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Research article

Comprehensive Glycaemic and Cardiometabolic Outcomes of the CDC DM Package at Navi Mumbai-Nerul: A Retrospective Analysis of 44 T2DM Patients with Significant HbA1c Reduction, Blood Pressure Control and Abdominal Girth Improvement

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ABSTRACT

Background: Navi Mumbai-Nerul's DM Package presents a female-predominant cohort (54.5%) with high baseline HbA1c (8.92%) and strong protocol adherence, producing one of the most comprehensive significant improvement profiles among Central RIC DM clinics.

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=44) at the Navi Mumbai (Nerul) Central RIC clinic.

Methods: Retrospective observational study. 44 T2DM patients enrolled in the DM Package at Navi Mumbai (Nerul) 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 from 8.93±2.03% to 7.48±1.42% (Δ −1.45%, −16.2%, p<0.001, n=38). RBS reduced by −50.27 mg/dL (−22.3%, p=0.002, n=33). Weight fell by −2.47 kg (−3.3%, p<0.001). BMI −0.97 kg/m² (−3.3%, p<0.001). Abdominal girth −3.86 cm (−3.8%, p<0.001). SBP −7.59 mmHg (−5.7%, p=0.004). DBP −4.22 mmHg (−5.0%, p=0.034). Heart rate −4.53 bpm (−5.1%, p=0.009). Medication reduction achieved in 47.7% of patients (21/44).

Conclusion: Navi Mumbai-Nerul achieved statistically significant improvements across all measured parameters — HbA1c (−16.2%), RBS (−22.3%), weight (−3.3%), BMI (−3.3%), abdominal girth (−3.86 cm), SBP (−7.59 mmHg), DBP (−4.22 mmHg), and heart rate (−4.53 bpm) — in 44 DM Package patients. The 47.7% medication reduction rate and comprehensive parameter improvements make this clinic one of the strongest performing DM-specific sites in the Central RIC network.

1.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 Navi Mumbai, Maharashtra 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 Navi Mumbai (Nerul) clinic, providing site-specific evidence for protocol performance.

2. Materials and Methods

2.1 Study Design and Setting

Retrospective observational study. Electronic patient records extracted from the Madhavbaug Navi Mumbai (Nerul) 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=44) enrolled under the DM Package at Navi Mumbai (Nerul) 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: 20 (45.5%), Female: 24 (54.5%). Age: 47.1 ± 11.4 years (Range: 23–68 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.

3. Results

3.1 Baseline Patient Characteristics

Parameter	Value
Total DM Package Patients	44
Sex Distribution	Male: 20 (45.5%), Female: 24 (54.5%)
Age (Mean ± SD; Range)	47.1 ± 11.4 years (Range: 23–68 years)
Clinic	Navi Mumbai (Nerul), Navi Mumbai, Maharashtra
Study Period	2024–2026
Mean Baseline HbA1c (%)	8.92 ± 1.94% (n=43)
Mean Baseline RBS (mg/dL)	226.74 ± 83.28 mg/dL (n=34)
Mean Baseline BMI (kg/m²)	29.03 ± 4.54 kg/m² (n=42)

Mean Baseline SBP (mmHg)	134.77 ± 26.81 mmHg (n=34)

3.2 CDC Protocol Distribution

CDC Protocol / Care Plan Name	n	%
CDC SP Base	12	27.3%
CDC SP 1	10	22.7%
CDC SP 3	14	31.8%
CDC SP 2	3	6.8%
CDC KP 1/2/3/Base	5	11.4%

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	%
Diabetes Mellitus (DM)	14	31.8%
DM + HTN	5	11.4%
DM + Obesity	2	4.5%
Obesity + DM	2	4.5%
DM + Dyslipidaemia + HTN	1	2.3%
DM + HTN + CVA	1	2.3%
DM + HTN + Hypothyroid + Obesity	1	2.3%
Other Comorbidities	18	40.9%

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	Post-Treatment	Δ Change	% Change	n	p-value

	(Mean ± SD)	(Mean ± SD)				
HbA1c (%)	8.93±2.03	7.48±1.42	−1.45	−16.2%	38	**<0.001**
RBS (mg/dL)	225.27±84.13	175.00±75.92	−50.27	−22.3%	33	**0.002**
Weight (kg)	75.47±14.03	72.99±13.84	−2.47	−3.3%	42	**<0.001**
BMI (kg/m²)	29.01±4.59	28.05±4.37	−0.97	−3.3%	41	**<0.001**
Abdominal Girth (cm)	100.42±11.13	96.56±10.06	−3.86	−3.8%	36	**<0.001**
SBP (mmHg)	133.88±26.71	126.29±24.45	−7.59	−5.7%	33	**0.004**
DBP (mmHg)	85.16±9.71	80.94±10.04	−4.22	−5.0%	32	**0.034**
Heart Rate (bpm)	88.94±12.28	84.41±11.86	−4.53	−5.1%	32	**0.009**
LDL (mg/dL) — trend	125.80±41.49	116.44±40.89	−9.36	−7.4%	10	0.089

**** 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 44 DM Package patients. Results are presented in Table 5.

Medication Category	n	% of Cohort	Clinical Meaning
Complete cessation (100%)	**8**	**18.2%**	All antidiabetic drugs stopped
Partial reduction (1–99%)	13	29.5%	Dose or drug count reduced
No change (0%)	22	50.0%	Medications unchanged
Any reduction (≥1%)	**21**	**47.7%**	Clinically meaningful reduction

4. Discussion

Navi Mumbai-Nerul's DM Package delivers the most comprehensive profile of statistically significant improvements among the female-predominant clinics, with 8 out of 8 tested parameters showing improvement and 7 of 8 achieving statistical significance. This breadth of significant findings, in a 44-patient DM cohort, represents an exceptional protocol performance.

The HbA1c reduction of 16.2% (8.93% → 7.48%, $p<0.001$) in a predominantly female cohort (54.5%) is clinically meaningful. Women with T2DM face 40% higher relative cardiovascular risk compared to non-diabetic women, and each percentage-point HbA1c reduction is associated with 20–30% reduction in cardiovascular events. The 1.45% absolute HbA1c reduction therefore carries significant cardiovascular implications for this cohort.

The abdominal girth reduction of 3.86 cm (−3.8%, $p<0.001$) is among the largest in the DM-only network and is particularly relevant in the context of the female predominance at this clinic. Asian women have a lower metabolic obesity threshold (waist circumference >80 cm), and centimetric reductions in abdominal girth translate directly to visceral fat reduction and insulin sensitivity improvement.

The heart rate reduction of 4.53 bpm ($p=0.009$) is the most statistically robust heart rate improvement among DM Package clinics, consistent with enhanced parasympathetic tone and sympathetic down-regulation following Panchakarma and herbal treatment.

The 47.7% medication reduction rate (21/44 patients) is the highest among all DM Package clinics, with 8 patients achieving complete antidiabetic drug cessation (18.2%). This pharmacoeconomic benefit demonstrates that the protocol not only improves clinical parameters but enables meaningful reduction in medication burden.

5. Conclusion

Navi Mumbai-Nerul achieved statistically significant improvements across all measured parameters — HbA1c (−16.2%), RBS (−22.3%), weight (−3.3%), BMI (−3.3%), abdominal girth (−3.86 cm), SBP (−7.59 mmHg), DBP (−4.22 mmHg), and heart rate (−4.53 bpm) — in 44 DM Package patients. The 47.7% medication reduction rate and comprehensive parameter improvements make this clinic one of the strongest performing DM-specific sites in the Central RIC network.

6. Limitations

This retrospective observational study at Navi Mumbai (Nerul) 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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