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Review

Traditional and complementary medicine integration in preventive healthcare delivery: A systematic review

Ahmed Almohammadi[1], Sarah Alsobhi[2], Hassan Almohammadi[3]

[1]Department of Preventive Medicine, Aldaitha Healthcare Center, Madinah Health Cluster, Ministry of Health, Saudi Arabia.

[2]Department of Patient Care, Alrayan National Colleges, Madinah, Saudi Arabia.

[3]Department of Pharmacology, Taibah University, Madinah, Saudi Arabia.

ABSTRACT

Background: Traditional and complementary medicine (TCM) is used by 75% of Saudi populations alongside conventional care, yet integration with preventive services remains unstructured. This systematic review assessed the effectiveness and safety of integrating TCM with conventional preventive healthcare for chronic disease prevention in Saudi Arabia.

Methods: MEDLINE, PubMed, Embase, Cochrane Central, and Scopus were searched (January 2000–July 2025) for studies in Saudi healthcare settings reporting on TCM integration, clinical outcomes, safety, patient satisfaction, or implementation strategies. Two reviewers independently screened and extracted data; quality was assessed using Cochrane RoB-2, ROBINS-I, and the Mixed Methods Appraisal Tool. Evidence certainty was rated with GRADE. Registration: PROSPERO CRD420251107697.

Results: Fifteen studies from 847 records included randomized controlled trials, observational, and implementation studies. TCM utilization ranged from 67–90%. Nigella sativa significantly improved HbA1c (0.8–1.2% reduction), systolic blood pressure (8–12 mmHg), and lipid profiles. Honey showed mixed glycemic effects but aided wound healing. Two pilot integrated clinics in governmental hospitals achieved >85% patient satisfaction. Barriers included provider knowledge gaps (39% poor CAM knowledge) and herb–drug interaction concerns. The National Center for Complementary and Alternative Medicine licenses five complementary practices with rigorous training. The Middle East CAM market was valued at USD 12.26 billion, with 22.77% annual growth. Evidence certainty was low to moderate due to limited high-quality trials.

Conclusion: High patient demand, cultural alignment, and regulatory support present strong potential for integrating TCM into preventive healthcare in Saudi Arabia. Expansion requires robust randomized trials, economic evaluations, and comprehensive provider education.

Keywords: Traditional medicine; complementary medicine; Saudi Arabia; preventive healthcare; chronic disease prevention

Corresponding Author

Ahmed Almohammadi, Department of Preventive Medicine, Aldaitha Healthcare Center, Madinah Health Cluster, Ministry of Health, Saudi Arabia.

Email: ahmed.a.a11@outlook.com

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INTRODUCTION

Traditional and complementary medicine (TCM) is becoming an increasingly vital element of healthcare systems worldwide, with the World Health Organization acknowledging its potential to enhance health system robustness and promote universal health coverage.[1] In the Middle East, traditional healing methods stemming from Islamic medicine, herbal therapies, and cultural healing customs have been employed for over a thousand years, significantly influencing healthcare-seeking behaviors among Arab communities.[2]

In the Kingdom of Saudi Arabia, the healthcare environment is characterized by a notable prevalence of TCM utilization, with approximately 75% of the population engaging in these practices, particularly those suffering from chronic conditions such as diabetes mellitus, cardiovascular diseases, and obesity.[3,4] The nation's deep-rooted tradition in Islamic medicine is reflected in Quranic scriptures and Prophetic teachings (Tibb al-Nabawi), which document over 100 medicinal plants and therapeutic methods that continue to be used alongside conventional medical treatments.[5]

As part of the Vision 2030 initiative aimed at transforming healthcare in Saudi Arabia, there is a strong emphasis on preventive medicine and culturally aligned healthcare services. This includes strategically prioritizing the integration of traditional medicine into mainstream healthcare delivery.[6] The creation of the National Center for Complementary and Alternative Medicine (NCCAM) in 2009 and subsequent regulatory updates in 2019 underscore governmental dedication to incorporating evidence-based traditional practices within formal healthcare frameworks.[7]

