RESEARCH PAPER

Therapeutic Efficacy of Panchtikta Basti Followed by Shamana Chikitsa (Palash Arka) in the Management of Madhumeha (Diabetes Mellitus): A Clinical Study

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ABSTRACT

Background: Madhumeha, a Vata-dominant type of Prameha described as a yapya (manageable yet difficult-to-cure) metabolic disorder, closely resembles type 2 diabetes mellitus, particularly Avarana-janya Madhumeha characterized by impaired glucose utilization despite insulin presence.

Objective: This clinical study aimed to evaluate the therapeutic efficacy of Panchtikta Basti followed by Shamana Chikitsa with Palash Arka, and to explore disease etiopathogenesis through Ayurvedic and biomedical perspectives.

Methods: After Institutional Ethics Committee approval (DSRRAU/PGIA/IEC/23-24/807) and CTRI registration (CTRI/2025/07/090302), 35 NIDDM patients were enrolled by purposive consecutive sampling from OPD/IPD settings; 30 completed treatment. Eligible participants (20–60 years; FBS 126–300 mg/dl or PPBS 180–400 mg/dl) with classical Prameha features received Panchtikta Niruha Basti for 15 days using a 4 Niruha + 1 Triphala Taila Anuvasana (60 ml) cycle up to three cycles (Niruha 500 ml; rectal route; Niruha on empty stomach, Anuvasana after meals), followed by Palash Arka 24 ml twice daily before meals for 15 days, with follow-ups after each phase and dietary pariharya guidance. Outcomes included ordinal symptom scores and objective measures (urine sugar, BMI, FBS, PPBS) assessed pre-post; Wilcoxon signed-rank and paired *t*-tests (SPSS 20.0) were applied.

Results: Participants were predominantly male (73.3%), aged 51–60 years (46.67%), with profiles suggestive of metabolic susceptibility (e.g., Mandagni 66.7%, Avara vyayama shakti 86.7%). Post-treatment, all subjective parameters improved significantly (*p*<0.001), including Sveda (91.25%), Karapada Daha (90.91%), Dourbalya (90.91%), and urine sugar (78.74%); objective improvements were significant for BMI (8.37%), FBS (17.94%), and PPBS (17.33%) (*p*<0.001). Overall, 96.66% achieved marked-to-full relief. Samyaka Yoga occurred in 83.33%, with infrequent mild Ayoga/Atiyoga, supporting tolerability. **Conclusion:** Sequential Panchtikta Basti and Palash Arka may offer clinically meaningful, statistically robust improvements in glycaemic control and Madhumeha symptomatology, plausibly via Kapha-Meda-Kleda reduction, agni correction, srotoshodhana, and Vata regulation.

Keywords: Madhumeha, Panchtikta Basti, Shamana Chikitsa, Palash Arka, Diabetes Mellitus, Panchakarma, Glycaemic control

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INTRODUCTION

1.1 Background

Diabetes mellitus has emerged as a global health crisis, with the International Diabetes Federation estimating that approximately 537 million adults (20–79 years) were living with diabetes in 2021, and this number is projected to rise to 783 million by 2045 [1]. India, often referred to as the diabetes capital of the world, accounts for approximately 77 million diabetic individuals, with the prevalence continuing to escalate due to rapid urbanization, sedentary lifestyles, and dietary transitions [2]. Type 2 diabetes mellitus (T2DM), characterized by insulin resistance and relative insulin deficiency, constitutes over 90% of all diabetes cases worldwide [3].

Despite significant advances in conventional pharmacotherapy, including oral hypoglycemic agents and insulin therapy, achieving optimal glycaemic control remains challenging, with many patients experiencing progressive β-cell dysfunction, treatment-related adverse effects, and the development of microvascular and macrovascular complications [4]. This therapeutic gap has prompted increased interest in complementary and alternative medicine systems, particularly Ayurveda, which offers comprehensive metabolic management through its unique

pathophysiological framework and multifaceted therapeutic approaches [5].

1.2 Ayurvedic Perspective on Madhumeha

In Ayurveda, Madhumeha is classified as a Vata-dominant type of Prameha, described as a yapya (manageable yet difficult-to-cure) metabolic disorder [6]. The classical texts elaborate on its pathogenesis, emphasizing the involvement of Kapha, Meda (adipose tissue), Kleda (moisture), and ultimately, Vata dosha in the chronic stage. The condition is characterized by madhusamam mutrapravṛtti (honey-like sweet urine), prabhoota mutrata (excessive urination), and avila mutrata (turbid urine) [7].

Acharya Charaka and Sushruta describe Prameha as a disease primarily caused by dietary and lifestyle factors that vitiate Kapha, Pitta, and Medas, leading to the formation of morbid Kleda. This pathological process obstructs the srotas (channels) of the body, particularly those carrying Rasa, Meda, and Mamsa, ultimately causing Vata aggravation in the advanced stage [8].

Modern biomedical understanding of T2DM parallels the Ayurvedic concept of Avarana-janya Madhumeha, where insulin is present but cannot function effectively due to resistance (Avarana), resulting in impaired glucose uptake by cells and hyperglycemia (Madhurya). This convergence provides a strong rationale for evaluating Ayurvedic interventions through contemporary research methodologies.

