

REVIEW ARTICLE

The Impact of Complementary Therapy on Diabetes Mellitus Patients: A Review

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ABSTRACT

The global rise in Diabetes Mellitus, expected to reach 700 million by 2045, brings challenges such as poor adherence and side effects. Complementary therapy offers supportive benefits, but further research is needed to confirm its effectiveness. This study analyzes complementary therapy effects on Diabetes Mellitus through meta-analysis. Article searches followed PICO criteria using PubMed, Google Scholar, and Science Direct. Keywords included "Complementary Therapy," "Blood Sugar Reduction," "Diabetes Mellitus," "Healthcare," and "Cross-sectional Study." Inclusion criteria comprised full-text, cross-sectional studies utilizing adjusted odds ratios (aOR), published between 2015 and 2024. Articles were analyzed with PRISMA and RevMan 5.3. A meta-analysis of nine studies from countries like Jamaica, the USA, Bangladesh, and others revealed complementary therapy significantly improved blood sugar control (aOR = 3.40; 95% CI = 1.76–6.57; $p < 0.001$). Complementary therapy benefits Diabetes Mellitus patients, but further research is needed to confirm its long-term effectiveness and safety.

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INTRODUCTION

Diabetes Mellitus is one of the most common chronic diseases in the world, with a prevalence that continues to increase significantly (1). According to the International Diabetes Federation (IDF), the global number of diabetes patients was estimated at 463 million in 2019 and is projected to rise to 700 million by 2045. This situation demands a comprehensive management approach to prevent serious complications such as heart disease, kidney failure, and limb amputations (2). The rising prevalence of diabetes mellitus each year requires timely management, not only with drug therapy but also by combining it with complementary therapy to help control blood sugar levels in individuals with diabetes mellitus.

Management of Diabetes Mellitus typically includes lifestyle changes like a balanced diet, regular physical activity, and blood sugar-lowering medications. However, many patients face challenges in achieving optimal

blood sugar control, often due to difficulties in adhering to therapy, medication side effects, and psychosocial factors such as stress and anxiety (3). In recent years, complementary therapy has gained attention as an additional approach to assist in blood sugar control for Diabetes Mellitus patients (4). Complementary therapy includes various non-conventional interventions, such as acupuncture, yoga, meditation, physiotherapy, and massage therapy, often used alongside standard medical treatment (5). This therapy is believed to help in blood sugar control through various mechanisms, including increased insulin sensitivity, reduction of oxidative stress, and improvement of patients' psychological well-being (6).

Various studies indicate that complementary therapy has the potential to lower blood sugar levels in Diabetes Mellitus patients (7). For instance, research on acupuncture shows a decrease in HbA1c levels and fasting blood sugar in patients receiving this therapy (8). Similarly, yoga and meditation are known to reduce cortisol levels, a stress hormone that contributes to elevated blood sugar levels (5). However, despite the promising preliminary evidence, further research is needed to confirm the effectiveness of these therapies and determine how complementary therapy can be

optimally integrated into Diabetes Mellitus management (9).

This research is necessary due to the increasing global prevalence of Diabetes Mellitus (DM), which poses a risk of serious complications. The management of DM that relies on medication often faces challenges such as non-adherence, side effects, and psychological factors. Complementary therapies such as acupuncture, yoga, and meditation have begun to be used as additional approaches to help control blood sugar levels (10). Although initial results are promising, further research is needed to confirm the effectiveness and optimal integration of these therapies in DM management. Complementary therapy is a supportive treatment used alongside conventional medicine and can be integrated into the management of various diseases, including Diabetes Mellitus (11). Complementary nursing therapy is performed to stabilize blood sugar levels and prevent complications arising from Diabetes Mellitus. Therefore, the aim of this research review is to assess the influence of complementary therapy on patients with Diabetes Mellitus.

METHODOLOGY

Study Design

This study employs a meta-analysis following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines across all review stages. The article search was conducted based on the eligibility criteria of the PICO Model (Participants, Intervention, Comparison, Outcomes), with P: patients with Diabetes Mellitus, I: Complementary Therapy, C: no complementary therapy, and O: reduction in blood sugar levels. The databases utilized include PubMed, Google Scholar, and ScienceDirect, focusing on articles published between 2015 and 2024. The keywords used for the search were "Complementary Therapy" AND "Blood Sugar Levels" AND "Diabetes Mellitus" AND "Healthcare" AND "Cross-sectional Study."

