

PREVALENCE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE USE IN PATIENTS WITH TYPE 2 DIABETES IN TAMIL NADU

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ABSTRACT

Introduction: India has an estimated 77 million adults with diabetes and about 25 million who are prediabetic. While conventional pharmacotherapy is widely used, lifestyle modifications and Complementary Alternative Medicine (CAM) are increasingly recognized for their potential to improve glycemic control and reduce complications. This study aimed to assess the prevalence, patterns, and predictors of CAM usage among Type 2 Diabetes Mellitus (T2DM) patients attending a tertiary care hospital. **Methods:** A hospital-based cross-sectional study was conducted among 250 patients with Type 2 Diabetes Mellitus (T2DM) attending Sree Mookambika Institute of Medical Sciences, Kulasekharam, over 3 months. Data were collected using a pretested, semi-structured questionnaire that covered socio-demographic characteristics, diabetes treatment, glycemic control, and CAM usage. The data were analyzed using the Chi-Square test. The results were represented as Mean, Standard Deviation (SD), Frequency, and Percentage. **Results:** The mean age of the study participants was 60.36 ± 9.76 years. Of the participants, 61.2% were males and 38.8% were females. The prevalence of CAM usage was reported by 26.4%. Among the CAM users, the majority were using biologically based therapies (16.8%), followed by whole medical systems like homeopathy (9.6%). The factors significantly associated with CAM usage were higher Socioeconomic Status (SES) (OR 95% CI=2.603 (1.046-6.479) and good to fair HbA1c control (OR 95% CI=6.530 (3.405-12.525)). **Conclusion:** CAM usage among T2DM patients in this rural population is relatively low. Targeted health education programs focusing on the benefits, safe use, and potential risks of CAM would enhance patient awareness and informed decision-making.

Keywords: Medical Pluralism, CAM, Prevalence, Holistic Medicine.

INTRODUCTION

Complementary and Alternative Medicine (CAM) encompasses a broad range of health practices and products that are not generally considered part of conventional medicine.(Ng et al., 2023)The National Centre for Complementary and Integrative Health (NCCIH) classifies CAM into five main domains, namely, mind-body medicine, biologically based practices, manipulative and body-based practices, energy medicine, and whole medical systems. (*Complementary and Alternative Medicine (CAM) - NCI*, 1980)The whole medical system encompasses traditional Chinese medicine (TCM), homoeopathy, and Ayurveda, each of which is often grounded in a unique philosophical and cultural foundation. The mind-body medicine focuses on the relationship between the mind and body, employing techniques like meditation, yoga, and tai chi to promote physical and emotional well-being. The biologically based practices utilize natural substances like herbs, dietary supplements, vitamins, and specific foods or diets. The manipulative and body-based practices include massage, chiropractic therapy, and osteopathic manipulation. The energy medicine involves practices that work with energy fields, such as Reiki and therapeutic touch. (*Complementary and Alternative Medicine (CAM) - NCI*, 1980)

According to the Indian Council of Medical Research–India Diabetes (ICMR–INDIAB) national cross-sectional study, published in *The Lancet Diabetes & Endocrinology* in 2023, an estimated 101 million individuals in India are living with diabetes. The study found that the overall prevalence of diabetes is 11.4%, with prediabetes affecting 15.3% of the population, and 40% of individuals with undiagnosed diabetes. The burden of diabetes is disproportionately higher in urban areas (17.9%) compared to rural areas (9.5%)(Anjana et al., 2023), highlighting a significant urban–rural disparity in disease prevalence and possibly in access to screening and care.

With the high prevalence of diabetes, India is often referred to as the “diabetes capital of the world,” posing a significant public health challenge. (M. Gupta et al., 2015)Various environmental and lifestyle factors—including rapid urbanization, dietary changes, increased consumption of processed foods and refined carbohydrates, sedentary behaviour, genetic predisposition, and lack of public awareness—are driving the rising burden of diabetes in the country.(Kolb & Martin, 2017)

While conventional pharmacological therapies are effective in achieving adequate blood sugar control, the long-term goals of diabetes management focus on preventing complications and improving overall health and well-being. (Richardson et al., 2021) In this context, the use of Complementary and Alternative Medicine (CAM) among individuals with diabetes becomes crucial for fostering a patient-centred approach to care. (Funnell & Anderson, 2000) It ensures the safety and effectiveness of all interventions, including CAM, while addressing individual patient preferences and cultural beliefs.(Yu et al., 2023)

Integration of CAM is a holistic approach with enhanced patient outcomes and reduced healthcare costs (R. Gupta, 2024). Despite the increasing interest in integrative approaches, data on CAM use among T2DM patients in rural India—especially those attending structured healthcare settings—are limited. Moreover, there is a lack of evidence regarding the sociodemographic and clinical factors that influence CAM use in this population.