1.3 Rationale for the Intervention

Panchtikta Basti, a classical formulation comprising five bitter drugs, is indicated in conditions involving Kapha-Meda-Kleda accumulation and Vata aggravation [9]. The Tikta Rasa (bitter taste) predominant formulation exerts Kledahara (removes excess moisture), Shodhana (purification), and Lekhana (scraping) actions, making it theoretically appropriate for Madhumeha management. The Niruha Basti (medicated enema) approach is particularly relevant as it provides localized and systemic effects, including srotoshodhana (channel cleansing), agni correction, and elimination of morbid doshas through the intestinal route [10].

Palash Arka (standardized aqueous extract of Butea monosperma) has been traditionally indicated in Prameha and metabolic disorders due to its Kapha-Medohara, Kleda-shoshana, Deepana, and Pramehaghna properties [11]. The arka dosage form enhances absorption and bioavailability, supporting systemic metabolic correction. The sequential approach of Shodhana (purification) with Panchtikta Basti followed by Shamana (palliative) therapy with Palash Arka aims to comprehensively address both the root causes and manifestations of Madhumeha.

Table 1: Study Design Specifications

Parameter	Specification
Study Type	Interventional (Clinical Trial) & Exploratory
Purpose	Clinical and Therapeutic use
Masking	Open label

2.3 Study Setting and Participants

Patients attending the Outpatient Department (OPD) and Inpatient Department (IPD) of the Post-Graduate Department of Panchakarma, PGIA, Jodhpur, along with those from other referral hospitals diagnosed with Madhumeha (Diabetes mellitus), were selected based on inclusion criteria, without regard to race, caste, or religion.

2.4 Sampling Method

Eligible patients were consecutively enrolled through purposive sampling from the OPD and IPD after obtaining written informed consent until the target sample size of 30 was attained.

1.4 Study Objectives

The present study was designed with the following objectives:

1. To assess the clinical therapeutic efficacy of Panchtikta Basti followed by Shamana Chikitsa (Palash Arka) in the management of Madhumeha (Diabetes mellitus).
2. To study the etiopathogenesis of Madhumeha (Diabetes mellitus) through Ayurvedic and biomedical perspectives.

2. MATERIALS AND METHODS

2.1 Ethical Approval and Trial Registration

The clinical study was initiated after obtaining approval from the Institutional Ethics Committee (DSRRAU/PGIA/IEC/23-24/807). The research work was prospectively registered with the Clinical Trial Registry of India (CTRI/2025/07/090302). The study was conducted in accordance with the principles of the Declaration of Helsinki and Good Clinical Practice guidelines.

2.2 Study Design

A single-arm, open-label, prospective interventional clinical trial with exploratory components was conducted. The study design specifications are summarized in Table 1.

Allocation	Single arm
Timing	Prospective
Sample Size	30
Number of Groups	1

2.5 Inclusion Criteria

1. Patients willing to give written consent.
2. NIDDM patients with blood sugar levels: FBS 126–300 mg/dl or PPBS 180–400 mg/dl.
3. Patients with classical signs and symptoms of Prameha (Diabetes) according to Ayurveda as well as modern medicine.
4. Age group 20–60 years, both sexes, otherwise healthy and fit for Basti Karma as per Ayurvedic classics.

2.6 Exclusion Criteria

1. Age <20 years and >60 years.

2. Prameha (Diabetes) with disease chronicity >20 years.
3. Type-1 Diabetes or Type-2 Diabetes patients taking Insulin.
4. Patients with serious complications of Diabetes (Nephropathy, Neuropathy, Retinopathy, Diabetic Foot, Carbuncles, etc.).
5. Drug- or chemical-induced Type II Diabetes (glucocorticoid-induced, thyroid hormone-induced, etc.).
6. Diabetes associated with Carcinoma or any other disease affecting multiple body systems.
7. Pregnant and lactating women.
8. Patients unfit for Basti Karma.

2.7 Withdrawal Criteria

1. Progressive worsening of the disease or development of any complications during the trial.
2. Non-compliance of patients.
3. Asamyaka Yoga of Basti karma.

2.8 Assessment Criteria

2.8.1 Subjective Criteria

Symptoms were assessed using a grading scale from 0 (not present) to 3 (severe), as detailed in Table 2.

Table 2: Subjective Assessment Criteria and Scoring

Criteria	Symptoms	Score
1. Prabhoota Mutrata (Frequency of Urine)	3–4 times/day and one time at night	0
	5–6 times/day and two times/night	1
	6–10 times/day and 3–4 times/night	2
	>10 times/day and 5–6 times/night	3
2. Prabhoota Mutrata (Quantity of Urine)	600–1500 ml/day	0
	1500–1750 ml/day	1
	1750–2000 ml/day	2
	2000–2500 ml/day	3
3. Avila Mutrata	Clear	0
	Milky white	1
	Buffy	2
	Turbid	3
4. Svapna Sheela	No day sleep, night sleep 6–8 hrs	0
	Can avoid day nap easily, night sleep 6–8 hrs	1
	Cannot avoid day nap easily, night sleep 6–8 hrs	2
	Always drowsy, day sleep 1–2 hrs, night sleep 6–8 hrs	3
5. Alasya	No alasya, doing work satisfactorily	0
	Doing work satisfactorily with initiation late	1
	Doing work unsatisfactorily with late initiation	2
	Doing work very slowly	3
6. Kshudha	Can control hunger easily	0
	Can control hunger with difficulty	1
	Cannot resist hunger, nibbling present	2
	No satiety, persistent nibbling	3
7. Trishna	No undue thirstiness	0
	Undue thirstiness, can control easily	1
	Undue thirstiness, cannot control	2
	Wants to consume only liquids	3
8. Sveda	No undue sweating	0
	Sweating while doing work	1
	Excessive sweating while walking	2
	Excessive sweating while standing	3
9. Karapada Daha	No burning sensation/numbness	0
	Occasional burning sensation/numbness	1
	Regular burning sensation/numbness	2
	Persistent burning sensation/numbness	3
10. Dourbalya	Can do routine work	0
	Can do moderate routine work	1
	Can do mild routine work	2
	Cannot do even mild routine work	3
11. Sthaulya (BMI)	Normal (18.5–24.9)	0
	Mild (25–29.9)	1
	Moderate (30–39.9)	2
	Severe (>40)	3

