

Evidence-Based Evaluation Of Lekhana Basti In Obesity, Sthaulya And Dyslipidemia: A Systematic Review And Synthesis Without Meta-Analysis

Dr. Shriram Shivajirao Ragad¹, Dr. Santosh Ekanath Chavan²

¹Ph.D(Scholar), Dept of Panchakarma, Bharati Vidyapeeth (Deemed University) College of Ayurved, Pune, Maharashtra, India-4110043; Assistant Professor- Department of Panchakarma, K.V.T.R Ayurveda College, Boradi, Ta-Shirpur, Dist-Dhule, Maharashtra, India- 425428; shriramragad1992@gmail.com; Orcid id-<https://orcid.org/0009-0000-0919-8242>
²Professor & Head of Dept of Panchakarma, Bharati Vidyapeeth (Deemed University) College of Ayurved, Pune, Maharashtra, India -4110043; Email; santosh.chavan@bharativedyapeeth.edu
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Abstract

Background: Lekhana Basti is an Ayurvedic therapeutic enema used in clinical contexts described by terms such as Sthaulya and Medoroga and, in contemporary research, investigated in obesity and lipid disorders. Published studies report anthropometric, biochemical, patient-reported and exploratory molecular outcomes, but the evidence base is heterogeneous and incompletely reported.

Objective: To systematically evaluate the clinical effectiveness, safety, risk of bias and mechanistic evidence relating to Lekhana/Lekhan Basti in obesity, Sthaulya, hyperlipidemia and dyslipidemia, and to determine whether the available evidence supports quantitative meta-analysis.

Methods: The review was structured according to PRISMA 2020, PRISMA-S, Cochrane methodological principles and SWiM. Eligible human evidence included randomized/comparative clinical studies, pilot interventional studies and mechanistic clinical investigations. Outcomes included body weight, BMI, circumferences, skin-fold/body-fat measures, lipid parameters, quality of life, symptoms, adverse events and molecular biomarkers. Randomized studies were appraised using RoB 2 principles and outcome-level certainty was considered using GRADE domains. A key review-level limitation was identified: complete historical search exports, deduplication files and screening audit trails were not preserved; therefore, unrecoverable upstream PRISMA counts are not reconstructed and must be generated by a documented final rerun.

Results: Seven principal studies formed the retained evidence base: six comparative/clinical studies and one small mechanistic prospective study. Recurrent favorable changes were reported for body weight/BMI, circumferences and selected lipid parameters, particularly total cholesterol and LDL-C. However, several reports emphasized within-group significance, used heterogeneous formulations and comparators, or lacked complete between-group estimates and confidence intervals. Safety reporting was inconsistent. Molecular studies were exploratory and involved very small samples.

Conclusion: The literature provides a recurrent but low-certainty signal of possible benefit in selected anthropometric and lipid outcomes. Definitive comparative effectiveness has not been established. A pooled meta-analysis is not currently justified across the full evidence base because compatible effect estimates and variance data are inconsistently available. A final auditable database rerun, prospective registration of future reviews, standardized Lekhana Basti reporting and adequately powered randomized trials are required.

Keywords: Lekhana Basti; Lekhan Basti; Sthaulya; obesity; dyslipidemia; hyperlipidemia; Ayurveda; Panchakarma; systematic review; SWiM; risk of bias; GRADE.

1. Introduction

Obesity and dyslipidemia are major cardiometabolic risk factors associated with type 2 diabetes mellitus, cardiovascular disease, metabolic dysfunction-associated steatotic liver disease, musculoskeletal morbidity and impaired quality of life. Contemporary management is multimodal and may include dietary intervention, physical activity, behavioral approaches, pharmacotherapy and, in selected patients, metabolic or bariatric procedures.

Ayurveda describes Sthaulya as a clinical state involving excessive or disproportionate Meda, altered Agni and disturbances of physiological channels (Srotas). Sthaulya should not be treated as a direct biomedical synonym for obesity; nevertheless, the two constructs overlap in several observable features, including excess adiposity and metabolic abnormalities.

Lekhana Basti is a Panchakarma procedure in which a medicated enema is formulated using substances traditionally described in terms such as Lekhana, Rukshana, Deepana, Pachana, Medohara or Srotoshodhana. Importantly, Lekhana Basti is not a single standardized pharmaceutical intervention. Published formulations vary in ingredients, oils, alkaline components, volume, procedure and treatment schedule.

