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Review Article

Ayurveda Management of Diabetes Mellitus: A Comprehensive Evidence-Based Narrative Review

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Abstract

Diabetes mellitus (DM) remains a key worldwide health issue due to its rising prevalence, significant morbidity, high economic burden. Conventional medical approaches often struggle to achieve optimal control in many patients, leading to growing interest in complementary therapies such as Ayurveda. This narrative review explores the clinical evidence supporting Ayurveda management of Type 2 Diabetes mellitus and prediabetes. A comprehensive literature search spanning PubMed, AYUSH Research portal and Google scholar from 2015 to 2025 identified 16 clinical studies, including randomized controlled trials, pilot studies, and single case report. The interventions evaluated ranged from classical and polyherbal formulations, herbo-mineral compounds, and Panchakarma therapies to integrated lifestyle strategies incorporating yoga, therapeutic fasting, and Ayurvedic dietary protocols. Ayurvedic therapy consistently improved glycemic indices (HbA1c, FBS, PPBS), insulin resistance, lipid profiles, BMI, and quality of life. Notably, integrative treatments that combined Ayurveda with Western medicines, including Metformin, resulted with improved outcomes with fewer adverse events. Panchakarma therapies such as Vamana, Virechana, and Basti have also shown promise for correcting early diabetes conditions. The findings underscore Ayurveda's holistic, individualized framework as a possible supplement or alternative in diabetes treatment and management. However, additional large-scale, standardized trials are required to corroborate these findings and promote wider clinical implementation.

Keywords: Ayurveda, Diabetes mellitus, Glycemic control, Herbal medicine, Integrative medicine, Lifestyle intervention, Panchkarma, Yoga

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Introduction

Diabetes mellitus (DM) has emerged significant global health issue that impacts both individuals and society on a socioeconomic level. Despite enormous advancements in contemporary medical research, it remains one of the most and highest prevalent noncommunicable diseases in the world today (1).

Globally, the frequency of diabetes mellitus is startlingly rising. According to "the International diabetes Federation" (IDF) there will be 693 million people with diabetes globally by 2024, up from 451 million in 2017 (among those aged 18 to 99) (2). Unfortunately, 374 million people with impaired glucose tolerance are thought to develop full-blown diabetes year at a rate of 5 to 10% and approximately 50% of those suffering from diabetes is unaware of their condition (3-4). Diabetes is not only a growing public health concern but also a major contributor to disability and mortality. Recent statistics show that diabetes and related complications causes over five million fatalities a year, which makes up a sizeable makes up a sizeable amount of the world's mortality rate (5). Furthermore, the economic burden is staggering, with global expenditure on diabetes care exceeding USD 850 billion annually worldwide, which is significantly more than many countries healthcare budgets (6).

A substantial portion of diabetes-related disability arises from its complications like heart disease, renal failure, neurological disorders and retinopathy. According to the Global Burden Disease (GBD) research conducted in 2019, diabetes considerably increased Disability-Adjusted Life Years (DALYs), which represents the combined burden of years lived with a disability and years lost due to early mortality (7). The same study highlighted that Years Lived with Disability (YLDs) linked to diabetes have increased rapidly over the past two decades, largely due to rising prevalence and poor glycemic control in many populations (8). This trend underscores the need for improved preventive strategies and early diagnosis to reduce the impact of diabetes on global health (9).

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In this context, *Ayurvedic* medications have emerged as a complementary approach to diabetes management, especially in India, where they are widely utilised to treat and manage various illnesses and diseases, including diabetes mellitus. *Ayurvedic* interventions often emphasise individualised therapies, including herbal formulations, dietary regulations, and lifestyle modifications that align with evidence-based strategies for glycemic control. Despite their extensive use, the safety and efficacy of *Ayurvedic* treatments require further exploration through rigorous clinical research.

This narrative review aims to analyse the existing literature on various Ayurvedic approaches to diabetes mellitus, highlighting their potential role either as standalone therapies or in combination with contemporary Western treatments. By integrating traditional wisdom with modern medical strategies, this review underscores the potential of comprehensive, evidence-based interventions to improve diabetes outcomes and reduce its global burden.

Materials & Methods

A thorough literature search was conducted in three electronic databases (PubMed, AYUSH Research portal, and Google scholar) from January 2015 to January 2025. Clinical trials, pilot studies, and case report published in the English language were included. Preclinical studies, conceptual review, and unpublished manuscripts were excluded. The keywords used in PubMed were "Complementary and Alternative Medicine (CAM) and Diabetes", "*Ayurveda* and Diabetes", "*Panchakarma* and Diabetes", "*Prameha*," "*Panchakarma* AND Diabetes," "Herbal Medicine AND Diabetes"

Inclusion Criteria:

- Clinical trials (RCTs and pilot studies)
- Case reports
- Interventions with Ayurveda alone or integrated with complimentary treatment
- Studies with quantitative glycemic outcome measures (e.g., HbA1c, FBS, PPBS)

Exclusion Criteria:

- Preclinical or animal studies
- Conceptual papers and
- Reviews without clinical data

Search Results

A total of 65 articles were retrieved from PubMed, 17 from the AYUSH Research Portal, and 20 from Google Scholar. After removing duplicates, 42 records remained, from which 40 relevant articles (RCTs, case reports, lifestyle–diet integrations, and Panchakarma with *Shamana* therapies) were identified. The AYUSH Portal search used filters: Ayurveda → Clinical Research → Metabolic & Endocrinology → Diabetes, yielding 17 articles graded A–C. After screening titles, abstracts, and full-text availability, 16 studies were finally included, comprising eleven clinical trials and one pilot study. Study selection is shown in the PRISMA flowchart (Figure 01), with detailed characteristics in Table 01.

