTRODUCTION

In our body, hyperglycaemia arises because the pancreas does not produce enough insulin or when the body is unable to properly utilise the insulin that is produced, where the hormone insulin controls and regulates the glucose level in the blood (WHO, 2024). This is characterised by an increase in blood sugar level, which leads to a health condition called "Diabetes". It is very important to diagnose diabetes at an early stage to reduce the severity of the disease. Signs, including increased thirst and urination, as well as repeated infections, can lead to a clinical diagnosis of diabetes (NCCIH, 2021). Diabetes can be diagnosed mainly with two different kinds of blood tests, the first is fasting and 2-hr postprandial plasma glucose test, and the second is Glycated Haemoglobin (HbA_{1c}) (NHP CC DC, 2019).

According to the International Diabetes Federation (IDF), the top three nations in terms of the number of people with diabetes in 2019 are China (116.4 million), India (77.0 million), and the United States of America (31.0 million). China (140.5 and 147.2 million diabetic patients) and India (101.0 and 134.2 million diabetic patients) are predicted to continue to have the greatest burden of diabetes in 2030 and 2045, respectively (Delice Gan, 2006). The number of people with diabetes in India has climbed from 7.1% to 8.9% in 2019. In addition to that, with 48% of all deaths occurring due to diabetes before the age of 70, diabetes

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was proven to be the direct cause of 1.5 million fatalities in 2019 (Pradeepa and Mohan, 2021; WHO, 2024). This is an overview of the severity of diabetes in India. Severity and fatality are mostly caused by microvascular (retinopathy, nephropathy, neuropathy) and macrovascular (coronary heart disease) consequences of Diabetes mellitus. Poor glycemic control and longer duration of illness tend to be the most relevant risk factors for severe complications (Unnikrishnan *et al.*, 2016). In addition to this, a heavy economic burden is also inflicted on those who suffer from diabetes, as regular monitoring of blood sugar levels and daily medicines costs a lot. According to a recent study, in India, the estimated annual cost of diabetes management in patients was Rs. 10,000 in urban regions and Rs. 6260 in rural places (Bansode and Jungari, 2019).

It is crucial to implement a strategy in order to reduce disease-related mortality and morbidity. The standard approach to treating diabetes has made tremendous strides, but the ultimate goal of maintaining blood glucose levels has not been achieved; it still has some side effects. Along with this, the cost of diabetic medical treatment is rising in step with innovation. When it comes to socioeconomic background, the bulk of the people in India belong to the lower middle class, which influences them to select Complementary and Alternative Medicine (CAM) due to the inaccessibility of these developments, due to financial load, dissatisfaction with the existing standard therapy, and also the side effects caused by the antidiabetic medicines (Shrilatha *et al.*, 2019). So, it has also been determined that a few of the main factors influencing patients' decisions to use CAM either alone or in combination with standard medical treatment are the existence of such a prolonged, crippling, and psychologically devastating medical condition (Chang *et al.*, 2011). Nevertheless, the way of maintaining blood glucose levels in diabetic patients has been changed by a rapid expansion in CAM (Yeh *et al.*, 2011).

According to the National Centre for Complementary and Integrative Health (NCCIH), Complementary and Alternative Medicine refers to medical and healthcare procedures that are currently not a fundamental component of standard medicine (NCCIH, 2021). In contrast to "alternative" medicine, which includes therapies that are used in place of traditional medicine, the word "complementary" refers to treatments that are employed along with standard therapy. To achieve integration with current medical therapy, it is crucial to be knowledgeable about the efficacy and safety of CAM (Dham *et al.*, 2006). Biologically based practices, mind-body medicine, manipulation and body-based therapies, energy medicine, and alternative medical systems are the five areas into which CAM therapy is divided (Table 1) (Birdee and Yeh, 2010).

