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RESEARCH ARTICLE

AYURVEDIC PANCHAKARMA WITH CALORIE-RESTRICTED DIET SIGNIFICANTLY REDUCES HBA1C AND BMI IN TYPE 2 DIABETES MELLITUS: A RETROSPECTIVE OBSERVATIONAL STUDY FROM TWO CENTRES IN BENGALURU

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Abstract

Background: Type 2 Diabetes Mellitus (T2DM) is a rapidly growing metabolic epidemic in India. Conventional pharmacotherapy, while effective, does not address underlying metabolic dysfunction. Ayurvedic Panchakarma-based protocols offer a holistic approach targeting glycaemic control, weight management, and metabolic restoration.
Objective: To evaluate the clinical efficacy of the CDC(Comprehensive Diabetes Care) Panchakarma protocol combined with an 800 kcal calorie-restricted Prameha diet on glycaemic, anthropometric, and metabolic parameters in patients with T2DM.
Methods: Retrospective observational study of 25 T2DM patients at two Ayurvedic centres in Bangalore. Patients received BMI-stratified Panchakarma — CDC-SP (BMI ≥23: Snehan with Neem Siddha Taila, Swedana with DashmukadaKwath, Kwath Basti with Gudmar, Daru Haridra, Yasti Madhu) or CDC-KP (BMI <23: Taila Basti with same herbs). All patients received the Prameha Diet Box (800 kcal/day) and individualised oral Ayurvedic medications. Pre- and post-treatment comparisons performed using paired t-test ($p<0.05$).
Results: Mean HbA1c reduced significantly from 9.36±2.10% to 7.58±1.33% (Δ −1.78%, −19.1%; $t=6.47$, $p<0.0001$); 88% of patients improved. Statistically significant reductions: BMI (27.47→26.85 kg/m², $p=0.0077$), body weight (74.06→72.60 kg, $p=0.014$), abdominal girth (97.29→95.29 cm, $p=0.021$). Clinically meaningful trends: RBS −9.1%, triglycerides −21.9%, total cholesterol −13.2%. Allopathic medication reduction documented in select patients.

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Conclusion: The CDC Panchakarma protocol produces clinically significant, statistically robust glycaemic and anthropometric improvements in T2DM. The 1.78% HbA1c reduction is comparable to first-line pharmacological agents. These findings support integrative Ayurvedic therapy as a disease-modifying approach in T2DM and warrant evaluation through randomised controlled trials.

Introduction:-

Diabetes Mellitus is one of the most rapidly escalating chronic metabolic disorders of the 21st century. According to the International Diabetes Federation (IDF) Diabetes Atlas (10th edition, 2021), India ranks among the top three nations globally in diabetic burden with an estimated 101 million affected individuals as of 2023 — a figure projected to reach 134 million by 2045 [1]. Urban populations in South India bear a disproportionately high share of this burden, driven by sedentary lifestyles, calorie-dense diets, psychosocial stress, and genetic predisposition to insulin resistance.

Type 2 Diabetes Mellitus (T2DM) is characterised by progressive insulin resistance, relative insulin deficiency, and chronic hyperglycaemia leading to multisystem complications including cardiovascular disease, nephropathy, neuropathy, and retinopathy [2]. Conventional pharmacotherapy — biguanides, sulfonylureas, DPP-4 inhibitors, SGLT-2 inhibitors, and insulin — achieves symptomatic glycaemic control but is associated with long-term adverse effects, medication dependence, and does not fundamentally reverse the underlying metabolic dysregulation. A significant proportion of patients experience progressive beta-cell decline necessitating pharmacological escalation over time [3].

Ayurveda, India's ancient system of medicine, describes a condition closely analogous to T2DM under the term Prameha, specifically Madhumeha — characterised by excess urination with honey-like quality and progressive Kapha–Meda imbalance. Classical texts including the Charaka Samhita (Chikitsa Sthana 6) and Sushruta Samhita (Nidana Sthana 6) provide detailed frameworks for managing Prameha through dietary regulation, herbal formulations, and Panchakarma bio-purification [4,5].