Figure 01: PRISMA flow chart

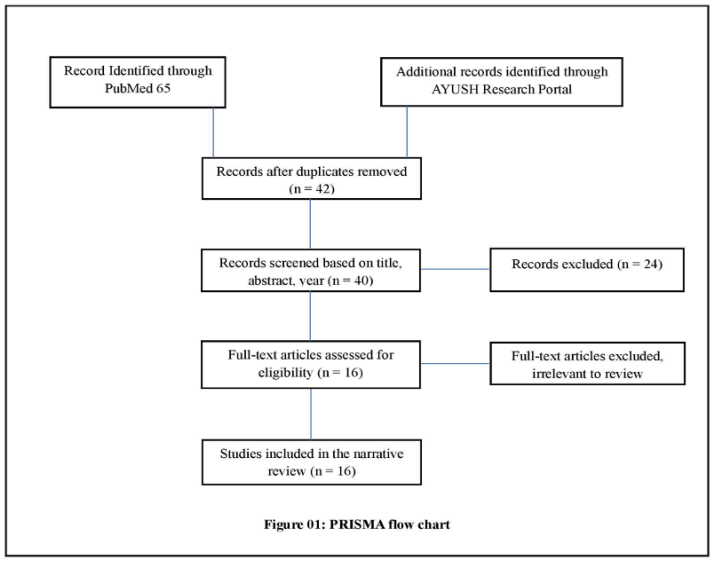

Figure 02: Showing distribution of Study Design among included studies in review

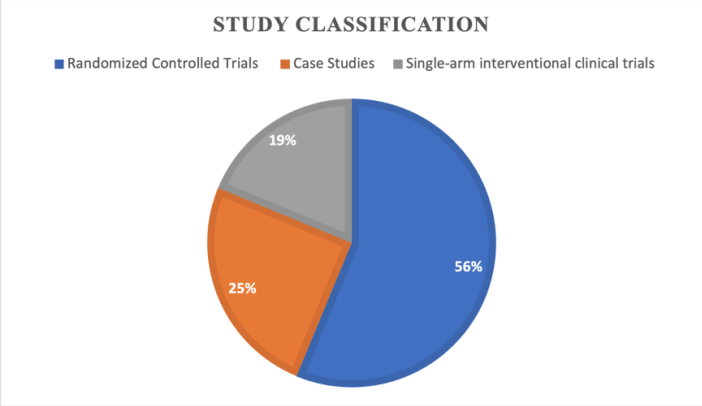

Table 01: Summary of the articles included in the review

S. No.	Study Title	Journal	Authors	Study Details	Key Findings
1	Effect of *Nisha-Amalaki* in prediabetic participants: A double-blind, randomized, placebo-controlled trial (10).	Journal of Ayurveda and integrative medicine	*R. Munshi, S. KarandePatil, D. Kumbhar et al.*	**Design:** Phase III RCT **Sample:** 62 prediabetics **Intervention:** Group A- *Nisha-Amalaki* 500mg BD Group B- Placebo **Duration:** 6 months	Out of 62 participants enrolled, 58 completed the study. After 6 months of treatment with *Nisha-Amalaki,* there was a significant reduction in IDRS scores ($p < 0.001$), BMI ($p < 0.001$), fasting and 2-hour post-OGTT glucose levels, insulin, HbA1c, HOMA-IR and oxidative stress markers ($p < 0.001$). Improvements were also noted in Ayurvedic symptom scores and quality of life measures in the treatment group.

2	Ayurveda approach in the treatment of type 2 diabetes mellitus - A case report (11).	Journal of Ayurveda & integrative medicine	*Varghese Thomas*	**Design:** Case study **Sample:** 1 severe T2DM **Intervention:** Katakakhadiradi kashayam, 15 ml mixed with 15 ml water bd 1 h before food with one Chandraprabha Vati **Duration:** 7 months, 7 days	Over 7.5 months, the patient attended five follow-ups. Initial symptoms like tiredness, frequent urination, and sweating improved early, with FBS at 158 mg/dL and PPBS at 220 mg/dL. Lab tests showed only minor abnormalities; lifestyle changes were advised. At the third visit, HbA1c was 8.13% and knee pain was diagnosed as osteoarthritis, which resolved with treatment. Later, burning sensation in hands and feet was diagnosed as diabetic neuropathy and treated successfully. By the fifth follow-up, HbA1c dropped to 6.05%, and blood glucose normalized. The patient tolerated all medications well, with only brief stomach discomfort.
3	Reversal of type 2 diabetes mellitus through integrated Ayurveda Dietary protocol – A case report (12).	Journal of Ayurveda & integrative medicine	*S kumari, et al.*	**Design:** Case study **Sample:** 1 T2DM **Intervention: Ayurvedic Diet and *Yoga* Therapy:** The approach includes therapeutic fasting (two-meal method), eating only when hungry, and consuming nutrient-dense, millet-based meals with herbal recipes like plant-based drinks and smoothies. *Yoga* practices involve body loosening exercises, *Surya Namaskara*, specific postures, breathing techniques, and meditation, followed regularly over a set period. **Duration:** 12 months	The patient showed remarkable improvements over the course of the intervention. HbA1c dropped from 13.5% to 5.6%, fasting blood sugar from 321 to 98 mg/dL and postprandial sugar from 396 to 123 mg/dL. Weight decreased by 17.6% (68 to 56 kg), BMI from 26.2 to 21.6 and waist circumference from 99 to 94.8 cm. Triglycerides fell from 170 to 80 mg/dL and HOMA-IR improved from 9.44 to 1.87, showing better insulin sensitivity.
4	Ayurveda polyherbal combination (PDBT) for prediabetes: A randomized double blind placebo controlled study (13).	Journal of Ayurveda & integrated Medicine	*A. Nakanekar et al.*	**Design:** RCT **Sample:** 114 **Intervention:** Group A: Polyherbal combination (PDBT) constituted of *Tinospora cordifolia, Pterocarpus marsupium, Gymnema sylvestre, Zingiber officinale* & *Momordica charantia,* 2g/day along with life style modification. Group B: placebo. **Duration:** 6 months	The intervention group showed significantly lower fasting glucose (90.3 vs 110.9 mg/dL), GTT, HbA1c, insulin and HOMA-IR compared to control (all $p < 0.001$). Hip-to-waist ratio and Ayurvedic scores improved significantly, while BMI change was not significant ($p = 0.1$).
5	A clinical study on the *Naimittika Rasayana* effect of *Silajatu* & *Mamajjaka* in type-2 Diabetes Mellitus (14).	AYU	*Kumar, et al.*	**Design:** RCT **Sample:** 95 T2DM **Intervention:** Group A: *Mamajjaka* 500mg BD, Group B: *Shilajatu* 500mg BD, Group C: Modern drug(c) **Duration:** 3 months	In FBS and PPBS across all groups ($P < 0.001$). HbA1c decreased significantly only in the *Mamajjaka* group ($P < 0.001$), with a significant intergroup difference between *Mamajjaka* and modern medicine ($P < 0.05$), suggesting better long-term glycemic control with *Mamajjaka*. while *Shilajatu* showed non-significant HbA1c change.