West Indians, Africans, Indians, Latin Americans, or Asians are the main populations who utilize CAM, reveals a report (Dham *et al.*, 2006). With its perceived efficacy, low cost, and safety, CAM is frequently used by people in underdeveloped nations who have chronic conditions like diabetes (IARP, 2016). However, there aren't enough data on the occurrence and consequences of CAM usage among diabetes patients (Das, 2016). Although there is some evidence that health literacy is linked to other preventative health behaviors, the relationship between health literacy and CAM usage has not yet been studied in previous studies (Kifle, 2021; White *et al.*, 2008). A study on prevalence and pattern of CAM usage in diabetics says that, two of the five major divisions of CAM, mind-body medicine and biologically based treatments, for example herbs were shown to be particularly popular among diabetes patients (Sridharan *et al.*, 2011). But again, the usage of herbal medications is not substantially correlated with demographic factors though it depends upon the clinical condition (El-Dahiyat *et al.*, 2020). Clinical studies on people with diabetes have revealed that even yoga reduces stress and improves measures of quality of life (Kosuri and Sridhar, 2009). Mind-body medicine has very low hazards, and movement-based treatments like yoga presumably have risks that are comparable to those of regular exercise. Consequently, there is lack of good published research on mind-body therapies for diabetic patients, necessitating more thorough investigation (Birdee and Yeh, 2010). According to one report (Yeh *et al.*, 2011), despite people with diabetes utilize CAM treatments at a rate comparable to that of the non-diabetic people, they don't seem to be doing so expressly to treat their diabetes. Only 35 % of the respondents who had

Table 1: Categories of Complementary and Alternative Medicine Approaches.

Cam Therapy	Description	Examples
Biologically-Based Practices	Therapies involving substances found in nature that have purported medicinal properties	Herbs
Mind-Body Medicine	Therapies that utilize the interplay between the mind and body to promote overall health	Yoga, Meditation
Manipulation and Body-Based Therapies	Therapies that include movements or manipulation of particular body parts or the entire body	Acupuncture, Massage therapy
Energy Medicine	Techniques based on a conviction that the human body's energy fields may be changed for health reasons both outside and inside	Reiki
Alternative Medical Systems	Whole medical systems that frequently developed before or apart from standard medicine	Ayurveda, Homeopathy

diabetes disclosed using CAM alone to treat their condition. Surveys of other specialized populations, however, have revealed that people with a variety of chronic diseases like asthma, cancer, HIV utilize CAM at greater rates. According to what is added or omitted in the definition of CAM, the estimates of CAM use will fluctuate (Egede *et al*., 2002). In addition to this, people with diabetes who utilized CAM reported being substantially more optimistic than those who did not. Their peers have already used CAM and provided good reviews, attesting to its effectiveness (Meraya *et al*., 2022). The diabetic population seek out CAM because they think it gives them more personal freedom and control over their healthcare decisions (Bell *et al*., 2006).

With reference to a report, 67.4% of diabetic patients never brought up using CAM with their doctors (Meraya *et al*., 2022). However, there is little discussion in the literature on the causes of the improper communication between patients and medical professionals, as well as the limited disclosure of CAM usage. This silence might be a sign of a problem in the patient-healthcare provider relationship, which could have an adverse effect on patient treatment and health outcomes (Chang *et al*., 2011). Due to the absence of conclusive proof in the majority of situations, the use of CAM in conjunction with contemporary pharmaceuticals is still unproven, prompting an awareness campaign among CAM users. The use of CAM may enhance or contradict allopathic therapy utilizing contemporary medications and may even cause the therapy to be slowed or fail (Borse *et al*., 2019). While some CAM techniques may be balanced, others may cause the blood sugar to abnormally rise or fall if an inappropriate CAM is used solely or to be added to standard treatments, respectively (Dham *et al*., 2006). Expected medication interactions can be reduced by being aware of how frequently conventional and alternative medicines are used; nevertheless, being aware of the most prevalent risk factors can help you regulate your diabetic health (Shrilatha *et al*., 2019).

The current study sought to explore the prevalence of, identify predictors of, and describe the preferred CAM therapy among diabetes patients. This understanding of why patients turn to a particular form of CAM can aid in the development of activities to raise awareness about its usage. Such might also illuminate the significance of establishing frameworks to control introduction, standardisation, and usage of CAM. Also understanding the views of medical practitioners including CAM providers as well on the CAM use. this will eventually lead to minimization of side effects such as abrupt hyper glycaemia or hypoglycemia occurring due to random use of CAM therapies.

MATERIALS AND METHODS

A number of quality control procedures were used to ensure the study was conducted correctly. Tasks included distributing the questionnaire widely, properly constructing the data collecting instrument, conducting a pilot or pre-test survey, and properly gathering and analysing the results.