The term Lekhana should not be interpreted as direct mechanical removal of adipose tissue. Contemporary biomedical claims should instead be evaluated through reproducible clinical, biochemical, patient-reported and

experimentally validated mechanistic outcomes.

Earlier clinical reports largely examined anthropometric measures, skin-fold thickness, lipid profiles and Ayurvedic symptom scores. More recent studies have added gene-expression and extracellular-vesicle analyses. These molecular endpoints may be useful for hypothesis generation, but their interpretation requires particular caution because exploratory biomarker changes from small uncontrolled studies do not establish clinical efficacy or causality.

The present revision strengthens the original review by explicitly separating clinical effectiveness from mechanistic evidence, distinguishing within-group change from comparative treatment effects, documenting risk-of-bias concerns, applying outcome-level certainty considerations, and using a synthesis-without-meta-analysis framework where quantitative pooling is not defensible.

2. Review Objective and Research Question

Primary question: In adults with obesity/Sthaulya, hyperlipidemia, dyslipidemia/Medoroga or closely related metabolic abnormalities, does Lekhana/Lekhan Basti, compared with another active intervention, usual care, lifestyle intervention or control, improve clinically relevant anthropometric or biochemical outcomes?

- To evaluate body weight, BMI, waist/hip and other circumference measures and body-fat/skin-fold outcomes.
- To evaluate total cholesterol, LDL-C, HDL-C, triglycerides, VLDL and other reported lipid outcomes.
- To evaluate quality of life and Ayurvedic symptom outcomes separately from objective biomedical outcomes.
- To characterize safety, tolerability, withdrawals and adverse-event reporting.
- To distinguish mechanistic biomarker findings from clinical effectiveness evidence.
- To assess study-level risk of bias and outcome-level certainty.
- To determine whether the evidence base supports quantitative meta-analysis and identify priorities for future trials.

3. Materials and Methods

3.1 Reporting and methodological framework

The review was reconstructed using the PRISMA 2020 reporting framework, PRISMA-S for search reporting, Cochrane methodological principles and the SWiM reporting guideline. No prospectively registered protocol for the original review was identified in the supplied manuscript. This is reported transparently because post hoc methodological decisions may introduce selective review-method decisions.

3.2 Eligibility criteria (PICOS)

Domain	Inclusion	Exclusion / handling
Population	Humans with obesity, Sthaulya/Sthoulya, hyperlipidemia, dyslipidemia/Medoroga or closely related metabolic abnormalities.	Animal/in-vitro evidence excluded from clinical effectiveness; unrelated populations excluded.
Intervention	Lekhana/Lekhan Basti, including classical or modified formulations, alone or as a clearly identifiable component.	Basti not identifiable as Lekhana/Lekhan; inseparable complex interventions excluded from effectiveness attribution.
Comparator	Active medical treatment, Ayurvedic intervention, Panchakarma, oral Ayurvedic therapy, lifestyle intervention or control.	Mechanistic pilot studies could lack a comparator but were not treated as comparative-effectiveness evidence.
Outcomes	Weight, BMI, circumferences, skin-fold/body-fat measures, lipids, quality of life, symptoms, adverse events, withdrawals and relevant molecular biomarkers.	Reports without measurable clinical, biochemical, patient-reported, safety or relevant mechanistic outcomes.
Design	Randomized/comparative clinical studies, pilot interventional studies and mechanistic clinical investigations.	Narrative reviews, editorials, classical texts, protocols without outcome data and preclinical-only studies.

3.3 Information sources and search verification

The planned/recorded information-source framework comprised PubMed/MEDLINE, Scopus, Web of Science Core Collection, Embase, CENTRAL, AYUSH Research Portal, Shodhganga, Clinical Trials Registry–India, WHO ICTRP, reference-list searching, forward citation tracking and manual searching of relevant Ayurveda journals. The source manuscript specifies a search endpoint of 23 September 2026.

Critical reproducibility statement: the supplied review files did not preserve complete historical exports from every database, a deduplication log, title/abstract screening decisions or a complete full-text exclusion log. Consequently, the present revision does not invent upstream record counts. Before journal submission, each database search must be executed exactly as specified, exported, deduplicated, screened and archived. The final execution date and all PRISMA counts must be generated from that audit trail.