6	*Vidangadi lauha* for obese type 2 diabetes mellitus patients – An open-label randomized controlled clinical trial (15).	Journal of Ayurveda	*Punam Khobarkar et al.*	**Design:** RCT **Sample:** 100 T2DM **Intervention:** Group A:*Vidangadi Lauha* 5 gm BD, Group B: Metformin 500 mg BD **Duration:** 3 months	*Vidangadi lauha* showed significantly improved HbA1c (8.05 to 7.14), Indian Diabetes questionnaire QOLID (113.87 to 136.47), bowel symptoms (30.28 to 13.2), and waist-hip ratio (0.92 to 0.88) with $p < 0.0001$ for all except waist-hip ratio ($p = 0.0058$). Metformin also reduced HbA1c (8.3 to 7.18; $p < 0.0001$) but showed a significant decline in Indian Diabetes questionnaire QOLID and worsening of bowel symptoms; BMI change was not significant in either group.
7	Effect of *Abhaya Ghana vati* along with *Pathya Aahara Vihara* on patients of Diabetes Trial (16).	Journal of Natural Remedies	*Joglekar et al.*	**Design:** Interventional Pilot study **Sample:** 41 Patients single group **Intervention:** *Abhaya Ghana Vati* 3 gm along with *Pathya Aahara Vihara,* was administered in 41 patients for three months. **Duration:** 60 days along with 30 days following equaling 90 days in total.	The intervention led to significant improvements in several outcome measures, including a 27% reduction in BMI ($p < 0.001$), as well as significant decreases in Waist-Hip Ratio ($p < 0.002$), Abdominal Girth ($p < 0.001$), Chest Girth ($p < 0.001$), and Waist Circumference ($p < 0.001$). Fasting blood sugar levels dropped significantly from a mean of 187.4 to 168.9 mg/dL ($p < 0.048$), and postprandial blood sugar levels also decreased significantly from 260 to 230.4 mg/dL ($p < 0.011$). However, the reduction in HbA1c was minimal, decreasing from 8.32 to 8.23 ($p < 0.71$). Subjective parameters such as Apatarpana Lakshana, Dhatusamya Lakshana, and Quality of Life scores showed significant improvement.
8	Efficacy of *Vamana karma* (therapeutic emesis) followed by *Darvyadi Kwatha* in the management of Prediabetes – A single-arm clinical trial (17).	AYU	*Yadav & Bhatted*	**Design**: Pilot **Sample**: 20 prediabetics **Intervention**: Classical Vamana Karma followed by oral administration of Darvyadi Kwatha was done **Duration**: 45 days with follow up after 120 days.	Post-treatment, significant improvements were seen in HbA1c (6.25 to 5.63), FBS (120.05 to 93.31), and PPBS (165.26 to 112.84) ($p < 0.001$). Symptoms of Prameha, physical and mental strength, and quality of life (SF-36) also improved.
9	Ayurveda treatment in management of snoring, obesity & type 2 Diabetes Mellitus: A case report (18).	Journal of Ayurveda & integrative Medicine	*A. Nakanekar and P. Khobarkar*	**Design:** Case study **Sample:** 1 T2DM **Intervention***: Kaal Basti, Snehapaana* with *guggulu tiltak ghrut* in 90 ml dose given for 7 days followed by *Virechana,* Punarnavadi kwatha **Duration:** 6 months	In pathological evaluation, HbA1c was 9.7%, Blood Glucose level (BGL) fasting was 189 mg/dl & BGL post prandial was 295 mg/dl, cholesterol was 174 mg/dl, triglycerides were 286.1 mg/dl, SGOT was 66.1 IU/L, SGPT was 70.4 IU/L After *Kaal Basti* & *Virechana* and *Shamana* medications HBA1C (%) drops 9.7to 6.8 reduction in Berlin Snoring Questionnaire categories, weight, BMI, Blood glucose levels, waist hip ratio & abdominal circumference were observed.

