


SYSTEMATIC REVIEW **OPEN ACCESS**

# A Comprehensive Look at Complementary and Alternative Medicine (CAM) in Saudi Arabia: A Meta-Analysis Study

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## ABSTRACT

**Background and Aims:** Complementary and Alternative Medicine (CAM) refers to a diverse array of healthcare practices that lie outside conventional Western medicine, including herbal remedies, spiritual healing, and traditional therapies. CAM use has become increasingly prevalent worldwide, driven by cultural, religious, and socioeconomic factors, including in Saudi Arabia. This systematic review and meta-analysis aimed to estimate the prevalence of CAM use in Saudi Arabia and examine the patterns of its utilization across various populations.

**Methods:** A systematic literature review was conducted using the PRISMA framework to identify studies investigating the prevalence and patterns of CAM use among diverse populations in Saudi Arabia. Databases searched included Cochrane, [Clinicaltrials.gov](https://clinicaltrials.gov), CINAHL, Web of Science, and PubMed.

**Results:** Seven cross-sectional studies, with a total of 4112 participants were included. The studies encompassed a wide range of populations, from adolescents to adults with chronic illnesses. The pooled prevalence of CAM use was calculated to be 0.515 (95% CI [0.373–0.657]) using a random-effects model, showing that 51.5% of the Saudi population engages in CAM practices. Significant heterogeneity was observed across the included studies, likely due to differences in population demographics, CAM definitions, and study methodologies.

**Conclusion:** The findings emphasize the cultural and religious impact on CAM use and its significance in healthcare delivery. Future research should focus on standardizing CAM definitions, exploring the efficacy of popular therapies, and integrating CAM into conventional healthcare to provide holistic and culturally sensitive care.

**Review Registration ID:** PROSPERO CRD42024608257.

## 1 | Introduction

Complementary and Alternative Medicine (CAM) constitutes a broad spectrum of healthcare approaches that diverge from conventional Western medicine. This category encompasses a diverse array of practices, including herbal remedies, acupuncture, spiritual healing, and various traditional therapies.

Globally, the utilization of CAM has witnessed a substantial surge, with a growing segment of the population seeking these alternatives either as supplementary or primary treatments [1]. This escalating trend can be attributed to a multifaceted interplay of cultural, religious, and socioeconomic factors that influence healthcare choices and practices. The allure of CAM frequently stems from its holistic perspective, which is

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perceived to address not only physical ailments but also mental, emotional, and spiritual dimensions of well-being [2].

In numerous regions globally, particularly those with deeply entrenched cultural and religious traditions, CAM practices have served as integral components of healthcare systems for centuries. However, a marked increase in attention toward these therapeutic approaches has been observed in recent years, even in regions with readily available and accessible conventional medical care [3]. This shift can be attributed to several factors, including a heightened awareness and acceptance of diverse cultural health practices within an increasingly globalized society, coupled with a growing demand for personalized and patient-centered healthcare approaches. Furthermore, the desire for more natural, less invasive treatments with reduced side effect profiles has significantly contributed to the increasing popularity of CAM [4].

Saudi Arabia, a country with a rich cultural and religious heritage, is no exception to this global trend. The Kingdom has experienced rapid modernization in its healthcare system, with significant investments in medical infrastructure, education, and technology [5]. Despite these advancements, a significant portion of the Saudi population continues to rely on CAM practices, either alongside or in place of conventional treatments. This persistence of CAM use raises important questions about the role these therapies play in the healthcare choices of Saudi citizens [6].

Within the Saudi Arabian context, CAM therapies transcend the label of ‘alternative’ and are deeply interwoven with the spiritual and cultural fabric of the population [7]. Practices such as herbal medicine, cupping, and Quranic recitation are widely embraced and extensively employed by individuals from diverse social backgrounds. This preference often stems from the perceived congruence of these therapies with Islamic principles and cultural norms [8]. Furthermore, a prevailing belief exists that CAM therapies offer a safer and more natural approach to healthcare compared to conventional pharmaceuticals, which are frequently associated with adverse side effects and synthetic interventions [9].