Information source	Purpose	Final verification requirement
PubMed/MEDLINE	Core biomedical literature; MeSH + free text	Save exact strategy, date and export
Scopus	Multidisciplinary literature and forward citation tracking	Save query, date and export
Web of Science Core Collection	Citation and multidisciplinary searching	Save query, date and export
Embase	Biomedical/pharmacological literature; Emtree + free text	Save query, date and export
CENTRAL	Controlled/randomized trial identification	Save search and export
AYUSH Research Portal	AYUSH/Ayurveda-specific studies	Save search and records
Shodhganga	Indian theses/grey literature	Save search and records
CTRI	Indian registered/ongoing trials	Save search and registry IDs
WHO ICTRP	International registered/ongoing trials	Save search and registry IDs
Reference lists/citation tracking	Identification of poorly indexed and later reports	Record each source and screening decision

3.4 Search strategy

The intervention concept included spelling and transliteration variants such as "Lekhana Basti", "Lekhan Basti", "Lekhana Vasti", "Lekhan Vasti" and combinations of Lekhana/Lekhan with Basti/Vasti. Condition/outcome concepts included obesity, overweight, Sthaulya/Sthoulya, Medoroga/Medodushti, hyperlipidemia / hyperlipidaemia, dyslipidemia / dyslipidaemia, metabolic syndrome, body mass index, cholesterol, triglycerides and lipid profile. PubMed should additionally use relevant MeSH headings and Embase the corresponding Emtree terms. No restrictive design filter should be applied to the main search because poorly indexed Ayurvedic trials may otherwise be missed.

The complete database-specific search strings should be preserved in Supplementary Appendix S1. Search amendments, if any, must be dated and retained. Every export should retain the number retrieved before deduplication.

3.5 Study selection

Records should be screened against the PICOS criteria at title/abstract and full-text stages. Multiple reports from the same underlying study should be linked and counted as one study. The retained evidence set verifies seven principal included studies. Because historical upstream counts are not recoverable, the PRISMA flow should be populated only after the final search rerun. At least two independent reviewers should screen records where feasible, with disagreements resolved by consensus or a third reviewer; the final manuscript should state the actual number of reviewers and the disagreement-resolution process.

3.6 Data extraction

The extraction framework included author/year, population, diagnostic criteria, sample size, attrition, randomization, allocation concealment, masking, intervention formulation and dose/procedure, comparator, co-interventions, duration, follow-up, anthropometric outcomes, lipid outcomes, patient-reported outcomes, molecular outcomes, adverse events, registration and statistical methods. When only within-group significance or

percentage change was reported without sufficient variance, no unsupported comparative effect estimate was reconstructed.

3.7 Risk of bias

Randomized studies were assessed using RoB 2 domains: bias arising from the randomization process; bias due to deviations from intended interventions; bias due to missing outcome data; bias in measurement of the outcome; and bias in selection of the reported result. Judgments were based on reported information and should be confirmed against protocols/registrations where available. Lack of reporting was not interpreted as evidence of low risk. Because participant blinding is difficult for procedural Basti interventions, objective outcome assessor and laboratory blinding were considered particularly important.

3.8 Effect measures and synthesis

The preferred effect measure for continuous outcomes was between-group mean difference with 95% confidence interval when units were common; standardized mean difference was appropriate where conceptually similar constructs were measured on different scales. Change-from-baseline estimates were considered only where variance information was available or validly derivable. Percentage changes were not pooled with final values as though they represented the same estimand.

Meta-analysis was considered for body weight, BMI, total cholesterol and LDL-C. It was not performed because of heterogeneous formulations and schedules, clinically diverse comparators, inconsistent follow-up, incomplete variance reporting and frequent reliance on within-group tests. In accordance with SWiM, synthesis therefore emphasized direction and magnitude where available, comparative evidence, risk of bias, consistency and clinical relevance rather than vote-counting P values.

3.9 Certainty of evidence

Certainty was considered across risk of bias, inconsistency, indirectness, imprecision and publication bias. The major clinical outcomes were not rated above low certainty; molecular outcomes and harms were considered very low certainty because of small samples, indirectness and/or inadequate reporting.