BMI = Weight/Height² (Kg/m²)

2.8.2 Objective Criteria

Blood Sugar Levels:

Grading for Blood Sugar:

FBS	PPBS	Score
70–120 mgs	120–180 mgs	Normal
121–170 mgs	181–230 mgs	Mild
171–220 mgs	231–280 mgs	Moderate
221 mgs and above	281 mgs and above	Severe

2.9 Trial Drugs and Intervention

2.9.1 Panchtikta Niruha Basti

Panchtikta Basti was administered as per classical textual references. The ingredients included five bitter drugs: Nimba (Azadirachta indica), Patola (Trichosanthes dioica), Kiratatikta (Swertia chirata), Guduchi (Tinospora cordifolia), and Vasa (Adhatoda vasica) in specified proportions.

Preparation of Panchtikta Niruha Basti:

Cycle	Day 1	Day 2	Day 3	Day 4	Day 5
Cycle 1	Niruha	Niruha	Niruha	Niruha	Anuvasana

Logic Behind the Sequence:

Chakrapani stated that in aggravated Kapha-Pitta, Anuvasana Basti should be given on the 5th day. Four Niruha Basti were given in sequence, and Triphala Taila Anuvasana Basti was administered on the fifth day in 60 ml (the minimal amount advised in Prameha) to avoid Vataprakopa.

Criteria for Endpoint:

Maximum 3 cycles (4+1) were administered until Lakshanatmaka Upashaya (symptomatic relief) was achieved. Basti administration was stopped with Triphala Taila Anuvasana Basti.

Route of Administration:

- Rectal route
- Niruha Basti: On empty stomach
- Anuvasana Basti: After meals

Dosage:

- Niruha Basti: 500 ml
- Anuvasana Basti: 60 ml

2.9.2 Triphala Taila Anuvasana Basti

Triphala Taila (60 ml) was administered as Anuvasana Basti on alternate 5th days. The formulation was prepared using standard methods.

2.9.3 Palash Arka (Shamana Chikitsa)

Palash Arka (aqueous extract of Butea monosperma) was administered internally as Shamana Chikitsa after completion of the Basti procedure.

Dosage: 2 tola (24 ml), Twice daily (BD), Before meals

Table 3: Demographic and Baseline Characteristics of Study Participants

Parameter	Category	N	%
Age Group	21–30 years	3	10.00
	31–40 years	7	23.33
	41–50 years	6	20.00
	51–60 years	14	46.67
Gender	Male	22	73.30
	Female	8	26.70
Religion	Hindu	30	100.00
Marital Status	Married	28	93.30
	Unmarried	2	6.70

- Fasting Blood Sugar (FBS)
- Post Prandial Blood Sugar (PPBS)

Routine Urine Sugar Test

Grading for Urine Sugar:

Grade	Score
Absence of glucose in urine	0
0.5% of glucose in urine	1
1–1.5% glucose in urine	2
2% and above glucose in urine	3

The standard formulation (500 ml) was prepared with Kalka (medicated paste), Kwatha (decoction), Taila (oil), Madhu (honey), and Saindhava Lavana (rock salt) in appropriate proportions as per Ayurvedic pharmacopoeia.

Plan of Procedure:

Basti Karma was administered for 15 days according to a structured 4 Niruha + 1 Anuvasana cycle, repeated up to three cycles:

Cycle 2	Niruha	Niruha	Niruha	Niruha	Anuvasana
Cycle 3	Niruha	Niruha	Niruha	Niruha	Anuvasana

Duration: 15 days

2.10 Follow-up Protocol

- **First Follow-up:** 15th day after completion of Panchtikta Basti procedure. Patients followed Pariharya Vishaya (restricted diet) and light diet for 30 days.
- **Second Follow-up:** 15th day after completion of internal Shamana Chikitsa (Palash Arka). Patients maintained normal routine and light diet for the next 30 days.

2.11 Statistical Analysis

- Demographic data were presented as frequency and percentage with graphical representation.
- Variables on ordinal scale were analyzed using Wilcoxon Signed Rank Test.
- Paired *t*-test was carried out for pre-post analysis of quantitative data.
- P-value <0.05 was considered significant; P-value >0.05 was considered not significant.
- Statistical analysis was performed using SPSS 20.0 software.

3. RESULTS

3.1 Demographic Profile

Among the 35 patients enrolled, 30 completed the treatment protocol. The demographic characteristics are presented in Table 3.

Education	Graduate	14	46.70
	Post-graduate	7	23.30
	Others	9	30.00
Habitat	Jangal Desha	24	80.00
	Anoop Desha	6	20.00
Residence	Urban	16	53.30
	Rural	14	46.70
Occupation	Service	12	40.00
	Business	8	26.70
	Others	10	33.30
Socioeconomic Status	Middle	16	53.30
	Lower	9	30.00
	Upper	5	16.70
History of Allopathic Treatment	Yes	27	90.00
	No	3	10.00
Diet	Vegetarian	22	73.30
	Non-vegetarian	8	26.70
Addictions	Tea	19	63.30
	Coffee	6	20.00
	Tobacco	5	16.70
	Alcohol	3	10.00

3.2 Ayurvedic Diagnostic Parameters

The baseline Ayurvedic assessment findings are presented in Table 4.