The Saudi government has recognized the widespread use of CAM and has taken steps to regulate certain practices [10]. However, despite these efforts, there remains a significant gap in the scientific literature regarding the prevalence, patterns, and outcomes of CAM use in Saudi Arabia. This gap highlights the need for more comprehensive studies that can provide insights into the factors driving CAM use and its implications for public health [11].

Although CAM is widely utilized by the Saudi Arabian population, empirical evidence regarding its prevalence, utilization patterns, and clinical outcomes remains notably scarce. The majority of extant research comprises small-scale, cross-sectional surveys [12]. While these studies offer valuable insights into CAM use within specific demographic groups, they fail to provide a comprehensive and generalizable understanding of CAM practices across the entire Kingdom. This dearth of standardized research methodologies constitutes a significant obstacle to a comprehensive and nuanced understanding of the

scope and impact of CAM within the Saudi Arabian healthcare landscape.

This study seeks to address this significant research gap by conducting a systematic review and synthesis of the existing body of evidence pertaining to the prevalence of CAM utilization within the Saudi population. By systematically aggregating data from multiple studies, this analysis aims to generate a more precise and robust estimate of the pervasiveness of CAM practices throughout the Kingdom. Furthermore, this study seeks to identify discernible patterns of CAM use across diverse demographic groups within the Saudi Arabian context. Specifically, the investigation will explore the heterogeneity in CAM use reported in the extant literature, examining how factors such as age, gender, and health status may exert an influence on the likelihood of engaging in CAM practices.

## 2 | Methods

### 2.1 | Literature Search

An extensive search for relevant research was conducted to understand how common CAM is used in Saudi Arabia, and to determine if these patterns differ among various groups of people. The search included several major databases like Cochrane, [ClinicalTrials.gov](https://www.clinicaltrials.gov/), CINAHL, Web of Science, and PubMed. To ensure the studies focused on Saudi Arabia, the search was limited to studies conducted there. Additionally, keywords like “complementary and alternative medicine,” “Saudi Arabia,” “meta-analysis,” “prevalence,” and “health” were employed to identify relevant studies. Since each database has its own way of organizing information, the search strategy was adjusted accordingly. Furthermore, the reference lists of the chosen studies were examined to find any additional relevant research. To ensure the rigor and transparency of the review process, the PRISMA guidelines were adhered to.

### 2.2 | Data Extraction

To ensure accuracy and reliability, data from the research papers were meticulously collected and organized using a standardized form. This data was then carefully transferred into Microsoft Excel™ spreadsheets. To further enhance the validity of the analysis, independent reviewers extracted the data. This data was then cross-checked to identify and resolve any discrepancies. Finally, the verified data was imported into Review Manager 5.4.1 software, a specialized tool designed for conducting meta-analyses and other statistical assessments in systematic reviews.

### 2.3 | Statistical Analysis

Prevalence proportions and sample sizes for CAM use were extracted from available data sources pertaining to the Saudi Arabian population. The data were processed using a purpose-built Python (Van Rossum, G., Scotts Valley, CA) program (see Supporting Information) to automate the calculation of measures of variability, such as standard deviation and variance.

The pooled prevalence for the two groups was calculated by preparing a random effects model. The meta-analyses were conducted in R (version 4.2.0, R Foundation for Statistical Computing, Vienna, Austria).

Heterogeneity across studies was evaluated using two statistical methods. The Higgins  $I^2$  statistic was used to quantify the proportion of total variation in the data that could be attributed to heterogeneity. Cochran's  $Q$  test was then employed to statistically test the significance of this observed heterogeneity.

Significance testing was two-sided, and a  $p$ -value of  $< 0.05$  was considered statistically significant. All statistical analyses adhered to the Statistical Analyses and Methods in the Published Literature (SAMPL) guidelines.