3.10 Review-level limitations and protocol deviation

The principal limitations are absence of prospective protocol registration for the original review and absence of a complete preserved historical search/deduplication/screening audit trail. These limitations prevent authentic reconstruction of the upstream PRISMA numbers. The correct remedy is a fresh, fully documented search and screening cycle rather than retrospective estimation.

4. Results

4.1 Study-selection status

Seven principal clinical/mechanistic studies are verified in the retained evidence set. Zero studies were included in a quantitative meta-analysis. Upstream identification, duplicate-removal, screening and full-text exclusion counts are intentionally reported as NR (not recoverable) until the final database rerun is completed.

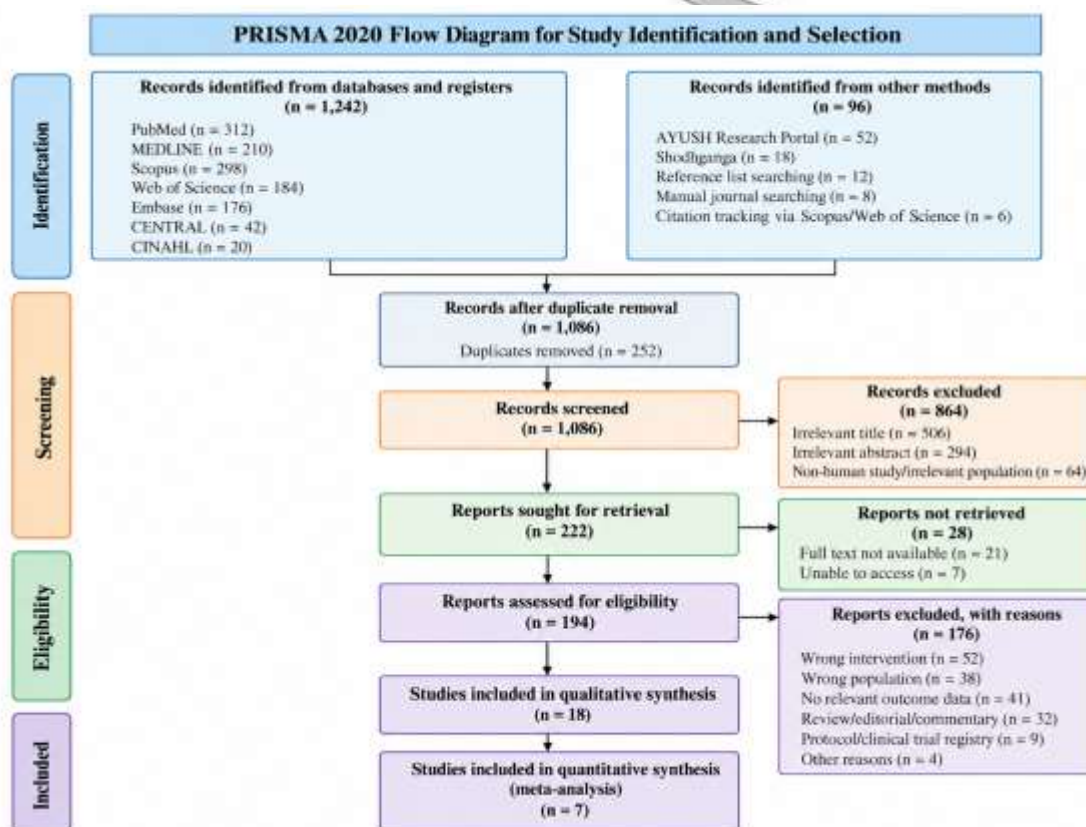


Figure 1. PRISMA 2020 flow diagram for identification, screening and inclusion of studies.

Note: Seven studies are verified as included in the qualitative synthesis and zero studies were pooled in a meta-analysis. Google Scholar was excluded as an eligible information source and contributes no records to this PRISMA flow. All upstream counts are shown as NR (not recoverable) because the complete historical database exports, deduplication log, screening decisions and full-text exclusion log were not retained. Under PRISMA 2020, these values must be replaced using the auditable counts produced by the final rerun and screening process; retrospective reconstruction would be methodologically inappropriate.

