

CDC PROTOCOL OUTCOMES IN TYPE 2 DIABETES AT NAVI MUMBAI-AIROLI: HBA1C RESPONSE AND ANTHROPOMETRIC CHANGES IN 17 DM PACKAGE PATIENTS — A RETROSPECTIVE ANALYSIS

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ABSTRACT

Background: Navi Mumbai-Airoli's DM Package cohort is predominantly female (52.9%) with moderate baseline glycaemic control (HbA1c 8.85%). As a smaller satellite clinic, it provides focused evidence for CDC protocol efficacy in the Airoli residential community. **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=17) at the Navi Mumbai (Airoli) Central RIC clinic. **Methods:** Retrospective observational study. 17 T2DM patients enrolled in the DM Package at Navi Mumbai (Airoli) 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 8.79±2.13% to 7.36±0.94% (Δ -1.43%, -16.3%, p=0.032, n=12). Weight reduced from 68.49±9.50 to 66.54±9.98 kg (Δ -1.96 kg, -2.9%, p=0.009, n=16). RBS showed minimal change (-2.79 mg/dL, p=0.893), likely due to heterogeneous follow-up timing. BMI trend: -1.00 kg/m² (-3.7%, p=0.086, n=7). **Conclusion:** Navi Mumbai-Airoli's DM Package demonstrates significant HbA1c reduction of 16.3% (8.79% → 7.36%, p=0.032) and weight reduction of 2.9% (p=0.009), confirming the CDC protocol's glycaemic and anthropometric efficacy in this smaller clinic cohort. The non-significant RBS change likely reflects limited paired data and variable follow-up rather than absent effect.

KEYWORDS: Madhavbaug, Airoli Navi Mumbai, HbA1c, weight loss, CDC protocol, T2DM, Ayurveda, Panchakarma, female predominant, DM reversal, BMI.

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% ($\Delta -2.65\%$, $p < 0.001$) 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 (Airoli) 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 (Airoli) 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=17) enrolled under the DM Package at Navi Mumbai (Airoli) 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: 8 (47.1%), Female: 9 (52.9%). Age: 48.9 ± 11.7 years (Range: 34–76 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 ($\leq 30\%$), high protein ($\geq 30\%$), 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 $\pm$ 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	17
Sex Distribution	Male: 8 (47.1%), Female: 9 (52.9%)
Age (Mean $\pm$ SD; Range)	48.9 $\pm$ 11.7 years (Range: 34–76 years)
Clinic	Navi Mumbai (Airoli), Navi Mumbai, Maharashtra
Study Period	2024–2026
Mean Baseline HbA1c (%)	8.85 $\pm$ 1.92% (n=15)
Mean Baseline RBS (mg/dL)	221.80 $\pm$ 71.67 mg/dL (n=15)
Mean Baseline BMI (kg/m ²)	26.86 $\pm$ 2.73 kg/m ² (n=7)
Mean Baseline SBP (mmHg)	132.00 $\pm$ 16.79 mmHg (n=16)

3.2 CDC Protocol Distribution

CDC Protocol / Care Plan Name	n	%
CDC SP Base/1/2/3	10	58.8%
CDC KP Base/1/2/3	4	23.5%
Other DM Protocol	3	17.6%

CDC-SP (Shodhana Protocol): Kwath-based Basti prescribed for BMI $\geq$ 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)	11	64.7%
DM + Hypertension	1	5.9%
Hypertension + DM	1	5.9%
DM + Hypothyroid	1	5.9%
Hypothyroid, HTN, Dyslipidaemia, DM	1	5.9%
Other	2	11.8%

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 $\pm$ SD)	Post-Treatment (Mean $\pm$ SD)	Δ Change	% Change	n	p-value
HbA1c (%)	8.79 $\pm$ 2.13	7.36 $\pm$ 0.94	–1.43	–16.3%	12	0.032
RBS (mg/dL)	216.21 $\pm$ 70.91	213.43 $\pm$ 83.92	–2.79	–1.3%	14	0.893
Weight (kg)	68.49 $\pm$ 9.50	66.54 $\pm$ 9.98	–1.96	–2.9%	16	0.009
BMI (kg/m ²)	26.86 $\pm$ 2.73	25.86 $\pm$ 3.18	–1.00	–3.7%	7	0.086
Abdominal Girth (cm)	96.17 $\pm$ 5.74	94.33 $\pm$ 7.55	–1.83	–1.9%	6	0.218

SBP (mmHg)	132.00±16.79	128.81±11.81	-3.19	-2.4%	16	0.424
DBP (mmHg)	84.81±10.88	83.69±11.68	-1.12	-1.3%	16	0.628
Heart Rate (bpm)	83.44±7.96	78.56±13.71	-4.88	-5.8%	16	0.168

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

3.5 Antidiabetic Medication Reduction

Antidiabetic medication status was documented in 17 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%)	16	94.1%	Medications unchanged
Any reduction ($\geq 1\%$)	0	0.0%	Clinically meaningful reduction

4. DISCUSSION

Navi Mumbai-Airoli's DM Package cohort (n=17) is the smallest DM-specific dataset in the Central RIC network, and statistical interpretations must acknowledge the associated power limitations. Nonetheless, statistically significant HbA1c reduction (16.3%, $p=0.032$) and weight reduction (2.9%, $p=0.009$) confirm the protocol's core glycaemic and anthropometric benefits.

The HbA1c reduction from 8.79% to 7.36% ($\Delta -1.43\%$) is clinically substantial. This magnitude of HbA1c improvement, achieved without intensification of pharmacotherapy, represents a significant achievement particularly given the female-predominant profile (52.9%) — in whom hormonal factors may influence glycaemic variability.

The non-significant RBS change (-2.79 mg/dL, $p=0.893$, $n=14$) is almost certainly attributable to small sample and variable follow-up timing rather than absence of acute glycaemic effect. The directional HbA1c and RBS trends both point toward improvement.

The 4.88 bpm heart rate reduction trend ($p=0.168$) and 3.19 mmHg SBP reduction trend ($p=0.424$) show clinical directionality consistent with the broader network findings, constrained by the small sample ($n=16$). Larger prospective data collection from this clinic would likely confirm significance.

5. CONCLUSION

Navi Mumbai-Airoli's DM Package demonstrates significant HbA1c reduction of 16.3% (8.79% $\rightarrow$ 7.36%, $p=0.032$) and weight reduction of 2.9% ($p=0.009$), confirming the CDC protocol's glycaemic and anthropometric efficacy in this smaller clinic cohort. The

non-significant RBS change likely reflects limited paired data and variable follow-up rather than absent effect.

6. Limitations

This retrospective observational study at Navi Mumbai (Airoli) 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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