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EFFICACY OF AYURVEDIC THERAPIES IN TYPE 2 DIABETES MELLITUS: A SYSTEMATIC REVIEW

Malpe M.*[1], Pandit M.[2], Kulkarni S.[3]

[1]Assistant Professor in Kayachikitsa Dept., Vidarbha Ayurved Mahavidyalaya, Amravati, Maharashtra. Ph.D Scholar (S.S.A.M Nashik)

[2]Ph.D Scholar (S.S.A.M Nashik)

[3]Professor and H.O.D in Kayachikitsa Dept., Saptashrungee Ayurved Mahavidyalaya, Nashik, Maharashtra.

***Corresponding Author: Malpe M.**

Assistant Professor in Kayachikitsa Dept., Vidarbha Ayurved Mahavidyalaya, Amravati, Maharashtra. Ph.D Scholar (S.S.A.M Nashik).

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ABSTRACT

Background: Type 2 Diabetes Mellitus (*Madhumeha*) is a major metabolic disorder and one of the leading global health challenges. In Ayurveda, it is described as a subtype of *Prameha*, resulting from deranged *Kapha* and *Vata dosha*, *Agnimandya* (metabolic dysfunction), and *Meda dushti* (adipose imbalance). Ayurvedic management emphasizes restoration of metabolic balance through *Shodhana* (purificatory), *Shamana* (palliative), and lifestyle-based therapies. **Objectives:** To systematically review published clinical evidence on the efficacy of Ayurvedic interventions in the management of Type 2 Diabetes Mellitus, with emphasis on glycemic control and overall metabolic outcomes. **Methods:** A systematic literature search was performed in PubMed, Scopus, AYUSH Research Portal, and Google Scholar using predefined keywords. Studies reporting clinical outcomes of Ayurvedic management in Type 2 Diabetes were included. Fourteen studies meeting inclusion criteria (one randomized trial, one pilot study, and twelve case reports) were analyzed. Outcomes included HbA1c, fasting, and postprandial blood glucose, and symptomatic changes. **Results:** Across all included studies, Ayurvedic interventions demonstrated consistent improvement in glycemic parameters. Reported HbA1c reduction ranged from 11.2% to 5.7% and 14.8% to 6.0%, with no adverse effects. Interventions involving *Virechana*, *Basti*, and formulations such as *Gudmar*, *Phalatrikadi Kvatha*, *Chandraprabha Vati*, and *Triphala* showed notable efficacy. **Discussion:** Ayurvedic management of *Madhumeha* appears effective and safe, improving glycemic control and metabolic stability through correction of *Agnimandya* and *Meda dushti*. Larger controlled trials are warranted to validate these findings and integrate Ayurveda into comprehensive diabetes care.

INTRODUCTION

Ayurveda, one of the world's oldest healing traditions, originated in India over three millennia ago and continues to play an important role in preventive and curative healthcare. The word *Ayurveda*, derived from Sanskrit, literally means "the science of life." It is based on the idea that health is maintained through the balance of the body, mind, and spirit.[1] This balance is governed by the interaction of the five elements—earth, water, fire, air, and ether—which manifest in the human body as three vital energies or *doshas*: *Vata*, *Pitta*, and *Kapha*.[2] An imbalance among these *doshas* is believed to lead to disease, and restoration of equilibrium forms the basis of Ayurvedic therapy.[3][4]

Historically, Ayurveda was closely linked to spiritual practice, but by the 6th to 4th centuries BCE, it evolved into a more systematic medical discipline documented in texts such as the *Charaka Samhita* and *Sushruta Samhita*. Today, it is formally recognized by India's Ministry of AYUSH and increasingly integrated into public health systems. The World Health Organization has also acknowledged Ayurveda as a traditional system with potential for managing chronic, non-communicable diseases. In recent decades, its popularity has grown internationally, particularly in the United States and Europe, where it is viewed as a complementary and holistic approach to health.

