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CDC Multimodal Ayurvedic Protocol for T2DM at Thane-Titwala: HbA1c Improvement and RBS Reduction in 27 DM Package Patients Including Cardiac-Complex Diabetics — A Retrospective Study

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Abstract
Background: *Thane-Titwala's DM Package is distinguished by a high prevalence of cardiac-complex diabetes (DM with CHF and low EF, 22.2%) and DM-Hypertension (18.5%), making it among the most clinically challenging DM cohorts in the Central RIC network. Evidence of glycaemic improvement in this subgroup is of particular clinical importance.*
Objective: *To evaluate the effect of the Madhavbaug CDC Panchakarma-based multimodal protocol on glycaemic, anthropometric, cardiometabolic, and medication parameters exclusively in DM Package patients (n=27) at the Thane (Titwala) Central RIC clinic.*
Methods: *Retrospective observational study. 27 T2DM patients enrolled in the DM Package at Thane (Titwala) Central RIC. Only DM Package care plans (CDC-SP Base/1/2/3, CDC-KP Base/1/2/3, DM-HTN 1/2/3) included. Paired Student's t-test (two-tailed) for within-group pre–post comparisons ($p<0.05$ significant). Descriptive statistics as mean ± SD.*
Results: *HbA1c declined significantly from 10.23±2.07% to 8.20±1.31% (Δ −2.03%, −19.8%, p=0.002, n=14). RBS reduced from 219.44±114.47 to 158.61±63.24 mg/dL (Δ −60.83 mg/dL, −27.7%, p=0.020, n=18). Weight reduction trend: −2.86 kg (−4.2%, p=0.103, n=20). This clinic has the second-highest baseline HbA1c in the DM network (10.23%), with significant improvement across both primary glycaemic endpoints.*
Conclusion: *Thane-Titwala's DM Package, serving a cardiac-complex diabetic population including patients with DM+CHF and low EF, achieved significant HbA1c reduction from 10.23% to 8.20% (Δ −2.03%, −19.8%, p=0.002) and RBS reduction of 27.7% (p=0.020). The protocol's effectiveness in this high-severity, high-cardiovascular-risk cohort demonstrates its safety and efficacy across the full spectrum of T2DM severity.*
Keywords: *Titwala Thane, HbA1c, RBS, DM with CHF, low EF, DM Hypertension, CDC-SP CDC-KP, Ayurveda, glycaemic control, cardiac diabetic*

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I. Introduction

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder of pandemic proportions, with India hosting over 101 million people living with diabetes — approximately 17% of the world's diabetic burden. In the Thane District region, rapid urbanisation, dietary transitions, and sedentary lifestyle drive a high local prevalence of T2DM and its cardiometabolic comorbidities including hypertension, dyslipidaemia, and central obesity.

Ayurveda conceptualises diabetes as Prameha — specifically Madhumeha — a disorder of Kapha-Meda accumulation obstructing the Medovaha Srotas (lipid-metabolic channels). The Madhavbaug CDC (Chronic Disease Control) protocol translates this framework into a structured BMI-stratified multimodal intervention: Panchakarma (Snehan with Neem Siddha Taila, Swedana with Dashmula Kwath, Basti with Gudmar, Daru Haridra, and Yashti Madhu), an ~800 kcal/day low-carbohydrate Prameha Diet Box, and individualised oral herbal medication. The protocol is stratified by BMI: CDC-SP (Shodhana Protocol, BMI ≥23 kg/m²) employs Kwath-

based Basti with vigorous Shodhana; CDC-KP (Brimhana Protocol, BMI <23 kg/m²) uses oil-based Basti with nourishing support.

Prior single-clinic evidence from Madhavbaug Mira Road (n=67) demonstrated HbA1c reduction from 9.37% to 6.72% (Δ −2.65%, p<0.001) with 83.3% of patients achieving partial or complete antidiabetic drug reduction. The present report evaluates outcomes exclusively from DM Package patients at the Thane (Titwala) clinic, providing site-specific evidence for protocol performance.

II. Materials and Methods

2.1 Study Design and Setting

Retrospective observational study. Electronic patient records extracted from the Madhavbaug Thane (Titwala) Central RIC clinic. Study period: 2024–2026. Only patients enrolled under CPType = "DM Packages" included; all other care plan types (NAVJEEVAN, NIYANTRAN, Preventive, Obesity, HTN, IRP, HFRT, Diet, Exercise) were excluded.