Reviews exploring the effectiveness of plant-based remedies in diabetes management have highlighted their potential as a favourable avenue for the development of natural antidiabetic drugs. Their diverse chemical constituents and mechanisms of action offer promising alternatives to regulate blood sugar levels, improve insulin sensitivity, and address various diabetes-related complications. The integration of biologically based practices into diabetes care opens opportunities for sustainable, nature-derived treatment options that target both the symptoms and underlying causes of diabetes. (Bhandari et al., 2025)

METHODS

A hospital-based cross-sectional study was conducted among 250 patients with Type 2 diabetes mellitus attending the medicine outpatient department of Sree Mookambika Institute of Medical Sciences, Kulasekharam, a rural area of Kanyakumari District. The study was approved by the Institutional Ethics Committee, and after getting informed consent, data were collected using pretested semi-structured questionnaires. The study was done for a period of three months from March 2025 to May 2025. The participants were selected using a purposive sampling technique. The patients who were above 18 years of age, having T2DM with a minimum duration of one year and who consented to the study were included in the study. Patients with other co-morbidities like liver disease, chronic kidney disease, patients with gestational diabetes and those unwilling to participate were excluded from the study.

In a study done by Kesavadev et al (2024) in Kerala, the prevalence of CAM use was found to be 40.7%. (Kesavadev et al., 2023) The total sample size was estimated with a 95% CI and 5% allowable error by using the formula to calculate the sample size for proportions $(n) = Z_{\alpha}^2 pq / L^2$ ($Z_{\alpha}=1.96$, $p=40.7$, $q=59.3$, relative precision of 15% of p); (Cochran, 1977) the calculated sample size was 250.

Data were collected using a pretested semi-structured interviewer-administered questionnaire, which included socio-demographic details, diabetes treatment history, and glycemic control status based on HbA1c levels, lifestyle modification practices, CAM usage- the type of CAM used, source of information, and reasons for using CAM. CAM use was defined as the use of any non-allopathic therapy for diabetes management in the past year. The patients' latest readings (within the past three months) of glycemic status were categorized as good glycemic control =HbA1c <7%, fair control

=HbA1c 7-8%, poor control HbA1c $\geq$ 8.0% and very poor control =HbA1c $\geq$ 9.0%. The primary outcome variable was current CAM usage, and the independent variables to be studied were age, gender, education, occupation, socioeconomic status, glycemic control and lifestyle behaviour. Dietary modification practices were assessed by inquiring whether participants had, over the past three months, reduced the addition of sugar in beverages, practised meal splitting, consumed whole grains, increased dietary fibre intake, and reduced carbohydrate consumption.

Data Analysis:

The data were entered in Microsoft Office Excel 2016 and analyzed using IBMSPSS Trial Version 20.0. Statistical analysis was carried out, and the data were expressed in frequency and percentages. The Chi-square test was used to determine the association between the independent variables and the current CAM usage and to prove their statistical significance. P-value <0.05 was considered statistically significant.

RESULTS

A total of 250 patients were studied. The mean age of the study population was 60.36 ± 9.76 years. Among them 153(61.2%) were males and 97(38.8%) were females. The majority of them, 231(92.4%), were married and living together, and 19(7.6%) were living separately (widowed/divorced). About half of the population 125(50%) studied middle school, 52(20.8%) studied high school, 7(2.8%) were illiterates, and only 4(1.6%) were professionals. With regard to their employment, 64(25.6%) of the study population were unemployed. The Socioeconomic status was calculated using the modified BG Prasad Scale (Updated May 2025). The majority of them, 99(39.6%), belonged to the upper middle class, followed by the middle class, 73(29.2%), as shown in Table 1.