Study design, sample and period

An anonymous cross-sectional study in the Mumbai Metropolitan Region was conducted to collect the data for this study from March 1 to June 26, 2022. The random sampling method was employed for sampling, and the final sample size is 105. Respondents were informed of the objective of the research and that it aimed to understand their knowledge and views regarding the use of CAM treatment in the diabetic population in the Mumbai Metropolitan Region.

Data collection procedures

The questionnaire was created using Google Forms as a self-report survey, and data confidentiality and respondents' anonymity were protected throughout.

A systematic literature study has been used to create the questionnaire (Naja *et al*., 2014; Nataraj, 2015; Radwan *et al*., 2020; Shrilatha *et al*., 2019). A questionnaire was created and evaluated. Patients were questioned about their sociodemographic and clinical factors in the questionnaire's first part. The next part evaluated how patients used CAM. In the following part, patients who indicated they had ever used CAM (i.e., current or former CAM users) were specifically asked which CAM therapies they had used. They were also asked where they had first learned about CAM. All CAM users were questioned about any adverse effects of CAM treatment in the last part. Prior to the main survey, a pilot survey with 35 participants was conducted to gauge usability and estimate completion time.

Data analysis

The Statistical Package for the Social Sciences (SPSS) for Windows software version 26.0, IBM Corporation, Armonk, New York, was used for data analysis. Using Pearson's χ^2 tests, differences between CAM users and nonusers were compared in terms of sociodemographic (age, gender, geographic region, education) and clinical (diabetes duration, main therapy, dose and frequency of medications) factors.

To identify outliers and verify data input, descriptive statistics like frequency and percentage were computed for each question asked. Categorical variables were compared using the Pearson's chi-square test. Categorical variables were reported as frequencies to describe the traits of the research subjects. CAM usage served as the analysis's primary outcome variable. A p-value is compared with the threshold of significance, i.e., the α value, which we have considered 0.05 as the cut-off; statistical significance was determined at a 95 % confidence interval.

A p-value less than 0.05 (typically ≤ 0.05) is statistically significant. It indicates strong evidence against the null hypothesis, as there is less than 5% probability that the null hypothesis is correct (and

results are random). Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Pearson's Chi-Square test - (McHugh, 2013; Rana and Singhal, 2015; Statistics Solutions, 2022). The objective of the chi-square test is to determine the likelihood that an observed distribution is the result of chance. The statistic is also known as a "goodness-of-fit" statistic since it assesses how well the observed data distribution matches the distribution that would be predicted if the variables were independent. When evaluating independence tests with a crosstabulation (a bivariate table), the Chi-Square statistic is most frequently utilised. When two categorical variables are presented in a crosstabulation, their distributions are shown concurrently, with the intersections of the categories shown in the table's cells. By contrasting the observed pattern of cell responses with the pattern that would be anticipated if the two factors were actually independent of one another, the Test of Independence determines if there is a link between the two variables. To determine if the observed cell counts deviate considerably from the predicted cell counts, the researcher computes the Chi-Square statistic and compares it to a critical value drawn from the Chi-Square distribution.

The Chi-Square statistic can be calculated in a simple method-

$$\chi^2 = \Sigma \left(\frac{fo-fe}{fe}\right)$$

where, fo is the observed frequency.

fe the expected frequency if no relationship existed between the variables.

Hypothesis

H_0 (Null hypothesis): CAM therapy is not prevalent in diabetic people.

H_1 (Alternate hypothesis): CAM therapy is prevalent among people with diabetes.

Decision rule: We reject H_0 if $p>0.05$; otherwise, we fail to reject H_0.

OBSERVATIONS AND RESULTS

The purpose of this survey was to determine the prevalence of Complementary and Alternative Medicine (CAM) and preferred CAM among people with diabetes in the Mumbai Metropolitan Region. The survey was completed by one hundred and five people in total.

Socio-demographic and clinical characteristics of the study population

The participants in the category of age group above 60 years were predominant (46.7%). Only a few people (0.9%) who were diagnosed with diabetes were in the age group of 18-24 years, 9.5% of people in the age group 25-44 years were diabetic, and the remaining 42.9% of people who had diabetes were within the age group 45-60 years. The majority of male patients responded to the questionnaire with a frequency of 60% and the frequency of female patients was found to be 40%. The highest number of people who responded having an education background as graduation (25.7%), where the percentage of people with education background of primary and secondary school was 17.1% and 18.1% respectively, 22.9% people were HSC pass and the remaining patients (14.3%) had their highest education background as post-graduation. The majority of the respondents were residing in the Kalyan-Dombivali area (56%), 27.6% lived in Mumbai, and 14.3% were from Alibag. 4.8% respondents were from other areas, and all 5 of them were CAM non-users.