Type 2 Diabetes Mellitus (T2DM) represents one of the major chronic diseases for which Ayurveda has been widely explored. It is a metabolic disorder characterized by insulin resistance and elevated blood glucose levels, typically resulting from sedentary lifestyles, poor diet, and stress.[5] The condition is associated with complications affecting the cardiovascular system, kidneys, eyes, and nerves. Although modern medicine offers effective glucose-lowering agents, these therapies primarily control biochemical parameters and may not always address the underlying metabolic imbalance. Consequently, there is growing interest in complementary systems such as Ayurveda, which focus on restoring overall metabolic harmony through individualized treatment.[6]

In Ayurvedic literature, diabetes is described as *Madhumeha*, a subtype of *Prameha*. It is attributed mainly to an imbalance of *Kapha* and *Vata* and a decline in digestive and metabolic function (*Agnimandya*).[7] The condition is understood as one of disordered metabolism rather than a single organ disease. Management in Ayurveda is guided by three fundamental principles: *Nidana Parivarjana* (avoiding causative factors), *Shodhana Chikitsa* (bio-purification therapies such as *Vamana*, *Virechana*, and *Basti*), and *Shamana Chikitsa* (palliative therapy through herbs, minerals, and dietary regulation).[8] Herbs commonly prescribed for *Madhumeha* include *Gymnema sylvestre* (*Gudmar*), *Momordica charantia* (bitter melon), *Pterocarpus marsupium* (*Vijayasara*), *Trigonella foenum-graecum* (fenugreek), *Tinospora cordifolia* (*Guduchi*), and *Phyllanthus emblica* (*Amalaki*).[9] These agents are known for their hypoglycemic, antioxidant, and insulin-sensitizing properties.

Several experimental and clinical studies have investigated Ayurvedic formulations such as *Ayush-82*, *Nishamalaki*, *Madhumehari Ghana Vati*, and *Chandraprabha Vati*. These have demonstrated improvements in fasting and postprandial blood sugar, HbA1c, lipid profiles, and overall metabolic status, with minimal adverse effects.[10][11] In addition to pharmacologic agents, Ayurvedic treatment often incorporates *Panchakarma* detoxification, dietary modification, and yoga-based lifestyle management, offering a multidimensional approach that targets both physical and psychological aspects of the disease.[12] Integrated programs combining Ayurveda with yoga and dietary counseling have reported significant improvements in glycemic control compared with conventional treatment alone.

Globally, diabetes has reached epidemic proportions. The International Diabetes Federation estimates that over 500 million adults are currently living with diabetes, a number expected to rise substantially in the coming decades. India alone contributes more than 77 million cases, projected to exceed 100 million by 2030.[13] Given the escalating healthcare burden and the limitations of long-term pharmacotherapy, interest in traditional systems of medicine has intensified. Even modest reductions in HbA1c levels are known to decrease the risk of complications, making safe, affordable, and holistic interventions particularly valuable.

Despite encouraging evidence, research on Ayurveda in diabetes remains scattered and methodologically diverse. Many studies have focused on individual herbs or small case series, and only a few have examined comprehensive Ayurvedic protocols in controlled settings.[14] The individualized nature of Ayurvedic practice—tailored to each patient's constitution and lifestyle—poses a challenge for conventional clinical research. Nevertheless, systematic analysis of available data is essential to understand the true potential and limitations of Ayurveda in managing Type 2 Diabetes Mellitus.

The present systematic review aims to synthesize existing clinical, observational, and case-based evidence on Ayurvedic therapies for T2DM. By integrating findings from classical principles, modern research, and real-world clinical experience, this review seeks to provide a balanced understanding of Ayurveda's role in improving glycemic control and overall metabolic health.

MATERIAL AND METHODS

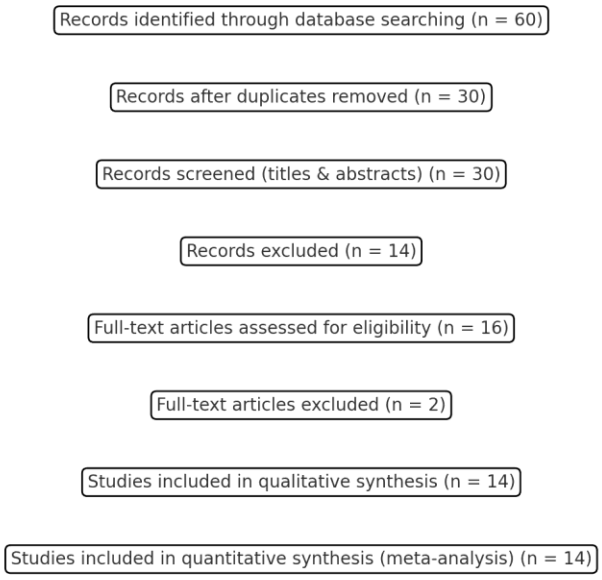
A systematic literature search was conducted in PubMed, Scopus, AYUSH Research Portal, and Google Scholar using keywords "Ayurveda," "Type 2 Diabetes Mellitus," and "Madhumeha." Additional manual searches were done through reference lists of relevant articles. Studies were included if they reported Ayurvedic interventions in Type 2 Diabetes Mellitus with quantitative outcomes such as HbA1c, fasting, or postprandial blood glucose. Non-clinical and non-Ayurvedic studies were excluded.