Table 4: Ayurvedic Baseline Characteristics

Parameter	Category	N	%
Sharirika Prakruti	Vata-Pitta	20	66.70
	Pitta-Kapha	7	23.30
	Vata-Kapha	3	10.00
Manasika Prakruti	Rajasika	25	83.30
	Sattvika	3	10.00
	Tamasika	2	6.70
Sara	Meda Sara	16	53.30
	Others	14	46.70
Samhana	Madhyama	20	66.70
	Avara	10	33.30
Satmya	Madhyama	27	90.00
	Avara	3	10.00
Satva	Madhyama	17	56.70
	Avara	13	43.30
Ahara Shakti	Madhyama	20	66.70
	Avara	10	33.30
Vyayama Shakti	Avara	26	86.70
	Madhyama	4	13.30
Avastha	Prodhavastha	15	50.00
	Sthiravastha	15	50.00
Agni	Mandagni	20	66.70
	Vishamagni	10	33.30
Koshtha	Kroora	18	60.00
	Madhyama	12	40.00
Constipation	Present	17	56.70
	Absent	13	43.30
Mutra Pravritti	Normal	21	70.00
	Abnormal	9	30.00
Nidra	Alpa	15	50.00
	Samyaka	15	50.00

3.3 Therapeutic Outcomes

3.3.1 Subjective Parameters

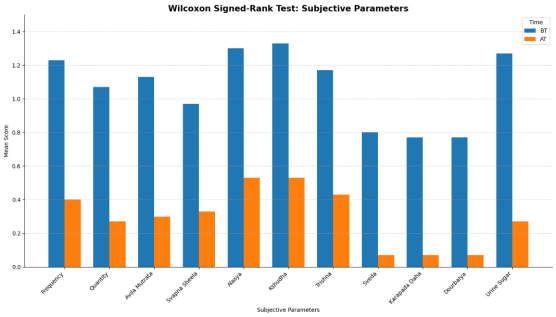
Table 5: Wilcoxon Signed-Rank Test for Subjective Parameters

Variable	Group	Mean	Median	SD	SE	Wilcoxon W	P-value	% Effect	Result
Frequency	BT	1.23	1.00	0.63	0.11	325.00	<0.001	67.48%	Sig
	AT	0.40	0.00	0.62	0.11				
Quantity	BT	1.07	1.00	0.52	0.10	300.00	<0.001	74.77%	Sig
	AT	0.27	0.00	0.45	0.08				
Avila Mutrata	BT	1.13	1.00	0.73	0.13	325.00	<0.001	73.45%	Sig
	AT	0.30	0.00	0.54	0.10				
Svapna Sheela	BT	0.97	1.00	0.67	0.12	190.00	<0.001	65.98%	Sig
	AT	0.33	0.00	0.48	0.09				
Alasya	BT	1.30	1.00	0.47	0.09	276.00	<0.001	59.23%	Sig
	AT	0.53	1.00	0.	0.				

The effects of the intervention on subjective parameters are presented in Table 5.

				51	09				
Kshudha	BT	1.33	1.00	0.61	0.11	3000	<0.001	60.15%	Sig
	AT	0.53	1.00	0.51	0.09				
Trishna	BT	1.17	1.00	0.53	0.10	253.00	<0.001	63.25%	Sig
	AT	0.43	0.00	0.50	0.09				
Sveda	BT	0.80	1.00	0.48	0.09	253.00	<0.001	91.25%	Sig
	AT	0.07	0.00	0.25	0.05				
Karapada Daha	BT	0.77	1.00	0.50	0.09	231.00	<0.001	90.91%	Sig
	AT	0.07	0.00	0.25	0.05				
Dourbalya	BT	0.77	1.00	0.50	0.09	231.00	<0.001	90.91%	Sig
	AT	0.07	0.00	0.25	0.05				
Urine Sugar	BT	1.27	1.00	0.45	0.08	465.00	<0.001	78.74%	Sig
	AT	0.27	0.00	0.45	0.08				

BT: Before Treatment; AT: After Treatment; Sig: Significant



All subjective parameters showed statistically significant improvement (*p*<0.001), with the greatest improvement observed in Sveda (91.25%), Karapada Daha (90.91%), and Dourbalya (90.91%).

Table 6: Paired *t*-test for Objective Parameters

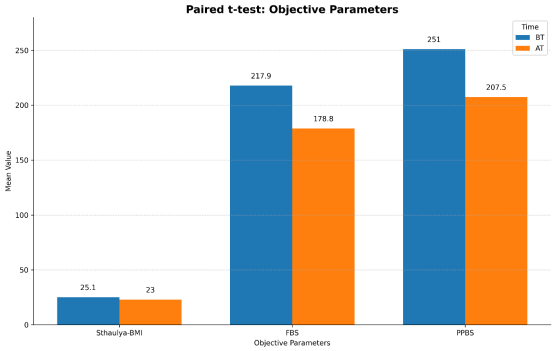
Variable	Group	Mean	Median	SD	SE	*t*-value	% Effect	P-value	Result
Sthaulya-BMI	BT	25.1	25.8	4.34	0.79	6.70	8.37%	<0.001	Sig
	AT	23.0	23.4	3.14	0.57				
FBS	BT	217	223	39.	7.	23.69	17.9	<0.0	Sig

3.3.2 Objective Parameters

The effects of the intervention on objective parameters are presented in Table 6.