10	Effect of *Meshashrungi Patra vati & Ajashrungi patra vati* in the management of type 2 Diabetes mellitus-A randomized, Single blind clinical Study (19).	International journal of Ayurvedic Medicine	*Vallamchetty Mounika et all*	**Design:** RCT **Sample:** 40 T2DM **Intervention:** Group A were administered *Meshashrungi patra vati* & Group B were administered *Ajashrungi patra vati* for a period of 60 days with a follow up for every 15 days **Duration:** 60 days	*Meshashrungi Patra Vati* (Gymnema sylvestre) produced highly significant reductions in FBS (12.28%), PPBS (15.64%), HbA1c (5.44%), and urine sugar (42.10%) with $p < 0.001$ for all parameters, indicating strong glycemic control. *Ajashrungi Patra Vati* (Pergularia daemia) showed comparable reductions in FBS (17.28%), PPBS (16.89%), HbA1c (5.46%) with $p < 0.001$ and urine sugar (43.47%) with $p < 0.01$, and was more effective in relieving diabetic symptoms like burning sensation and polyuria.
11	Efficacy of integrated Ayurveda treatment protocol in uncontrolled type 2 diabetes mellitus: A randomized controlled study (20).	European journal of integrated medicine	*S kumari, et al.*	**Design:** RCT **Sample:** 200 T2DM **Intervention:** Group A has Standard diabetic treatment (SDT), SDT intervention had standard dietary advice, lifestyle intervention along with drug metformin (≥ 1g/day) Group B has Integrated Ayurveda treatment (IAT), IAT group had metformin (≥ 1g/ day), add on intervention of Ayurveda polyherbal drug called *Madhumehari ghana vati*(MGV) 3 grams per day administered as 500 mg ghana(thick extract) 2 tablet 3 times a day after meal with water, Ayurvedic therapeutic diet and *yoga* **Duration:** 90 days	The IAT group demonstrated significantly greater improvements in glycemic control compared to the SDT group. HbA1c levels reduced by 16.58% in the IAT group versus 4.82% in the SDT group (**$p < 0.001$**). Fasting blood sugar (FBS) and postprandial blood sugar (PPBS) levels showed earlier and more significant reductions in the IAT group (**$p = 0.001$** for FBS, **$p < 0.001$** for PPBS). Insulin resistance also improved significantly with IAT, with lower fasting insulin (**$p < 0.05$**) and HOMA-IR values (**$p = 0.001$**). Lipid profile changes favored IAT, with significant reductions in total cholesterol (**$p = 0.001$**), triglycerides (**$p < 0.001$**), and VLDL (**$p < 0.001$**); both groups showed no change in HDL and LDL. Weight and BMI significantly decreased in both groups, but more notably in IAT (**$p < 0.001$**). Subjectively, the IAT group showed significant improvement in 6 of 8 *Purvaroopas* and all major *Prameha roopas* with **p-values ranging from < 0.05 to < 0.001**. Quality of life also improved significantly across all domains (**$p < 0.001$**). No adverse events were reported, supporting the safety and efficacy of integrated Ayurvedic management for T2DM with Prameha.
12	Comparative study of *Shilajatu & Asanadi Ghana vati* in the management of *madhumeha* wrs to type 2 DM (21).	AYU	*V Gupta, et al*	**Design:** RCT **Sample:** 90 T2DM **Intervention:** In group A *Shilajatu* cap. (500mg twice daily) given for 3 months & in Group B- *Asanadi Ghana Vati* (2 Vati twice daily). **Duration:** 3 months	After three months, both groups showed significant reductions in HbA1c, FBS, and PPBS ($P < 0.001$). In Group A, FBS decreased from 166.58 to 126.57 mg/dL, PPBS from 274.50 to 218.95 mg/dL, and HbA1c from 7.82% to 7.16%, while Group B showed similar improvements with FBS reducing from 170.45 to 126.08 mg/dL, PPBS from 272.30 to 219.77 mg/dL, and HbA1c from 7.61% to 6.89%.

13	Randomized Controlled trial on the efficacy of *Mamajjaka* (Enicostemma littorale Linn.) in the management of *madhumeha* (22).	International journal of Ayurvedic medicine	*Amit R Nampalliwar et.al.,*	**Design:** RCT **Sample:** 110 T2DM in each group **Intervention:** Group A- Tab. Metformin 50 mg tablet 1 BD before meal, Group B- Capsule *mamajjaka* 2 BD before meal with lukewarm water. **Duration:** 100 days	In this 100-day randomized trial on 92 type 2 diabetes patients, both Metformin (Group A) and *Mamajjaka capsules* (Group B) led to significant improvements in glycemic parameters. Fasting blood sugar, postprandial blood sugar, HbA1c, and fasting urine sugar all decreased significantly in both groups (**p < 0.0001**), with no significant differences between them (FBS **p = 0.5380**, PPBS **p = 0.9525**, HbA1c **p = 0.9191**, FBS **p = 0.2479**). *Mamajjaka* showed greater improvement in subjective symptoms: *prabhuta-mutra* (81.31% vs. 58.95%, **p = 0.0036**) and *avila-mutra* (63.46% vs. 22.73%, **p < 0.0001**). Metformin was more effective in reducing BMI (**p < 0.0001** vs. **p = 0.0062**), with a significant intergroup difference (**p < 0.0001**). Overall, *Mamajjaka* offered better symptom relief, while both treatments improved blood sugar levels comparably.
14	Evaluation of *Gokshuradi Guggulu & Guduchi churna* in the management of Type 2 Diabetes Mallitus *(Madhumeha)* (23).	Journal of research in Ayurvedic Science	*Anil Mangal et al.*	**Design:** An open label noncomparative, prospective, clinical trial. **Sample:** 50 T2DM **Intervention:** *Gokshuradi Guggulu* 1 g (two tablets of 500 mg) twice daily after food (chew the tablets before swallowing) and *Guduchi Churna* 3 g twice daily after food with lukewarm water **Duration:** 12 weeks	After 84 days of treatment with *Gokshuradi Guggulu* and *Guduchi churna*, HbA1c reduced from 8.27 ± 0.23 to 7.99 ± 0.33 and FBS from 147.92 ± 2.05 to 139.14 ± 3.72—both changes were statistically insignificant. However, leukocyte, basophil, monocyte counts, and SGOT levels changed significantly (**p > 0.05**) but remained within normal limits. Quality of life scores (SF-36 and DSQ) improved significantly.
15	Effects of a Standardized ayurveda formulation on diabetes control in newly diagnosed Type 2 diabetes: A randomized active controlled clinical study (24).	Complementary therapies in medicine	*H. Awasthi et al*	**Design:** RCT **Sample:** 93 T2DM **Intervention:** Group 1 (received polyherbal capsules 500 mg/day, up titrated weekly to a maximum of 3 g/day) (Each 500 mg of capsule (size 0) contain water extracts from *B. aristata* (83.3 mg), *C. rotundus* (83.3 mg), *C. deodara* (83.3 mg), *E. officinalis* (83.3 mg), *T. chebula* (83.3 mg) and *T. bellirica* (83.3 mg) and Group 2 (received Metformin 500 mg/ day, up titrated weekly to a maximum of 2 g/day). **Duration:** 6 months	After 24 weeks, the polyherbal formulation (PHF) group showed a 25.52% decrease in fasting blood glucose and a 24.22% decrease in postprandial glucose, compared to 31.46% and 24% reductions in the Metformin group. The reduction in HbA1c was similar between both groups. Notably, PHF led to a greater reduction in total cholesterol (mean difference 61.3) than Metformin (mean difference 41.12), with a significant difference between groups after six months (treatment difference 20.18, 95% CI 12.34 to 28.02).