Steps of Meta-Analysis

The meta-analysis followed five stages:

- 1. Formulating the research question using the PICO format (Population, Intervention, Comparison, Outcome).
- 2. Identifying primary studies from electronic and non-electronic databases like PubMed, Science Direct, and Google Scholar.
- 3. Screening articles to apply inclusion and exclusion criteria, followed by a critical journal assessment.
- 4. Extracting data from primary studies and synthesizing effect estimates using RevMan software.
- 5. Interpreting the results and drawing conclusions.

Inclusion and Exclusion Criteria

The inclusion criteria consist of full-text articles using cross-sectional studies with Diabetes Mellitus patients

as subjects. The measure of association is the Adjusted Odds Ratio (aOR), and the research outcomes focus on factors influencing complementary therapy in diabetic patients. The exclusion criteria include studies that report statistical results only through bivariate analysis and articles published in languages other than English.

Operational Definitions of Variables

Complementary Therapy: Complementary therapy refers to non-conventional interventions used in conjunction with conventional medical treatments. This therapy aims to complement primary treatment, enhance quality of life, alleviate symptoms, and support holistic healing processes (12). Examples include acupuncture, yoga, meditation, therapeutic massage, and the use of herbal supplements.

Blood Sugar Levels: Blood sugar levels refer to the amount of glucose present in the blood (13). Glucose is the primary energy source for the body's cells, and blood sugar levels are influenced by food intake, insulin production, and the body's ability to utilize glucose (14). Measuring blood sugar levels is essential for diagnosing and managing conditions such as Diabetes Mellitus (14). Normally, blood sugar levels are tightly regulated by the body; however, in patients with diabetes, the body's ability to control glucose levels is often impaired.

Patients with Diabetes Mellitus: Diabetes Mellitus is a chronic condition marked by high blood sugar (glucose) levels caused by disruptions in insulin production or function, which regulates blood glucose (15). Patients with Diabetes Mellitus require long-term care that includes monitoring blood glucose levels, managing diet, engaging in physical activity, and often using medications or insulin (16).

Learning Instruments

The assessment of quality in this study employs a checklist related to the critical appraisal of cross-sectional studies, as published by the Centre for Evidence-Based Medicine (CEBM).

Data Analysis

The articles included in this research were collected following the PRISMA flowchart stages and analyzed using Review Manager 5.3 software. The analysis calculated the effect size and the heterogeneity consistency value (I²) based on the research results.

RESULTS

The article research in this study utilized databases including PubMed, Google Scholar, and Science Direct. The keywords used were: "Complementary Therapy" AND "Blood Glucose Reduction" AND "Diabetes Mellitus" AND "Healthcare Services" AND "Cross-sectional study". The review process of the relevant articles is shown in the PRISMA flow diagram in Figure

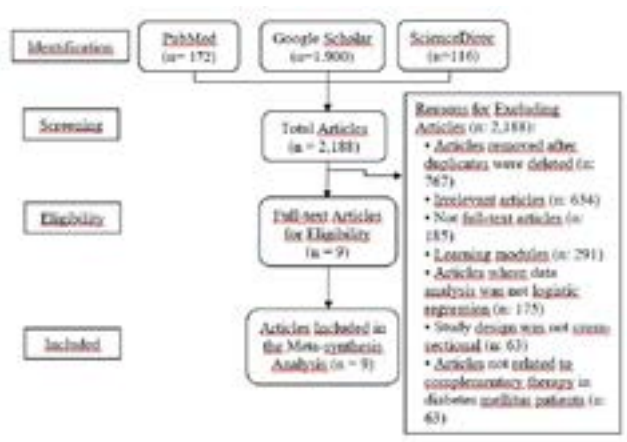


Figure 1: PRISMA flow diagram

1. The research on the impact of complementary therapy on diabetes mellitus patients included 9 articles. The initial search yielded 2,188 articles, but after thorough screening based on the criteria, only 9 were eligible for the qualitative synthesis using meta-analysis.

The articles used in the systematic analysis and meta-analysis come from studies conducted across three continents: North America [3 articles: 2 from Jamaica (17,18), 1 from the United States (19)], Asia [5 articles: 1 from Bangladesh (20), 2 from Pakistan (21,22), 1 from the United Arab Emirates (23), 1 from Lebanon (24)], and Africa [1 article from Ethiopia (25)].

The research questions were evaluated based on several methodological criteria. First, the alignment between the study objective and the research focus was assessed. The suitability of the cross-sectional study design in answering the research question was also considered. In addition, the clarity of the subject selection process, the appropriateness of the sampling method, and the extent to which the sample represented the target population were evaluated. The assessment also considered whether the sample size was justified based on pre-study considerations and whether the response rate was adequate. Furthermore, the validity and reliability of the

instruments used to assess complementary therapy in diabetes were examined. The evaluation also included whether statistical significance was assessed, whether confidence intervals were provided, and whether potential confounding factors such as gender and age were considered. Finally, the relevance of the study results to the current research was reviewed. Each criterion was scored using a three-point scale, where 0 indicated “No,” 1 indicated “Uncertain,” and 2 indicated “Yes.”