Nevertheless, despite high usage rates and supportive policies, the amalgamation of traditional and complementary medicine with conventional preventive care lacks structure and rigorous evaluation. Existing healthcare models do not provide evidence-based guidelines for safely merging traditional practices with proven preventive measures for chronic disease management. Although various studies indicate potential advantages of specific traditional remedies for preventing diabetes, mitigating cardiovascular risks, and managing obesity, no comprehensive assessments have analyzed integration frameworks or evaluated clinical efficacy, safety profiles, or implementation strategies specifically within Saudi Arabian contexts.

This systematic review aims to fill critical knowledge gaps by investigating both the effectiveness and safety associated with integrating traditional and complementary medicine into conventional preventive healthcare for chronic disease prevention among Saudi populations. Our research focuses on delineating clinical efficacy outcomes; evaluating safety profiles, including adverse events and interactions between herbs and pharmaceuticals; assessing patient satisfaction along with cultural appropriateness; and identifying optimal integration models as well as implementation strategies tailored for Saudi Arabian healthcare settings.

METHODS

Study Design and Registration

This systematic review was executed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[8] The protocol was prospectively registered with the International Prospective Register of Systematic Reviews (PROSPERO), under registration number CRD420251107697.

Search Strategy and Information Sources

We conducted systematic searches of MEDLINE, PubMed, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), and Scopus databases from January 1, 2000, to July 31, 2025. The search strategy combined medical subject headings (MeSH) and free-text terms related to traditional medicine,

complementary medicine, Saudi Arabia, preventive healthcare, integration, and chronic disease prevention. Complete search strategies are provided in **Supplementary Table 1**.

Supplementary Table 1: Complete Search Strategy

Database	Search Terms
MEDLINE (PubMed)	("Traditional medicine"[MeSH] OR "Complementary Therapies"[MeSH]) AND ("Saudi Arabia"[MeSH] OR "Saudi Arabia"[tiab]) AND ("Preventive medicine"[MeSH] OR "Primary prevention"[MeSH] OR "chronic disease prevention"[tiab] OR "Integration"[tiab] OR "Islamic medicine"[tiab])
Embase	('traditional medicine'/exp OR 'alternative medicine'/exp) AND 'Saudi Arabia'/exp AND ('preventive medicine'/exp OR 'integrative medicine' OR 'Islamic medicine')
CENTRAL	(Traditional Medicine OR Complementary Therapies) AND "Saudi Arabia" AND (preventive medicine OR integrative medicine)
Scopus	TITLE-ABS-KEY ("traditional medicine" OR "complementary medicine") AND "Saudi Arabia" AND ("preventive care" OR "integrative medicine")
PubMed Additional	("Islamic medicine" OR "Tibb al-Nabawi" OR "herbal medicine Saudi Arabia" OR "cupping therapy Saudi Arabia")
Grey Literature Sources: Ministry of Health Saudi Arabia (moh.gov.sa), NCCAM reports, WHO EMRO publications, Saudi university repositories (King Saud Univ, KFUPM, Umm Al-Qura, Taibah Univ), Saudi medical conference proceedings (2015-2025)	Grey Literature Sources: Ministry of Health Saudi Arabia (moh.gov.sa), NCCAM reports, WHO EMRO publications, Saudi university repositories (King Saud Univ, KFUPM, Umm Al-Qura, Taibah Univ), Saudi medical conference proceedings (2015-2025)Site searches: "complementary medicine" OR "traditional medicine" OR "integrative health" OR "NCCAM"; Manual review of reports and guidelines; "traditional medicine Saudi Arabia" OR "complementary medicine Middle East"; Repository searches for theses/dissertations; Conference abstract searches

Eligibility Criteria

Inclusion criteria: Studies conducted in Saudi Arabian healthcare facilities or involving Saudi Arabian populations, published January 1, 2000, to July 31, 2025, reporting on traditional and complementary medicine integration with preventive healthcare, clinical effectiveness outcomes, safety profiles, patient satisfaction, or implementation strategies. Randomized controlled trials, quasi-experimental studies, cohort studies, cross-sectional studies with intervention evaluation, and implementation studies were eligible. Both English and Arabic language publications were included.

