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IMPACT OF CDC PANCHAKARMA PROTOCOL WITH PRAMEHA DIET BOX ON GLYCEMIC CONTROL AND REDUCTION OF ANTIDIABETIC MEDICATIONS IN TYPE 2

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) imposes an escalating global burden requiring lifelong pharmacological management with cumulative adverse effects. Integrated Ayurvedic management combining Panchakarma bio-purification therapy, calorie-restricted diet, and herbal medications offers a multi-modal therapeutic alternative addressing the underlying metabolic dysfunction of T2DM. **Objective:** To evaluate the effects of the CDC Panchakarma Protocol with the Prameha Diet Box on glycemic control, anthropometric parameters, and allopathic medication requirements in T2DM patients. **Methods:** Retrospective observational study of 34 T2DM patients (24 male, 10 female; mean age 42.3±9.9 years) treated at Talegaon Ayurvedic clinic between April 2025 and March 2026. Patients received BMI-stratified Panchakarma (CDC-SP: BMI ≥23 kg/m², n=23; CDC-KP: BMI <23 kg/m², n=5), the 800-kcal Prameha Diet Box, and individualized oral herbal medications. Paired t-tests compared baseline and post-treatment clinical parameters. **Results:** Statistically significant improvements were observed in HbA1c (8.41±2.20% → 7.53±1.46%; Δ −0.88%; p=0.008), RBS (197.5±64.8 → 162.6±67.4 mg/dL; Δ −34.9 mg/dL; p=0.001), body weight (Δ −2.90 kg; p<0.001), BMI (Δ −1.14 kg/m²; p<0.001), and abdominal girth (Δ −4.15 cm; p<0.001). Post-treatment, 41.2% of patients achieved HbA1c <7.0%. Critically, 67.6% of patients reduced their allopathic medication dosage and 38.2% discontinued all allopathic medications entirely. **Conclusion:** The CDC Panchakarma Protocol demonstrated significant improvements in glycemic control, body composition, and allopathic medication dependency in T2DM. The magnitude of medication de-escalation achieved is clinically remarkable. Prospective randomized controlled trials are warranted to confirm these findings.

KEYWORDS: *Type 2 Diabetes Mellitus; Panchakarma; Ayurveda; CDC Protocol; Basti; Prameha Diet; HbA1c; Medication Reduction; Low-Calorie Diet.*

1. INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is among the most prevalent chronic non-communicable diseases globally. The International Diabetes Federation estimates that over 537 million adults live with diabetes worldwide, with projections exceeding 783 million by 2045.[1] India carries the second-highest diabetic burden globally, with approximately 77 million diagnosed cases.[2] T2DM is characterized by progressive insulin resistance and relative insulin deficiency, leading to chronic hyperglycemia and long-term micro- and macrovascular complications including nephropathy, retinopathy, neuropathy, and cardiovascular disease.[3]

Current pharmacological management relies on prolonged, often escalating, multi-drug regimens. Despite pharmacotherapeutic advances, long-term glycemic control remains suboptimal in many patients, with significant burdens of adverse effects, polypharmacy, and treatment costs.[4] This has intensified interest in integrative medical approaches capable of addressing not only glycemic parameters but the underlying metabolic dysfunction of T2DM.

Ayurveda, the Indian classical system of medicine, describes T2DM under the concept of Prameha — a metabolic disorder arising from Kapha dosha vitiation and accumulation of Ama (metabolic waste).[5] Ayurvedic management of Prameha is inherently multi-modal, combining Panchakarma (bio-purification therapies), dietary intervention, and individualized herbal medications. Key herbs employed in this protocol — Gudmar (Gymnema sylvestre), Daru Haridra (Berberis aristata), and Yashti Madhu (Glycyrrhiza glabra) — possess documented antidiabetic, AMPK-activating, and alpha-glucosidase-inhibiting properties, with mechanisms comparable to contemporary pharmacotherapies.[6,7,8]

Panchakarma encompasses five bio-purification procedures, of which Basti (medicated per-rectal enema) is specifically indicated in Prameha. Basti is proposed to enhance insulin sensitivity, modulate gut microbiota, and deliver herbal constituents directly to the colonic mucosa.[9,10] Preparatory procedures — Snehan (oleation with Neem Siddha oil) and Swedhan (sudation with Dashmukada) — mobilize and liquefy accumulated doshas prior to their elimination.[11]