Table 1 presents the quality assessment and characteristics of the cross-sectional studies included in the meta-analysis. A total of nine articles were assessed and included to examine the impact of complementary therapy among patients with diabetes mellitus. The included studies were conducted in various countries, including Jamaica, Bangladesh, Pakistan, Ethiopia, the United States, the United Arab Emirates, and Lebanon. Overall, the studies shared a common focus on the use or effect of complementary therapy in patients with diabetes mellitus. The articles were extracted and summarized based on the PICO framework, in which the population consisted of patients with diabetes mellitus, the intervention was complementary therapy, and the study design was cross-sectional. The sample sizes varied across the included studies, ranging from 244 to 422 participants.

Based on Table II, the effect size estimates (odds ratios) from all primary studies in the meta-analysis display the lower and upper limit values. These values are processed using Review Manager 5.3 software to generate a forest plot, enabling conclusions on the impact of complementary therapy on diabetes mellitus patients.

The forest plot and funnel plot in Figure 2. shows that complementary therapy positively impacts diabetes mellitus patients, with an Adjusted Odds Ratio (aOR) of 3.40 (CI 95% = 1.76 to 6.57; p < 0.001). These results are statistically significant. The funnel plot shows an uneven distribution of effect estimates across studies, with a

Table 1. Results of the Quality Assessment of Case-Control Studies

Primary Study	Question Criteria												Total	Country	Sample
	1	2	3	4	5	6	7	8	9	10	11	12			
Kwak at al. 2021 (30)	2	2	2	2	2	2	2	2	2	1	2	2	23	Jamaica	288
Owusu et al. 2020 (18)	2	2	2	2	2	2	2	2	2	2	2	2	24	Jamaica	345
Rafi et al.2020 (20)	2	2	2	2	2	2	2	2	2	2	2	2	24	Bangladesh	244
Kafle 2021 (21)	2	2	2	2	2	2	2	2	2	2	2	2	24	Pakistan	400
Raja et al. 2019 (22)	2	2	2	2	2	2	2	2	2	2	2	2	24	Pakistan	261
Jawed et al. 2019 (25)	2	2	2	2	2	2	2	2	2	2	2	2	24	Ethiopia	422
Handley et al. 2017 (19)	2	2	2	2	2	2	2	2	2	2	2	2	24	United States of America	278
Radwan et al 2020 (23)	2	2	2	2	2	2	1	2	2	2	2	2	23	United Arab Emirates	244
Naja et al.2017(24)	2	2	2	2	2	2	2	2	2	2	2	2	24	Lebanon	333

Table II. Estimation of Effects Meta-Analysis

Author (year)	Or	95% CI	
		Lower Limit	Upper Limit
Kwak at al. 2021 (30)	7.17	3.54	14.51
Owusu et al. 2020 (18)	7.19	1.34	38.52
Rafi et al.2020 (20)	2.25	1.14	4.44
Kafle 2021 (21)	1.802	1.13	2.87
Raja et al. 2019 (22)	35.76	16.79	76.15
Jawed et al. 2019 (25)	2.53	1.27	2.75
Handley et al. 2017 (19)	1.78	0.7	4.52
Radwan et al 2020 (23)	2.33	1.21	4.47
Naja et al.2017(24)	1.25	1.10	1.38

clear imbalance on both sides of the vertical average estimate line. The upper plot suggests publication bias (overestimation). Six plots on the left have standard errors between 0 and 0.5, while three plots on the right have standard errors between 0 and 0.8.

DISCUSSION

Complementary therapy is a non-conventional approach used alongside conventional medical treatment to enhance the health of diabetes mellitus patients. Research from 9 articles in North America, Asia, and Africa shows that complementary therapy has a positive impact, with an effect 3.40 times better compared to those without complementary therapy (aOR = 3.40; 95% CI = 1.76–6.57; p<0.001). The data indicates high heterogeneity with I² = 95% (random effects model). Managing diabetes mellitus requires serious attention to controlling blood sugar levels (17). In addition to appropriate medication, diabetes patients also need complementary therapy as an adjunct to help manage blood sugar levels (26). Thus, patients with diabetes mellitus can better control their blood sugar increases (27).

The use of complementary therapy among diabetes patients is notably high in controlling blood sugar levels,

which aligns with the data analyzed by researchers (28). Factors significantly associated with the use of this therapy include being female, elderly, having a lower educational level, unemployment status, longer duration of diabetes, diabetes-related complications, and poor glycemic control (2). Many people in Pakistan believe that complementary therapy has fewer side effects compared to conventional medications and can assist in managing their diabetes (25) . Therefore, the implementation of complementary therapy in diabetes mellitus patients is crucial as an adjunct in controlling blood sugar levels (22).