Most of the participants in the study, i.e., 47.6% had a duration of diabetes of 6-15 years, 24.8% respondents had been diagnosed with diabetes more than 15 years before, and 27.6% patients had been diagnosed with diabetes earlier than the above two categories (1-5 years). Many diabetic patients with frequency of 45.7% have the random sugar value in the range of 131-180 mg/dL, 21.9% have their glucose in somewhat control with the range of 80-130 mg/dL, the frequency of patients having blood sugar level 181-230 mg/dL is 17.1% and rest 15.2% had blood sugar level out of control with the range of above 230 mg/dL. The most frequently used primary allopathic medicine has composition of only metformin and glimepiride (26.7%) and metformin, glimepiride along with other contents (26.7%), and the medicines having no metformin content were used very rarely with the frequency of 6.7%, the medicines having only metformin content were used by 15.2% of diabetic people and remaining 24.8% population uses medicines having metformin and other contents but without glimepiride. The majority of patients (66.7%) take the medicine twice daily, 8.6% take it once a day, and 24.8% diabetic patients take it three times a day.

Prevalence and characteristics of complementary and alternative medicine use among participants

Table 2 reports the data on prevalence and characteristics of complementary and alternative medicine use among participants. Among the total participants (n=105), 85% were aware of CAM therapy, and of these, 55.2% were using it. Most patients preferred a combination of different types of CAM (Figure 1), with 43.1% using biologically based medicines, 22.4% using alternative medicine therapy, and 20.7% using mind-body interventions to gain control over their health. Among the people who were using CAM, 48.3 of % population had started using CAM approximately 6 months before, 37.9 of % people used CAM for 1 year, whereas only 12.1% of the are used CAM for more than 5 years, and a very small population of only 1.7% used it for 5 years. The 82.8% diabetic patients who use CAM feel good after using it, but along with this, 15.5% of them were not able to review it good or bad, so they preferred selecting the option of 'cannot say'; only 1.7% of the respondents said that they felt no difference in their health

Table 2: Prevalence and Determinants of Complementary and Alternative Medicine Utilization among Participants.

Variables		*n*	Percent
Are you aware of CAM? (*n*=105)	Yes	85	81
	No	20	19
Are you using CAM now? (*n*=105)	Yes	58	55.2
	No	47	44.8
Type of CAM (*n*=58)	Biologically based	13	22.4
	Mind-body	8	13.8
	Alternative	12	20.7
	Combination	25	43.1
Since when are you using CAM? (*n*=58)	6 months	28	48.3
	1 year	22	37.9
	5 years	1	1.7
	More than 5 years	7	12.1
Reviews about CAM (*n*=58)	Feeling good	48	82.8
	Cannot Say	9	15.5
	No difference	1	1.7
	Feeling bad	0	0
CAM referral from- (*n*=58)	Friend/relatives	29	50.0
	Social media	8	13.8
	Other patients	21	36.2
Is there any change in CAM therapy in case of new symptoms? (*n*=58)	Yes	16	27.6
	No	42	72.4
Any dosage changes after started using CAM? (*n*=58)	Yes	37	63.8
	No	21	36.2
Side effects of CAM (*n*=58)	Yes	0	0
	No	58	100.0
Informed about CAM to treating doctor? (*n*=58)	Yes	31	53.4
	No	27	46.6
Is it paid? (*n*=58)	Yes	40	69.0
	No	18	31.0
Cost of CAM (*n*=40)	₹ 10-100	9	22.5
	₹ 101-400	19	47.5
	Above ₹ 400	12	30.0

after using CAM. It was observed that half of the population obtained a reference for CAM from a friend or relative, 36.2% were referred by other patients, and the remaining 13.8% learned about CAM through social media platforms. 72.4% people say that there is no change in the CAM therapy they are using in case of any new symptom. But it is important to note that 63.8% of people have their dosage of primary medicine changed after they have started CAM therapy. 53.4% of patients reported informing their treating physician about using CAM. 69% use paid CAM, where 22.5% of paid CAM are between ₹10-100, 47.5% between ₹101-400, and the remaining 30% of people are using CAM above ₹400. Not a single person from our sample has suffered from any side effect of CAM.