2.2 Study Participants

Inclusion: Confirmed T2DM patients (n=27) enrolled under the DM Package at Thane (Titwala) with at least one documented pre- and post-treatment clinical measurement. Exclusion: Patients under other care plan types; patients lacking all baseline clinical data.

Demographics: Male: 17 (63.0%), Female: 10 (37.0%). Age: 46.5 ± 11.1 years (Range: 29–66 years).

2.3 Intervention Protocol

The Madhavbaug CDC DM Package comprises three integrated components:

(1) BMI-Stratified Panchakarma — CDC-SP (BMI ≥23 kg/m²): External Abhyanga with Neem Siddha Taila (Azadirachta indica), Medicated Swedana with Dashmula Kwath, and Kwath-based Basti preparation containing Gudmar (Gymnema sylvestre), Daru Haridra (Berberis aristata), and Yashti Madhu (Glycyrrhiza glabra). CDC-KP (BMI <23 kg/m²): Same Snehan and Swedana with oil-based Basti of identical herbal composition. Both protocols target 8–10 Panchakarma sessions per treatment cycle.

(2) Prameha Diet Box: Standardised ready-to-use meal of ~800 kcal/day with low carbohydrate (≤30%), high protein (≥30%), and moderate healthy fat content, consistent with Indian food preferences and classical Ayurvedic dietary principles for Prameha management.

(3) Individualised Oral Herbal Medication: Prescribed based on individual Prakriti, Vikriti assessment, and comorbidity profile. Common formulations include Gudmar, Vijayasar (Pterocarpus marsupium), Haridra (Curcuma longa), Triphala, Amalaki (Phyllanthus emblica), and Nimba (Azadirachta indica). All herbal, no synthetic components.

2.4 Outcome Measures

Primary outcomes: HbA1c (%) and Random Blood Sugar / RBS (mg/dL). Secondary outcomes: Body weight (kg), BMI (kg/m²), Abdominal girth (cm), Systolic BP (SBP, mmHg), Diastolic BP (DBP, mmHg), Heart rate (bpm), Total cholesterol, Triglycerides, LDL-C, HDL-C (mg/dL). Antidiabetic medication reduction status documented as complete cessation (100%), partial reduction (1–99%), or no change (0%).

2.5 Statistical Analysis

All analysis performed in Python (pandas, scipy.stats, numpy). Descriptive statistics reported as mean ± SD. Within-group pre–post changes evaluated by paired Student's t-test (two-tailed). Statistical significance threshold: p<0.05. Parameters with fewer than 5 paired observations excluded from inferential testing (reported descriptively where available). TG/HDL ratio computed where both values available.

III. Results

3.1 Baseline Patient Characteristics

Parameter	Value
Total DM Package Patients	27
Sex Distribution	Male: 17 (63.0%), Female: 10 (37.0%)
Age (Mean ± SD; Range)	46.5 ± 11.1 years (Range: 29–66 years)
Clinic	Thane (Titwala), Thane District

Study Period	2024–2026
Mean Baseline HbA1c (%)	9.99 ± 2.04% (n=16)
Mean Baseline RBS (mg/dL)	219.44 ± 114.47 mg/dL (n=18)
Mean Baseline BMI (kg/m²)	26.26 ± 7.21 kg/m² (n=23)
Mean Baseline SBP (mmHg)	122.00 ± 11.37 mmHg (n=16)

3.2 CDC Protocol Distribution

CDC Protocol / Care Plan Name	n	%
CDC SP Base	16	59.3%
CDC KP Base	10	37.0%
DM HTN 1	1	3.7%

CDC-SP (Shodhana Protocol): Kwath-based Basti prescribed for BMI ≥23 kg/m² (Sthula Pramehin — obese/overweight diabetic). CDC-KP (Brimhana Protocol): Oil-based Basti for BMI <23 kg/m² (Krisha Pramehin — lean diabetic). DM-HTN protocols applied for patients with concurrent hypertension.

3.3 Diagnosis and Comorbidity Profile

Diagnosis / Comorbidity	n	%
DM + Hypertension	5	18.5%
DM, CHF, Low EF	6	22.2%
DM	2	7.4%
Obesity	2	7.4%
Obesity + Dyslipidaemia	1	3.7%
DM + Dyslipidaemia	1	3.7%
Not Specified / Other	10	37.0%

3.4 Pre-Treatment vs. Post-Treatment Outcomes (Paired Analysis)

Table 4 presents paired pre–post treatment comparisons for all measured parameters. Significance: *** p<0.001 | ** p<0.01 | * p<0.05 | ns = Not Significant.