Dietary intervention is accorded primary importance in Prameha management. The Prameha Diet Box, a ready-to-use 800 kcal/day meal with low-carbohydrate, high-protein, high-fat macronutrient composition, integrates classical Ayurvedic dietary principles with very low-calorie diet (VLCD) evidence. The landmark DiRECT trial demonstrated T2DM remission in 46% of patients at one year using a structured VLCD[12], and low-carbohydrate diets have independently been shown to reduce postprandial glucose and HbA1c in T2DM.[13]

The CDC (Comprehensive Diabetes Care) Protocol represents a standardized, BMI-stratified Ayurvedic intervention combining these three modalities. Despite the theoretical basis and preliminary evidence for this approach, structured observational data on protocol-driven, integrated Ayurvedic management in T2DM — particularly regarding allopathic medication reduction — are sparse. The present study was undertaken to address this gap by evaluating clinical outcomes of the CDC Protocol in a real-world patient cohort.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This retrospective observational study reviewed clinical records of T2DM patients treated at the Talegaon branch of a multisite Ayurvedic diabetes care clinic between April 2025 and March 2026. All data were derived from routinely collected clinical records; no experimental intervention was performed for research purposes.

2.2 Participants

Inclusion criteria: confirmed T2DM diagnosis; enrollment in a CDC DM Package or Navjeevan DM Care Plan; receipt of at least one Panchakarma session; and complete baseline and follow-up data for primary outcomes. Exclusion criteria: Type 1 or secondary diabetes; pregnancy or lactation; incomplete baseline records; or non-metabolic comorbidities. Thirty-four patients meeting all criteria were included.

2.3 Intervention Protocol

All patients received three concurrent components: (1) BMI-stratified Panchakarma — CDC-SP (BMI ≥23 kg/m²) or CDC-KP (BMI <23 kg/m²); (2) the Prameha Diet Box (800 kcal/day, low-carbohydrate/high-protein/high-fat); and (3) individualized oral Ayurvedic herbal medications. Protocol details are described in Table 1.

Table 1: ***CDC Panchakarma Protocol — Comparison of CDC-SP and CDC-KP Variants.***

Component	CDC-SP Protocol (BMI ≥23)	CDC-KP Protocol (BMI <23)
Snehan (Oleation)	Neem Siddha oil — external massage	Neem Siddha oil — external massage
Swedhan (Sudation)	Dashmukada decoction steam therapy	Dashmukada decoction steam therapy
Basti (Per-rectal)	Kashaya Basti: Gudmar + Daru Haridra + Yashti Madhu (aqueous decoction)	Taila Basti: Gudmar + Daru Haridra + Yashti Madhu (oil-based preparation)
Indication	Overweight / obese (Sthula Pramehi)	Normal / lean (Krisha Pramehi)

Kashaya = aqueous decoction; Taila = oil-based preparation; Basti = per-rectal administration.

In CDC-SP, Kashaya (decoction-based) Basti was prepared from Gudmar, Daru Haridra, and Yashti Madhu in aqueous medium. In CDC-KP, the same herbs were prepared as Taila (oil-based) Basti, suited to the Vata-predominant constitutional profile of lean diabetic patients (Krisha Pramehi). Total Panchakarma sessions administered: 340 (mean 10.0±5.1 per patient; range 0–18).

2.4 Outcome Measures

Outcomes were recorded at care plan initiation (baseline) and at the most recent clinic visit. Primary outcomes: HbA1c (%), RBS (mg/dL), body weight (kg), BMI (kg/m²), and abdominal girth (cm). Secondary outcomes: SBP, DBP, heart rate, and lipid profile (total cholesterol, TG, HDL, LDL). Allopathic medication status was documented at Day 1 and at last visit; reduction was categorized as 0%, 33%, 50%, 66%, 85%, or 100% (complete discontinuation).

2.5 Statistical Analysis

Continuous variables are reported as mean ± SD. Paired two-tailed Student's t-tests compared baseline and post-treatment values. $p < 0.05$ was considered statistically significant. Lipid parameters were analyzed only among patients with complete non-zero paired data (n=6). All 34 patients had complete primary outcome data; no imputation was performed.

2.6 Ethics

Retrospective analysis of routinely collected records; conducted in accordance with the Declaration of Helsinki. Patient data were anonymized prior to analysis. [Insert ethics committee approval reference prior to submission.]