Sample characteristics of CAM non-users

Table 3 presents the characteristics of diabetic patients who are currently not using any CAM therapy. Results show that 80.9% of the sample population has never used CAM in the past, and their reasons for not using CAM are: do not trust (10.7%), do not know (72.3%), and others (17%).

Table 3: Sample characteristics of CAM non-users (*n*=47).

Variable		*n*	Percent
Have you ever tried CAM?	Yes	9	19.1
	No	38	80.9
Reason for not taking CAM now.	Do not know	34	72.3
	Do not trust	5	10.7
	Other	8	17.0

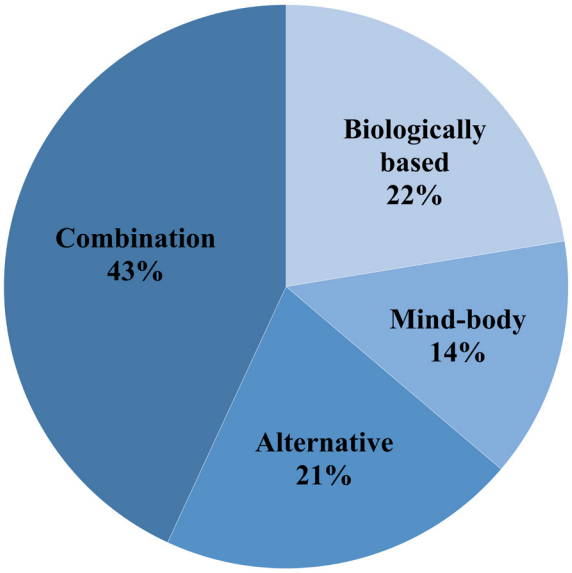


Figure 1: Preferred CAM therapy among Cam users.

Relationship between socio-demographic characteristics and CAM use in the studied participants

The relationship between socio-demographic characteristics and CAM use in the studied participants was summarised in Table 4. Socio-demographic factors were compared among the people using CAM and the people who are not currently using CAM. The outcome of the present study sums up that CAM usage was higher in male patients (69%), which was statistically significant (*p=0.03*). Chi-Square was found to be 4.34 with 1 to be the degree of freedom. Whereas, in education-wise distribution more significant number of CAM users were identified to be graduates, which was again statistically significant with the *p* value as *0.03* and Chi-Square value of 12.11 at degree of freedom 5. Place of residence, Kalyan-Dombivali was also one of the criteria for identification of the CAM users, as a greater number of people using CAM therapy were living in that particular area, which was statistically significant (*p=0.01*), with Chi-Square value of 10.10 at 3 degree of freedom.

Relationship between clinical characteristics and CAM use in studied participants

According to Table 5, there is no relationship between clinical characteristics and CAM use in the studied participants.

DISCUSSION

The prevalence, trends, and factors influencing the use of complementary and alternative medicine among patients with diabetes in the Mumbai Metropolitan Area were assessed in this study. With over half of the participants 55.2% regularly using one or more forms of CAM therapy, the results show that awareness and use of CAM are significantly high among diabetics. This shows how people with long-term conditions like diabetes mellitus are beginning to embrace integrative healthcare practices. A variety of CAMs have been tried to treat diabetes with varying levels of efficacy. Globally, medicinal plants remain a major part of human healthcare. The usage of herbal therapies has increased by 380% in the United States alone over the past few years, despite the lack of solid evidence to back it up. Approximately 2-3.6 million Americans use CAM to treat their diabetes (Medagama and Bandara, 2014). The rising prevalence of diabetes in India, long-term pharmaceutical use, treatment expenses, and concern about consequences may be the reasons why many people look for alternative therapies outside of conventional healthcare. One of the study's key conclusions was that the most popular strategy was the combination of several CAM treatments, 43.1%, followed by biologically based treatments like herbal remedies. This implies that patients are using a holistic approach that incorporates herbal treatments, yoga, meditation, Ayurveda, and other therapies rather than relying solely on a single alternative therapy. According to Radwan *et al.* (2020), diabetes patients in the United Arab Emirates frequently use CAM, especially herbal medicines and spiritual therapies. Shrilatha *et al.* (2019b) reported similar results, showing that diabetic patients frequently favoured a combination of CAM modalities and biologically based therapies. Combination therapy is popular because it is thought to promote overall health, improve glycemic control, and reduce the adverse effects of allopathic medications.