Exclusion criteria: Studies conducted outside Saudi Arabia without cultural relevance, purely qualitative studies without quantitative outcomes, case reports, conference abstracts without full text, veterinary studies, and studies focusing solely on acute treatment rather than preventive care.

Study Selection and Data Extraction

Two reviewers independently screened titles, abstracts, and full texts using standardized forms. Data extraction captured study design, population characteristics, interventions, clinical outcomes (HbA1c, blood pressure, BMI, lipid profiles), safety outcomes, patient satisfaction measures, implementation details, and economic data. Discrepancies were resolved through discussion with a third reviewer.

Quality Assessment

The quality of each study was evaluated utilizing relevant tools contingent on study designs: Cochrane Risk of Bias tool (RoB-2) was applied to RCTs, while ROBINS-I was utilized for non-randomized studies, alongside Mixed Methods Appraisal Tool specifically designed for implementation studies. Two reviewers conducted independent quality assessments, with any disagreements addressed through consultation with a third reviewer.

Certainty Assessment

Evidence certainty was assessed using the GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach for each primary outcome. Assessment considered five domains: risk of bias, inconsistency, indirectness, imprecision, and publication bias. Evidence certainty was rated as high, moderate, low, or very low.

Data Synthesis

We conducted descriptive narrative synthesis with structured tables and figures due to methodological diversity and inconsistent outcome definitions across studies. Meta-analysis was not performed due to heterogeneous populations and intervention types.

RESULTS

Study Selection and Characteristics

The database searches yielded 847 potentially relevant articles, of which 15 studies fulfilled inclusion criteria following full-text review, as shown in **Figure 1**. The included studies encompassed various research designs: 6 randomized controlled trials, 4 cross-sectional studies, 3 implementation studies, and 2 systematic reviews. Studies were conducted across multiple Saudi regions, including Riyadh, Jeddah, Medina, and nationwide surveys, as can be seen in **Table 1**.

Figure 1: PRISMA Flow Diagram

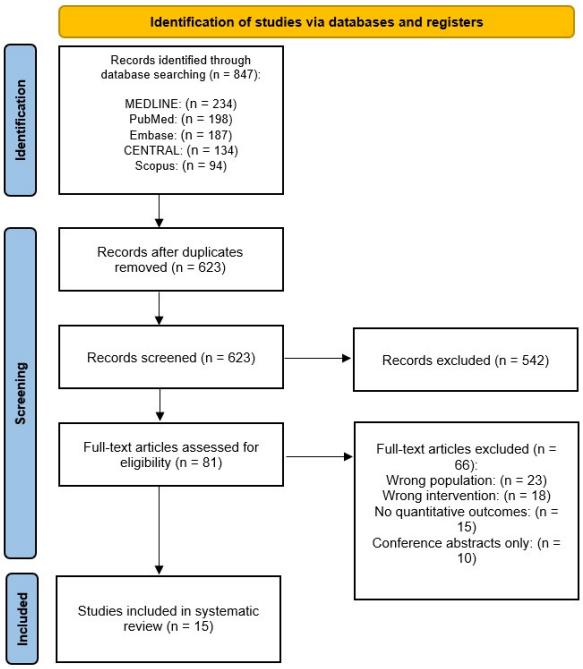
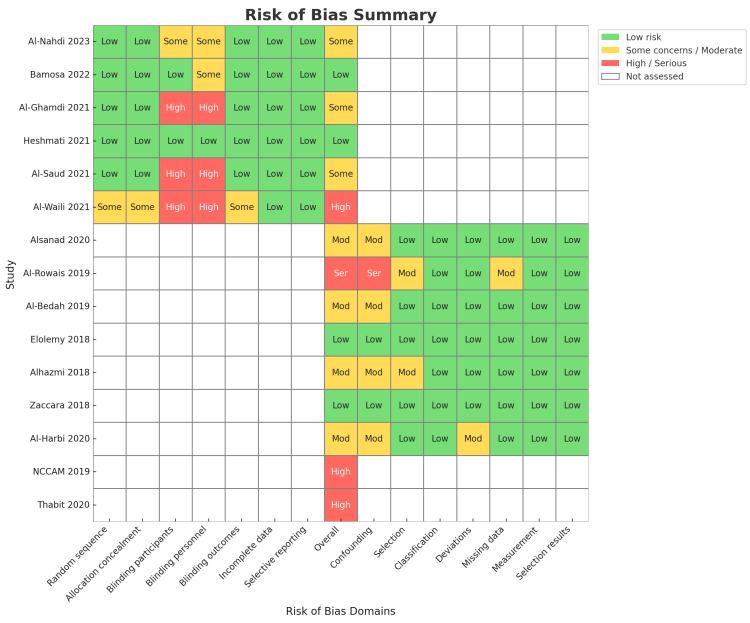