16	Use of Ayurveda in the treatment of Type 2 diabetes Mellitus (25).	Global Advances in Health and Medicine	*Allison Gordon et all*	**Design:** A case study **Sample:** 1 **Intervention:** Treatments completed: *Udwartanam* *Triphaladi choornamþ* *Kolakulathadi choorna in dhanyamla paste,* *Dhanyamladhara Dhanyamla,* *Snehapanam Triphala ghrita,* Body *Abhyanga* with *Mahavishagarbha taila* and head *abhyanga* with *Balaguduchyadi taila* F/B *Bashpasweda, Vamanam* with *Yastimadhu Phanta – 3L, Madanaphala yoga – 1 g & milk – 3 L* *Virechanam* with *Avipatti choorna* - 20 g with hot water *Yogavasti: Erandamooladhi niruha basti* *Anuvasana basti: Nimbamritadi erandam100ml + Shilajatu1g* *Shirodhara with Balaguduchyadi taila* **Duration:** 9 months	Specific ayurvedic intervention used in a patient, bringing his HbA1c from a level of 11.2 to 5.7 over the course of 9 months.

Results: Among 16 studies included in the review, nine were randomised controlled trials of which one was a large-scale integrative clinical study. In addition, four were case studies and three were single-arm, open-label interventional clinical trials. Distribution of study designs is illustrated in the pie chart (Figure 2).

Table 02: Classification of studies on the basis of interventions

Intervention type	Number of studies	Representative Studies
Pharmacological	**11**	
1. Single Herbs	3	- *Mamajjaka vs Shilajatu (Kumar, et al.)* - *Mamajjaka* vs Metformin *(Amit R Nampalliwar et al.)* - *Shilajatu vs Asanadi Ghana Vati (Gupta et al.)*
2. Polyherbal Formulations	5	- *Nisha-Amalaki (R. Munshi et al.)* - *PDBT (A. Nakanekar et al.)* - *Vidangadi Lauha vs Metformin (Punam Khobarkar et al.)* - *Meshashrungi/Ajashrungi Vati (Mounika et al.)* - *Standardized Ayurvedic PHF vs Metformin (H. Awasthi et al.)*
3. Herbo mineral Compounds	2	- *Katakakhadiradi + Chandraprabha Vati (Varghese Thomas)* - *Gokshuradi Guggulu + Guduchi (Anil Mangal et al.)*
4. Ayurveda + Modern Drug	1	- Metformin + *Ayurveda diet + Yoga (S Kumari et al.)*
***Panchakarma* & External Therapies**	**3**	
1. Vamana	1	- *Vamana + Darvyadi Kwatha (Yadav & Bhatted)*
2. Basti	1	- *Kalabasti + Virechana (Nakanekar & Khobarkar)*
3. Integrated *Shodhana + Shamana*	1	- *Yogavasti + Rasayana + Virechana (Allison Gordon et al.)*
Non-Pharmacological	2	
1. Diet + *Yoga*	1	- *Ayurveda diet + yoga (S Kumari et al.)*
2. Dietary Intervention	1	- Therapeutic fasting + millet diet (S Kumari et al.)

Results

Overview of Studies

Sixteen clinical studies were included in this review after screening databases such as PubMed, AYUSH Research Portal, and Google Scholar. These studies evaluated a wide range of Ayurvedic interventions for Type 2 Diabetes Mellitus (T2DM) and pre-diabetes. Among them, 11 were randomised controlled trials (RCTs), 2 were case reports, 1 was a pilot study, 1 an open-label non-comparative clinical trial, and 1 was a large-scale quasi-observational integrative study. Of the RCTs, two followed a single-blind design, while the remaining nine were open-label parallel-arm studies. The non-randomised studies provided supportive clinical insights through individualised or small-group outcomes.

Diagnostic benchmarks were largely uniform across studies, with HbA1c, fasting blood sugar (FBS), and postprandial blood sugar (PPBS) serving as primary markers. Additional assessments included HOMA-IR, lipid profile, BMI, body weight, quality-of-life measures (QOLID, DQOL, SF-36, DSQ), and Ayurvedic

parameters such as *Agnibala*, *Dehabala*, and *Satvabala*. Study sample sizes ranged from single patients in case reports to 200 participants in RCTs. Intervention durations varied from 30 days to nine months. Overall, most studies demonstrated meaningful improvements in glycemic indices, insulin resistance, lipid metabolism, anthropometric measures, and patient-reported outcomes.