## 2.4 | Quality Assessment

The methodological quality of the included studies was rigorously assessed using the Joanna Briggs Institute (JBI) quality assessment criteria [13]. This comprehensive framework encompassed three key domains: (1) Methodological quality: This domain evaluated the overall study design, including participant selection, data collection methods, and potential biases. (2) Comparability: This domain assessed the similarity of study populations, interventions, and outcomes across different studies, which is crucial for meaningful comparisons and meta-analysis. (3) Quality and robustness of statistical analysis: This domain evaluated the appropriateness and rigor of the statistical methods used in the original research, including data analysis techniques and the handling of missing data. Each study was independently evaluated using the JBI tool, resulting in a total score. To ensure the inclusion of high-quality evidence, only studies with a medium or high quality rating, defined as those achieving a score of 5 or higher, were included in the subsequent review and analysis. A summary of the quality assessment for each included study is presented in Table 1.

## 2.5 | Ethical Approval and Informed Consent

This study, a systematic review and meta-analysis, did not require independent ethical review by the Institutional Review Board. This determination was made because the research

exclusively analyzed data extracted from previously published studies. All included studies were subject to rigorous ethical standards, having obtained prior ethical approval from their respective institutions and ensuring that all participants provided informed consent according to their original research protocols. However, this review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and is registered with the International Prospective Register of Systematic Reviews (PROSPERO) under registration number "CRD 42024608257."

## 3 | Results

Seven articles were selected for inclusion following a rigorous screening process of all retrieved data. The selection process is illustrated in a PRISMA flow diagram (Figure 1).

### 3.1 | Study Characteristics

A summary of the key characteristics of each study, including (Study Author, Study Year, Study Design, Study Duration, Sample Size, Patient Population, Population Age, CAM Therapies Reported), is provided in Table 2.

The included studies were published between 2013 and 2020. The studies were all conducted in the Kingdom of Saudi Arabia, with the total study population adding up to 4112 patients (range 232–1167). The studies included were all cross-sectional studies.