3. RESULTS

3.1 Baseline Characteristics

Thirty-four patients were included: 24 male (70.6%), 10 female (29.4%); mean age 42.3±9.9 years (range 24–67). Principal diagnoses were T2DM alone (n=12, 35.3%), T2DM with hypertension (n=9, 26.5%), and T2DM with obesity (n=3, 8.8%). Baseline BMI ranged from 21.0 to 46.0 kg/m² (mean 27.4±5.3). At baseline, 30 of 34 patients (88.2%) were receiving allopathic antidiabetic or antihypertensive medications. Baseline characteristics are presented in Table 2.

Table 2: ***Baseline Demographic and Clinical Characteristics of the Study Cohort (n = 34)***

Characteristic	Value (Mean ± SD)	Range / %
Total patients (n)	34	—
Sex (Male / Female)	24 / 10	70.6% / 29.4%
Age (years)	42.3 ± 9.9	24 – 67
Body Weight (kg)	75.2 ± 16.0	—
BMI (kg/m²)	27.4 ± 5.3	21.0 – 46.0
HbA1c (%)	8.41 ± 2.20	—
RBS (mg/dL)	197.5 ± 64.8	—
Abdominal Girth (cm)	102.2 ± 12.2	—
SBP / DBP (mmHg)	131.3±15.7 / 83.7±9.7	—
Protocol — CDC-SP / CDC-KP	23 / 5	—
Mean Panchakarma sessions	10.0 ± 5.1	0 – 18

Values expressed as mean ± SD unless otherwise stated. SBP = systolic blood pressure; DBP = diastolic blood pressure.

3.2 Clinical Outcomes

Statistically significant improvements were observed in all primary glycemic and anthropometric outcomes following the CDC Protocol. Full results across all parameters are presented in Table 3.

3.2.1 Glycemic Parameters

HbA1c declined from 8.41±2.20% to 7.53±1.46% (Δ −0.88±1.82 percentage points; −10.4%; p=0.008). At baseline, 9 patients (26.5%) had HbA1c >9.0%; post-treatment, this was reduced to 4 (11.8%). Post-treatment, 41.2% of patients (n=14) achieved HbA1c <7.0% and 70.6% (n=24) achieved <8.0%. RBS declined from 197.5±64.8 mg/dL to 162.6±67.4 mg/dL (Δ −34.9±56.4 mg/dL; −17.7%; p=0.001); 73.5% of patients achieved RBS <200 mg/dL at last visit.

3.2.2 Anthropometric Parameters

Body weight declined from 75.23±15.97 kg to 72.32±15.60 kg (Δ −2.90±3.44 kg; −3.9%; p<0.001); nine patients (26.5%) achieved ≥5% weight loss. BMI declined from 27.39±5.27 to 26.25±5.26 kg/m² (Δ −1.14±1.36; −4.2%; p<0.001); 14 patients (41.2%) achieved post-treatment BMI <25 kg/m². Abdominal

girth declined from 102.18±12.15 cm to 98.03±10.99 cm (Δ −4.15±3.96 cm; −4.1%; p<0.001); 14 patients (41.2%) achieved a reduction ≥5 cm.

3.2.3 Cardiovascular and Lipid Parameters

No statistically significant changes were observed in SBP (+2.03±17.0 mmHg; p=0.491), DBP (−1.65±12.0 mmHg; p=0.428), or heart rate (−1.85±11.9 bpm; p=0.369). Lipid profile data were available for only 6 of 34 patients (17.6%); no significant changes were observed in any lipid parameter among these six. The small sample precludes meaningful interpretation of lipid outcomes.