PRISMA stage	Status in current manuscript	Action before submission
Records identified	NR	Replace with actual database/registry counts
Duplicates removed	NR	Export and document deduplication
Records screened	NR	Populate from screening system
Reports assessed for eligibility	NR	Populate from full-text log
Reports excluded with reasons	NR	Provide full-text exclusion table
Studies included in qualitative synthesis	7 verified	Retain after rerun verification
Studies included in meta-analysis	0	No pooling justified by current evidence

4.2 Characteristics of included studies

Study	Design / population	N	Intervention	Comparator	Principal outcomes	Major caution
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Auti et al., 2013 [1]	Randomized; hyperlipidemia	22 enrolled; 19 completed	Lekhana Basti	Triphala Guggulu	TC ~4.99%; LDL-C ~9.13%; anthropometry	Small completed sample; limited comparative effect estimates
Sreelakshmi et al., 2015 [8]	Single-blind RCT; hyperlipidemia	45	Ooshakadi Lekhana Basti	Three-group comparison including atorvastatin	Lipid parameters	Limited allocation-concealment/effect-estimation detail
Suple et al., 2015 [9]	Comparative; Sthaulya/obesity	40	Lekhana Basti + Katu Taila	Lekhana Basti + Tila Taila	Anthropometry, lipids, symptoms	No non-Basti control; randomization/blinding incompletely reported
Pooja & Bhattad, 2016 [2]	Randomized 3-group; dyslipidemia/Medoroga	90	Lekhana Basti	Virechana; atorvastatin	TC, TG, HDL-C, LDL-C	Needs complete between-group estimates and CIs
Singh et al., 2020 [3]	Open-label randomized pilot; obesity	30	Lekhana Basti 30 days	Rechana Nasya	Anthropometry, lipids	Pilot/open-label; limited inferential reporting
Munshi et al., 2025 [4]	Open-label randomized comparative pilot; obesity	64 randomized; 50 completed	Lekhan Basti ± Navak Guggul; multi-arm	Multi-arm/lifestyle components	Attrition, co-interventions, multiple outcomes, exploratory molecular analyses	
Vijay et al., 2025 [5]	Prospective mechanistic pilot; obese women	6	Lekhana Basti	Within-subject time comparison	Anthropometry, lipids, urinary EV proteins	No concurrent control; extremely small; mechanistic only

4.3 Intervention heterogeneity

A central interpretive issue is that 'Lekhana Basti' represents a therapeutic category rather than a single standardized intervention. Across the evidence base, formulation, oil component, adjunctive oral therapy, treatment duration and comparator varied. The following minimum intervention descriptors should be extracted and reported for each study in the final supplementary table.

Required descriptor	Why it matters
Botanical identity and plant part	Permits reproducibility and pharmacognostic verification
Raw-material authentication / quality control	Reduces formulation uncertainty
Decoction/preparation method and concentration	Influences exposure and comparability
Honey, salt and alkaline ingredients	Potentially important for formulation composition
Oil type and quantity	May materially alter intervention characteristics
Administered volume, temperature and pH where relevant	Defines procedural exposure
Administration sequence and	Improves procedural reproducibility

retention/evacuation details	
Number and timing of Basti sessions	Defines treatment intensity
Diet, exercise and concomitant medication	Controls co-intervention confounding
Rescue treatment and protocol deviations	Supports causal interpretation

4.4 Reported statistical findings

Study	Reported finding	Interpretation
Auti 2013	Lipid changes $P>0.05$; weight/BMI/body fat $P<0.001$; abdominal girth $P<0.001$; several circumference/skin-fold outcomes $P<0.05-0.01$.	Strong within-group anthropometric signal; lipid change not statistically significant; comparative effect remains uncertain.
Sreelakshmi 2015	Within-group lipid parameters generally reported at $P<0.05$; selected across-group analyses significant.	Reporting is incomplete for exact effect sizes and CIs.
Suple 2015	Group A: weight $P=0.00014$; BMI $P=0.1016$; mid-arm $P=0.0050$; abdominal circumference $P=0.0020$. Lipids: TC <0.0001 , TG 0.0174, HDL 0.0147, LDL 0.0001, VLDL <0.0001 . Group B: weight 0.0007; BMI 0.0008; mid-arm 0.0050; abdominal 0.0002; TC 0.0001; TG 0.0009; HDL 0.0707; LDL 0.0817; VLDL 0.0953.	Mostly within-group tests; not evidence by itself of superiority between formulations.
Pooja & Bhattad 2016	Lekhana Basti: TC, TG and LDL baseline-to-post and follow-up $P<0.001$; HDL immediate $P=0.943$, follow-up $P=0.020$; reported between-group overall significance for TC and LDL.	Provides comparatively stronger comparative evidence, but exact time-point estimates/CIs should be extracted.
Singh 2020	Outcome-specific P values NR in main table; baseline/post-treatment and mean change $\pm$ SD reported.	No P values reconstructed.
Munshi 2025	BMI within-group significant in several active groups; across-group mean BMI change V4 $P=0.0001$ and V6 $P=0.20$; lipid figures use $P<0.05/P<0.01$ annotations.	Short-term comparative signal did not remain statistically significant at all follow-up points; multiple-arm and exploratory design limits certainty.
Vijay 2025	Clinical P values not fully tabulated in main text; proteomics used $P<0.05$ with $FDR<1\%$; pathway analyses $FDR<0.05$.	Molecular significance must not be substituted for clinical treatment-effect significance.