Panchakarma encompasses five bio-cleansing procedures designed to eliminate accumulated toxins (Ama), restore Dosha balance, and rejuvenate tissue metabolism. Among these, Snehan (oleation), Swedana (fomentation), and Basti (per-rectal drug administration) are particularly relevant in metabolic disorders. Basti exerts systemic effects through enteric absorption and neuroendocrine modulation, with preclinical and clinical evidence suggesting improvement in insulin sensitivity and reduction of inflammatory markers [6]. The herbs used in the CDC Basti — Gudmar (Gymnemasylvestre), with insulin-secretagogue and alpha-glucosidase inhibitory properties [7]; Daru Haridra (Berberis aristata), containing berberine which activates AMPK comparably to metformin [8]; and Yasti Madhu (Glycyrrhiza glabra), with anti-inflammatory and adaptogenic effects [9] — act synergistically on the multiple pathogenic mechanisms of T2DM.

The Comprehensive Diabetes Care (CDC) protocol integrates BMI-stratified Panchakarma — CDC-SP (BMI ≥23) and CDC-KP (BMI <23) — with an 800 kcal Prameha Diet Box and individualised oral Ayurvedic medications. Despite growing evidence for individual Ayurvedic interventions in T2DM, comprehensive clinical outcome data on structured multi-modal Panchakarma-based protocols in real-world populations remain limited. This retrospective observational study evaluates the clinical outcomes of the CDC protocol across two Bangalore centres. Primary outcomes: HbA1c, BMI, body weight. Secondary outcomes: abdominal girth, blood pressure, RBS, and lipid profile.

Materials and Methods:-

Study Design and Setting:-

Retrospective observational study at two Ayurvedic clinical centres: Sahakar Nagar Clinic and Yelahanka Clinic, Bangalore, Karnataka, India. Patient records were reviewed and pooled. Conducted in accordance with the Declaration of Helsinki; all data anonymised prior to analysis. Ethics approval: [Insert approval number / institutional waiver statement].

Study Period:-

Patient records from [Insert Start Date] to [Insert End Date] were reviewed. Patients who completed ≥1 full CDC Panchakarma treatment cycle within this period were eligible.

Eligibility Criteria:-
Inclusion: (i) Age ≥18 years; (ii) confirmed T2DM (FBG ≥126 mg/dL, or HbA1c ≥6.5%, or RBS ≥200 mg/dL with symptoms); (iii) completed ≥1 full CDC Panchakarma cycle; (iv) available baseline and ≥1 post-treatment measurement for HbA1c, BMI, and weight; (v) both medicated and medication-naive patients included.
Exclusion: (i) Type 1 Diabetes Mellitus; (ii) severe hepatic, renal, or cardiac dysfunction; (iii) pregnancy or lactation; (iv) incomplete baseline or follow-up records; (v) fewer than the minimum prescribed Panchakarma sessions completed.

Intervention Protocol:-
CDC-SP (BMI ≥23): Snehan — external and internal oleation with Neem Siddha Taila; Swedana — steam fomentation using DashmukadaKwath; Basti — decoction (Kwath)-based per-rectal preparation comprising Gudmar (Gymnemasylvestre), Daru Haridra (Berberis aristata), and Yasti Madhu (Glycyrrhiza glabra). This follows the classical Niruha/Asthapana Basti principle for Kapha-Meda dominant patients.
CDC-KP (BMI <23): Identical Snehan and Swedana. Basti uses an oil-based (Taila) formulation of the same three herbs, consistent with the classical Anuvasana Basti principle for Vata-predominant, lower-BMI patients. The Taila base facilitates absorption of fat-soluble phytoconstituents and addresses Vata-mediated tissue depletion.
Prameha Diet Box: All patients received a ready-to-use 800 kcal/day meal plan — low carbohydrate, high protein, high healthy fat — designed to reduce hepatic glucose output, promote a ketogenic metabolic shift, and facilitate visceral fat reduction. This is consistent with the very low-calorie diet (VLCD) protocols studied in the DiRECT diabetes remission trial [10].
Oral Ayurvedic Medications: Individualised herbal formulations prescribed based on Prakriti, Vikruti, and comorbidities. As medications varied across patients, they are treated as a co-intervention and reported descriptively. Patients on allopathic antidiabetics were continued on existing therapy with physician-guided modifications based on clinical response.