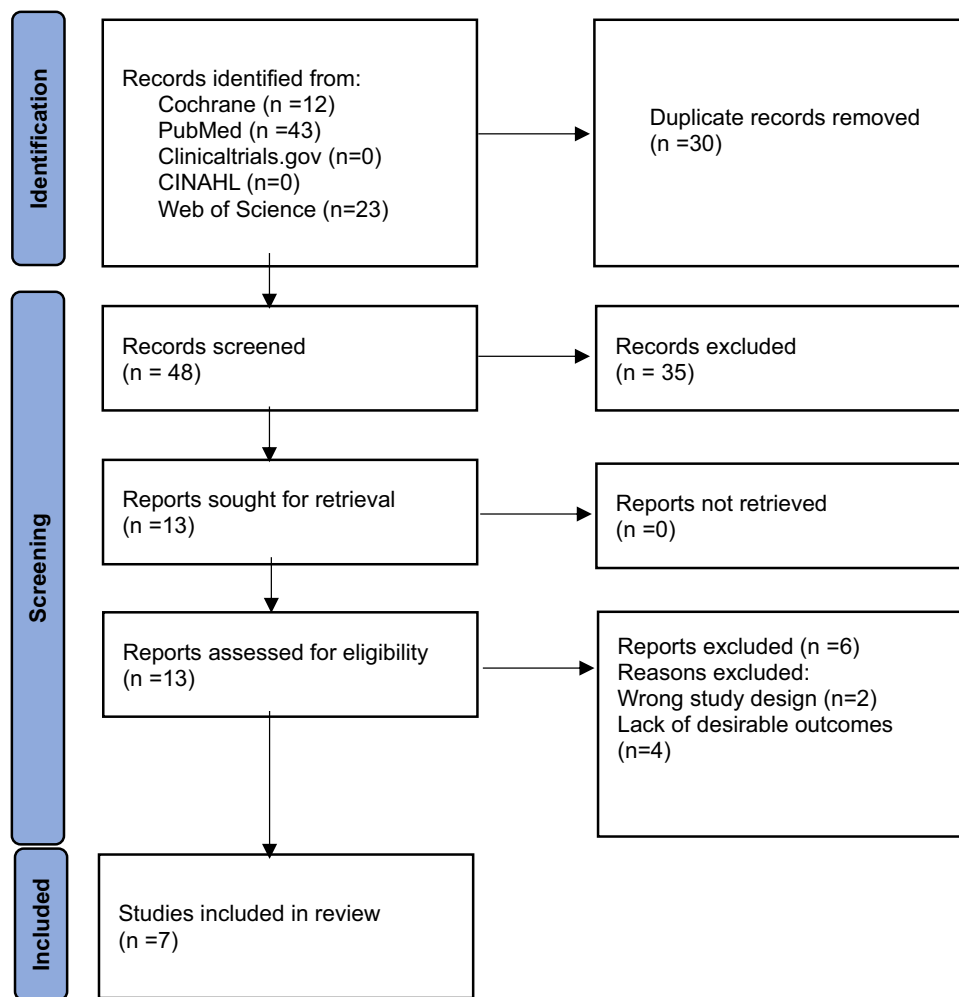
### 3.2 | Pooled Prevalence of CAM Use

The pooled prevalence estimates of use of CAM in Saudi Arabia, based on seven studies was 0.515 (95% CI [0.373-0.657]) with a random-effects model, showing that 51.5% of the Saudi population uses various modalities of CAM therapies. (Figure 2) displays the forest plot with the prevalence estimates of individual studies, along with the pooled estimate and Confidence Interval. The study by Al Bedah et al. (2012) had the highest prevalence estimate of 0.743 (95% CI [0.718-0.768]), while the study by Al Eidi et al. (2016) reported the lowest prevalence estimate of 0.305 (95% CI [0.253-0.357]). The overall effect sizes and confidence intervals are shown in the plot.

TABLE 1 | Quality assessment (JBI assessment criteria).

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Total score
Al Eidi 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Al Zahim 2013	Y	Y	Y	Y	Y	Y	Y	N	Y	8
Al Badr 2018	Y	N	N	Y	Y	Y	Y	Y	N	6
Al Bedah 2012	Y	Y	Y	N	Y	Y	Y	Y	Y	8
Gad 2013	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
Khan 2020	Y	Y	N	Y	Y	Y	Y	N	Y	7
Musaiger 2015	Y	Y	Y	Y	Y	Y	Y	N	Y	8

Abbreviations: N, no; NA, not appropriate; NR, not reported; Y, yes.



**FIGURE 1** | PRISMA flowchart.

### 3.3 | Sensitivity Analysis

There was significant heterogeneity among the studies pooled for the overall outcome. For determining the cause of this heterogeneity, a leave-one-out analysis was performed. (Figure 3) shows the forest plot for the leave-one-out analysis. The study by Al Bedah et al. (2012) shows the most variability in the effect size (0.477, 95% CI [0.353-0.600]).

## 4 | Discussion

The findings from this meta-analysis provide significant insights into the prevalence and patterns of CAM use in Saudi Arabia. The analysis was carried out using a random-effects model to account for variability across studies and revealed that approximately 51.5% of the population engages in CAM practices. This high prevalence suggests that CAM is a substantial component of healthcare for many individuals in Saudi Arabia, reflecting cultural, religious, and possibly socioeconomic factors that drive the preference for CAM therapies [14, 15].