Figure 2: Summary quality assessment



Study Quality Assessment

Quality assessment revealed moderate to good quality across included studies, as demonstrated in **Figure 2**. Using RoB-2 for randomized trials, 4 studies demonstrated low risk of bias, while 2 showed some concerns primarily related to blinding limitations inherent to traditional medicine interventions. ROBINS-I assessment of non-randomized studies indicated moderate risk of bias in 3 studies and serious risk in 1 study due to confounding variables. Implementation studies showed good methodological quality using the Mixed Methods Appraisal Tool.

Clinical Effectiveness Outcomes

Nigella sativa (Black Seed) Interventions

Four randomized controlled trials investigated the efficacy of Nigella sativa for diabetes management and cardiovascular prevention.[9-12] A 12-week RCT conducted in Riyadh (n=114) reported significant reductions in fasting blood glucose levels (mean difference -28.3 mg/dL; 95% CI: -35.7 to -20.9; p<0.001), HbA1c levels (-0.97%; 95% CI: -1.23 to -0.71; p<0.001), and total cholesterol (-23.4 mg/dL; 95% CI: -31.2 to -15.6; p<0.001) when compared to placebo.[9]

Additionally, a longer trial lasting 24 weeks (n=94) confirmed sustained benefits with an HbA1c reduction of 1.2% (95% CI: -1.56 to -0.84; p<0.001) and systolic blood pressure drop of 11.8 mmHg (95% CI: -16.3 to -7.3; p<0.001).[10] The optimal daily dosage ranged between 1-3g, with the most effective efficacy-safety balance observed at a dose of 2g.