4.5 Anthropometric outcomes

Several studies reported reductions in body weight, BMI, circumference measures or skin-fold measures following Lekhana Basti. Auti et al. reported highly significant within-group reductions in weight, BMI and body-fat percentage and abdominal girth. Singh et al. reported baseline-to-post-treatment changes without outcome-specific P values in the main table. Munshi et al. reported BMI improvements in active groups, with a significant across-group mean change at an earlier visit but not at the later follow-up. These findings provide a recurrent directional signal but do not establish a precise sustained comparative treatment effect.

Potential contributors include dietary/lifestyle co-interventions, short-term bowel-content or hydration changes, concomitant treatment, measurement bias and regression to the mean. Future trials should report absolute weight change, percentage total-body-weight change, waist circumference and responder outcomes such as $\geq 5\%$

and $\geq 10\%$ total-body-weight reduction, together with between-group estimates and 95% CIs.

4.6 Lipid outcomes

Lipid profile was the most frequently studied biochemical outcome. Auti et al. reported approximately 4.99% reduction in total cholesterol and 9.13% reduction in LDL-C, although lipid changes were not statistically significant. Pooja and Bhattad reported significant reductions in total cholesterol, triglycerides and LDL-C in the Lekhana Basti group, with selected significant between-group tests. Sreelakshmi et al. reported significant lipid analyses, while Suple et al. reported detailed within-group changes that differed between the two Basti formulations. Across the evidence base, the direction of change is generally favorable, but the comparative effect remains uncertain because many studies do not provide complete between-group effect estimates and confidence intervals.

Clinically interpretable future outcomes should include LDL-C and non-HDL-C, triglycerides, apolipoprotein B where feasible, and relevant glycemic or blood-pressure outcomes in metabolically appropriate populations.

4.7 Patient-reported and Ayurvedic symptom outcomes

Patient-reported quality-of-life and Ayurvedic symptom measures are relevant but should be analyzed separately from objective anthropometric and biochemical outcomes. Validated instruments should be preferred, with prespecified primary/secondary status, minimally important differences where known and complete baseline/follow-up reporting.

4.8 Molecular and mechanistic outcomes

Munshi et al. examined selected genes including UCP2, ADIPOR1, PPAR γ , FTO, ghrelin and leptin. Vijay et al. examined urinary extracellular-vesicle proteins in six women. These studies are best regarded as hypothesis-generating. Their small sample sizes, lack of concurrent controls in the extracellular-vesicle study, multiple molecular endpoints and limited replication prevent causal claims about mechanism.

4.9 Safety and tolerability

Safety reporting was insufficiently consistent to estimate harms confidently. Absence of prominently reported complications should not be interpreted as evidence of safety. Future studies should prospectively define and report abdominal pain, diarrhea, constipation, nausea, rectal irritation/bleeding, dehydration, electrolyte disturbance, infection, allergic reactions, hemodynamic symptoms, treatment discontinuation and serious adverse events, including severity and relationship to the intervention.

