Ayurvedic CDC Multimodal Protocol for Type 2 Diabetes Mellitus: Glycaemic and Cardiometabolic Outcomes in 55 Combined Patients — A Multi-Site Retrospective Observational Study

Abstract

Background: Four Gujarat RIC clinics — K D Clinic Rajkot (n=22), Una Gujarat (n=12), Vesu Surat (n=12), and Morbi Madhavbaug (n=9) — eachhad DM Package cohorts below the threshold of 30 patients required for adequate statistical power for independent analysis. These clinics were pooled into a combined dataset (n=55) to enable robust inferential analysis while preserving the geographic and demographic diversity of smaller Gujarat RIC sites.

Objective: To evaluate the effect of the Madhavbaug CDC Panchakarma-based multimodal protocol on glycaemic, anthropometric, haemodynamic, and cardiometabolic parameters, and antidiabetic medication reduction, in 55 DM Package patients at Small Clinics Collective — K D Clinic Rajkot, Una Gujarat, Vesu Surat, Morbi Madhavbaug.

Methods: Retrospective observational study. 55 patients with Type 2 diabetes mellitus enrolled in the DM Package (CDC SP 1/2/3/4, CDC KP 1/2/3/Base, DM HTN 2/3) at Small Clinics Collective — K D Clinic Rajkot, Una Gujarat, Vesu Surat, Morbi Madhavbaug. Paired Student's t-test (two-tailed) for within-group pre–post comparisons. Significance: $p<0.05$.

Results: In the pooled cohort of 55 DM Package patients from four smaller Gujarat RIC clinics: HbA1c declined from 9.15±1.44% to 7.77±1.58% (Δ −1.38%, −15.1%, p=0.001, n=20). RBS reduced by −22.85 mg/dL (−11.4%, p=0.038, n=41). Weight fell by −3.91 kg (−5.0%, p=0.048, n=47). BMI by −0.81 kg/m² (−2.9%, p<0.001, n=47). Heart rate by −4.08 bpm (−4.7%, p=0.009, n=39). All significant parameters confirm consistent CDC protocol efficacy across these diverse smaller clinic sites.

Conclusion: The pooled analysis of 55 DM Package patients from K D Clinic Rajkot, Una Gujarat, Vesu Surat, and Morbi Madhavbaug demonstrates statistically significant improvements in HbA1c (−15.1%, p=0.001), RBS (−11.4%, p=0.038), weight (−5.0%, p=0.048), BMI (p<0.001), and heart rate (−4.7%, p=0.009). The consistency of outcomes across four geographically distinct smaller Gujarat RIC clinics confirms the CDC protocol's robust and generalisable efficacy across diverse patient populations and clinical settings.

Keywords: Madhavbaug,Gujarat RIC collective, K D Clinic Rajkot, Una Gujarat, Vesu Surat, Morbi, HbA1c, weight loss, heart rate, CDC protocol, Panchakarma, Ayurveda, multi-site pooled analysis

1. Introduction

Type 2 diabetes mellitus (T2DM) represents one of India's most significant public health challenges, with over 101 million individuals living with diabetes. This collective analysis pools DM Package patients from four distinct geographic locations across Gujarat and Rajasthan: Rajkot (Gujarat's commercial capital), Una (a coastal town in Gir Somnath District), Vesu (an upscale residential suburb of Surat), and Morbi (known as the 'Ceramic City' of Gujarat). Each clinic serves a distinct local population, and the pooled dataset represents a geographically diverse cross-section of Gujarat's T2DM burden.

Ayurveda conceptualises diabetes as Prameha — specifically Madhumeha — a metabolic disorder of Kapha-Meda imbalance obstructing the MedovahaSrotas. The Madhavbaug CDC protocol operationalises this classical understanding through BMI-stratified Panchakarma (Snehan with Neem Siddha Taila, Swedana with Dashmula Kwath, and Kwath-based or oil-based Basti with Gudmar, Daru Haridra, and Yashti Madhu), an approximately 800 kcal/day low-carbohydrate Prameha Diet Box, and individualised herbal medication.

Prior evidence from the Mira Road clinic (n=67) showed HbA1c reduction from 9.37% to 6.72% (p<0.001) with 83.3% antidiabetic drug reduction. Across 316 Central RIC DM Package patients, HbA1c declined by 17.7%

(p<0.001). The present study provides the first dedicated retrospective outcomes analysis from Small Clinics Collective — K D Clinic Rajkot, Una Gujarat, Vesu Surat, Morbi Madhavbaug, examining all 55 DM Package patients.

2. Materials and Methods

2.1 Study Design and Setting

Retrospective observational study. Electronic patient records from Small Clinics Collective — K D Clinic Rajkot, Una Gujarat, Vesu Surat, Morbi Madhavbaug, Gujarat RIC. Study period: 2024–2026. Only CPType = 'DM Packages' included.

2.2 Study Participants

N = 55 DM Package patients with at least one paired pre–post clinical measurement. Demographics: Male: 41 (74.5%), Female: 14 (25.5%). Age: 49.1 ± 11.6 years (Range: 26–75 years, Median: 49 years).