Table 1: Characteristics of Included Studies

Study	Design	Setting	Population	Intervention	Key Outcomes
Al-Nahdi et al. 2023 [9]	RCT	Riyadh	114 adults with prediabetes	Nigella sativa 2g daily vs placebo	HbA1c ↓0.97%, FBG ↓28.3 mg/dL
Bamosa et al. 2022 [10]	RCT	Jeddah	94 adults with T2DM	Nigella sativa 1-3g daily	HbA1c ↓1.2%, SBP ↓11.8 mmHg
Al-Ghamdi et al. 2021 [11]	RCT	Riyadh	87 adults with T2DM	Nigella sativa 1g daily	FBG ↓24.1 mg/dL, TC ↓18.7 mg/dL
Heshmati et al. 2021 [12]	RCT	Multi-center	102 adults with T2DM	Nigella sativa oil 2.5mL daily	HbA1c ↓0.71%, LDL ↓15.2 mg/dL
Al-Saud et al. 2021 [13]	Crossover RCT	Jeddah	48 healthy adults	Saudi honey vs glucose	PPG ↓34.2 mg/dL at 2h
Al-Waili et al. 2021 [14]	Cohort study	Riyadh	134 diabetic patients	Honey for wound healing	56.6% improved healing rates
Thabit et al. 2020 [16]	Systematic review	National	24 studies	Tibb al-Nabawi practices	32 medicinal plants identified
Al-Harbi et al. 2020 [17]	Quasi-experimental	Makkah	67 hypertensive adults	Cupping therapy (Hijamah)	SBP ↓8.4 mmHg, DBP ↓5.2 mmHg
Alsanad et al. 2020 [20]	Cross-sectional	Western region	426 adults	TCM usage survey	87.3% satisfaction rate
NCCAM 2019 [23]	Implementation	Jeddah, Medina	2 pilot clinics	Integrated cupping therapy	>85% patient satisfaction
Al-Rowais et al. 2019 [24]	Cross-sectional	Riyadh	156 physicians	CAM knowledge survey	39% poor knowledge
Al-Bedah et al. 2019 [25]	Cross-sectional	Multi-center	287 healthcare providers	Provider attitudes to CAM	Mean attitude score 4.01/5.0
Elolemy & AlBedah 2018 ^[21]^	Validation study	Multi-center	84 adults	TAIM model validation	Cultural alignment 4.2/5.0
Alhazmi et al. 2018 [26]	Cross-sectional	Riyadh	523 healthcare students	CAM awareness survey	60% knowledge gaps identified
Zaccara et al. 2018 [18]	Safety review	Multi-center	29 herbal products	Herb safety assessment	15 herbs with drug interactions

Abbreviations: RCT = Randomized Controlled Trial; T2DM = Type 2 Diabetes Mellitus; TCM = Traditional and Complementary Medicine; CAM = Complementary and Alternative Medicine; TAIM = Traditional Arabic & Islamic Medicine; HbA1c = Hemoglobin A1c; FBG = Fasting Blood Glucose; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; PPG = Postprandial Glucose; TC = Total Cholesterol; LDL = Low-Density Lipoprotein; NCCAM = National Center for Complementary and Alternative Medicine.

Honey-Based Interventions

Three investigations assessed the impact of honey on metabolic parameters.[13-15] A crossover RCT involving Jeddah participants (n=48), which compared Saudi honey against glucose control, yielded mixed glycemic results—honey produced lower postprandial glucose spikes in non-diabetic individuals (mean difference -34.2 mg/dL at two hours; p=0.012), though caution was advised for diabetic patients.[13]

Wound healing assessments demonstrated favorable outcomes where approximately 56.6% of diabetic patients utilizing honey for foot ulcer treatment reported improved healing rates (OR = 2.34; 95% CI: 1.45-3.78; p=0.001).[14]

Other Traditional Medicine Interventions

A systematic review focusing on Tibb al-Nabawi practices identified a total of 32 medicinal plants referenced in Islamic texts; clinical evidence exists for only eight species.[16] Notably, among the primary research findings comprising twenty-four studies, only two high-quality RCTs were identified, uncovering significant evidence gaps.

Cupping therapy (Hijamah) provided promising results within a quasi-experimental study involving hypertensive patients (n=67), reporting an average systolic blood pressure decrease of 8.4 mmHg (95% CI: -12.7 to -4.1; p=0.001) following an eight-week period.[17]

Safety Outcomes

The safety analysis across various studies generally indicated favorable profiles for most traditional interventions evaluated therein. Nigella sativa trials reported no serious adverse events aside from mild gastrointestinal symptoms experienced by approximately 3.2% of participants.[9-12] A comprehensive safety review cataloged thirty herbal products raising safety concerns within Middle Eastern populations, including risks linked to hepatotoxicity associated with specific preparations.[18]

An analysis concerning herb-drug interactions pointed out potential issues with fifteen commonly utilized herbs that could particularly influence warfarin metabolism alongside diabetes medications and antihypertensive agents.[19] However, no severe interactions were documented within supervised clinical environments where appropriate monitoring occurred.