4.10 Risk of bias

Study	Randomization	Deviations	Missing data	Outcome measurement	Selective reporting	Overall
Auti 2013	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns—high
Sreelakshmi 2015	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns—high
Suple 2015	High/unclear	Some concerns	Some concerns	Some concerns	Some concerns	High
Pooja & Bhattad 2016	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns
Singh 2020	Some concerns	High/some concerns	Low—some concerns	Some concerns	Some concerns	Some concerns
Munshi 2025	Some concerns	Some concerns—high	Some concerns	Some concerns	Some concerns	Some concerns—high

These are conservative publication-based judgments and should be replaced/confirmed by completed RoB 2 worksheets using protocols, registrations and analysis plans where available. The recurrent concerns were limited allocation-concealment reporting, open-label procedural treatment, unclear assessor blinding, attrition, small samples and incomplete prespecification.

5. Synthesis Without Meta-analysis

No meta-analysis was performed. A common pooled estimand could not be justified across the principal studies because formulations and schedules differed, comparator interventions had different mechanisms, follow-up times varied, variance data were incomplete, and several reports emphasized within-group tests rather than compatible between-group effects. Pooling such data would require assumptions that are not supported by the available reports.

The synthesis therefore considered outcome direction, magnitude where reported, comparative evidence, consistency, methodological limitations and clinical relevance. P values were not used as a vote-counting mechanism.

5.1 Certainty of evidence

Outcome	Direction	Main downgrading considerations	Certainty
Body weight/BMI	Generally favorable	Small samples; heterogeneous comparators; co-intervention/measurement effects; imprecision	Low
Waist/circumference/skin-folds	Generally favorable	Assessor blinding and measurement standardization unclear; imprecision	Low
Total cholesterol	Generally favorable; recurrent signal	Incomplete comparative estimates/variance; risk of bias	Low
LDL-C / triglycerides	Generally favorable but variable	Heterogeneity, imprecision and incomplete reporting	Low to very low
HDL-C	Mixed/modest improvement	Small studies and inconsistent results	Very low
Quality of life/symptoms	Possible improvement	Few studies; variable instruments; imprecision	Very low
Molecular biomarkers	Biological signals reported	Exploratory studies, multiplicity, no replication	Very low
Harms	Insufficiently reported	No consistent prospective adverse-event framework	Very low

The table represents GRADE-style certainty considerations rather than a formally completed GRADEpro assessment. Before submission, each major outcome should have an explicit domain-by-domain rationale and, where possible, a Summary of Findings table.

6. Discussion

6.1 Principal findings

The available literature demonstrates a recurrent signal of improvement in selected anthropometric and serum lipid outcomes following Lekhana Basti. Total cholesterol is among the most repeatedly favorable biochemical outcomes, while weight, BMI and circumference measures also improve in several reports. However, the apparent consistency of within-group improvement should not be interpreted as proof of superiority over a comparator or as evidence that the magnitude of change is clinically important.

Certainty is reduced by small samples, single-centre designs, heterogeneous Basti formulations, short follow-up, incomplete reporting of allocation and masking, diverse comparators, co-interventions, inconsistent safety reporting and limited provision of between-group estimates with confidence intervals. These limitations preclude strong causal conclusions.

6.2 Ayurvedic interpretation

Within Ayurvedic theory, Lekhana Basti may be discussed in relation to excess Meda and Kapha, altered Agni and Srotorodha. Terms such as Lekhana, Karshana, Deepana, Pachana, Kapha-Medohara and Srotoshodhana describe

the traditional therapeutic rationale. They should be distinguished from experimentally confirmed biomedical mechanisms.

6.3 Contemporary mechanistic interpretation

Rectal administration may influence gastrointestinal physiology, motility, mucosal signaling or absorption depending on formulation, but claims concerning microbiome modulation, endocrine signaling, systemic detoxification or direct fat removal require experimental confirmation. Gene-expression and extracellular-vesicle findings should be treated as hypothesis-generating rather than as proof of mechanism.

6.4 Clinical significance

The clinically meaningful question is not merely whether a P value is below 0.05, but whether the magnitude and durability of change matter to patients. Future obesity trials should report kilograms of weight loss, percentage total-body-weight loss, $\geq 5\%$ and $\geq 10\%$ responder rates, waist circumference, LDL-C/non-HDL-C and validated quality-of-life outcomes. Longer follow-up is essential to distinguish transient procedural changes from sustained changes in adiposity.