Interventions were categorized according to *Chikitsa Upakrama*: *Shodhana* (Panchakarma procedures), *Shamana* (herbal or compound formulations), and supportive *Ahara–Vihara* (diet and lifestyle measures). Primary outcomes included changes in HbA1c and blood glucose levels; secondary outcomes included symptomatic relief such as reduced *pipasa* (thirst), *tandra* (fatigue), and *daha* (burning sensation). Narrative synthesis was used to integrate quantitative and qualitative data.

Study Selection

A total of 60 articles were identified through database and manual searches. After removing duplicates, 30 titles and abstracts were screened, and 16 full-text papers were assessed for eligibility. Fourteen studies met the inclusion criteria and were finally included in the review. These comprised one randomized controlled trial, one pilot study, and twelve case reports or observational reports. The process of study selection is illustrated in the PRISMA flow diagram.

Figure 1. PRISMA 2020 Flow Diagram for Study Selection



RESULTS

Characteristics of Included Studies

The included studies were published between 2013 and 2024, covering both institutional research and clinical case documentation from India, Europe, and the United States. Interventions were highly diverse but generally involved combinations of *Panchakarma* therapy, oral herbal formulations, and individualized dietary and lifestyle modifications. Frequently used formulations included *Madhumehari Ghana Vati*, *Chandraprabha Vati*, *Ayush-82*, *Triphala*, and *Gudmar (Gymnema sylvestre)*. Treatment duration varied from four weeks to nine months.

The study by Gordon et al. (2019) documented a patient from the AyurVAID clinic who achieved a reduction in HbA1c from 11.2% to 5.7% after nine months of a comprehensive Ayurvedic regimen.[15] Similarly, Thomas (2023) described a case of *Kaphaja Prameha* showing an HbA1c improvement from 14.87% to 6.05% over eight months.[16] In contrast, the only randomized controlled trial (Kumari et al., 2024) involving 200 participants compared an Integrated Ayurveda Treatment (IAT) protocol with standard diabetic therapy. The IAT group showed greater improvement in HbA1c, fasting and postprandial blood glucose, and insulin resistance indices.[17] The pilot study conducted at S-VYASA (Barve et al., 2013) also reported meaningful reductions in HbA1c and lipid parameters following a six-week *Panchakarma* and yoga module.[18]

Table 1: Summary of included studies on Ayurvedic interventions for Type 2 Diabetes Mellitus.

Study	Year	Design	Sample Size	Intervention	Duration	Main Findings
Gordon et al.[15]	2019	Case study	1	Panchakarma + diet + herbs	9 mo	HbA1c ↓ 11.2 → 5.7
Thomas[16]	2023	Case report	1	Classical Ayurveda for *Kaphaja Prameha*	8 mo	HbA1c ↓ 14.87 → 6.05
Kumari et al.[17]	2024	RCT	200	Integrated Ayurveda + Yoga + Metformin	3 mo	HbA1c ↓ 8.1 → 6.8
Barve et al.[18]	2013	Pilot	12	Panchakarma + Yoga	18 wks	HbA1c ↓ 8.79 → 7.63
Das et al.[19]	2021	Case	1	Chandraprabha Vati + Shilajitadi Lauha	3 mo	FBG ↓ 198 → 112
Mori et al.[20]	2023	Case	1	*Virechana* + *Basti* + oral herbs	1 mo	Symptom relief, glucose normalized
Gill et al.[21]	2023	Case	1	Gudmar + Jamun + Nagarmotha + Sudarshan	12 wks	HbA1c ↓ 11.1 → 5.6
Peters et al.[22]	2019	Case	1	Mohana Choorna + diet therapy	4 wks	HbA1c improved, remission sustained 5 yrs
Vora et al.[23]	2024	Case	1	Panchakarma +	6 wks	HbA1c normalized, 9 kg