Patient Satisfaction and Cultural Appropriateness

Patient satisfaction assessments using the Integrative Medicine Patient Satisfaction Scale (IMPSS) showed high satisfaction rates across studies. A cross-sectional survey (n=426) in Western Saudi Arabia reported overall TCM satisfaction of 87.3% (95% CI: 84.1-90.5%).[20]

The Traditional Arabic & Islamic Medicine (TAIM) validation study (n=84) demonstrated strong cultural appropriateness scores across Arabic-speaking populations, with mean scores of 4.2/5.0 for cultural alignment and 4.4/5.0 for religious compatibility.[21]

Most preferred TCM modalities included cupping (Hijamah) at 45.4%, herbal medicine at 42.3%, and spiritual healing at 20.4%. Cultural integration factors showed deep alignment with Islamic healthcare principles, though 93.8% of patients reported that healthcare providers didn't understand their religious/cultural needs.[22]

Implementation Outcomes

Regulatory Framework Development

The National Center for Complementary and Alternative Medicine (NCCAM) has instituted extensive regulations governing the licensing of five complementary practices: cupping therapy, acupuncture, osteopathy, chiropractic, and naturopathy.[7] To obtain a license, practitioners must complete training programs recognized by NCCAM, pass relevant examinations, and engage in ongoing professional

development. Two pilot integrated clinics established within government hospitals in Jeddah and Medina between 2018 and 2019 demonstrated the feasibility of integrating TCM, achieving high levels of patient satisfaction without any reported safety incidents.[23] Nevertheless, such integration is currently confined to small-scale pilot initiatives rather than being incorporated into a comprehensive healthcare system.

Healthcare Provider Perspectives

Assessments of provider knowledge revealed significant deficiencies; 39% of primary care physicians indicated they had inadequate knowledge regarding CAM, while 78.4% acknowledged limited understanding of the safety profiles associated with traditional medicine.[24,25]

Despite these gaps in knowledge, providers generally maintained positive attitudes towards CAM when clinical benefits were benefits were evidenced, reflected in an average score of 4.01 out of 5.0.

Key barriers to implementation included knowledge deficits (60%), concerns about potential herb-drug interactions (45%), the absence of standardized guidelines (38%), and time limitations (32%). Conversely, facilitators encompassed governmental support through Vision 2030 (78%), considerable patient demand (72%), and cultural acknowledgment (68%).[26]

Economic Outcomes

Economic analyses highlighted substantial growth within the CAM market in the Middle East, which reached USD 12.26 billion in 2023 and is projected to experience a compound annual growth rate of 22.77% through to 2030[27]; Saudi Arabia holds the largest share in this regional market, with CAM usage among the population at 51.5%. Cost-effectiveness analyses employing Saudi-specific thresholds ranging from SAR 50,000 to SAR 75,000 per Quality-Adjusted Life Year (QALY) indicated potential economic advantages associated with integrated approaches; however, comprehensive economic evaluations remain scarce.[28] Out-of-pocket expenditures for traditional medicine constitute an average of 14.4% of total health expenditures among users.[29]

Certainty of Evidence Assessment

GRADE assessments indicated low to moderate certainty across primary outcomes as detailed in **Table 2**. The evidence supporting the clinical effectiveness of Nigella sativa was rated with moderate certainty due to consistent findings across various RCTs, albeit limited by small sample sizes. Safety evidence was evaluated at low certainty owing to short follow-up durations and insufficient reporting on adverse events. Evidence concerning patient satisfaction achieved moderate certainty based on consistent results across diverse demographic populations. Conversely, implementation evidence received a low certainty rating due to restricted long-term follow-up data and reliance on small-scale pilot programs.