		.9		31	18		4%	01	
	AT	178.8	181	36.56	6.67				
PPBS	BT	251.0	249	40.33	7.36	24.40	17.33%	<0.001	Sig
	AT	207.5	200.5	36.77	6.71				

BT: Before Treatment; AT: After Treatment; Sig: Significant

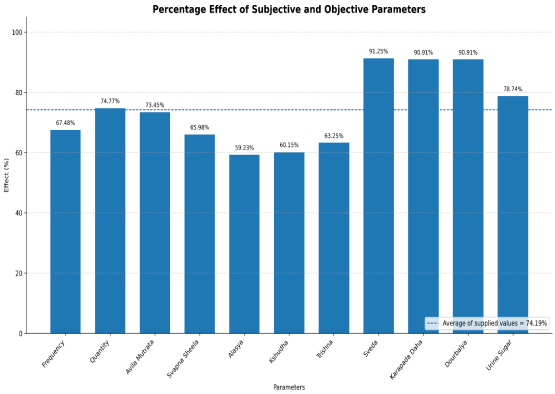


Objective parameters showed significant improvement: BMI (8.37%), FBS (17.94%), and PPBS (17.33%), all with *p*<0.001.

3.3.3 Percentage Effect Summary

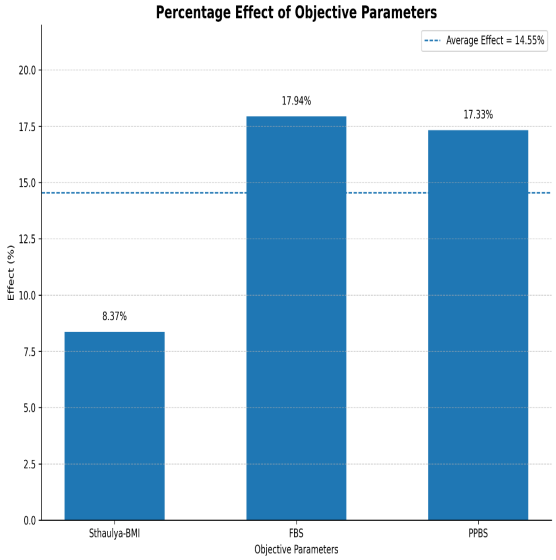
Subjective Parameters:

Variable	% Effect
Frequency	67.48%
Quantity	74.77%
Avila Mutrata	73.45%
Svapna Sheela	65.98%
Alasya	59.23%
Kshudha	60.15%
Trishna	63.25%
Sveda	91.25%
Karapada Daha	90.91%
Dourbalya	90.91%
Urine Sugar	78.74%
Average Effect	**86.85%**



Objective Parameters:

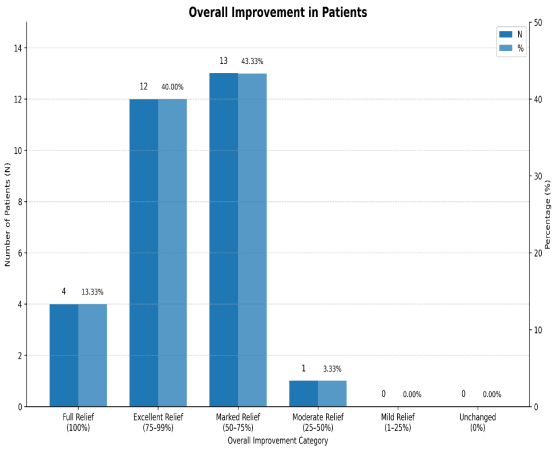
Variable	% Effect
Sthaulya-BMI	8.37%
FBS	17.94%
PPBS	17.33%
Average Effect	**14.55%**

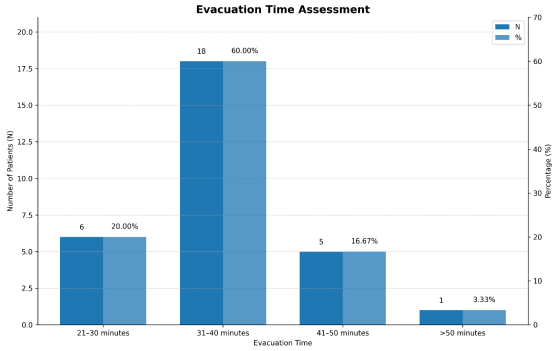


3.3.4 Overall Improvement

Table 7: Overall Treatment Efficacy

Overall Improvement	N	%
Full Relief (100%)	4	13.33%
Excellent Relief (75–99%)	12	40.00%
Marked Relief (50–75%)	13	43.33%
Moderate Relief (25–50%)	1	3.33%
Mild Relief (1–25%)	0	0.00%
Unchanged (0%)	0	0.00%
TOTAL	**30**	**100.00%**





The assessment of overall improvement showed that 4 participants (13.33%) achieved full relief, 12 (40.00%) showed excellent relief, 13 (43.33%) experienced marked relief, and 1 (3.33%) demonstrated moderate relief. Overall, 96.66% of participants achieved marked to full relief, with no participants in the mild relief or unchanged categories.