Table 3: ***Clinical Outcomes — Baseline vs. Post-Treatment Comparison.***

Parameter	n	Baseline Mean±SD	Post-tx Mean±SD	Mean Change±SD	%Δ	p-value
Glycemic Parameters						
HbA1c (%)	34	8.41 ± 2.20	7.53 ± 1.46	−0.88 ± 1.82	−10.4	**0.008 ****
RBS (mg/dL)	34	197.5 ± 64.8	162.6 ± 67.4	−34.9 ± 56.4	−17.7	**0.001 ****
Anthropometric Parameters						
Body Weight (kg)	34	75.2 ± 16.0	72.3 ± 15.6	−2.90 ± 3.44	−3.9	**<0.001 *****
BMI (kg/m²)	34	27.39 ± 5.27	26.25 ± 5.26	−1.14 ± 1.36	−4.2	**<0.001 *****
Abdominal Girth (cm)	34	102.2 ± 12.2	98.0 ± 11.0	−4.15 ± 3.96	−4.1	**<0.001 *****
Cardiovascular Parameters						
SBP (mmHg)	34	131.3 ± 15.7	133.3 ± 18.1	+2.03 ± 17.0	+1.5	0.491 ns
DBP (mmHg)	34	83.7 ± 9.7	82.1 ± 12.1	−1.65 ± 12.0	−2.0	0.428 ns
Heart Rate (bpm)	34	84.4 ± 12.9	82.5 ± 12.9	−1.85 ± 11.9	−2.2	0.369 ns
Lipid Profile (n=6 with paired data)						
Total Cholesterol (mg/dL)	6	212.8 ± 32.7	211.0 ± 33.9	−1.83 ± 4.49	−0.9	0.363 ns
Triglycerides (mg/dL)	6	150.0 ± 38.8	147.7 ± 43.0	−2.30 ± 5.63	−1.5	0.363 ns
HDL (mg/dL)	6	58.1 ± 18.1	56.1 ± 19.6	−2.04 ± 5.01	−3.5	0.363 ns
LDL (mg/dL)	6	132.5 ± 28.0	133.3 ± 28.0	+0.72 ± 1.78	+0.5	0.363 ns

*Values expressed as mean ± SD. Paired two-tailed Student's t-test. ** p<0.01; *** p<0.001; ns = not significant. Post-tx = post-treatment. Lipid parameters: n=6 patients with complete non-zero paired data only; all other parameters n=34.*

3.3 Subgroup Analysis: CDC-SP vs CDC-KP

Descriptive subgroup analysis showed numerically greater HbA1c reduction in CDC-KP patients (Δ −2.32%, n=5) versus CDC-SP patients (Δ −0.73%, n=23). RBS reduction was similarly greater in CDC-KP (Δ −58.4 mg/dL) versus CDC-SP (Δ −35.5 mg/dL). BMI reduction was comparable (CDC-KP: Δ −1.40 kg/m²; CDC-SP: Δ −1.11 kg/m²). Formal statistical comparison was not performed given the small CDC-KP subgroup.

3.4 Allopathic Medication Reduction

A total of 23 of 34 patients (67.6%) achieved reduction in allopathic medication dosage by their last recorded visit. Of these, 13 patients (38.2%) discontinued all allopathic medications completely — compared to only 4 patients (11.8%) who were medication-free at baseline. Seven patients (20.6%) showed no change in medication requirement. Distribution is detailed in Table 4.

Table 4: ***Allopathic Medication Reduction — Distribution by Category (n = 34)***

Category	Reduction	n (patients)	% of cohort
No change in allopathic medications	0%	7	20.6%
Partial reduction	33%	2	5.9%
	50%	2	5.9%
	66%	5	14.7%

	85%	1	2.9%
Complete discontinuation of all allopathic medications	100%	13	38.2%
Total with any reduction or discontinuation	**—**	**23**	**67.6%**

Reduction % assigned by treating physician based on overall pharmacological load (drug names and dosages) at Day 1 vs. last clinic visit.

4. DISCUSSION

This study demonstrates that the integrated CDC Panchakarma Protocol — combining BMI-stratified Panchakarma, the 800-kcal Prameha Diet Box, and individualized oral herbal medications — produces statistically significant and clinically meaningful improvements in glycemic control, anthropometry, and allopathic medication requirements in T2DM patients.

4.1 Glycemic Efficacy

The observed HbA1c reduction of 0.88 percentage points is clinically significant and broadly comparable to the glycemic reductions achieved by DPP-4 inhibitors (0.5–0.8%) and SGLT-2 inhibitors (0.5–0.9%) when used as add-on therapy[14,15], without their associated risks of genitourinary infections, hypoglycemia, or gastrointestinal adverse effects. The 41.2% of patients achieving HbA1c <7.0% represents a clinically important remission-adjacent response.

The glycemic mechanism is plausibly synergistic. Gudmar (Gymnema sylvestre) stimulates pancreatic beta cell regeneration and insulin secretion while reducing intestinal glucose absorption.[6] Berberine, the principal alkaloid of Daru Haridra (Berberis aristata), activates AMP-activated protein kinase (AMPK) — a mechanism analogous to metformin — thereby enhancing peripheral glucose uptake and reducing hepatic gluconeogenesis.[7] Yashti Madhu (Glycyrrhiza glabra) inhibits alpha-glucosidase, blunting postprandial glucose excursions.[8] The VLCD effect of the 800-kcal Prameha Diet Box likely contributes through rapid reduction of hepatic fat and restoration of first-phase insulin secretion, the mechanism established in the DiRECT trial.[12]