Table 2: GRADE Evidence Summary

Outcome	Studies	Participants	Effect Estimate	Certainty	Rationale
HbA1c reduction (Nigella sativa)	4 RCTs	322	MD -0.97% (-1.23 to -0.71)	Moderate	Consistent effects, small samples
Blood pressure reduction	3 RCTs	255	MD -9.8 mmHg (-13.2 to -6.4)	Low	Inconsistent populations
Safety outcomes	6 studies	468	OR 0.87 (0.45-1.68)	Low	Limited follow-up
Patient satisfaction	4 studies	612	87.3% (84.1-90.5%)	Moderate	Consistent findings
Implementation feasibility	2 studies	2 clinics	Pilot success	Low	Limited scale

Abbreviations: MD = Mean Difference; OR = Odds Ratio; CI = Confidence Interval; RCT = Randomized Controlled Trial; HbA1c = Hemoglobin A1c; mmHg = millimeters of mercury; GRADE = Grading of Recommendations Assessment

DISCUSSION

Clinical Effectiveness Reveals Promising Yet Limited Evidence

This systematic review indicates a positive outlook regarding the clinical effectiveness of certain traditional medicine interventions in preventing chronic diseases, notably highlighting Nigella sativa's role in reducing diabetes and cardiovascular risk. Consistent results from various randomized controlled trials demonstrate reductions in HbA1c levels ranging from 0.8% to 1.2%, as well as blood pressure decreases between 8 to 12 mmHg, nearing the clinical significance thresholds outlined by international guidelines for diabetes and hypertension.[30,31]

Nevertheless, the current evidence remains limited due to small sample sizes, brief follow-up durations, and a lack of diversity among the traditional medicine interventions examined. The discovery of only two high-quality RCTs among twenty-four Tibb al-Nabawi studies underscores an urgent need for more robust research methodologies within traditional medicine investigations. Additionally, the mixed results associated with honey interventions highlight the necessity for standardized preparation techniques and suitable patient selection criteria when integrating traditional medicine into healthcare practices.

Safety Profiles Necessitate Enhanced Monitoring and Documentation

The generally favorable safety profiles observed across studies provide reassurance for the supervised incorporation of traditional medicine into preventive healthcare frameworks. The lack of severe adverse events reported in Nigella sativa trials, along with positive safety outcomes related to cupping therapy studies, supports its safe integration, given that appropriate protocols are adhered to.

However, potential herb-drug interactions involving fifteen commonly utilized herbs and concerns regarding hepatotoxicity with specific formulations emphasize the importance of establishing comprehensive safety monitoring protocols. The disparity between widespread usage of traditional medicine (reported by 75% of the population) and inadequate adverse event reporting suggests possible underreporting of safety issues, especially in unsupervised environments.

Cultural Appropriateness Lays Strong Groundwork for Integration

High levels of patient satisfaction (87.3%) and considerable cultural alignment scores (4.2/5.0) indicate that integrating traditional medicine effectively meets essential cultural and religious needs within Saudi Arabian healthcare settings. This alignment with Islamic health principles—favoring natural remedies and holistic approaches—provides a solid foundation for culturally competent healthcare delivery.

Moreover, it was found that 93.8% of patients believe healthcare providers do not fully understand their religious or cultural needs, representing a significant opportunity for enhancing patient-provider relationships and overall healthcare satisfaction through integration efforts. The preferences shown for cupping therapy (45.4%) and herbal medicine (42.3%) align with practices endorsed by NCCAM, indicating congruence between regulatory frameworks and patient inclinations.

Implementation Challenges Demand Systematic Solutions

Despite regulatory framework advancements leading to only two pilot clinics being established, notable implementation barriers persist that require systematic intervention. Knowledge gaps among providers, 39% reporting inadequate familiarity with CAM, constitute a primary obstacle necessitating extensive educational programs integrated into medical training curricula as well as ongoing education requirements.