The widespread acceptance of Ayurveda and Herbal therapy in India may also have an impact on the strong preference for natural-based treatments. In the Indian subcontinent, Ayurvedic medicine has been used for centuries and is generally regarded as safe and natural. According to earlier research, diabetic patients frequently use herbal products such as fenugreek, bitter gourd, *Gymnema sylvestre*, and turmeric due to their alleged ability to reduce blood sugar (E Das, 2016; Egede *et al.*, 2002).

Table 4: Association between Socio-Demographic Factors and CAM Use among Study Participants.

Variable		Using CAM No. (*n*=58)		Not using CAM No. (*n*=47)		Chi-Square (d_f)	*p*-value
		n	%	*n*	%		
Gender	Male	40	69.0	23	48.9	4.34 (1)	0.037
	Female	18	31.0	24	51.1		
Age	18-24 years	0	0.0	1	2.1	2.182 (3)	0.536
	25-44 years	7	12.1	3	6.4		
	45-60 years	24	41.4	21	44.7		
	Above 60 years	27	46.6	22	46.8		
Education	Upto primary	8	13.8	10	21.3	12.11 (5)	0.033
	Upto secondary	11	19.0	8	17.0		
	HSC	17	29.3	7	14.9		
	Graduate	18	31.0	9	19.1		
	Post-graduate	4	6.9	11	23.4		
	Other	0	0.0	2	4.3		
Place of residence	Kalyan-Dombivali	34	58.6	22	46.8	10.107 (3)	0.018
	Mumbai	13	22.4	16	34.0		
	Alibag	11	19.0	4	8.5		
	other	0	0.0	5	10.6		

Table 5: Relationship between clinical characteristics and CAM use in studied participants.

Variable		Using CAM No. (*n*=58)		Not using CAM No. (*n*=47)		Chi-Square (d_f)	*p*-value
		n	%	*n*	%		
Duration of diabetes	1-5 years	14	24.1	15	31.9	4.669 (2)	0.097
	6-15 years	33	56.9	17	36.2		
	More than 15 years	11	19.0	15	31.9		
Composition of primary medicine	Only metformin	9	15.5	7	14.9	3.599 (4)	0.463
	Metformin and glimepiride	12	20.7	16	34.0		
	Metformin, Glimepiride and others	17	29.3	11	23.4		
	Metformin and others (Without glimepiride)	17	29.3	9	19.1		
	without metformin	3	5.2	4	8.5		
Frequency of primary medicine	Daily once	4	6.9	5	10.6	0.494 (2)	0.781
	Daily twice	39	67.2	31	66.0		
	Daily thrice	15	25.9	11	23.4		
Random sugar value (mg/dl)	80-130	13	22.4	10	21.3	1.14 (3)	0.767
	131-180	27	46.6	21	44.7		
	181-230	11	19.0	7	14.9		
	Above 230	7	12.1	9	19.1		

The growing interest in herbal and traditional medicine for the treatment of chronic illnesses is also supported by recent research. Due to accessibility and affordability (Kifle, 2021), noted substantial CAM utilisation in diabetics in situations with limited resource settings. The majority of CAM users 82.8% reported feeling better after taking CAM therapies, while none reported negative effects, which is another significant finding from the current study. The continuing use of CAM may be greatly influenced by this favourable view. Meraya *et al.* (2022) observed similar results, with diabetes patients expressing satisfaction about the safety and effectiveness of CAM. However, care should be used when interpreting the current study's lack of documented side effects. Particularly when CAM is taken alongside prescription medications, patients may overlook minor side effects or drug-herb interactions.

Additionally, the study found that after beginning CAM therapy, 63.8% of CAM users altered the dosage of their primary medications. Because unsupervised changes in dosage can negatively impact glycaemic control and raise the risk of complications, this is clinically significant. Some people may cut back on or stop using prescription medications because they think CAM is enough for managing their diabetes. Uncontrolled blood glucose levels and postponed medical care are possible outcomes of such behaviors. This research highlights the significance of medical supervision and patient education when combining complementary and alternative medicine with conventional therapy. The fact that nearly half of CAM users 46.6% had not disclosed their CAM use to their treating physician was a significant concern found in this study. Previous research has shown similar results, with diabetes patients being reluctant to report their use of CAM because they fear judgment, don't ask their doctors, or think it's harmless (Delice Gan, 2003; Dham *et al.*, 2006; Meraya *et al.*, 2022). Inadequate communication between patients and medical professionals might have an adverse impact on treatment results since physicians might not be aware of possible interactions between prescription drugs and CAM medicine. This result emphasizes how important it is for medical practitioners to regularly inquire about patients' use of CAM without passing judgment. Open communication can lower the possibility of unfavourable interactions, guarantee safer treatment approaches, and increase patient trust.