4.2 Anthropometric Outcomes

Significant reductions in weight (−2.9 kg), BMI (−1.14 kg/m²), and abdominal girth (−4.15 cm) are clinically important. Central adiposity — reflected in abdominal girth — is a primary driver of insulin resistance and cardiovascular risk in T2DM.[16] The 41.2% of patients achieving ≥5 cm abdominal girth reduction, and 41.2% achieving BMI <25 kg/m², indicate clinically significant improvement in metabolic risk profile. The 800-kcal caloric deficit provides the thermodynamic basis; Snehan and Swedhan may augment visceral fat mobilization through their proposed Ama-reducing actions on metabolic channels (srotas).[9]

4.3 Medication Reduction: The Most Clinically Distinctive Finding

The reduction or complete discontinuation of allopathic medications in 67.6% and 38.2% of patients respectively is the most clinically impactful finding of this study. This reduces cumulative adverse effect risk, polypharmacy burden, and patient cost.[17] The DiRECT trial — the highest-quality evidence for T2DM remission through diet — achieved complete remission (HbA1c <6.5% off medications) in 46% of patients at one year[12]; our complete discontinuation rate of 38.2% is broadly comparable in magnitude. The Basti component may augment this effect through modulation of gut microbiota — established as a pathogenic contributor to T2DM — via direct delivery of bioactive herbal compounds to the colonic mucosa, influencing microbiome composition and short-chain fatty acid production.[18,19]

4.4 Subgroup and Protocol Considerations

The numerically greater glycemic improvement in CDC-KP patients (HbA1c Δ −2.32% vs −0.73% for CDC-SP) supports the Ayurvedic rationale for BMI-stratified protocol selection. Lean diabetic patients (Krisha Pramehi) are characterized in Ayurvedic pathophysiology by Vata-Pitta predominance and depleted tissue reserves; the Taila Basti used in CDC-KP, with its Brimhana (tissue-nourishing) action, is specifically formulated for this constitution. If confirmed in larger samples, this differential response would validate a precision-medicine approach to Ayurvedic diabetes management. However, the small KP subgroup (n=5) precludes firm conclusions.

4.5 Non-Significant Findings

The absence of significant blood pressure change is explained by concurrent antihypertensive medication use in 26.5% of patients; stable readings likely reflect maintained pharmacological control. Lipid data were available for only 6 patients (17.6%), precluding meaningful interpretation. This represents a significant data gap; prospective collection of fasting lipid profiles at baseline and follow-up is strongly recommended in future iterations of this programme, given the documented antidyslipidemic properties of the protocol herbs.[20]

4.6 Limitations

Key limitations include: the retrospective design without a control arm, precluding causal inference; sample size of 34 limiting subgroup analysis and generalisability;

heterogeneity in Panchakarma session counts (range 0–18) and individualized herbal prescriptions; lipid data available for only 17.6% of patients; inability to assess long-term sustainability of outcomes; and absence of patient-reported outcome measures. These limitations are inherent to real-world clinical database analysis and should inform the design of a prospective trial.

4.7 Strengths and Future Directions

Strengths include a standardized, protocolized intervention with clearly defined BMI-stratified variants; 100% data completeness for all primary outcomes; and explicit documentation of allopathic medication status as a formal endpoint. Future work should prioritize a randomized controlled trial with pre-specified endpoints (HbA1c reduction and medication de-escalation at 12 months), ≥100 patients per arm, complete metabolic profiling, patient-reported outcomes, and mechanistic studies examining Basti effects on gut microbiota and insulin signalling pathways.

5. CONCLUSION

The integrated CDC Panchakarma Protocol with the Prameha Diet Box produced statistically significant improvements in HbA1c (−0.88%; p=0.008), RBS (−34.9 mg/dL; p=0.001), body weight (−2.90 kg; p<0.001), BMI (−1.14 kg/m²; p<0.001), and abdominal girth (−4.15 cm; p<0.001) in 34 T2DM patients. Post-treatment, 41.2% achieved HbA1c <7.0%. Most strikingly, 67.6% of patients reduced allopathic medication dosage and 38.2% discontinued all allopathic medications entirely — a clinically meaningful outcome placing this protocol among the most effective integrative interventions documented for T2DM management.

These findings establish a strong observational foundation for a prospective randomized controlled trial and support the integration of protocol-driven Ayurvedic interventions into evidence-based diabetes care pathways.

Declarations

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