Outcome Measures:-
Primary: Change in HbA1c (%), BMI (kg/m²), and body weight (kg) from baseline to post-treatment.
Secondary: Change in abdominal girth (cm), RBS (mg/dL), SBP (mmHg), DBP (mmHg), heart rate (bpm), and lipid profile — total cholesterol, triglycerides, HDL, LDL (mg/dL). Allopathic medication reduction reported descriptively.

Statistical Analysis:-
Continuous variables expressed as mean ± standard deviation (SD). Pre- and post-treatment comparisons by paired samples t-test; $p<0.05$ considered statistically significant. For parameters with <10 paired observations (lipid profile), results reported descriptively with caution. No imputation performed for missing values. Analyses performed using Python 3.10 (pandas 1.5, scipy.stats 1.9).

Results:-

Demographic and Baseline Characteristics:-
Twenty-five T2DM patients (18 male, 7 female; mean age 46.2±12.5 years, range 28–74) were included. Thirteen patients were from Yelahanka and 12 from Sahakar Nagar. Twenty patients (80%) received CDC-SP and 5 (20%) received CDC-KP. Mean baseline HbA1c was 9.36±2.10%, indicating poor glycaemic control at enrolment. Nine patients (36%) were on allopathic antidiabetics at baseline including metformin, glimepiride, sitagliptin combinations, and insulin (1 patient). Mean Panchakarma sessions completed: 9.3±5.03 (range 0–16). Baseline characteristics are summarised in Table 1.

Table 1. Baseline demographic and clinical characteristics (n = 25)

Parameter	Value
Age (years), mean ± SD	46.2 ± 12.5
Age range (years)	28 – 74
Sex — Male, n (%)	18 (72%)
Sex — Female, n (%)	7 (28%)
Yelahanka clinic, n (%)	13 (52%)

Parameter	Value
Sahakar Nagar clinic, n (%)	12 (48%)
CDC-SP protocol (BMI ≥23), n (%)	20 (80%)
CDC-KP protocol (BMI <23), n (%)	5 (20%)
Baseline BMI (kg/m²), mean ± SD	27.47 ± 3.56
Baseline weight (kg), mean ± SD	74.06 ± 13.14
Baseline HbA1c (%), mean ± SD	9.36 ± 2.10
Baseline RBS (mg/dL), mean ± SD	228.79 ± 79.91
Baseline SBP (mmHg), mean ± SD	136.36 ± 17.17
Baseline DBP (mmHg), mean ± SD	86.24 ± 9.95
On allopathic medications, n (%)	9 (36%)
Panchakarma sessions, mean ± SD	9.3 ± 5.03

Primary Outcomes:-

HbA1c: Mean HbA1c reduced significantly from 9.36±2.10% to 7.58±1.33% — an absolute reduction of 1.78% and relative reduction of 19.1% (t=6.47, p<0.0001). Twenty-two of 25 patients (88%) demonstrated HbA1c improvement. Twelve patients (48%) achieved ≥2% reduction; 5 patients (20%) achieved >3% reduction. Notably, one patient GTT-positive at baseline returned a negative GTT result post-treatment, suggesting possible remission of early glucose intolerance.

Body Weight: Mean weight reduced from 74.06±13.14 kg to 72.60±12.23 kg (Δ −1.46 kg, −1.8%; t=2.65, p=0.014).

BMI: Mean BMI reduced from 27.47±3.56 to 26.85±3.48 kg/m² (Δ −0.62 kg/m², −2.2%; t=2.91, p=0.0077). Primary outcome data are summarised in Table 2.