Classification of Interventions

Pharmacological Interventions

Nine studies evaluated pharmacological approaches, including classical Ayurvedic formulations, polyherbal combinations (PHCs), herbo-mineral preparations, and integrative protocols combining Ayurveda with modern medicine. These consistently showed improvements in glycemic control, insulin sensitivity, lipid levels, and quality of life.

Classical Ayurvedic Formulations

Two RCTs assessed single-drug classical formulations.

- Kumar et al. evaluated *Mamajjaka* and *Shilajatu* in 95 patients. While all groups showed significant reductions in FBS and PPBS, *Mamajjaka* alone produced a significant HbA1c reduction, outperforming modern medicine, suggesting sustained glycemic benefits.
- Gupta et al. studied *Shilajatu* versus *Asanadi Ghana Vati* in 90 patients over three months. Both interventions significantly reduced FBS, PPBS, and HbA1c, reflecting comparable therapeutic benefits.

Polyherbal Formulations

Four studies investigated PHCs with synergistic botanical combinations traditionally used in *Prameha* management.

- A double-blind RCT by Munshi et al. evaluated *Nisha-Amalaki* in 62 prediabetic individuals. Significant improvements were reported in IDRS, BMI, FBS, OGTT values, HbA1c, insulin levels, HOMA-IR, oxidative stress markers, and quality-of-life scores.
- A randomised study by *Nakanekar et* al. evaluated the PDBT formulation containing *Guduchi* and *Meshashringi* in 114 prediabetic participants. Significant reductions were noted in fasting glucose, HbA1c, OGTT parameters, insulin levels, waist–hip ratio, and symptom scores.
- *Khobarkar et* al. compared *Vidangadi Lauha* with metformin in 100 obese T2DM patients. *Vidangadi Lauha* significantly improved HbA1c, QOLID scores, and bowel parameters. Metformin reduced HbA1c but adversely affected quality-of-life and bowel symptoms.
- Vallamchetty et al. compared *Meshashrungi Patra Vati* and *Ajashrungi Patra Vati* in 40 patients over 60 days. Both reduced FBS, PPBS, HbA1c, and urine sugar significantly, with *Ajashrungi* showing better symptom relief.

Herbo-Mineral Preparations

Two studies evaluated herbo-mineral interventions.

- Varghese Thomas presented a case report using *Katakakhadiradi Kashayam* and *Chandraprabha Vati* over 7.5 months, resulting in an HbA1c reduction from 8.13% to 6.05% and improvement in neuropathic symptoms.
- An open-label trial by *Anil Mangal et* al. assessed *Gokshuradi Guggulu* and *Guduchi Churna* in 50 T2DM patients over 12 weeks. Although HbA1c and FBS reductions were small, improvements in quality-of-life and liver function parameters were observed.

Integrative Ayurveda + Modern Medicine

A major RCT by S. Kumari et al. evaluated an Integrated Ayurveda Treatment (IAT) protocol combining metformin with *Madhumehari Ghana Vati*, Ayurvedic diet, and yoga in 200 uncontrolled T2DM patients. Over 90 days, the IAT group demonstrated significantly greater improvements in HbA1c, FBS, PPBS, insulin levels, HOMA-IR, lipid profile, BMI, and DQOL scores compared to standard treatment alone, confirming superior efficacy and safety.

Panchakarma Interventions

Three studies assessed Panchakarma modalities administered alone or with supportive oral medications. Interventions included *Vamana*, *Virechana*, *Basti*, and *Rasayana* therapies.

- Yadav and Bhatted conducted a pilot trial on *Vamana* followed by *Darvyadi Kwatha* in 20 prediabetic participants. Significant reductions were recorded in HbA1c (6.25 → 5.63), FBS, PPBS, and Prameha symptoms, along with improved strength and well-being.
- Nakanekar and Khobarkar presented a case involving *Kala Basti*, *Snehapana*, *Virechana*, and *Punarnavadi Kwatha* in an obese T2DM patient. HbA1c improved markedly (9.7% → 6.8%), along with reductions in glucose levels, lipid profile abnormalities, liver enzymes, BMI, waist–hip ratio, and snoring.
- *Allison Gordon et* al. documented a nine-month comprehensive Panchakarma protocol including *Udwartanam*, *Dhanyamladhara*, *Snehapana*, *Vamana, Virechana*, *Yogavasti*, *Anuvasana Basti* and *Shirodhara*. HbA1c dropped substantially from 11.2% to 5.7%, indicating the strong potential of personalised Panchakarma in diabetes care.

Non-Pharmacological Interventions

Four studies evaluated non-drug Ayurvedic approaches focusing on yoga, diet, and lifestyle.

Yoga-Based Interventions

A case study by *S. Kumari et* al. reported profound improvements after 12 months of Ayurvedic diet and yoga, with HbA1c dropping from 13.5% to 5.7%, BMI from 30.1 to 21.2, and HOMA-IR from 9.44 to 1.87.

In a large RCT, the Integrative Therapy Protocol (Ayurveda + Yoga + Metformin) outperformed standard treatment in reducing HbA1c, improving HOMA-IR, reducing triglycerides, and enhancing quality-of-life scores.

Diet and Lifestyle Interventions

An observational intervention involving therapeutic fasting and millet-based diet reported improvements in insulin sensitivity, weight management, and subjective well-being.

Joglekar et al. studied *Abhaya Ghana Vati* with *Pathya Ahara-Vihara* in 30 T2DM patients for 90 days. Significant reduction in FBS was noted, though HbA1c changes were minimal, highlighting the supportive role of diet–lifestyle correction.

Result Summary

Across pharmacological, Panchakarma, and lifestyle-based modalities, Ayurvedic interventions consistently improved glycemic control, insulin sensitivity, metabolic markers, and quality of life in T2DM and prediabetes. These findings highlight the multidimensional and individualised therapeutic strength of Ayurveda in diabetes management.