Table 1: Socio-demographic Characteristics of the study population (n=250)

Socio-demographic Characteristics		N	%
Gender	Male	153	61.2
	Female	97	38.8
Marital Status	Married living together	231	92.4
	Unmarried	5	2.0
	Widowed	11	4.4
	Divorced	3	1.2
Educational status*	Illiterate	7	2.8
	Primary School	30	12
	Middle School	125	50
	High School	52	20.8
	Intermediate	3	1.2
	Graduate	29	11.6
	Professional	4	1.6
		279	

Occupation	Employed	186	74.4
	Unemployed	64	25.6
Socioeconomic status (Modified BG Prasad) (Monthly per capita income in Rupees)	Upper class(≥ 9414)	34	13.6
	Upper middle class (4707-9413)	99	39.6
	Middle class (2824-4706)	73	29.2
	Lower middle class (1412-2823)	29	11.6
	Lower(<1412)	15	6

*Primary School: Class 1-5, Middle School: Class 6-8, High School: Class 9-10, Intermediate: Class 11, 12/diploma, Professionals (Specialized training): Doctors, Engineers, Chartered Accountants, Lawyers, Professors.

Out of the total studied diabetic patients, about 180(72%) were on monotherapy and 70(28%) on dual therapy for their blood sugar control. (Table:2) Among the single drug therapy patients, majority 91(36.4%) were taking biguanides (metformin), followed by sulfonylureas 25(10%), dipeptidyl peptidase 4 Inhibitors 24(9.6%), Insulin 21(8.4%), alpha glucosidase inhibitors 15(6%), and SGLT2 receptor inhibitors 4(1.6%). Among the dual therapy patients, the majority were taking a combination of sulfonylurea plus biguanide 58(23.2%), followed by DPP-4 inhibitor plus biguanide 7(2.8%), SGLT2 receptor inhibitors plus biguanides 4(1.6%), and SGLT2 receptor inhibitors plus DPP-4 inhibitor 1(0.4%).

Glycemic control status:

Their glycemic control was studied using their HbA1c levels and was classified as good control ($<7\%$), fair control ($7- <8\%$), poor control $\geq 8\%$, and very poor control $\geq 9\%$. Among the T2DM patients, good control of HbA1c levels were seen among 75(30%), fair control 39(15.6%), poor control 55(22%), and very poor control among 81(32.4%) patients as shown in table2. More than half, 136(54.4%) of the study participants had a poor self-assessment of their blood sugar control as perceived by them.

Table 2: Diabetes treatment pattern of the study participants (n=250)

Diabetes Treatment Characteristics		N	%
Treatment	Monotherapy	180	72
	Dual therapy	70	28
HbA1c control status	Good control	75	30
	Fair control	39	15.6
	Poor control	55	22
	Very poor control	81	32.4
Perception towards blood sugar control**	Poor control	136	54.4
	Good control	114	45.6

** Based on patient self-reporting and not on clinical assessment.

Lifestyle modification practices among diabetic patients:

Modification in their dietary habits was followed by 146(58.4%) of the diabetics. The majority of them, 109(43.6%), reported cutting the sugar in the beverage, followed by splitting the meals, 21(8.4%), and consumption of whole grains with increased dietary fibre and reduced intake of refined carbohydrates by 16(6.4%) of the study population. About 110(44%) of the study population reported no physical activity, 111(44.4%) had a physical activity of 150 minutes per week, and 29(11.6%) had physical activity more than 150 minutes per week. Salt restriction was followed by more than half, 130(52%), of the study population.

Prevalence of CAM Usage and pattern of CAM usage:

The CAM usage was reported by 66 (26.4%) of the study population.(Figure1) The pattern of CAM used was predominantly the biologically based practices like using bittergourd, fenugreek, kalonji, amla, and jamun seeds among 42 (63.6%) of the diabetics, and 24 (36.4%) were using homoeopathy. (Figure2)

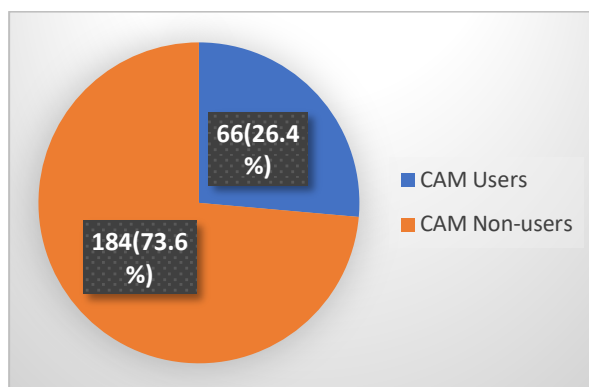


Figure 1: Prevalence of CAM usage among T2DM patients (n=250)