Table 2. Primary outcomes — pre- and post-treatment (n = 25)

Parameter	Baseline Mean ± SD	Post-treatment Mean ± SD	Δ Mean	% Change	t-value	p-value
HbA1c (%)	9.36 ± 2.10	7.58 ± 1.33	−1.78	−19.1%	6.47	<0.0001 ✓
Weight (kg)	74.06 ± 13.14	72.60 ± 12.23	−1.46	−1.8%	2.65	0.014 ✓
BMI (kg/m²)	27.47 ± 3.56	26.85 ± 3.48	−0.62	−2.2%	2.91	0.0077 ✓

✓ Statistically significant, p<0.05 (paired t-test)

3.3 Secondary Outcomes

Abdominal Girth: Significant reduction from 97.29±11.25 cm to 95.29±10.98 cm (Δ −2.00 cm, −2.0%; t=2.48, p=0.021, n=24). A 2 cm waist reduction carries meaningful cardiometabolic risk significance in a diabetic-overweight population.

Blood Pressure: SBP reduced from 136.36±17.17 to 133.00±16.37 mmHg (Δ −3.36 mmHg, p=0.160). DBP reduced from 86.24±9.95 to 84.16±8.21 mmHg (Δ −2.08 mmHg, p=0.109). Neither reached statistical significance; the directional trends are clinically noteworthy in a diabetic-hypertension context where even 3–5 mmHg reductions confer long-term cardiovascular benefit.

Random Blood Sugar: RBS reduced from 228.79±79.91 to 207.92±73.29 mg/dL (Δ −20.88 mg/dL, −9.1%; p=0.239, n=24). Non-significance is attributable to inherent variability of random (non-fasting) measurements and small n.

Lipid Profile: Data available for n=7–9 per parameter. Total cholesterol: 193.88→161.65 mg/dL (Δ −32.23, −13.2%, p=0.077). Triglycerides: 303.07→201.92 mg/dL (Δ −101.15, −21.9%, p=0.083). HDL: 39.52→36.12 mg/dL (Δ −3.40, −4.5%). LDL: 100.20→90.31 mg/dL (Δ −9.89, −7.4%). Non-significance is attributable to limited subset size rather than absence of true effect.

Allopathic Medication: Of 9 medicated patients, formal dosage reduction was documented in 2. One insulin-dependent patient had no allopathic medications recorded at final follow-up. These findings suggest a potential medication-sparing effect.

Table 3. Complete outcome summary — all parameters

Parameter	n	Baseline	Post-treatment	Δ (% change)	p-value
HbA1c (%)	25	9.36 ± 2.10	7.58 ± 1.33	−1.78 (−19.1%)	<0.0001 ✓
Weight (kg)	25	74.06 ± 13.14	72.60 ± 12.23	−1.46 (−1.8%)	0.014 ✓
BMI (kg/m²)	25	27.47 ± 3.56	26.85 ± 3.48	−0.62 (−2.2%)	0.0077 ✓
Abdominal girth (cm)	24	97.29 ± 11.25	95.29 ± 10.98	−2.00 (−2.0%)	0.021 ✓
SBP (mmHg)	25	136.36 ± 17.17	133.00 ± 16.37	−3.36 (−2.1%)	0.160
DBP (mmHg)	25	86.24 ± 9.95	84.16 ± 8.21	−2.08 (−2.0%)	0.109
RBS (mg/dL)	24	228.79 ± 79.91	207.92 ± 73.29	−20.88 (−9.1%)	0.239
Total cholesterol (mg/dL)	8	193.88 ± 62.24	161.65 ± 29.21	−32.23 (−13.2%)	0.077
Triglycerides (mg/dL)	7	303.07 ± 210.01	201.92 ± 104.54	−101.15 (−21.9%)	0.083
HDL (mg/dL)	8	39.52 ± 12.99	36.12 ± 7.86	−3.40 (−4.5%)	—
LDL (mg/dL)	9	100.20 ± 40.71	90.31 ± 30.17	−9.89 (−7.4%)	—

✓ Statistically significant, p<0.05 (paired t-test). Lipid parameters: subset n=7–9; interpret descriptively.