Significant correlations between CAM use and sociodemographic factors such gender, education level, and place of residence were discovered by the study. Compared to female participants, males were more likely to use CAM. Additionally, graduates used CAM more frequently, indicating that education may affect awareness and willingness to explore alternative treatments. These results are somewhat in contradiction with earlier research that found no significant correlation between the use of herbal medicines and demographic variables (Kifle, 2021). Regional variations, disparities in healthcare accessibility, and differences in exposure to social media and community-based information sources could all contribute to the reported connection in this study. It's interesting to note that there was no apparent connection found between the usage of CAM and clinical features including blood glucose levels, duration of diabetes, frequency of medication use, or primary medication composition. This suggests that social and behavioural factors may have a greater impact on CAM use than the actual severity of the disease. However, the comparatively small sample size could possibly be the cause of the lack of correlation. More detailed information about the clinical determinants of CAM use may be obtained from larger multidisciplinary research. The fact that friends, family, other patients, and social media platforms were the main sources of CAM information is another significant finding. This suggests that the majority of patients base their healthcare decisions on unofficial and possibly untrustworthy sources. Patient perceptions regarding CAM seem to be significantly shaped by social impact. Positive testimonies could promote the use of CAM, but false information from unreliable sources can result in dangerous or irrational behaviour. As a result, politicians and healthcare authorities should concentrate on creating awareness campaigns that offer information about CAM that has been verified by research. Patients can distinguish between evidence-based procedures and unproven claims with the use of public education efforts.

The study's conclusions have significant implications for general practitioners, healthcare professionals, and legislators. The study highlights how important it is for clinicians to talk about CAM use during routine diabetes visits. Physicians can deliver safer and more customised care by being aware of their patients' beliefs and habits. Additionally, healthcare professionals should inform patients about potential herb-drug interactions and advise them not to change prescription drugs without a doctor's approval. The widespread use of CAM emphasises to legislators the necessity of regulatory frameworks to guarantee the standardisation, safety, and quality of CAM procedures and products. Patient satisfaction and comprehensive illness treatment may also be enhanced by incorporating CAM therapies that have been scientifically proven into public healthcare systems.

Having everything considered, the current study provides significant information about the use of CAM among diabetes patients in the Mumbai Metropolitan Area. The results show that CAM has grown to be a significant part of diabetics' self-management. To ensure safe and effective diabetic care, however, the increasing use of CAM needs increased awareness, improved patient-provider communication, and more robust scientific review.

This study has a few limitations, such as 1) a small sample size, 2) sampling bias, and 3) the CAM questionnaire was administered to all diabetic patients, rather than confirming their CAM usage only for diabetes.

CONCLUSION

It can be concluded from the study that there is great awareness regarding Complementary and Alternative Medicine therapy among diabetic patients. Adding to it, the prevalence of use of CAM therapy was also higher in the diabetic patients in the Mumbai Metropolitan region. The combination of two or more CAM therapies is prevalent in this area. Major population revealed that there is no change in the CAM therapy that they are using, even after new symptoms have arisen. This needs to be put into light, as this could lead to possible interaction between the drug and the herb. Also, a higher number of people are still dependent upon social media, friends or relatives and even other patients, which cannot be considered to be the proper source of information regarding CAM. Here, medical professionals come into play in order to develop better relationships with their patients in order to build trust. This will result in patients freely disclosing their CAM use to them and eventually prescribing them medicines that possibly would not harm patients' health if used simultaneously with the CAM.

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ABBREVIATIONS

CAM: Complementary and Alternative Medicine; **DM:** Diabetes Mellitus; **MMR:** Mumbai Metropolitan Region; **IDF:** International Diabetes Federation; **NCCIH:** National Center for Complementary and Integrative Health; **WHO:** World Health Organization; **NIDDK:** National Institute of Diabetes and Digestive and Kidney Diseases.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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