

UDGHARSHANA KARMA (AYURVEDIC HERBAL POWDER FRICTION MASSAGE) IN THE REDUCTION OF STHAULYA (OBESITY): AN INTEGRATIVE REVIEW OF CLASSICAL AYURVEDIC CONCEPTS, CUTANEOUS PHYSIOLOGY AND CONTEMPORARY BIOCHEMICAL EVIDENCE

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ABSTRACT

Background: Sthaulya (obesity) is described in Ayurvedic classics as a Santarpanajanya Vyadhi arising from vitiation of Kapha Dosha and abnormal accumulation of Meda Dhatu consequent upon Agnimandya (impaired metabolic fire) and Srotorodha (channel obstruction). Udgharshana – the vigorous rubbing of dry or semi-dry herbal powders (Churna) over the skin in a direction opposite to hair growth – is among the Bahiparimarjana (external palliative) procedures prescribed for Sthaulya, alongside its allied procedures Udvartana and Utsadana. **Objective:** To collate and critically integrate classical Ayurvedic textual references on Udgharshana Karma with the physiology of the cutaneous appendages (eccrine sweat glands and sebaceous glands) and with contemporary biochemical/pharmacological evidence on the herbs most frequently used in anti-obesity Udgharshana Churna formulations. **Methods:** A narrative literature review was conducted using classical Brihatrayee texts (Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya) and their commentaries, supplemented by a search of PubMed, ScienceDirect, Google Scholar and the AYUSH Research Portal for terms including “Udvartana”, “Udgharshana”, “sebaceous gland”, “eccrine sweat gland”, “Cyperus rotundus”, “Acorus calamus”, “Macrotyloma uniflorum” and “adipocyte lipolysis”. **Findings:** Classical texts uniformly attribute Kapha-hara, Medo-hara (fat-reducing), Shoshana (absorbent/desiccant) and Twak-prasadana (skin-brightening) properties to Udgharshana. Contemporary evidence corroborates several of these actions: mechanical friction over the skin activates cutaneous mechanoreceptors and local sympathetic outflow, promoting catecholamine-mediated, β -adrenoceptor-driven hydrolysis of adipocyte triglycerides (lipolysis), while herbs conventionally incorporated into Udgharshana Churna – notably Musta (Cyperus rotundus), Vacha (Acorus calamus), Kulattha (Macrotyloma uniflorum), Yava (Hordeum vulgare) and Triphala – possess documented anti-adipogenic, PPAR γ -modulating, lipid-lowering and antioxidant bioactivities. **Conclusion:** Udgharshana represents a physiologically plausible, low-cost and evidence-congruent adjunct in the multimodal Ayurvedic management of obesity, though robust randomised clinical trials with standardised Churna composition and objective anthropometric/biochemical endpoints remain scarce and are needed to validate its independent contribution.

KEYWORDS: Udgharshana, Sthaulya, Obesity, Ayurveda, Udvartana, Kapha Dosha.

1. INTRODUCTION

Obesity has emerged as a global non-communicable disease of pandemic proportions, and India is no exception, with prevalence estimates crossing 5% and rising steadily among both children and adults.^[14] Modern biomedicine correlates obesity with hypertrophy and hyperplasia of adipocytes, chronic low-grade inflammation, dyslipidaemia, insulin resistance, hypertension and atherosclerosis.^[14] Ayurveda, more than two millennia earlier, had already classified Sthaulya among the eight blameworthy constitutional types (Ashta Nindita Purusha) and described it in detail as a disorder of Meda Dhatu (adipose tissue) driven by Kapha-Pitta vitiation, Margavarodha (channel blockage) and paradoxical Agnimandya of Dhatvagni despite an exaggerated Jatharagni.^[5]

Among the Bahiparimarjana Chikitsa (external line of treatment) described for Sthaulya, Udgharshana – vigorous, dry, upward-and-opposite-to-hair-follicle friction of herbal powders over the body – occupies a distinctive place alongside its closely related sister procedures Udvartana (oil- or paste-based powder massage) and Utsadana (cosmetic/beautifying massage).^[14] While these three terms are frequently used interchangeably in contemporary Ayurvedic literature, classical commentators, notably Dalhana on the Sushruta Samhita, differentiate them according to the nature of the drug used, the vehicle (dry powder versus paste), and the therapeutic intent (Lekhana/Shoshana for obesity versus Varnya/cosmetic for beautification).^[1]

This review consolidates the classical textual basis of Udgharshana Karma in Sthaulya, correlates its described actions (Kapha-hara, Medo-hara, Shoshana, Twak-prasadana) with the physiology of the skin's exocrine appendages — the eccrine sweat glands and holocrine

sebaceous glands — and reviews the biochemical/pharmacological evidence for the principal herbs conventionally compounded into anti-obesity Udgharshana Churna.