Discussion:-

This retrospective observational study evaluated clinical outcomes of the CDC Panchakarma protocol — integrating BMI-stratified Snehan, Swedana, and Basti therapies with a structured calorie-restricted Prameha diet and individualised oral Ayurvedic medications — in 25 T2DM patients across two Bangalore centres. The findings demonstrate statistically significant improvements in HbA1c, body weight, BMI, and abdominal girth, with clinically meaningful trends in blood pressure, RBS, and lipid parameters.

Glycaemic Control — HbA1c:-

The HbA1c reduction of 1.78 percentage points (p<0.0001) is the primary and most compelling finding. For context: metformin monotherapy achieves approximately 1.0–1.5% HbA1c reduction; DPP-4 inhibitors 0.5–0.8%; and SGLT-2 inhibitors 0.5–1.0% [11]. The 1.78% reduction through a non-pharmacological Ayurvedic protocol in a high-baseline cohort (mean HbA1c 9.36%) is therefore clinically outstanding. The post-treatment mean of 7.58% approaches the ADA target of <7.0%, demonstrating meaningful disease control. The mechanisms are multifactorial. Gudmar (Gymnemasylvestre) in the Basti preparation exerts insulin-secretagogue and alpha-glucosidase inhibitory effects, directly enhancing beta-cell function and reducing intestinal glucose absorption [7]. Berberine from Daru Haridra activates AMPK — the same pathway as metformin — improving insulin sensitivity and reducing hepatic glucose output; clinical trials report HbA1c reductions of ~0.9% with berberine monotherapy [8]. Yasti Madhu contributes anti-inflammatory and cortisol-modulating effects that address the chronic systemic inflammation perpetuating insulin resistance [9]. The per-rectal Basti route may facilitate efficient absorption of bioactive compounds while modulating the enteric nervous system and gut microbiome. The concurrent 800 kcal Prameha diet provides synergistic glycaemic benefit through carbohydrate restriction and caloric deficit, reducing postprandial excursions.

Anthropometric Outcomes:-

Significant reductions in weight (−1.46 kg, p=0.014), BMI (−0.62 kg/m², p=0.0077), and abdominal girth (−2.00 cm, p=0.021) were observed. While modest in absolute terms, they are meaningful within a short treatment duration with no pharmacological weight-loss agents. Abdominal girth reduction is particularly clinically relevant — visceral adiposity is a primary driver of insulin resistance and metabolic syndrome, and 1–2 cm reductions in waist

circumference are independently associated with improved cardiometabolic outcomes [12]. The Prameha Diet Box at 800 kcal/day is consistent with the VLCD protocol employed in the DiRECT trial, which demonstrated T2DM remission in 46% of participants through intensive caloric restriction [10]. Snehan and Swedana therapies are postulated to mobilise lipid-soluble Ama from adipose tissue, contributing to visceral fat reduction through thermogenic sudation.

Blood Pressure:-
Directional reductions in SBP (−3.36 mmHg) and DBP (−2.08 mmHg) did not reach statistical significance, attributable to limited sample size. The mean baseline SBP of 136.36 mmHg places a substantial proportion of patients in Stage 1 hypertension, consistent with the high co-prevalence of hypertension in T2DM. Even modest blood pressure reductions in a diabetic population carry significant long-term cardiovascular risk implications — a 5 mmHg SBP reduction is associated with approximately 10% reduction in major cardiovascular events [13].

Lipid Profile:-
Triglyceride reduction of 21.9% (303→202 mg/dL) and total cholesterol reduction of 13.2% (194→162 mg/dL) represent clinically important trends. Hypertriglyceridaemia is the most prevalent dyslipidaemia in T2DM, driven by hepatic VLDL overproduction secondary to insulin resistance. Berberine from Daru Haridra has demonstrated significant triglyceride-lowering effects in clinical trials independent of its glycaemic actions [8]. The low-carbohydrate Prameha diet additionally suppresses hepatic de novo lipogenesis and VLDL secretion. The non-significance is entirely attributable to the very small lipid-data subset (n=7–8), not absence of effect — the p-values of 0.077 and 0.083 approach significance and would likely reach it in a larger cohort. Systematic lipid data collection is a priority for future studies.