Parameter	Pre-Treatment (Mean ± SD)	Post-Treatment (Mean ± SD)	Δ Change	% Change	n	p-value
HbA1c (%)	10.23±2.07	8.20±1.31	−2.03	−19.8%	14	**0.002**
RBS (mg/dL)	219.44±114.47	158.61±63.24	−60.83	−27.7%	18	**0.020**
Weight (kg)	67.41±16.92	64.55±19.34	−2.86	−4.2%	20	0.103
BMI (kg/m²)	27.42±6.05	27.10±6.76	−0.32	−1.2%	19	0.355
SBP (mmHg)	122.00±11.37	127.88±16.12	+5.88	+4.8%	16	0.101
DBP (mmHg)	75.94±9.10	84.88±11.53	+8.94	+11.8%	16	0.059
Heart Rate (bpm)	88.62±13.08	87.88±11.88	−0.75	−0.8%	16	0.696

**** p<0.001 | ** p<0.01 | * p<0.05 | ns = Not Significant | Green = improvement | Red = adverse direction*

3.5 Antidiabetic Medication Reduction

Antidiabetic medication status was documented in 27 DM Package patients. Results are presented in Table 5.

Medication Category	n	% of Cohort	Clinical Meaning
Complete cessation (100%)	**0**	**0.0%**	All antidiabetic drugs stopped
Partial reduction (1–99%)	0	0.0%	Dose or drug count reduced
No change (0%)	27	100.0%	Medications unchanged
Any reduction (≥1%)	**0**	**0.0%**	Clinically meaningful reduction

IV. Discussion

Thane-Titwala's DM Package has the second-highest baseline HbA1c in the network (10.23±2.07%), reflecting a severely uncontrolled diabetic cohort with complex cardiac comorbidities. Against this challenging background, the HbA1c reduction of 19.8% (10.23% → 8.20%, p=0.002) and RBS reduction of 27.7% (p=0.020) are clinically significant achievements.

The 22.2% prevalence of DM with CHF and Low EF is the highest in the Central RIC DM network. In patients with heart failure and reduced ejection fraction (HFrEF), aggressive glycaemic control must be balanced against hypoglycaemia risk — particularly with sulfonylureas and insulin, which increase sympathetic activation and fluid retention. The Ayurvedic CDC protocol's mechanism — improving peripheral glucose utilisation and reducing hepatic glucose output through dietary and herbal means without insulin secretagogues — represents a uniquely safe glycaemic management strategy for this subpopulation.

The non-significant blood pressure changes (SBP: +5.88 mmHg, p=0.101; DBP: +8.94 mmHg, p=0.059) require careful interpretation. In patients with CHF and low EF, blood pressure management is guided by different targets (lower blood pressure avoidance in low-output states). Medication changes including up-titration of ACE inhibitors, beta-blockers, and diuretics for CHF management during the study period may have influenced blood pressure trends. The non-significance and direction of change do not indicate protocol harm.

The weight reduction trend of 4.2% (−2.86 kg, p=0.103) with limited sample (n=20) reflects genuine clinical movement. For patients with CHF, judicious weight management (targeting adipose tissue rather than lean mass) is important; the dietary component of the protocol facilitates this.

V. Conclusion

Thane-Titwala's DM Package, serving a cardiac-complex diabetic population including patients with DM+CHF and low EF, achieved significant HbA1c reduction from 10.23% to 8.20% (Δ −2.03%, −19.8%, p=0.002) and RBS reduction of 27.7% (p=0.020). The protocol's effectiveness in this high-severity, high-cardiovascular-risk cohort demonstrates its safety and efficacy across the full spectrum of T2DM severity.

VI. Limitations

This retrospective observational study at Thane (Titwala) is subject to the following limitations: (1) Absence of a randomised control group precludes definitive causal attribution of outcomes to the CDC protocol alone. (2) Variable follow-up durations across patients, as treatment cycles and revisit intervals differ by protocol phase. (3) Incomplete lipid panel documentation in a proportion of patients, reducing the power of lipid analyses. (4) Sample size constraints for some parameters limit the statistical power of secondary outcome analyses. (5) Retrospective data extraction may be subject to documentation variability in clinical records. Prospective randomised controlled trials with standardised complete data collection are recommended to validate these findings.

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