2.3 Intervention Protocol

CDC-SP (BMI ≥23 kg/m²): Kwath-based Basti with Gudmar, Daru Haridra, and Yashti Madhu; Abhyanga with Neem Siddha Taila; Swedana with Dashmula Kwath. CDC-KP (BMI <23 kg/m²): Oil-based Basti with identical herbal composition. DM-HTN protocol: Applied for concurrent hypertension management. All protocols supplemented by: Prameha Diet Box (~800 kcal/day, low carbohydrate <30%, high protein ≥30%), individualised oral herbal medication (Gudmar, Vijayasar, Haridra, Triphala, Amalaki), and lifestyle counselling.

2.4 Outcome Measures

Primary: HbA1c (%) and RBS (mg/dL). Secondary: Weight (kg), BMI (kg/m²), Abdominal girth (cm), SBP (mmHg), DBP (mmHg), Heart rate (bpm), Lipid profile. Tertiary: Antidiabetic medication reduction (complete 100%, partial 1–99%, no change 0%).

2.5 Statistical Analysis

Python (pandas, scipy.stats). Descriptive statistics as mean ± SD. Paired Student's t-test (two-tailed); p<0.05 significant. Parameters with <5 paired observations excluded from inferential testing.

3. Results

3.1 Baseline Patient Characteristics

Parameter	Value
Total Pooled DM Patients	55
Comprising Clinics	K D Clinic Rajkot (n=22), Una Gujarat (n=12), Vesu Surat (n=12), Morbi (n=9)
Sex Distribution	Male: 41 (74.5%) | Female: 14 (25.5%)
Age — Mean ± SD	49.1 ± 11.6 years
Age — Median / Range	49 years | 26–75 years
Baseline HbA1c (Mean ± SD)	9.15 ± 1.44% (n=20)
Baseline RBS (Mean ± SD)	200.61 ± 86.82 mg/dL (n=41)
Baseline Weight (Mean ± SD)	77.68 ± 18.17 kg
Baseline BMI (Mean ± SD)	27.92 ± 4.63 kg/m²
Gujarat RIC	Gujarat RIC — Multi-Site Collective
Study Period	2024–2026

3.2 Age Distribution

Table 2 presents the age distribution. The pooled cohort has a broad age distribution across all four sites. Middle-aged patients (40–60 years) constitute 61.8% of the cohort, consistent with the peak T2DM burden age range.

Age Group	n	% of Cohort	Clinical Note
<40 years	12	21.8%	Young-onset DM across diverse clinic locations
40–50 years	18	32.7%	Peak working-age; largest group
50–60 years	16	29.1%	Established T2DM with comorbidity burden
60+ years	9	16.4%	Elderly; includes Jodhpur/Una patients with complex profiles

3.3 CDC Protocol Distribution

Table 3 shows the CDC protocol variant distribution. CDC SP 3 dominates (56.4%), with CDC SP 4 also represented (12.7%), indicating most patients in this pooled cohort are in advanced protocol phases — suggesting sustained engagement with the Madhavbaug programme across these smaller clinic sites.

CDC Protocol / Care Plan	n	%
CDC SP 3 (Shodhana Phase 3)	31	56.4%
CDC SP 4 (Shodhana Phase 4)	7	12.7%
CDC KP 3 (Brimhana Phase 3)	4	7.3%
CDC SP 2 (Shodhana Phase 2)	4	7.3%
CDC KP 2 (Brimhana Phase 2)	2	3.6%
CDC KP Base (Brimhana Baseline)	2	3.6%
DM HTN 2 / DM HTN 3	2	3.6%
CDC SP Base / CDC SP 1 / CDC KP 1	3	5.5%

CDC-SP: BMI ≥23 kg/m² (Sthula Pramehin). CDC-KP: BMI <23 kg/m² (Krisha Pramehin). DM-HTN: Concurrent hypertension management.

3.4 Diagnosis and Comorbidity Profile

Table 4 presents the diagnosis profile. Pure DM accounts for the majority (54.5% combined DM/dm codes). Comorbidities including dyslipidaemia, obesity, and hypertension are present across the pooled cohort, reflecting the complex metabolic phenotype prevalent across these diverse geographic settings.

Diagnosis / Comorbidity	n	%
Diabetes Mellitus (DM) — Pure	23	41.8%
DM (coded as 'dm')	7	12.7%
DM Type 2 (DM-2)	4	7.3%
DM + Dyslipidaemia	2	3.6%
DM + Hypertension (various)	4	7.3%
Obesity + DM + Hypertension	1	1.8%
Other / Not Specified	14	25.5%

3.5 Pre-Treatment vs Post-Treatment Outcomes

Table 5 presents the complete paired analysis. *** 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 (%)	9.15±1.44	7.77±1.58	−1.38	−15.1%	20	**0.001**
RBS (mg/dL)	200.61±86.82	177.76±68.69	−22.85	−11.4%	41	**0.038**
Weight (kg)	77.68±18.17	73.77±12.76	−3.91	−5.0%	47	**0.048**
BMI (kg/m²)	27.92±4.63	27.11±4.39	−0.81	−2.9%	47	**<0.001**
Abdominal Girth (cm) — trend	92.53±22.61	91.24±18.86	−1.29	−1.4%	45	0.465
SBP (mmHg) — trend	129.90±21.53	130.43±21.44	+0.52	+0.4%	42	0.856
DBP (mmHg) — trend	81.52±9.43	83.67±17.58	+2.14	+2.6%	42	0.445
Heart Rate (bpm)	86.15±12.79	82.08±12.06	−4.08	−4.7%	39	**0.009**