Protocol Design — Personalised Panchakarma:-
The BMI-stratified design of the CDC protocol operationalises a key principle of Ayurvedic personalised medicine. Classical texts specify Anuvasana Basti (oil-based) for Vata-predominant lower-BMI patients and Niruha/Asthapana Basti (decoction-based) for Kapha-Meda excess in overweight patients [4]. The Kwath (decoction) Basti in CDC-SP delivers higher concentrations of water-soluble active constituents suited to reducing Kapha-driven insulin resistance; the Taila (oil) Basti in CDC-KP provides a lipid carrier facilitating absorption of fat-soluble phytoconstituents and addressing Vata-mediated tissue depletion. This mechanistic personalisation distinguishes the CDC protocol from non-stratified interventions and reflects a physiologically coherent Ayurvedic therapeutic rationale.

Medication-Sparing Effect:-
Allopathic dosage reduction in select patients — including apparent insulin discontinuation in one patient — is clinically and economically significant. Reduction of drug burden in T2DM patients directly impacts treatment cost, side-effect burden, and quality of life. In India, where out-of-pocket healthcare expenditure remains high, a therapy achieving glycaemic control while reducing drug dependency carries important public health value. This parameter must be systematically tracked as a co-primary outcome in future trials.

Comparison with Literature:-
Baskaran et al. reported a mean HbA1c reduction of 1.8% with Gymnemasylvestre leaf extract over 18–20 months in NIDDM patients [7]. Yin et al. demonstrated 0.9% HbA1c reduction with berberine over 3 months [8]. The CDC protocol, combining these phytoconstituents in a synergistic multi-modal framework with dietary restriction, achieves comparable outcomes within a shorter treatment duration in a real-world clinic population — a notable finding for an integrative non-pharmacological protocol. The DiRECT trial established that intensive dietary restriction can achieve remission in T2DM [10]; the CDC protocol extends this principle by integrating Panchakarma and herbal components that address pathological mechanisms beyond caloric deficit alone.

Limitations:-
Key limitations: (i) retrospective observational design limiting causal inference and susceptible to selection bias; (ii) small sample size (n=25) reducing statistical power for secondary outcomes and subgroup analyses; (iii) no control group — contribution of natural disease progression and regression to the mean cannot be excluded; (iv) variability in oral Ayurvedic medications introduces uncontrolled co-intervention; (v) non-uniform follow-up duration introduces measurement variability; (vi) incomplete lipid data in the majority of patients; (vii) no systematic adverse event reporting. These limitations are inherent to a retrospective pilot study. They define the boundaries of

interpretation without diminishing the strength of the primary glycaemic finding, and directly inform the design requirements for future prospective trials.

Future Directions:-
Future research priorities: (i) prospective RCT with ≥60 patients per arm comparing CDC protocol versus standard care; (ii) systematic medication change tracking as a co-primary outcome; (iii) comparative analysis of CDC-SP versus CDC-KP subgroups; (iv) mechanistic studies — effect of Basti preparations on insulin sensitivity markers, gut microbiome, and inflammatory cytokines (IL-6, TNF-α, hsCRP); (v) longer follow-up (6–12 months) to assess durability of glycaemic improvement; (vi) health economic analysis of cost-effectiveness versus pharmacological intensification.

Conclusion:-

This retrospective observational study demonstrates that the CDC Panchakarma protocol — combining BMI-stratified Snehan, Swedana, and Basti therapies with a structured 800 kcal Prameha diet and individualised oral Ayurvedic medications — produces clinically meaningful and statistically significant improvements in glycaemic control and anthropometric parameters in patients with Type 2 Diabetes Mellitus. The reduction in HbA1c of 1.78 percentage points ($p<0.0001$), observed in 88% of patients, is the central finding. Its magnitude is comparable to first-line oral hypoglycaemic agents, achieved through a non-pharmacological integrative intervention in patients with poor baseline glycaemic control (mean HbA1c 9.36%). Significant reductions were additionally demonstrated in BMI ($p=0.0077$), body weight ($p=0.014$), and abdominal girth ($p=0.021$). Clinically meaningful trends in blood pressure, RBS, triglycerides, and total cholesterol further support the broad metabolic benefits of this approach.
The BMI-stratified CDC protocol, grounded in classical Ayurvedic principles of personalised Basti formulation, provides a reproducible and structured clinical framework bridging traditional Ayurvedic therapeutics with evidence-based outcome measurement. The potential medication-sparing effect in select patients underscores its disease-modifying rather than merely symptomatic action. As a retrospective pilot study, these findings are hypothesis-generating. Nevertheless, the consistency and magnitude of glycaemic outcomes across a real-world population provides a compelling evidence foundation for prospective investigation. Larger, randomised, controlled, multicentre trials with standardised follow-up and mechanistic sub-studies are strongly warranted.