2. MATERIALS AND METHODS

This is a narrative-integrative literature review. Classical sources consulted include the Charaka Samhita (Sutrasthana), Sushruta Samhita (Chikitsasthana) with the Nibandhasangraha commentary of Dalhana, Ashtanga Hridaya (Sutrasthana), Bhavaprakasha and Sharangdhara Samhita, accessed through standard published translations and the Carakasamhita Online repository.^[1716] Contemporary literature was retrieved from PubMed/MEDLINE, ScienceDirect, Nature Scientific Reports, Wiley Online Library and Google Scholar using the search terms “Udvartana”, “Udgharshana”, “sebaceous gland physiology”, “eccrine sweat gland”, “Cyperus rotundus obesity”, “Acorus calamus lipid”, “Macrotyloma uniflorum obesity”, “massage lipolysis catecholamine” and “mechanotransduction skin”, restricted to full-text or substantial-abstract sources available at the time of writing (2026).

3. Classical Conceptual Framework

3.1 Terminological distinction: Udgharshana, Udvartana and Utsadana

Although the present review is titled around Udgharshana — the term most precisely denoting dry, high-pressure herbal-powder friction — classical and contemporary Ayurvedic literature on obesity management overwhelmingly documents this action under the closely allied and more extensively studied procedure of Udvartana, of which Udgharshana is regarded as a specific dry-powder variant.^[13] Table 1 summarises the classical distinction.

Table 1: Classical differentiation of Udgharshana, Udvartana and Utsadana.

Term	Vehicle / Technique	Primary classical citation	Chief indication emphasised
Udgharshana	Dry or semi-dry Churna, applied with firm pressure against the direction of hair follicles	Sushruta Samhita Chikitsasthana (Dalhana's Nibandhasangraha); Charaka Samhita Su. 5/23 ^[11,30]	Ruksha Kapha states, Kandu (itch), Kotha, and reduction of oiliness — desiccant (Shoshana) action
Udvartana	Herbal Churna, often mixed with a small quantity of oil, massaged upward toward the heart	Charaka Samhita Su. 5/23: “Udvartanam kaphaharam medasah prashamanam shramanashanam twakprasadakaram cha tat” ^[30]	Kapha-hara, Medo-hara (classic Sthaulya indication), Shramanashana, Twak-prasadana
Utsadana	Fine cosmetic powders (e.g., Reetha, aromatic Churna)	Sushruta Samhita; cited in comparative reviews. ^[1]	Varnya (complexion enhancement), Lavanya (beautification), skin lustre

3.2 The governing classical verse

The most frequently cited textual authority for the anti-obesity application of this group of procedures is Charaka Samhita, Sutrasthana, Chapter 5 (Matrashitiya Adhyaya), verse 23, which is rendered:^[30]

“Udvartanam kaphaharam medasah prashamanam shramanashanam twakprasadakaram cha tat”

Translated: “Udvartana (herbal-powder friction massage) alleviates Kapha, reduces (excess) Meda, relieves fatigue, and imparts lustre/clarity to the skin.”^[30] This

single verse condenses four distinct, independently verifiable pharmacophysiological claims that structure the remainder of this review: (i) Kapha-hara — doshic pacification, (ii) Medo-hara — direct reduction of adipose mass, (iii) Shrama-nashana — an anti-fatigue/circulatory effect, and (iv) Twak-prasadana — an effect specifically mediated through the cutaneous appendages.