Discussion

Herbal and Polyherbal Preparations

Numerous randomised trials in this review highlight the therapeutic benefits of classical *Ayurvedic* and polyherbal formulations in improving glycemic parameters. Drugs such as *Mamajjaka* (*Enicostema littorale*), *Shilajatu* (*Asphaltum punjabianum*), *Vidangadi Lauha* (containing *Embelia ribes*, *Piper longum*, *Zingiber officinale*, etc.) and *Nisha–Amalaki* (*Curcuma longa* and *Emblica officinalis*) demonstrated significant reductions in fasting blood sugar (FBS), postprandial blood sugar (PPBS) and glycated haemoglobin (HbA1c). The polyherbal decoction PDBT, polyherbal formulation notably reduced diabetes risk by 82% in prediabetic individuals, with marked improvement in insulin resistance. Herbs like *Tinospora cordifolia*, *Gymnema sylvestre*, *Emblica officinalis*, and *Berberis aristata* contribute antioxidant, insulin-sensitising, and β-cell-supportive actions. Herbo-mineral preparations such as *kashaya Katakakhadiradi* and *Chandraprabha Vati* also demonstrated strong clinical benefits, even in severe T2DM, with minimal reported adverse effects. Ensuring standardisation and quality control of these formulations remains essential. Commonly used Ayurvedic drugs are summarised in Table 3.

Table 3: Common Ayurvedic Herbs, PHC, and Herbo-Mineral Drugs Used Across Studies

Category	Commonly Used Drugs (Ayurvedic Terms)
Single Herbs (Eka Dravya)	*Amalaki, Haridra, Guduchi, Meshashringi, Jambu, Katuki, Daruharidra, Karavellaka*
Polyherbal Combinations (PHC)	*Nisha-Amalaki, PDBT Yoga, Vidangadi Lauha, Meshashrungi Vati, Ajashrungi Vati, Madhumehari Ghana Vati*
Herbo-Mineral (Rasa-Aushadhi)	*Shilajatu, Chandraprabha Vati, Gokshuradi Guggulu*
Kwatha / Ghrita	*Darvyadi Kwatha, Punarnavadi Kwatha, Tikta-Ghrita*

Panchakarma and Detoxification-Based Therapies

Panchakarma therapies includes *Vamana*, *Virechana*, and *Basti* were used either alone or in combination with oral medications. These detoxification-based interventions consistently improved glycemic indices and anthropometric parameters. *Vamana* followed by *Darvyadi Kwatha* significantly improved prediabetic profiles within 45 days, while a comprehensive nine-month Panchakarma and *Rasayana* regimen reduced HbA1c from 11.2% to 5.7%. Their benefits appear linked to systemic detoxification, improved metabolic clearance, and correction of *Agni* and *Kapha-Meda* imbalance.

Lifestyle and Behavioural Interventions

Lifestyle-based approaches including Ayurvedic diet planning, yoga, *Pranayama*, therapeutic fasting, and millet-based diets also showed meaningful impact. A notable case reported remission of uncontrolled T2DM with HbA1c reducing from 13.5% to 5.7% after 12 months of Ayurvedic diet and yoga. Such findings highlight the significance of behaviour, diet, and mind–body practices in managing *Madhumeha*.

Commonly adopted line of management principles based on included studies

Reviewed clinical studies indicate that Ayurvedic management of *Prameha* generally integrates four key principles: *Shodhana, Shamana, Rasayana* and *Ahara-Vihara*. *Shodhana* procedures includes *Vamana*, *Virechana* and *Basti* were commonly employed in individuals with obesity or chronic hyperglycemia to enhance insulin sensitivity and metabolic balance by eliminating *Ama*, improving *Agni*, and correcting *Kapha-meda disturbance*. *Shamana* therapy was the predominant approach, involving classical herbs, polyherbal formulations, and herbo-mineral preparations aimed at strengthening *Agni*, reducing *Kapha* and *Meda* and supporting pancreatic functions. Dietary recommendations focused on low-glycemic, fiber-rich, millet-based foods, incorporation of bitter items, avoidance of heavy and oily meals, and the use of therapeutic fasting, consistent with the management of *Kapha-Meda* disorders. Lifestyle practices including *yoga*, *Pranayama*, meditation, post-meal walking, and adherence to daily and seasonal regimens played an important supportive role in improving metabolic and psychosocial outcomes.

Conclusion

Ayurveda presents a holistic, evidence-informed strategy for the management of diabetes mellitus, combining pharmacological, identificatory and lifestyle-based interventions. The included studies demonstrate that *Ayurvedic* therapies can significantly improve glycemic outcomes, reduce insulin resistance and enhance overall metabolic health. Treatments such as classical and polyherbal formulations, *Panchakarma* procedures and non-pharmacological regimens like *yoga* and therapeutic diets have shown encouraging results with high safety margins.

Despites these promising findings, the current body of clinical evidence is limited by small sample size, heterogeneity in study design, short durations and lack of standardised outcome measures. There is an urgent need for well-powered, multicentric randomised controlled trials with rigorous methodology to validate these outcomes. Furthermore, integrating biomarker-based assessments, long-term follow-up and patient-centered outcome measures could significantly strengthen the scientific foundation of *Ayurvedic* diabetes management.

A deeper collaboration between *Ayurveda* and modern research frameworks may pave the way for safer, sustainable, individualised care strategies for the growing global diabetes epidemic.

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Conflict of Interest

The authors declare that they have no known competing financial interest or personal relationships that could have appeared to influence the work reported to this paper.

Declaration of generative AI scientific writing

Nothing to disclose.