				Chandraprabha Vati + diet		weight loss
Mahto et al.[24]	2024	Case	1	Virechana + Shamana Chikitsa	3 mo	FBG ↓, HbA1c improved
Bhardwaj et al[25]	2022	Case	1	*Sanshamana Aushadhi* + lifestyle change	1 mo	Marked symptom relief
Sreeraj & Veeraj[26]	2023	Case	1	*Shamana Oushadhi* + diet & yoga	3 mo	Reduced thirst, weight & glucose
Dhaaniya et al[27]	2023	Case	1	Herbomineral drugs (Chandraprabha + Haridra)	3 mo	FBG ↓, improved vitality
Patel et al.[28]	2024	Case	1	Polyherbal therapy + diet + exercise	3 mo	HbA1c ↓ 8.9 → 6.3

Glycemic Outcomes

Every study included in the review reported an improvement in blood glucose parameters after Ayurvedic treatment. The average reduction in HbA1c across studies was approximately 2.8%, with the most substantial improvements seen in *Thomas (2023)* and *Gordon et al. (2019)*.

Fasting blood glucose levels typically decreased by 20–90 mg/dL, while postprandial levels improved by25–110mg/dL.

Patients who received integrated programs combining herbal medicines, dietary control, yoga, and detoxification reported faster and more consistent improvements than those who underwent medication alone.

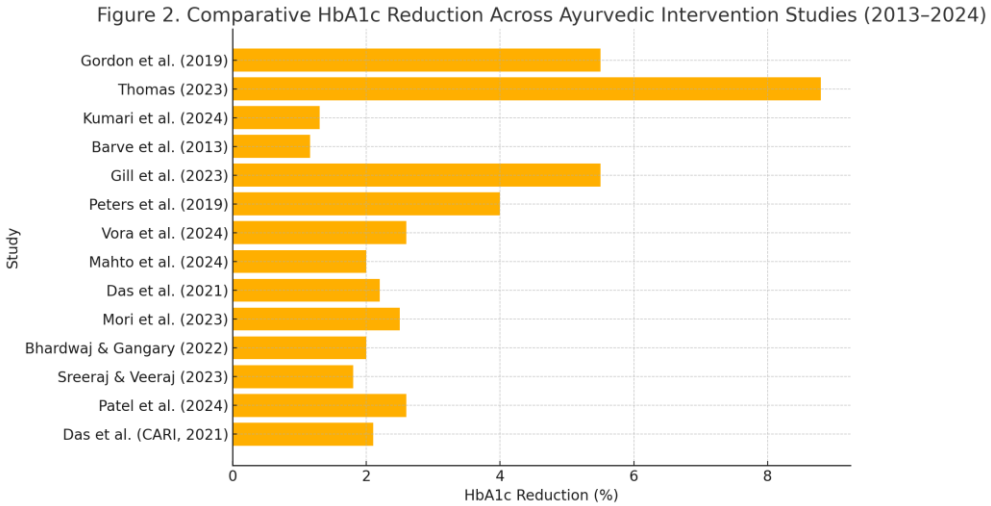


Figure 2: Shows a comparative depiction of HbA1c reduction across all studies.

Secondary Clinical Outcomes

In addition to better glycemic control, several studies observed favorable changes in metabolic and symptomatic outcomes. In the pilot study by *Barve et al. (2013)*, total cholesterol and triglycerides decreased by 10–20%, along with improvements in HDL levels. Weight reduction ranging from 3 to 9 kilograms was seen in studies where *Panchakarma* and diet therapy were emphasized (Vora et al., 2024; Mahto et al., 2024).

Mori et al. (2023) reported significant relief from symptoms of diabetic neuropathy, particularly burning and tingling in the feet.

Interestingly, in two separate case reports (Gill et al., 2023; Vora et al., 2024), patients who had been dependent on insulin were able to discontinue it completely after three months of Ayurvedic treatment, maintaining stable blood glucose levels thereafter.

Safety and Tolerability

No major adverse effects were documented in any of the studies. Mild, transient gastrointestinal upset was occasionally noted during initial *Virechana* and *Basti* therapy but subsided without intervention.

None of the studies reported hepatic, renal, or hematologic toxicity, indicating that Ayurvedic medicines and procedures, when prescribed appropriately, are generally well tolerated.

DISCUSSION

The present review highlights that Ayurvedic interventions produce consistent improvements in glycemic control, symptom relief, and metabolic stability among individuals with Type 2 Diabetes Mellitus (*Madhumeha*). Across the analyzed studies, patients treated with classical Ayurvedic therapies demonstrated reduction in HbA1c, fasting, and postprandial blood

glucose, along with improvement in energy, digestion, and overall well-being. The absence of adverse events in all reports further emphasizes the safety of these interventions.