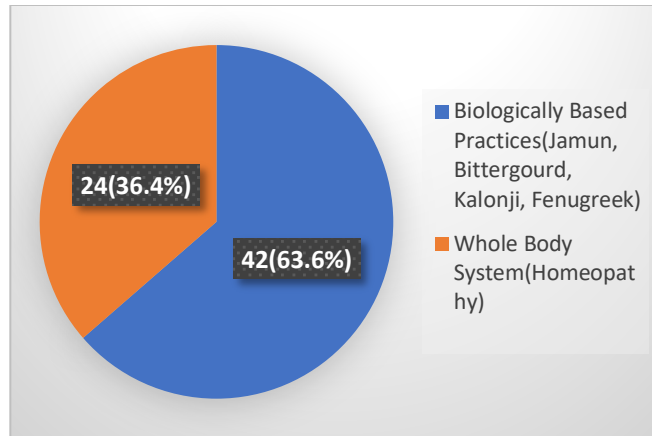


Figure 2: Pattern of CAM usage among T2DM patients (n=66)

The major reasons for using CAM among people with diabetes are shown in Figure 3. The main source of CAM was through family and friends, as reported by 54(21.6%), healthcare providers by 9(3.6%), and the internet and social media by 3(1.2%) of the CAM users. None of the CAM users reported any side effects due to CAM. None of the patients disclosed their CAM usage to their healthcare provider.

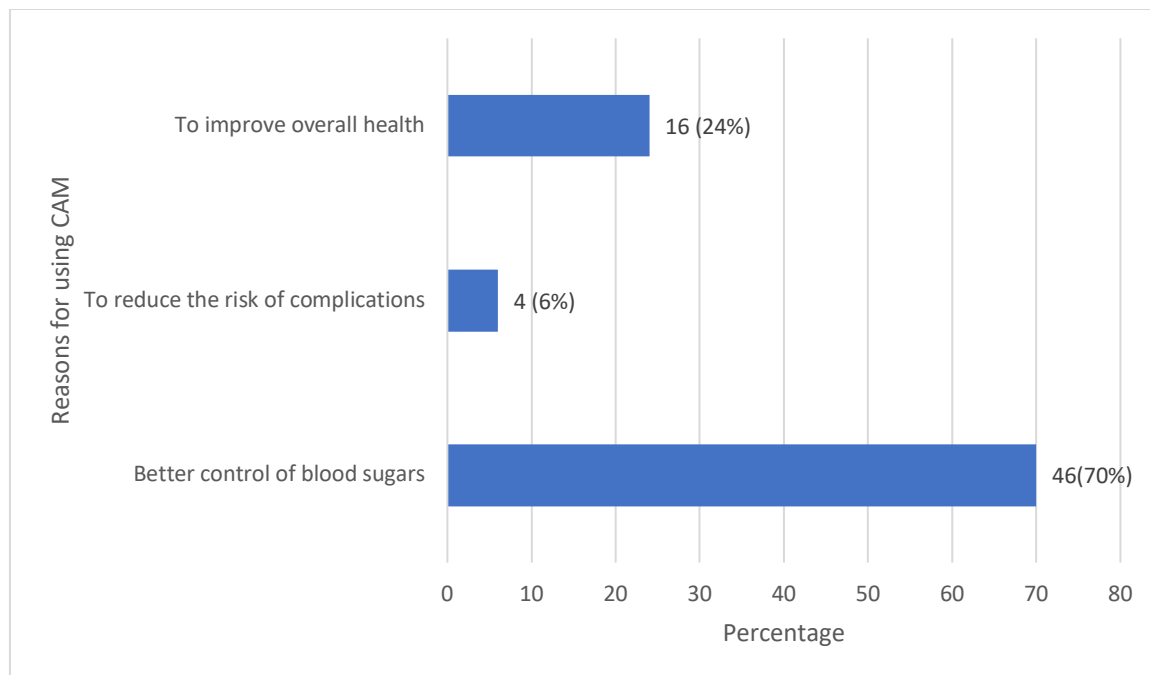


Figure 3: Reasons for using CAM among the study participants (n=66)