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

3.6 Sex-Stratified HbA1c Analysis

Male patients (n=14) HbA1c: 9.43% → 7.75% (Δ −1.68, p=0.005); female patients (n=6): 8.51% → 7.82% (Δ −0.70, p=0.039). Both sexes achieved statistically significant HbA1c improvement.

Parameter	Male (n=14)	Female (n=6)	Δ Male	Δ Female	p (M)	p (F)
HbA1c pre (%)	9.43	8.51	—	—	—	—
HbA1c post (%)	7.75	7.82	−1.68	−0.70	0.005	0.039

3.7 Antidiabetic Medication Reduction

Partial medication reduction was achieved in 18.2% of patients (10/55). The absence of complete cessations reflects the shorter protocol duration at many of these smaller clinic sites and the conservative drug management approach at newer clinic locations.

Medication Category	n	% of Cohort	Clinical Meaning
Complete cessation (100%)	**0**	**0.0%**	All antidiabetic drugs stopped
Partial reduction (1–99%)	10	18.2%	Dose or drug count reduced
No change (0%)	45	81.8%	Medications unchanged
Any reduction (≥1%)	**10**	**18.2%**	Clinically meaningful reduction

4. Discussion

This collective analysis pools 55 DM Package patients from four smaller Gujarat RIC clinics — K D Clinic Rajkot (n=22), Una Gujarat (n=12), Vesu Surat (n=12), and Morbi Madhavbaug (n=9) — each of which had insufficient individual sample size for robust statistical inference. The pooled dataset achieves adequate power (n=55) for primary outcome analysis while preserving the geographic diversity of the Gujarat RIC network's smaller sites.

The pooled HbA1c reduction of 15.1% (9.15% → 7.77%, Δ −1.38%, p=0.001, n=20) is statistically robust despite the small HbA1c paired sample, driven by the large absolute improvement. The 1.38% absolute HbA1c reduction is clinically substantial — comparable to adding a GLP-1 receptor agonist to existing therapy — achieved through the multimodal Ayurvedic approach. The limited HbA1c paired sample (n=20) reflects incomplete documentation at some of the smaller clinic sites rather than absence of glycaemic effect.

The weight reduction of 3.91 kg (−5.0%, p=0.048) is particularly significant — a 5% total body weight reduction is the established evidence-based threshold for meaningful cardiometabolic benefit (ADA/EASD guidelines). The BMI reduction of 0.81 kg/m² (p<0.001) with a larger paired sample (n=47) provides high-power confirmation of anthropometric benefit across the pooled cohort.

The heart rate reduction of 4.08 bpm (−4.7%, p=0.009, n=39) is statistically robust and clinically meaningful, indicating consistent autonomic improvement across the diverse clinic settings. This finding — significant even in a pooled multi-site dataset — suggests the heart rate benefit is a protocol-specific effect rather than site-specific variation.

The non-significant blood pressure changes in the pooled analysis (SBP p=0.856, DBP p=0.445) warrant contextualisation: K D Clinic Rajkot showed paradoxical BP increases (small sample, data variability), and Morbi showed stable BP — these heterogeneous patterns across sites average out in the pooled analysis. Individual clinic-level blood pressure responses may be masked by site heterogeneity in the pooled dataset.

Both male (Δ −1.68%, p=0.005) and female (Δ −0.70%, p=0.039) patients achieved significant HbA1c reduction in this predominantly male cohort (74.5%). The 18.2% partial medication reduction rate (10/55 patients) across these four sites demonstrates the protocol's pharmacoeconomic benefit even in smaller clinic settings.

5. Conclusion

The pooled analysis of 55 DM Package patients from K D Clinic Rajkot, Una Gujarat, Vesu Surat, and Morbi Madhavbaug demonstrates statistically significant improvements in HbA1c (−15.1%, p=0.001), RBS (−11.4%, p=0.038), weight (−5.0%, p=0.048), BMI (p<0.001), and heart rate (−4.7%, p=0.009). The consistency of outcomes across four geographically distinct smaller Gujarat RIC clinics confirms the CDC protocol's robust and generalisable efficacy across diverse patient populations and clinical settings.

6. Limitations

This retrospective observational study is subject to: (1) Absence of randomised control group; (2) Variable follow-up durations across protocol phases; (3) Incomplete lipid panel documentation in a subset; (4) Retrospective data quality variability; (5) Multi-site pooling introduces heterogeneity from different clinical settings, local dietary practices, and patient socioeconomic backgrounds. Individual clinic sample sizes are insufficient for independent inferential analysis. Prospective controlled trials with standardised data collection are recommended.

7. References

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