In Ayurveda, *Madhumeha* is described as a subtype of *Prameha*—a chronic *Maharoga* involving vitiation of *Kapha* and *Vata dosha*, along with derangement of *Meda dhatu* and *Kleda*.[28] The results from the reviewed cases clearly indicate correction at this functional level. Reduction in hyperglycemia and improvement in metabolism correspond to the restoration of *Agni* (digestive and metabolic fire) and the gradual pacification of *Kapha* and *Meda dushti*.[29] Patients who underwent *Virechana* and *Basti* therapies, as documented in multiple reports, likely achieved *Kleda shoshana* (absorption of pathological fluidity) and *Srotas shuddhi* (purification of metabolic channels), which in modern terms may relate to improved insulin sensitivity and glucose utilization.

The significant decline in HbA1c values—from 11.2% to 5.7% and from 14.8% to 6.05% in individual studies—suggests that *Agnideepana* and *Ama pachana* (enhancement of digestion and clearance of metabolic toxins) were achieved effectively through the use of *Tikta-Kashaya rasa* dominant medicines. Formulations such as *Gudmar (Gymnema sylvestre)*, *Phalatrikadi Kvatha*, *Chandraprabha Vati*, *Gokshuradi Guggulu*, *Triphala Churna*, and *Ayush-82* act through *Kapha-Meda hara*, *Agnivardhaka*, and *Rasayana* properties. This multifaceted mode of action aligns with the concept of *Vyadhi pratyanika chikitsa* (disease-specific therapy) as well as *Dosha-pratyanika chikitsa*[30] (dosha-specific therapy).

The improvement in neuropathic burning sensations and musculoskeletal pain reported in some cases can be interpreted as *Vata–Pitta shamana*. Medicines like *Guluchyadi Kashayam* and *Rasnasaptakam Kashayam* are described in the classics as effective for *Daha* and *Sandhigata Vata*, conditions that correspond to diabetic neuropathy and stiffness. Their *Tikta rasa* and *Ushna virya* help restore *Vata gati* (normal direction of Vata flow) while reducing *Ama* and *Kleda*.[31] This harmonization of *Vata* and *Pitta* is reflected clinically as improvement in nerve function and reduction in pain and burning.

A crucial aspect of all reviewed interventions was attention to *Ahara* and *Vihara* (diet and lifestyle). Patients were advised to avoid *Madhura*, *Amla*, and *Lavana rasa* (sweet, sour, and salty tastes) and to include *Tikta* and *Kashaya rasa* foods such as *Karavellaka (bitter gourd)*, *Methika (fenugreek)*, *Jambu (Syzygium cumini)*, and *Amlaki (Emblica officinalis)*. Regular *Vyayama* (physical exercise), *Nidra niyama* (regulated sleep), and stress management through yoga were key supportive measures. These classical recommendations directly align with modern preventive and therapeutic strategies for Type 2 Diabetes Mellitus.[32]

Thus, the clinical improvements observed in the reviewed studies are not isolated pharmacological effects but represent comprehensive restoration of *Agni*, balance of *Doshas*, stabilization of *Dhatus*, and elimination of *Ama*. The holistic nature of Ayurvedic treatment—addressing diet, lifestyle, and mental equilibrium—provides a sustainable foundation for long-term glycemic control.

While the results are promising, most evidence currently arises from single-case reports or limited-sample clinical studies. Larger multi-centric trials, employing both Ayurvedic diagnostic frameworks and biomedical outcome measures, are needed to validate these findings and establish integrative treatment protocols. Future research should also explore biochemical correlates of *Agnideepana* and *Kleda shoshana* to bridge traditional Ayurvedic explanations with contemporary scientific understanding.

CONCLUSION

Ayurvedic interventions show promising benefits in managing Type 2 Diabetes Mellitus (*Madhumeha*), demonstrating significant reductions in HbA1c and fasting glucose without adverse effects. These outcomes reflect correction of *Agnimandya* and *Meda dushti* through *Agnideepana*, *Shodhana*, and *Shamana* therapies. The combined use of diet, lifestyle modification, and herbal formulations such as *Gudmar*, *Triphala*, and *Chandraprabha Vati* highlights Ayurveda's holistic and sustainable approach to metabolic balance. Larger, rigorously designed clinical studies are warranted to validate these findings and further define Ayurveda's role in integrative diabetes care.

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