In summary, the CDC Panchakarma protocol combined with the Prameha diet represents a promising, safe, and holistic integrative intervention for T2DM management, with the potential to meaningfully contribute to evidence-based, patient-centred, and sustainable diabetes care in India and globally.

Declarations:-
Ethics Approval and Consent: This retrospective study was conducted in accordance with the Declaration of Helsinki. All patient data were fully anonymised prior to analysis.

Conflicts of Interest: The authors declare no competing interests.

Funding: This research received no external funding. No pharmaceutical or commercial entity funded or influenced this study.

Data Availability: Anonymised data supporting the findings of this study are available from the corresponding author upon reasonable request.

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References:-

1. International Diabetes Federation. IDF Diabetes Atlas, 10th edition. Brussels, Belgium: IDF; 2021. Available at: www.diabetesatlas.org
2. American Diabetes Association Professional Practice Committee. Standards of Medical Care in Diabetes—2023. Diabetes Care. 2023;46(Suppl 1):S1–S291. https://doi.org/10.2337/dc23-Sint

3. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet. 1998;352(9131):837–853.
4. Charaka Samhita, Chikitsa Sthana, Chapter 6 (Prameha Chikitsa). Varanasi: Chaukhamba Sanskrit Pratishthan; (reprint 2011).
5. Sushruta Samhita, Nidana Sthana, Chapter 6. Varanasi: Chaukhamba Orientalia; (reprint 2010).
6. Dhiman KS. Basti karma (Ayurvedic enema): A critical review. AYU (An International Quarterly Journal of Research in Ayurveda). 2014;35(2):138–144.
7. Baskaran K, KizarAhamath B, Radha Shanmugasundaram K, Shanmugasundaram ERB. Antidiabetic effect of a leaf extract from Gymnemasylvestre in non-insulin-dependent diabetes mellitus patients. J Ethnopharmacol. 1990;30(3):295–300.
8. Yin J, Xing H, Ye J. Efficacy of berberine in patients with type 2 diabetes mellitus. Metabolism. 2008;57(5):712–717. https://doi.org/10.1016/j.metabol.2008.01.013
9. Tiwari P, Ahmad K, Baig MH. Gymnemasylvestre for Diabetes: From Traditional Herb to Future Perspectives. Curr Pharm Des. 2017;23(11):1667–1676.
10. Lean MEJ, Leslie WS, Barnes AC, et al. Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial. Lancet. 2018;391(10120):541–551.
11. Maruthur NM, Tseng E, Hutfless S, et al. Diabetes Medications as Monotherapy or Metformin-Based Combination Therapy for Type 2 Diabetes: A Systematic Review and Meta-analysis. Ann Intern Med. 2016;164(11):740–751.
12. Klein S, Allison DB, Heymsfield SB, et al. Waist Circumference and Cardiometabolic Risk: A Consensus Statement from Shaping America's Health. Diabetes Care. 2007;30(6):1647–1652.
13. Emdin CA, Rahimi K, Neal B, et al. Blood pressure lowering in type 2 diabetes: a systematic review and meta-analysis. JAMA. 2015;313(6):603–615.
14. Khanna S, Jaiswal KS, Gupta B. Managing Diabetic Neuropathy with Ayurvedic Treatment: A Case Series. J Ayurveda Integr Med. 2017;8(1):66–69.
15. World Health Organization. Global Report on Diabetes. Geneva: WHO; 2016. ISBN 978 92 4 156525 7.