Other research indicates that complementary therapy has a significant and safe impact for use, making it a primary need in controlling blood sugar levels among diabetes mellitus patients (29). A study in Jamaica also states that there is a high interest in integrating complementary therapy into the healthcare system, and this therapy provides substantial benefits for individuals with diabetes mellitus (30). Various studies have shown that complementary therapy is highly effective for individuals with diabetes mellitus when applied in daily life, as it can help reduce blood glucose levels (31). Complementary therapies may include a range of practices such as herbal medicine, acupuncture, yoga, massage, and meditation, all of which have been proven to support both the physical and psychological well-being of diabetes patients (32).

In addition, complementary therapy can also help provide a relaxing effect for patients with diabetes mellitus, which aligns with research findings indicating that complementary therapy has a positive impact on individuals with diabetes (33). Thus, this therapy not only helps control physiological symptoms but also contributes to the overall quality of life for individuals living with diabetes, reinforcing the evidence that complementary therapy has a beneficial effect on people with diabetes mellitus.

Based on the findings of this meta-analysis, future

research should focus on randomized controlled trials (RCTs) with stronger methodological designs and adequate sample sizes. This is important to assess the specific effectiveness of various types of complementary therapies, such as herbal medicine, acupuncture, yoga, massage, and meditation, in helping to control blood glucose levels in patients with diabetes mellitus. In addition, studies need to consider variables that may influence the success of therapy, such as age, gender, education level, employment status, and medical history. The use of standardized and consistent measurement methods is essential to improve the overall validity and reliability of the research findings.

Long-term studies are also needed to evaluate the impact of complementary therapies on glycemic control, complication prevention, and improvements in the quality of life of diabetes patients. Research involving populations from diverse social backgrounds and geographic regions will help generate findings that are more representative and broadly generalizable. Moreover, integrating qualitative data from patients' experiences will provide deeper insights into perceptions, motivations, and barriers in the use of complementary therapies. Therefore, future research is expected to provide a strong foundation for the development of nursing practices, clinical interventions, and health service policies that are evidence-based and aligned with the holistic needs of patients.

CONCLUSION

The meta-analysis involving nine cross-sectional studies shows that complementary therapy has a significant positive impact on individuals with Diabetes Mellitus. Complementary therapy has been proven effective in helping manage diabetes symptoms, improving blood glucose control, and enhancing patients' quality of life.

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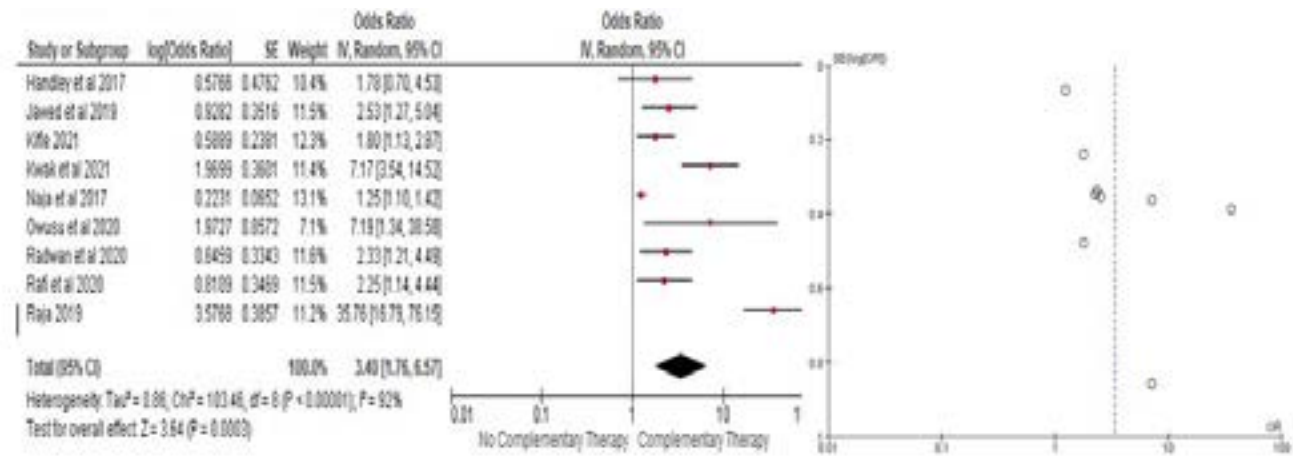


Figure 2: Forest plot and funnel plot

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