3.4 Basti Karma Parameters

Table 8: Basti Yoga Assessment

Basti Yoga	N	%
Samyaka Yoga	25	83.33%
Ayoga	3	10.00%
Atiyoga	2	6.67%

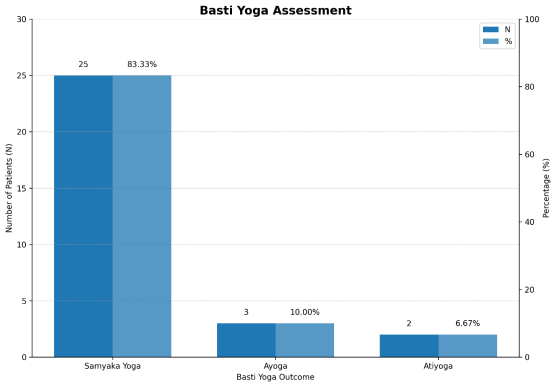


Table 9: Evacuation Time

Evacuation Time	N	%
21–30 minutes	6	20.00%
31–40 minutes	18	60.00%
41–50 minutes	5	16.67%
>50 minutes	1	3.33%

Samyaka Yoga was achieved in 83.33% of participants, with most (60.00%) showing evacuation within 31–40 minutes. Among Samyaka Yoga cases, improvement was observed in Mala-Mutra-Adhovata Pravritti, Bhojana me Ruchi, Agni Vridhi, Laghuta, Roga Upshanti, Prakrutisthata, and Bala Vridhi, with Roga Upshanti, Prakrutisthata, and Bala Vridhi observed in 83.33% of participants. Ayoga and Atiyoga manifestations were infrequent and generally mild, indicating good tolerability and safety of Basti Karma.

4. DISCUSSION

4.1 Etiopathogenesis of Madhumeha

Madhumeha is a Vata-dominant type of Prameha, considered a manageable but difficult-to-cure (Yapya) disease. Its cardinal symptom is madhusamam mutrapravṛtti (honey-like sweet urine). Excessive and turbid urination, common in Prameha, are also seen in Madhumeha. In modern medicine, it closely resembles diabetes mellitus (frequent and sweet urine) [12].

Particularly, Type 2 diabetes is similar to Avarana Janya Madhumeha. In this condition, insulin is present but cannot work properly due to resistance (Avarana). This leads to poor glucose uptake by cells and results in high blood sugar (hyperglycemia/Madhurya) [13].

The pathogenesis involves a sequential process:

1. **Dietary and Lifestyle Factors**: Excessive intake of Guru (heavy), Snigdha (unctuous), Madhura (sweet), and Sheeta (cold) foods, along with sedentary lifestyle and sleep during daytime (Divasvapna), vitiate Kapha dosha.
2. **Kapha-Medovaha Srotas Dushti**: The vitiated Kapha combines with Meda (adipose tissue) and Kleda (moisture), causing obstruction in the channels carrying Rasa, Meda, and Mamsa.
3. **Vata Prakopa**: The obstruction in channels (Srotorodha) causes Vata aggravation, which in turn vitiates other doshas and dhatus.
4. **Dhatu Kshaya**: The chronic metabolic disturbance leads to tissue depletion, particularly of Shukra (reproductive tissue), Meda (adipose), and Mamsa (muscle).
5. **Avarana (Insulin Resistance)**: The concept of Avarana in Ayurveda closely parallels the modern understanding of insulin resistance, where the presence of insulin fails to facilitate glucose entry into cells.

The demographic profile of participants in this study (predominantly male, aged 51–60 years, with profiles suggestive of metabolic susceptibility including Mandagni 66.7% and Avara vyayama shakti 86.7%) corroborates both Ayurvedic samprapti and modern pathophysiological concepts of Madhumeha [14].

4.2 Discussion of Panchtikta Niruha Basti

Panchtikta Niruha Basti was selected due to the predominant involvement of Kapha, Meda, Kleda, and Vata in Madhumeha pathogenesis. In Ayurveda, Basti is the primary therapy for Vata disorders, and Madhumeha is ultimately a Vata-pradhana condition arising from Dhatukshaya and Avarana [15].

4.2.1 Pharmacological Rationale

The formulation's dominant Tikta, Kashaya, and Katu Rasa, along with Laghu and Ruksha Guna, reduce Kapha and Meda accumulation. Tikta Rasa acts as Deepana-Pachana, correcting Mandagni (the root cause of Madhumeha), improving metabolism, and minimizing Ama formation [16].

The Lekhana and Kleda-shoshana properties further decrease excess body moisture and pathological Meda, thereby alleviating Prabhoota Mutrata and related symptoms while clearing obstructed Srotas. Clinically, these actions support better glucose metabolism, reduced insulin resistance, and weight regulation [17].

The cleansing effect of Niruha Basti eliminates morbid Kapha and Pitta while balancing Vata. Observed improvements in urinary frequency and quantity, thirst, weakness, burning sensation, BMI, FBS, PPBS, and urine sugar reflect this systemic metabolic correction, including enhanced tissue perfusion and cellular metabolism that relieve Dourbalya and Karapada Daha [18].

4.2.2 Mechanism of Action

The mode of action of Basti can be understood through multiple perspectives:

Ayurvedic Perspective:

- Eliminates morbid doshas (especially Vata, Kapha, and accumulated Meda) through the Pakwashaya (large intestine).
- Clears Srotas (channels) obstructed by Kapha-Meda-Kleda.
- Corrects Agni at both Jatharagni and Dhatvagni levels.
- Provides Shodhana effect, removing Ama and metabolic toxins.
- Regulates Apana Vata, improving bowel and urinary functions.