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References

1. World Health Organization. Noncommunicable diseases [Internet]. Available from: https://www.who.int/health-topics/noncommunicable-diseases. Accessed on 01 March 2025 at 10:00 IST.
2. International Diabetes Federation. IDF Diabetes Atlas. 8th ed. Brussels: International Diabetes Federation; 2017. Available from: https://diabetesatlas.org. Accessed on 01 March 2025 at 10:00 IST.
3. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the IDF Diabetes Atlas, 9th edition. Diabetes Res Clin Pract. 2019;157:107843.
4. World Health Organization. Diabetes fact sheet [Internet]. Geneva: World Health Organization; 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/diabetes. Accessed on 01 March 2025 at 10:00 IST.
5. Bommer C, Heesemann E, Sagalova V, Manne-Goehler J, Atun R, Bärnighausen T, et al. Global economic burden of diabetes in adults aged 20–79 years: A cost-of-illness study. Lancet Diabetes Endocrinol. 2017;5(6):423–430.
6. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1204–1222.
7. Sun H, Saeedi P, Karuranga S, Pinkepank M, Ogurtsova K, Duncan BB, et al. IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. Diabetes Res Clin Pract. 2022;183:109119.
8. World Health Organization. Global report on diabetes. Geneva: World Health Organization; 2016.
9. Munshi R, Karande-Patil S, Kumbhar D, Deshmukh A, Hingorani L. A randomized controlled proof-of-concept study evaluating the efficacy and safety of Nisha-Amalaki capsules in prediabetes. J Ayurveda Integr Med. 2023;14(6):100806. doi:10.1016/j.jaim.2023.100806.
10. Thomas V. Ayurveda approach in the treatment of type 2 diabetes mellitus: A case report. J Ayurveda Integr Med. 2023;14(4):100744. doi:10.1016/j.jaim.2023.100744.
11. Kumari S, Tubaki BR, Patil RS, Laxmikant SD. Reversal of type 2 diabetes mellitus through integrated Ayurveda dietary protocol: A case report. J Ayurveda Integr Med. 2024;15(4):100946. doi:10.1016/j.jaim.2024.100946.
12. Nakanekar A, Kohli K, Tatke P. Ayurvedic polyherbal combination (PDBT) for prediabetes: A randomized double-blind placebo-controlled study. J Ayurveda Integr Med. 2019;10(4):284–289. doi:10.1016/j.jaim.2018.05.004.
13. Kumar S, Singh G, Pandey AK, Singh RH. Naimittika Rasayana effect of Silajatu and Mamajjaka in type 2 diabetes mellitus: A clinical study. Ayu. 2014;35(4):404–410. doi:10.4103/0974-8520.159000.
14. Khobarkar P, Gulhane J, Nakanekar A. Vidangadi Lauha for obese type 2 diabetes mellitus patients: An open-label randomized controlled trial. J Ayurveda Integr Med. 2024;15(1):100878. doi:10.1016/j.jaim.2023.100878.
15. Joglekar AA, Vyas M, Bhojani MK, Kumar A. Effect of Abhaya Ghana Vati along with Pathya Ahara Vihara on diabesity: A single-arm clinical trial. J Nat Remedies. 2023;23(4):1425–1433. Available from: https://www.informaticsjournals.co.in/index.php/jnr/article/view/32931. Accessed on 03 May 2025 at 10:00 IST.
16. Yadav U, Bhatted SK. Efficacy of Vamana Karma followed by Darvyadi Kwatha in prediabetes (Prameha): A single-arm clinical trial. Ayu. 2021;42(1):30–34. doi:10.4103/ayu.ayu_417_20.
17. Nakanekar A, Khobarkar P. Ayurveda treatment in snoring, obesity and type 2 diabetes mellitus: A case report. J Ayurveda Integr Med. 2022;13(1):100506. doi:10.1016/j.jaim.2021.08.001.
18. Vallamchetty M, Sangu PK. Effect of Meshashrungi Patra Vati and Ajashrungi Patra Vati in type 2 diabetes mellitus: A randomized single-blind clinical study. Int J Ayurvedic Med. 2024;15(2):341–347. Available from: https://ijam.co.in/index.php/ijam/article/view/5014. Accessed on 03 May 2025 at 10:00 IST.
19. Kumari S, Patil R, Tubaki BR. Efficacy of integrated Ayurveda treatment protocol in uncontrolled type 2 diabetes mellitus: A randomized controlled study. Eur J Integr Med. 2025;73:102424. doi:10.1016/j.eujim.2024.102424.
20. Gupta V, Keshari BB, Tiwari SK, Murthy KHHVSSN. Comparative study of Shilajatu and Asanadi Ghana Vati in type 2 diabetes mellitus. Ayu. 2016;37(2):120–124. doi:10.4103/ayu.AYU_211_15.
21. Nampalliwar AR, Godatwar P. Randomised controlled trial on the efficacy of Mamajjaka (*Enicostemma littorale*) in Madhumeha (diabetes mellitus). Int J Ayurvedic Med. 2024;15(1):148–153. Available from: https://ijam.co.in/index.php/ijam/article/view/4276. Accessed on 03 May 2025 at 10:00 IST.
22. Mangal A, Jadhav AD, Ota S, et al. Evaluation of Gokshuradi Guggulu and Guduchi Churna in type 2 diabetes mellitus (Madhumeha). J Res Ayurvedic Sci. 2019;3(2):48–54.
23. Awasthi H, Nath R, Usman K, Mani D, Khattri S, Nischal A, et al. Effects of a standardized Ayurvedic formulation on glycemic control in newly diagnosed type 2 diabetics: A randomized active-controlled clinical study. Complement Ther Med. 2015;23(4):555–561. doi:10.1016/j.ctim.2015.06.005.
24. Gordon A, Buch Z, Baute V, Coeytaux R. Use of Ayurveda in the treatment of type 2 diabetes mellitus. Glob Adv Health Med. 2019;8:2164956119861094. doi:10.1177/2164956119861094.

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