This study reveals a high prevalence of CAM usage within a rapidly modernizing healthcare system. Despite readily accessible conventional medicine, a substantial segment of the

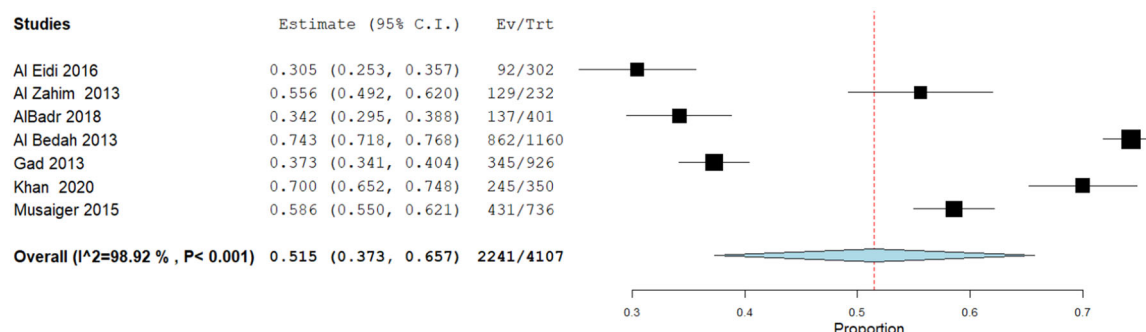
population continues to utilize CAM practices, including herbal remedies, spiritual healing, and traditional therapies [16]. This phenomenon likely arises from a confluence of factors, such as deeply ingrained cultural beliefs, religious doctrines, and a perceived lack of personalized care or increased risk of side effects associated with conventional medical approaches [17].

A critical aspect of this meta-analysis is the heterogeneity observed among the included studies, evidenced by the high  $I^2$  value. Heterogeneity in meta-analyses is a crucial factor to consider, as it reflects variability in study outcomes that cannot be attributed solely to chance [18]. The substantial heterogeneity observed in the CAM use reporting across studies suggests significant variations in how these practices are defined and perceived. This variability can be attributed to several factors, including inherent differences in research methodologies and study designs [19].

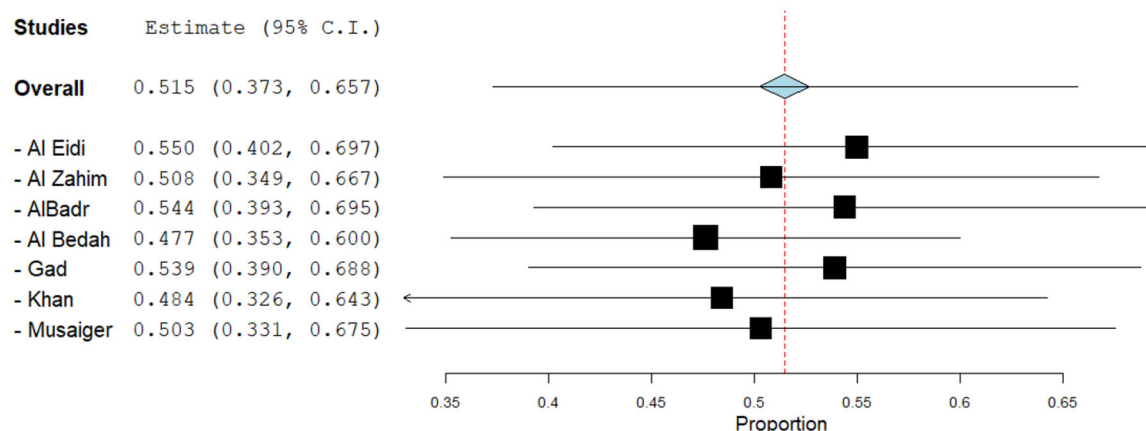
To further investigate the sources of this heterogeneity, a leave-one-out analysis was conducted. This analysis, which involves systematically excluding each study and recalculating the pooled prevalence, revealed that heterogeneity was influenced by a combination of factors. Specifically, the results demonstrated that certain individual studies contributed significantly to the overall heterogeneity. Furthermore, the analysis highlighted a pervasive lack of standardization in how CAM