Bivariate Analysis:

The factors associated with the current CAM usage were analyzed using the chi-square test. Upon bivariate analysis using the Chi-Square test, a statistically significant association was found between SES, HbA1c control status, with CAM usage. The factors significantly associated with CAM usage were higher SES (OR 95% CI=2.603 (1.046-6.479) (p value <0.034) and good to fair HbA1c control (OR 95% CI=6.530 (3.405-12.525) (p value <0.001). It was found that patients who belonged to higher SES were 2.6 times more likely to use CAM than those who belonged to the lower SES. Also, patients who had good to fair control of their HbA1c levels were 6.5 times more likely to use CAM than those with poor to very poor control of HbA1c levels, as shown in Table 3

Table 3: Bivariate analysis between basic characteristics of study participants and CAM usage (n=250)

Characteristics of participants		CAM usage		Chi-Square value	OR(95% CI)	p-value
		Yes	No			
Age	<60 years	36(30.5%)	82(69.5%)	1.941	1.493 (0.848-2.626)	0.164
	≥ 60 years	30(22.7%)	102(77.3%)			
Gender	Male	40(26.1%)	113(73.9%)	0.013	0.967 (0.543-1.720)	0.908
	Female	26(26.8%)	71(73.2%)			
Marital status	Single	4(21.1%)	15(78.9%)	0.303	0.727 (0.232-2.274)	0.582
	Married	62(26.8%)	169(73.2%)			
Occupation	Unemployed	15(23.4%)	49(76.6%)	0.389	0.810 (0.418-1.571)	0.533
	Employed	51(27.4%)	135(72.6%)			
Socioeconomic status (SES)	Higher SES [#]	60(29.1%)	146(70.9%)	4.477	2.603 (1.046-6.479)	<0.034*
	Lower SES ^{##}	6(13.6%)	38(86.4%)			
Education	Illiterate	0	7(100%)	2.583	-	0.108
	Literate	66(27.2%)	177(72.8%)			
Type of treatment	Monotherapy	52(28.9%)	128(71.1%)	2.049	1.625 (0.833-3.171)	0.152
	Dual therapy	14(20.0%)	56(80%)			
HbA1C control status	Good to fair	51(44.7%)	63(55.3%)	36.264	6.530 (3.405-12.525)	<0.001*
	Poor to very poor	15(11%)	121(89%)			
Diet Control	No diet control	23(22.1%)	81(77.9%)	1.683	0.680 (0.379-1.220)	0.195
	Diet control	43(29.5%)	103(70.5%)			

[#]Higher SES-Class I, Class II, and Class III, ^{##}Lower SES-Class IV and Class V.

OR: Odds Ratio; 95% CI: 95% Confidence Interval; * Significant association (* p-value < 0.05)

DISCUSSION

This study found that approximately one in four T2DM patients in a rural tertiary care setting reported using CAM, particularly biologically based remedies such as bitter melon, fenugreek, cinnamon, kalonji, and jamun seeds being the most prevalent (16.8%), followed by homoeopathy (9.6%). CAM users were significantly more likely to have better glycemic control and belong to higher socioeconomic groups.

The prevalence of CAM usage observed in our study aligns with findings from similar studies conducted in various international settings. A cross-sectional study in Japan (2002) reported comparable rates of CAM usage among diabetic patients attending healthcare facilities. (Peltzer & Pengpid, 2016) Similarly, a study conducted across Cambodia, Vietnam, and Thailand reported a prevalence of 26% for CAM usage among patients with chronic illnesses, including diabetes. (Peltzer et al., 2016) However, higher prevalence rates have been documented in other regions. For instance, a study in Australia among middle-aged women reported CAM usage rates as high as 82% (Sarris et al., 2011), and in the United States, 62% of adults reported CAM use in the previous 12 months. (Barnes et al., 2004) These differences may be attributed to variations in healthcare systems, cultural beliefs, health literacy, and accessibility to conventional healthcare.