3.3 Ayurvedic pathophysiology (Samprapti) of Sthaulya

Sthaulya is classified by Charaka among the Santarpanotha Vyadhi (disorders of over-nourishment), resulting from Bija-swabhava (genetic predisposition), Beeja Dushti, excessive intake of Guru (heavy), Snigdha (unctuous), Madhura (sweet) and Kapha-vardhaka Ahara combined with Avyayama (sedentary habit) and Divaswapna (day sleep).^[5] The vitiated Kapha and Medas obstruct the Vayu-Vaha and Medo-Vaha Srotas, producing Srotorodha; the resultant abnormally free-flowing yet functionally impaired Samana and Vyana Vayu paradoxically stimulate Jatharagni while suppressing Dhatvagni, so that ingested nutrients are preferentially converted into further Meda Dhatu rather than progressing through the sequential Dhatu Poshana — a self-perpetuating cycle classical commentators term Medo-Dhatvagni-Mandya.^[5]

Bahiparimarjana measures such as Udgharshana/Udvartana are understood to act locally at the level of Twacha (skin) and the superficial Medas layer to achieve Lekhana (scraping/depletion) of accumulated fat, Sroto-shodhana (channel clearance) and stimulation of peripheral Agni, complementing internal Shodhana (e.g., Virechana) and Shamana (e.g., Guggulu-based) therapies.^[8]

4. Cutaneous Physiology Relevant to Udgharshana

The classical claim of Twak-prasadana and Medo-hara through external friction cannot be fully appreciated without reference to the two principal exocrine appendages of the skin acted upon by Udgharshana: the eccrine sweat glands (Swedavaha Srotas) and the sebaceous glands, together with the subjacent subcutaneous adipose tissue (Meda Dhatu).

4.1 Eccrine sweat glands

Eccrine glands are simple, coiled tubular glands distributed over almost the entire body surface and are the principal effectors of thermoregulatory sweating; their secretory coil, located in the deep dermis/subcutis, produces a hypotonic filtrate of plasma that is further modified by ductal reabsorption of sodium and chloride as it ascends to the epidermal surface.^[12] Sweat composition and volume are influenced by axon-reflex activation, local skin temperature and the degree of cutaneous stimulation, providing a plausible physiological substrate for the classical description of Udvartana “eliminating excessive perspiration and body

odour” through regulation, rather than mere stimulation, of glandular output.^[12,31]

4.2 Sebaceous glands

Sebaceous glands are holocrine glands, usually associated with a hair follicle to form the pilosebaceous unit, that mature through a programme of centripetal sebocyte migration, progressive lipid loading, and terminal disintegration of the entire cell to release sebum — a complex mixture of triglycerides and free fatty acids ($\approx 57\%$), wax esters ($\approx 26\%$), squalene ($\approx 12\%$) and cholesterol/cholesterol esters ($\approx 2\%$) — into the pilosebaceous canal.^[9,13] Sebaceous glands contribute up to 90% of total skin-surface lipids and are metabolically active, capable of de novo lipogenesis from both glycogen and glycerophosphate substrates even under conditions of glucose deprivation.^[10,11] Because sebocyte lipogenesis is governed by pathways that include peroxisome proliferator-activated receptor- α (PPAR α), sterol regulatory element-binding protein (SREBP) and arachidonic-acid metabolism — the same nodal pathways implicated in systemic adipocyte lipid handling — herbal actives capable of modulating these pathways (see Section 5) offer a mechanistic bridge between the classical Twak-prasadana effect and quantifiable sebum regulation, as has been demonstrated experimentally for other plant extracts acting on sebaceous gland secretion via network-pharmacology-validated PPAR/SREBP modulation.^[14,18]

4.3 Mechanotransduction, sympathetic activation and adipocyte lipolysis

Independent of any herbal constituent, the mechanical act of friction itself is bioactive. Cutaneous mechanoreceptors transduce shear and pressure into biochemical signalling cascades (mechanotransduction) that influence local barrier function, microcirculation and autonomic outflow.^[53] Direct electrical or physiological stimulation of cutaneous sympathetic nerves increases lipolysis specifically in the adipose tissue innervated by that nerve, while denervation reduces lipolytic capacity and increases adipocyte volume, establishing a causal role for local sympathetic tone in regional fat mobilisation.^[51] Locally released noradrenaline acts on β -adrenoceptors of the adipocyte membrane to activate adenylate cyclase and, via protein kinase A, hormone-sensitive lipase (HSL), catalysing hydrolysis of stored triglycerides to glycerol and free fatty acids — the biochemical definition of lipolysis — while also modulating local adipose tissue blood flow.^[49,50] Even light, repetitive mechanical stress of the type generated by manual or device-based massage has been shown to disrupt adipocyte architecture, mobilise stored triglycerides and stimulate tissue vascularisation and lymphatic clearance without inducing an inflammatory repair reaction.^[47,48,54] These findings collectively provide a coherent biomedical rationale for the classical assertion that repetitive, direction-specific friction (Udgharshana) independently contributes to Medo-hara

action, over and above any effect attributable to the herbal Churna itself.