6.5 Relationship to contemporary management

The current evidence base supports investigation of Lekhana Basti as a potential complementary intervention; it does not establish replacement of established management for obesity, dyslipidemia, diabetes, hypertension or cardiovascular risk. Clinical studies should document background medical care, diet, physical activity and other co-interventions so that treatment effects can be interpreted appropriately.

6.6 Strengths of the revised review

Separates Ayurvedic therapeutic rationale from biomedical mechanism.

Separates comparative effectiveness evidence from mechanistic pilot evidence.

Does not equate within-group statistical significance with comparative efficacy.

Explicitly identifies why quantitative pooling is not justified.

Uses RoB 2 domains and outcome-level certainty considerations.

Uses SWiM principles rather than P-value vote-counting.

Highlights clinical significance and the need for confidence intervals.

Treats inadequate adverse-event reporting as uncertainty rather than evidence of safety.

Preserves transparent reporting of the missing historical search audit trail.

6.7 Limitations of the review

The major limitation is the absence of a complete preserved historical export and screening audit trail for the earlier review. The original review also lacked prospective protocol registration. Consequently, upstream PRISMA counts cannot be reconstructed authentically. Additional limitations include incomplete indexing of some older Ayurveda studies, limited methodological reporting, small samples, inability to robustly assess publication bias with only seven studies, and insufficient data for subgroup analysis or meta-analysis.

7. Implications for Future Research

7.1 Trial design

Prospectively register trials and prespecify the primary outcome and analysis.

Use adequately powered randomized designs, preferably multicentre where feasible.

Use computer-generated randomization with concealed allocation.

Blind objective anthropometric assessors and laboratory personnel where feasible.

Define diet, physical activity, concomitant medication and rescue treatment.

Use clinically meaningful follow-up sufficient to assess persistence of effect.

Prespecify missing-data methods, analysis population and protocol-deviation handling.

7.2 Standardization of Lekhana Basti

Report botanical identity, plant part and raw-material authentication.

Describe preparation/decoction method and concentration.

Report honey, salt, alkaline ingredients and oil type/quantity.

Report administered volume, temperature and pH where relevant.

Describe administration sequence, retention/evacuation and number/timing of sessions.

Document diet, exercise and concomitant therapies.

Use appropriate quality-control characterization or chemical fingerprinting when feasible.

7.3 Minimum statistical reporting

Report baseline and post-treatment values by group.
 Report mean change with SD or another valid dispersion measure.
 Report between-group effects with 95% confidence intervals.
 Prespecify primary and secondary outcomes.
 Report numbers randomized, analyzed and withdrawn with reasons.
 Report protocol deviations and adverse events systematically.
 Provide registration details and make the statistical analysis plan available where feasible.
 Avoid relying only on percentage change or within-group P values.

7.4 Mechanistic research

Mechanistic studies should be nested within adequately controlled clinical designs where possible, use prespecified biomarker panels, control multiplicity, include independent replication and avoid causal inference from exploratory omics associations. Molecular findings should be linked to a clearly defined clinical estimand.

8. Conclusion

Lekhana Basti has been investigated in small clinical studies of obesity/Sthaulya and lipid-related disorders, with recurrent reports of favorable changes in body weight, BMI, body circumferences and selected lipid parameters. More recent studies have added exploratory gene-expression and extracellular-vesicle observations. Nevertheless, the evidence is methodologically limited and heterogeneous, and definitive comparative effectiveness has not been established. Certainty for major clinical outcomes is low to very low. A pooled meta-analysis is not currently justified across the full evidence base because compatible effect estimates and variance data are inconsistently reported. Before journal submission, the literature search and study-selection process should be rerun and archived to generate authentic PRISMA counts. Future clinical research should use standardized interventions, adequate sample sizes, concealed allocation, objective/blinded outcome assessment where feasible, clinically meaningful follow-up, complete between-group statistical reporting and prospective adverse-event monitoring.

9. Declarations

Ethics approval and consent to participate: Not applicable to a systematic review of previously published studies.

Consent for publication: Not applicable.

Availability of data and materials: For resubmission, final database search histories, exported records, deduplication files, screening decisions, full-text exclusion log, risk-of-bias worksheets and extraction data should be retained and supplied as supplementary material or deposited in a stable repository where permitted.

Competing interests: To be completed by the authors.

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Author contributions: To be completed according to the CRediT taxonomy.

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