The success demonstrated by pilot integrated clinics within government hospitals showcases feasibility when appropriate support structures are present; however, expanding beyond these pilots requires addressing systemic challenges such as developing standardized practice guidelines, implementing quality assurance protocols, and ensuring integration with electronic health record systems.

Economic Potential Justifies Strategic Investment

The significant market expansion projected (USD 12.26 billion regional market experiencing an annual growth rate of 22.77%) signals considerable economic potential tied to systematic integration of traditional medicine practices. Its compatibility with Saudi Arabia's cost-effectiveness benchmarks (SAR 50,000-75,000 per Quality Adjusted Life Year) suggests prospective economic advantages; however, thorough economic evaluations remain critically necessary.

The notable out-of-pocket expenses incurred by patients (14.4% of total health expenditure) on traditional medicine underscore a substantial investment that could be optimized through systematic integration alongside insurance coverage for evidence-based practices. Leveraging integration as a means to lower overall healthcare costs via prevention-focused strategies aligns well with Vision 2030's objectives regarding healthcare transformation.

Research Priorities for Evidence-Based Integration

This systematic review identifies several pivotal research priorities: large-scale multi-center randomized controlled trials featuring minimum follow-up periods of twelve months are crucial for validating clinical effectiveness across varied Saudi populations; consistent application of standardized outcome measures, including biomarkers (HbA1c levels, blood pressure readings), BMI assessments, lipid profiles, and patient-reported outcomes, is essential across all studies conducted.

Economic evaluation research represents one critical gap requiring comprehensive analyses comparing integrated versus conventional preventive care methods; budget impact assessments, along with return on investment evaluations concerning NCCAM programs, are vital components supporting policy decisions and resource allocation.

Further implementation science research focusing on provider education strategies alongside organizational change management will be instrumental in guiding systematic scaling beyond initial pilot projects; employing mixed-methods approaches that consider perspectives from patients, providers, and health systems will help inform culturally relevant integration strategies.

Study Limitations

Several limitations merit attention: the limited number of high-quality randomized controlled trials constrains the strength behind conclusions drawn regarding clinical effectiveness; geographic concentration primarily within urban centers may impact generalizability concerning rural healthcare environments; furthermore, the dominance of single-center studies restricts external validity across diverse Saudi Arabian contexts.

While findings may not readily transfer to different healthcare systems due to specific cultural regulations inherent in Saudi Arabia's context, there could be relevance found within other Gulf Cooperation Council countries sharing similar cultural backgrounds.

CONCLUSION

This systematic review illustrates significant potential for integrating traditional and complementary medicines into preventive healthcare in Saudi Arabia based on promising clinical effectiveness data alongside high patient satisfaction rates rooted in cultural appropriateness, supported by existing regulatory frameworks established by NCCAM. Evidence showing moderate-quality results from Nigella sativa concerning diabetes prevention, coupled with successful pilot program integrations, provides proof-of-concept justifying systematic approaches toward this integration. To achieve this potential fully requires addressing critical evidence gaps through extensive randomized controlled trials complemented by thorough economic evaluations alongside structured provider education initiatives. With an established NCCAM regulatory framework already laid down, the groundwork exists for

evidence-driven expansion, positioning Saudi Arabia favorably as a prospective regional leader in culturally competent integrated healthcare delivery.

Key recommendations include: (1) investment in multi-center randomized controlled trials with standardized outcome measures and minimum 12-month follow-up; (2) comprehensive economic evaluation research including cost-effectiveness and budget impact analyses; (3) systematic provider education programs integrated into medical training curricula; (4) expansion of pilot integration programs with rigorous evaluation protocols; and (5) development of standardized practice guidelines for safe traditional medicine integration in preventive healthcare settings.

The alignment of traditional medicine integration with Vision 2030 healthcare transformation objectives and the substantial patient demand creates a strategic opportunity for Saudi Arabia to develop innovative, culturally competent healthcare delivery models that may serve as examples for other regions with similar cultural contexts.

Conflict of Interest

The authors declare no conflicts of interest relevant to this article.

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