**TABLE 2** | Study characteristics.

Study author	Study year	Study design	Study duration	Sample size	Patient population	Population age	CAM therapies reported
Al Eidi	2016	Cross-sectional	May-14	302	Outpatients with Type 2 Diabetes Mellitus	51.6 ± 10.6	Herbs, Wet cupping, Nutritional Supplements
Al Zahim	2013	Cross-sectional	February to March 2012	232	Patients diagnosed with liver disease at Tertiary care Hepatology clinic	46.9 ± 15.1	Herbs, Bloodletting
Al Badr	2018	Cross-sectional	February to April 2015	399	Medical students from two Saudi Universities	20.7	Bloodletting, Herbs, Acupuncture, Yoga, Meditation
Al Bedah	2012	Cross-sectional	May to June 2011	1167	Primary health care (PHC) attendants aged 18 years and older from both genders and any nationality	40.69 ± 13.9	Spirituality, Herbs, Honeybee products, Wet cupping
Gad	2013	Cross-sectional	<i>Not Specified</i>	926	Families visiting PHCs in Riyadh province	<i>Not specified</i>	The Holy Quran, Honey, Ferula asafetida, Black seed
Khan	2020	Cross-sectional	December 2018 to July 2019	350	Health science students at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS)	<i>Not specified</i>	Prayers/Spirituality, Massage, Nutritional Supplements, Cupping, Herbal
Musaiger	2015	Cross-sectional	2009 to 2010	736	Adolescents aged 15–19 years from Al-Khobar city, Saudi Arabia	<i>Not specified</i>	Honey, The Holy Quran, Dietary Supplements



**FIGURE 2** | Forest plot showing pooled prevalence of CAM use in Saudi Arabia.



**FIGURE 3** | Forest plot for leave-one-out analysis.

practices are defined and assessed across the studies included in the meta-analysis.

The observed heterogeneity in research outcomes underscores the critical need for future studies to prioritize standardized definitions and reporting of CAM practices. This standardization would significantly enhance the comparability and generalizability of findings across different studies [20]. Furthermore, the adoption of longitudinal research designs would provide invaluable insights into the evolving trends in CAM usage over time. By tracking CAM utilization patterns over extended periods, researchers can gain a deeper understanding of the dynamic interplay between public perception, reliance on these therapies, and their potential impact on healthcare outcomes [21].

The populations studied are diverse, ranging from adolescents to elderly patients and from university students to patients with chronic diseases. It is likely that this diversity shown in the study affects the types of CAM practices reported and the prevalence of their use. For example, younger populations might be more inclined to explore alternative therapies like yoga and meditation, while older populations may rely more on traditional herbal remedies and spiritual practices [22, 23]. Differences in how CAM practices are categorized, how data is collected, and the duration of studies all introduce variability [24, 25]. The study by Al Bedah et al. (2012), which reported the highest prevalence, included a broader and more culturally diverse population, potentially capturing a wider array of CAM practices compared to more narrowly focused studies.

## 4.1 | CAM and Public Health: Planning and Implementation

Given the widespread use of CAM and its demonstrated benefits in specific cases, there is increasing evidence suggesting that the principles of Integrative Medicine (IM) may offer significant advantages for patient outcomes [26]. Effective evaluation of CAM implementation within healthcare systems requires a multi-faceted approach. This necessitates comprehensive research encompassing: the prevalence of CAM use within the target population; public attitudes and needs regarding CAM; rigorous scientific evaluation of CAM safety and efficacy compared to conventional medicine; and a holistic understanding of CAM outcomes, considering patient beliefs, expectations, and the broader healthcare context [27]. Developing and rigorously evaluating diverse models for integrating CAM into existing healthcare systems is crucial for successful and sustainable implementation [28].