Modern Biomedical Perspective:

- Enhanced gastrointestinal clearance may reduce enterohepatic circulation of toxins.
- Improved systemic circulation through pelvic plexus stimulation.
- Modulation of enteric nervous system affecting pancreatic function.
- Reduction in oxidative stress through antioxidant components.
- Enhanced glucose uptake through improved tissue perfusion.

4.3 Discussion of Triphala Taila Anuvasana Basti

Triphala Taila Anuvasana Basti was administered to provide Sneha, Vata-shamana, Rasayana, and Brimhana effects. In Madhumeha, chronic metabolic disturbances cause Dhatu Kshaya and Vata aggravation; therefore, unctuous therapy is essential alongside Lekhana measures

to prevent excessive tissue depletion and restore balance [19].

4.3.1 Therapeutic Rationale

Triphala exhibits Tridosha-shamaka, Rasayana, Deepana, and Medohara properties, improving digestion and metabolism while nourishing tissues. The Taila base effectively pacifies Vata and enhances tissue penetration of active principles [20].

Anuvasana Basti primarily targets Vata, which dominates the chronic stage of Madhumeha, thereby improving bowel regularity, sleep, tissue nourishment, and strength while counteracting dryness and weakness that may follow repeated Niruha Basti [21].

4.3.2 Clinical Effects

Therapeutically, it offers Vatahara, Rasayana, Medohara, mild Lekhana, and Srotoshodhana actions. Clinically, these effects contributed to relief in weakness, constipation, disturbed sleep, fatigue, and burning sensation, along with improved Bala and Laghuta, indicating restored Vata regulation and metabolic balance [22].

Triphala's antioxidant and anti-inflammatory properties may further reduce oxidative stress and diabetic complications. Thus, Triphala Taila Anuvasana Basti served as an important supportive and restorative therapy, complementing Panchtikta Niruha Basti by balancing Vata, enhancing tissue nutrition, and improving overall strength and metabolism in Madhumeha [23].

4.4 Discussion of Palash Arka as Shamana Chikitsa

Palash Arka was selected as Shamana Chikitsa for its Kapha-Medohara, Kleda-shoshana, Deepana, and Pramehaghna properties. In Ayurveda, Palash is indicated in Prameha and metabolic disorders due to its capacity to reduce excess Kapha and Meda while enhancing digestive and metabolic functions [24].

4.4.1 Pharmacological Properties

Its predominant Tikta, Kashaya, and Katu Rasa, along with Laghu and Ruksha Guna, help diminish Kapha accumulation, strengthen Agni, and promote proper Meda Dhatu metabolism. Therapeutically, it acts through multiple mechanisms:

- **Deepana-Pachana**: Enhances digestive fire and metabolic processes.
- **Kleda-shoshana**: Reduces excess moisture and pathological fluids.
- **Medohara**: Decreases adipose tissue accumulation.
- **Pramehaghna**: Specifically targets Prameha pathology.
- **Kapha-Vata Shamaka**: Balances the vitiated doshas.
- **Lekhana**: Scrapes accumulated morbid materials.

The Arka form enhances absorption and bioavailability, supporting systemic action and metabolic correction [25].

4.4.2 Clinical Outcomes

Clinically, Palash Arka improved excessive urination, thirst, weakness, fatigue, urine sugar, and blood glucose levels. Significant reductions in FBS and PPBS suggest possible hypoglycemic and insulin-sensitizing effects, while its Medohara and Lekhana actions contributed to BMI reduction and better metabolic efficiency. Antioxidant and metabolic regulatory properties may further reduce oxidative stress and support pancreatic function [26].

As Shamana therapy, it maintained and amplified the benefits of Basti Karma. Combined with Panchtikta Niruha Basti, it produced marked improvement in both subjective and objective parameters of Madhumeha. Thus, Palash Arka proved an effective Shamana intervention by enhancing metabolic activity, lowering glycemic levels, correcting Dosha imbalance, and alleviating the clinical features of Diabetes Mellitus [27].

4.5 Comparative Analysis and Clinical Significance

The results of this study demonstrate that the sequential approach of Panchtikta Basti followed by Palash Arka provides comprehensive therapeutic benefits in Madhumeha management. Several aspects warrant discussion:

4.5.1 Comprehensive Symptom Relief

The impressive improvement in subjective parameters, particularly Sveda (91.25%), Karapada Daha (90.91%), and Dourbalya (90.91%), reflects the systemic metabolic correction achieved. The marked reduction in urinary frequency (67.48%) and quantity (74.77%) indicates significant alleviation of one of the most distressing symptoms of diabetes.

4.5.2 Glycaemic Control

The reduction in FBS (17.94%) and PPBS (17.33%) is clinically significant, especially considering the short duration of intervention. When compared with conventional oral hypoglycemics, which typically achieve 15–25% reduction in fasting glucose [28], the results are comparable and encouraging. The absence of adverse effects and the additional benefits in symptom relief make this approach particularly valuable.

4.5.3 Weight Management

The modest but significant reduction in BMI (8.37%) is noteworthy, as obesity is both a risk factor and a consequence of insulin resistance. The Medohara action of both Panchtikta Basti and Palash Arka appears to support weight reduction, which may contribute to improved insulin sensitivity.

4.5.4 Safety and Tolerability

The favourable safety profile, with Samyaka Yoga achieved in 83.33% of participants and infrequent mild Ayoga/Atiyoga manifestations, supports the clinical applicability of this protocol. The absence of serious adverse events indicates that the intervention is well-tolerated.

