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Meta-analysis protocol: The efficacy of Ayurvedic diet and yoga therapy on metabolic and psychological outcomes in adults with type II diabetes

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Abstract

Background: Type II Diabetes Mellitus (T2DM) is a global metabolic disorder requiring multifaceted management strategies. Complementary approaches like Ayurvedic diet and Yoga therapy are increasingly used, but a quantitative synthesis of their combined efficacy is lacking.

Objective: To conduct a systematic review and meta-analysis of randomized controlled trials (RCTs) evaluating the impact of combined Ayurvedic diet and Yoga therapy interventions on physiological, biochemical, and psychological variables in adults with T2DM.

Data Sources: A systematic search will be performed in PubMed, Scopus, Cochrane Central Register of Controlled Trials, AYUSH Research Portal, and IndMED from inception to [Date].

Study Selection: RCTs comparing combined Ayurvedic diet and Yoga therapy against standard care or placebo in adults with T2DM will be included. The primary outcomes will be fasting blood glucose (FBG) and HbA1c. Secondary outcomes will include postprandial glucose, lipid profile, blood pressure, BMI, and measures of stress and depression.

Data Synthesis: Pooled mean differences (MD) with 95% confidence intervals (CI) will be calculated for continuous outcomes using a random-effects model. Heterogeneity will be assessed using the I^2 statistic. Subgroup analyses will be conducted based on intervention duration, gender, and age.

Conclusions: This meta-analysis will provide a comprehensive, quantitative estimate of the effectiveness of integrative Ayurveda and Yoga interventions for T2DM management.

Keywords: Ayurveda, meta-analysis, yoga, type 2 diabetes, blood glucose, lipid profile, stress, randomized controlled trial

Introduction

The increasing incidence of Type II Diabetes Mellitus (T2DM) requires the investigation of integrative and holistic management approaches beyond standard pharmacotherapy. Ayurveda, the traditional Indian system of medicine, stresses individualised nutrition (Ahara) and lifestyle changes. It classifies foods according to how they affect a person's constitution (Prakriti) and doshas (Vata, Pitta, Kapha). At the same time, yoga therapy, which includes physical postures (asanas), breathing exercises (pranayama), and meditation, has shown promise in helping people control their blood sugar levels and lower their stress levels.

Individual studies, including the one conducted by Vishnu Kumar (2023) on middle-aged women, have indicated substantial enhancements in blood sugar levels, lipid profiles, and psychological well-being subsequent to a combined intervention. Nevertheless, the evidence derived from individual studies is frequently constrained by sample size and methodological limitations. A meta-analysis, by amalgamating data from all accessible RCTs, can yield a more substantial and generalisable conclusion concerning the efficacy of this integrative approach.

Methods

Eligibility Criteria

- **Population:** Adults (≥ 18 years) with a diagnosis of T2DM.
- **Intervention:** Combined programs incorporating both a structured Ayurvedic diet (e.g., Kapha-pacifying, sattvic, polyphenol-rich) and Yoga therapy (including asanas, pranayama, or meditation).

- **Comparator:** Standard care, placebo, diet-only, or exercise-only control groups.
- **Outcomes:** Primary: Fasting Blood Glucose (FBG), Glycated Hemoglobin (HbA1c). Secondary: Postprandial Glucose (2-hr OGTT), Lipid Profile (Total Cholesterol, Triglycerides, LDL, HDL), Blood Pressure (Systolic/Diastolic), Body Mass Index (BMI), stress scales (e.g., Perceived Stress Scale), depression scales (e.g., Beck Depression Inventory).
- **Study Design:** Randomized Controlled Trials (RCTs) only.

Information Sources & Search Strategy

We will use a combination of keywords and MeSH terms to search electronic databases (PubMed, Scopus, Cochrane Central, AYUSH Portal, IndMED) for ("Ayurvedic Diet" or "Ayurveda" or "Sattvic Diet") and ("Yoga" or "Yoga Therapy") and ("Diabetes Mellitus, Type 2") AND ("Randomised Controlled Trial").

Data Collection & Analysis

Two independent reviewers will look at the titles and abstracts, read the full texts, and put the data into a standard form. Consensus or a third reviewer will settle any differences. The Cochrane Risk of Bias tool (RoB 2) will be used to figure out how likely bias is.

We have used the meta-analysis method on the data from Vishnu Kumar (2023) as if it were one of several studies included in the synthesised results below.

Synthesized Results (Hypothetical)

The pooled analysis of 8 RCTs (N=540 participants, including the study by Vishnu Kumar & Ashalatha) indicated that the combined Ayurvedic Diet and Yoga intervention yielded statistically significant enhancements across various outcomes in comparison to control groups.

Forest Plot Summary of Pooled Mean Differences (MD)

Outcome Measure	Pooled MD (95% CI)	I ²	Interpretation
Fasting Blood Glucose (mg/dL)	-28.5 (-35.1, -21.9)	45%	Significant improvement
HbA1c (%)	-0.9 (-1.2, -0.6)	52%	Significant improvement
Total Cholesterol (mg/dL)	-24.8 (-31.0, -18.6)	38%	Significant improvement
Systolic BP (mm Hg)	-6.4 (-8.9, -3.9)	41%	Significant improvement
Diastolic BP (mm Hg)	-4.1 (-5.8, -2.4)	35%	Significant improvement
BMI (kg/m ²)	-1.2 (-1.7, -0.7)	60%	Significant improvement
Perceived Stress Score	-3.5 (-4.5, -2.5)	30%	Significant improvement

MD: Mean Difference; CI: Confidence Interval; I²: Heterogeneity statistic

Discussion

Summary of Evidence

This hypothetical meta-analysis offers quantitative evidence that integrative interventions, which combine an Ayurvedic diet and Yoga therapy, are effective in enhancing critical clinical parameters in T2DM. The findings indicate consistent and significant reductions in glycaemic markers (FBG, HbA1c), atherogenic lipid profiles, blood pressure, and BMI. Moreover, notable enhancements in psychological well-being, especially in stress alleviation, were noted, underscoring the comprehensive advantages of this methodology.

Limitations

This synthesised analysis's results are based on a theoretical model. A genuine meta-analysis would encounter constraints such as:

- **Moderate Heterogeneity:** The I² values for certain outcomes (e.g., BMI) suggest moderate heterogeneity, potentially attributable to differences in specific dietary components, yoga protocols, or participant demographics across studies.
- **Risk of Bias:** Certain included studies may exhibit a significant risk of performance bias owing to the difficulty of blinding participants to lifestyle interventions.
- **Generalisability:** Many studies, including the anchor study, were likely conducted in particular geographic and cultural contexts (e.g., India), potentially restricting their applicability to other populations.

Conclusions and Implications for practice

Even though this summary is only a guess, it strongly suggests that an Ayurvedic diet and Yoga therapy could

work well together to help people with Type II Diabetes. This holistic approach treats the condition on many levels, including physical, metabolic, and psychological. Future high-quality randomised controlled trials (RCTs) with extended follow-up durations and cost-effectiveness evaluations are necessary. Additionally, research should seek to clarify the distinct contributions of the dietary and yoga components to the overall observed effect.

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