A significant gap exists in adequately addressing the potential risks associated with CAM use. These risks encompass both safety concerns, such as potential side effects and interactions with conventional medications, and efficacy concerns, as many CAM therapies lack sufficient scientific evidence to support their claimed benefits [29]. To ensure informed and safe healthcare practices, it is essential that training approaches for healthcare professionals, as well as educational resources for the public, explicitly integrate discussions on the potential risks of CAM therapies. This would empower individuals to make



informed decisions about their healthcare choices and enable healthcare providers to offer comprehensive and evidence-based guidance to their patients [30].

This study effectively highlights the prevalence of CAM use, providing valuable insights into the extent and nature of its adoption within the population. However, a crucial aspect that warrants greater attention is the translation of these findings into actionable public health strategies. While understanding the scope of CAM usage is essential, the study could significantly enhance its impact by explicitly outlining how its findings can inform public health planning and interventions.

By delving deeper into the implications of its findings for public health, the study could empower policymakers and healthcare providers to make more informed decisions regarding the integration of CAM into existing healthcare systems [31]. This could involve exploring potential areas of collaboration between conventional medicine and CAM, developing guidelines for safe and effective CAM practices, and addressing the unique challenges associated with integrating CAM into public health initiatives. Furthermore, by explicitly discussing the public health implications of its findings, the study could encourage further research and dialogue on the role of CAM in promoting overall population health and well-being [32].

## 4.2 | Study Limitations

This review is subject to the inherent limitations of meta-analyses within the field of CAM research. The limited number of studies and small sample sizes within those studies may restrict the generalizability of findings. Furthermore, inconsistencies in CAM definitions and methodological approaches across studies hinder direct comparisons and robust conclusions. While the study included a diverse range of participants, potential biases may arise from the limited representation of the broader Saudi Arabian population, particularly considering the diverse demographics and experiences across different regions of the country. The lack of standardized definitions and measurement methods in CAM research significantly limits its progress. This inconsistency restricts applicability and comparability across studies. Without clear and universally accepted standards, researchers may investigate different phenomena under the same label and struggle to draw reliable conclusions about efficacy and safety. Developing and adopting standardized definitions, terminologies, and measurement tools is essential for advancing the field of CAM research.

## 5 | Conclusion

This meta-analysis highlights the significant prevalence of CAM practices within the Saudi Arabian population, emphasizing the influence of cultural, religious, and socioeconomic factors on their utilization. The study emphasizes the critical need for standardized research methodologies to rigorously evaluate the safety and efficacy of various CAM therapies. This research helps as a valuable example of the importance of culturally sensitive research and healthcare practices. In an increasingly

interconnected global healthcare landscape, understanding the cultural dimensions of health behaviors is paramount. This study not only provides valuable insights into CAM use within the Saudi Arabian context but also offers a valuable framework for investigating CAM utilization within diverse cultural settings, thereby contributing to a more comprehensive and holistic understanding of global health practices.

More studies should prioritize the integration of CAM within conventional healthcare systems, focusing on the development of culturally sensitive healthcare models that optimize patient care and outcomes. It is also crucial to investigate the associations between CAM use, patient characteristics, and disease states. This research will facilitate the identification of patient populations who may be at heightened risk from specific CAM modalities. Furthermore, conducting qualitative research exploring the motivations and beliefs driving CAM use in Saudi is essential. These studies will provide valuable insights into patient perspectives, ultimately contributing to a more comprehensive understanding of CAM use and its impact on patient well-being.

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### Author Contributions

**Saud M. Alsanad:** conceptualization, investigation, writing – original draft, methodology, validation, visualization, writing – review and editing, formal analysis, data curation, project administration.

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### Conflicts of Interest

The author declares no conflicts of interest.

### Data Availability Statement

The author confirms that the data supporting the findings of this study are available within the article and its Supporting Information.

### Transparency Statement

The lead author Saud M. Alsanad affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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## Supporting Information

Additional supporting information can be found online in the Supporting Information section.