In contrast, lower rates of CAM use have been reported in South Africa, where only 16.1% of women with noncommunicable diseases (NCDs) reported using CAM, as per the Prospective Urban Rural Epidemiology (PURE) study. (Vorster et al., 2014) Interestingly, another arm of the PURE study, which looked at traditional medicine use across multiple countries, reported a prevalence of 27%, of which 61% was for NCDs. (Hughes et al., 2015) These findings suggest that CAM usage is context-dependent, influenced by socioeconomic, cultural, and geographic factors.

In our study, better glycemic control (HbA1c <8%) was significantly associated with CAM usage, indicating that CAM may play a complementary role in improving metabolic outcomes. The association between CAM use and glycemic control was also highlighted in a study by Almalki et al, which found improved HbA1c levels among diabetic patients who used herbal medicine in combination with standard treatment. (Almalki et al., 2024) However in a study done by Sagar Kumar showed no significant reduction in the serum HbA1C levels after 12 weeks in patients taking alternative medicines. (Kumar et al., 2020)

Additionally, the majority of our study participants, 81 (32.4%), had very poor control of their HbA1c levels, which indicates irregular treatment, poor adherence to medications, and also increased risk of microvascular and macrovascular complications. Similar findings were seen in a study done in Madhya Pradesh, where 118 out of the 150 study participants had poor glycemic control, indicating the need for treatment adherence and diabetes education. (Mathuriya & Abbas, 2023)

Furthermore, socioeconomic status (SES) emerged as an independent predictor of CAM use. Participants from upper-middle-class backgrounds were significantly more likely to use CAM than those from lower socioeconomic strata. This aligns with findings from previous studies in India, suggesting that CAM use may be more prevalent among individuals who have higher health awareness, disposable income, and greater access to diverse health resources.(Tehrani et al., 2022)This also contrasts with a common assumption that CAM is mostly used by the economically disadvantaged who lack access to allopathic care.

Our study reflected that more than half of the study participants had a poor self-assessment of their blood sugar control as perceived by them. This finding indicates a gap in patients' awareness and confidence regarding diabetes self-management. A poor self-assessment of blood sugar control may reflect limited knowledge of monitoring practices, inadequate adherence to treatment, financial burden, and inadequate family support, all of which can contribute to suboptimal glycemic control. (Lalesh Kumar, 2022)

The most common source of CAM recommendation was family and friends (21.6%), with minimal input from healthcare professionals (3.6%). This finding is concerning as it indicates a communication gap between patients and providers. None of the CAM users disclosed this information to their treating physicians, which has implications for patient safety, especially considering the potential for herb-drug interactions.

The study's strengths are being focused on a rural population, a relatively understudied group in CAM research. The limitations of the study are that the findings are based on a private tertiary care facility and may not represent the broader rural population, especially those who avoid or lack access to medical care, and thereby lack generalizability. Individuals who are undiagnosed or solely rely on traditional systems are not included, limiting the completeness of the data, and there is exclusion bias. Since the study is a cross-sectional design, it restricts causal inferences between CAM use and health outcomes. CAM usage information may be affected by recall or reporting bias. The sampling technique, being purposive sampling, may introduce bias based on the researcher's judgment and may not fully capture the diversity of the target population, thereby lacking external validity. The long-term effects and prognosis of CAM use in diabetes were not assessed due to a lack of follow-up. Patients exclusively using traditional medicine were not included, which may underestimate actual CAM use.

CONCLUSION

CAM usage among T2DM patients in this rural Tamil Nadu population is modest, with a preference for plant-based remedies and homoeopathy. CAM usage, particularly Homoeopathy, appears to be more common in the study setting, likely due to the presence of a homoeopathy medical college nearby, making it more accessible and familiar to the local population. A positive association with glycemic control indicates the potential role of CAM as an adjunct in diabetes care. Notably, none of the participants disclosed their CAM use to healthcare providers, underscoring a critical communication gap that may compromise patient safety. This lack of disclosure raises concerns about the risk of drug–drug interactions, reduced treatment adherence, and unforeseen complications in diabetes management.

As a recommendation, Physicians should routinely ask about CAM use to prevent adverse interactions and ensure comprehensive care. Awareness campaigns must address both benefits and risks. Policymakers can integrate validated CAM practices into national diabetes management protocols. Further evidence-based research is needed on standardized dosing, side effects, and long-term safety with biologically based therapy to support safe integration with allopathic care.

Conflict of interest

The authors declare that they have no conflicts of interest.

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