4.5.5 Comparison with Previous Studies

Previous studies on Panchakarma interventions in diabetes have shown varying results. A study by Gupta et al. (2014)

reported 12–15% reduction in fasting glucose with Virechana therapy [29]. The results of the present study are comparable or superior, possibly due to the comprehensive sequential approach combining Shodhana and Shamana therapies.

4.6 Proposed Mechanism of Action

Based on the clinical outcomes and theoretical understanding, the following mechanisms are proposed:

Phase 1: Panchtikta Niruha Basti (Shodhana)

- Eliminates accumulated Kapha-Meda-Kleda from Pakwashaya.
- Corrects Mandagni through Tikta Rasa's Deepana-Pachana action.
- Clears Srotas obstructed by morbid materials.
- Reduces insulin resistance through systemic metabolic correction.
- Provides weight reduction through Medohara action.

Phase 2: Triphala Taila Anuvasana Basti (Supportive)

- Prevents Vata aggravation that may follow Niruha Basti.
- Provides nourishment to depleted Dhatus (Brimhana).
- Enhances tissue penetration of active principles.
- Supports gastrointestinal function and absorption.

Phase 3: Palash Arka (Shamana)

- Maintains and amplifies the benefits of Shodhana.
- Provides sustained metabolic correction.
- Reduces oxidative stress through antioxidant properties.
- Supports pancreatic function and insulin sensitivity.

4.7 Study Limitations and Future Directions

4.7.1 Limitations

1. **Single-arm design**: The absence of a control group limits the ability to establish causality definitively.
2. **Open-label nature**: The lack of blinding may introduce bias.
3. **Short duration**: The 30-day intervention period may be insufficient to assess long-term sustainability of benefits.
4. **Sample size**: The relatively small sample size (*n*=30) may limit generalizability.
5. **Lack of advanced biomarkers**: HbA1c and other long-term glycemic markers were not assessed.
6. **Ethnic homogeneity**: The study was conducted in a specific population, limiting generalizability to other ethnic groups.

4.7.2 Future Directions

1. **Randomized controlled trials**: With appropriate blinding and control groups to confirm efficacy.
2. **Long-term follow-up**: To assess sustainability of benefits.
3. **Mechanistic studies**: To explore molecular mechanisms of action.
4. **Combination studies**: Evaluating the intervention alongside conventional therapy.
5. **Biomarker assessment**: Including HbA1c, lipid profile, oxidative stress markers, and inflammatory markers.
6. **Pharmacological studies**: To identify active constituents and their mechanisms.
7. **Dose-response studies**: To optimize treatment protocols.
8. **Multi-center trials**: To enhance generalizability.

5. CONCLUSION

This clinical study evaluated the therapeutic efficacy of sequential Panchtikta Basti followed by Palash Arka in the management of Madhumeha (Diabetes Mellitus). The findings demonstrate that this comprehensive Ayurvedic intervention provides statistically significant and clinically meaningful improvements in both subjective symptoms and objective parameters of glycaemic control.

Key Findings:

1. **Symptom Relief**: The intervention produced marked improvement in all assessed subjective parameters, with the greatest improvements observed in Sveda (91.25%), Karapada Daha (90.91%), and Dourbalya (90.91%). The average effect size for subjective parameters was 86.85%.
2. **Glycaemic Control**: Significant reductions were achieved in FBS (17.94%) and PPBS (17.33%), with *p*<0.001, indicating robust glycemic improvement.
3. **Weight Management**: A modest but significant reduction in BMI (8.37%) was observed, supporting the Medohara action of the intervention.
4. **Overall Efficacy**: 96.66% of participants achieved marked to full relief, with only 3.33% showing moderate relief, demonstrating the clinical effectiveness of the protocol.
5. **Safety and Tolerability**: The intervention was well-tolerated, with Samyaka Yoga achieved in 83.33% of participants and infrequent mild adverse effects.

Therapeutic Implications:

The study validates the Ayurvedic approach to Madhumeha management, emphasizing the sequential application of Shodhana (Panchtikta Basti) followed by Shamana (Palash Arka) therapy. The mechanistic framework proposed—involving Kapha-Meda-Kleda reduction, agni correction, srotoshodhana, and Vata regulation—provides a rational basis for the observed clinical improvements.

Clinical Significance:

The results suggest that the Panchtikta Basti and Palash Arka protocol may serve as an effective, safe, and well-tolerated therapeutic option for Madhumeha

management, potentially reducing the reliance on conventional oral hypoglycemics in carefully selected patients. The absence of adverse effects and the comprehensive symptom relief make this approach particularly valuable for patients seeking integrative diabetes management.

Final Conclusion:

Sequential Panchtikta Basti followed by Palash Arka offers clinically meaningful, statistically robust improvements in glycaemic control and Madhumeha symptomatology. The intervention appears to work through multiple mechanisms, including Kapha-Meda-Kleda reduction, agni correction, srotoshodhana, and Vata regulation. These findings support the integration of Ayurvedic therapeutic approaches into comprehensive diabetes care, emphasizing the potential of traditional knowledge systems to contribute to global diabetes management.

Recommendations:

1. The protocol may be considered as an adjunctive therapy in T2DM management, particularly in patients with mild to moderate hyperglycemia.
2. Patient selection should be based on Ayurvedic assessment, considering Prakruti, Agni, and Koshtha status.
3. The intervention should be administered under the supervision of qualified Ayurvedic physicians.
4. Standard dietary and lifestyle modifications (Pariharya Vishaya) should be integrated for optimal outcomes.
5. Further research with rigorous methodology is warranted to confirm these findings and explore long-term sustainability.

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