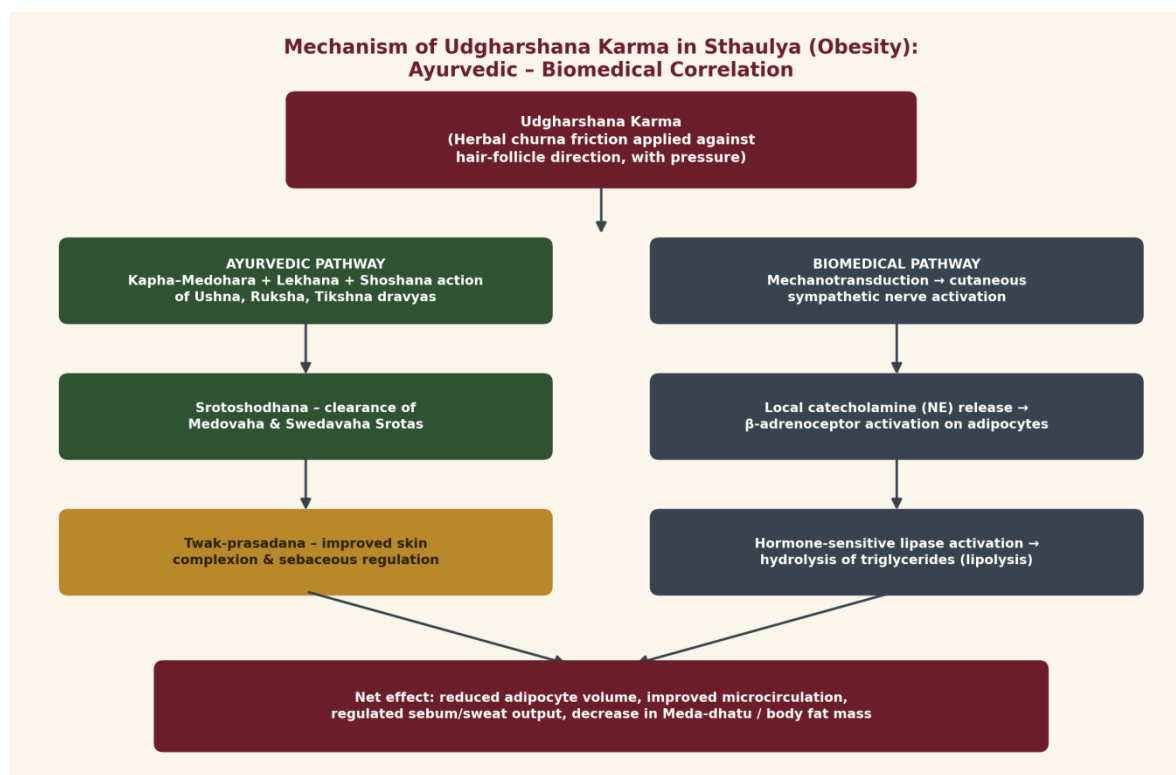


Figure 1: Proposed dual-pathway mechanism of Udgharshana Karma in Sthaulya.

5. Herbs Conventionally Used in Anti-Obesity Udgharshana Churna

Classical descriptions of the Churna employed for Udgharshana/Udvardhana in Sthaulya do not specify a single fixed formula; Acharyas describe broad categories of Kapha-Medohara, Lekhaniya and Ruksha (desiccant) Dravyas suitable for the purpose, and clinical practice — corroborated by contemporary case reports — most

frequently draws upon Musta, Vacha, Kulattha, Yava and Triphala, singly or in combination, sometimes fortified with Trikatu (Sunthi, Maricha, Pippali) for its Ushna-Tikshna properties.^[40] Table 2 summarises the Ayurvedic pharmacological attributes (Rasa-Guna-Virya-Vipaka-Karma) of these herbs alongside their principal documented bioactive constituents and contemporary pharmacological evidence.

Table 2: Principal herbs used in anti-obesity Udgharshana/Udvardhana Churna — Ayurvedic properties and biochemical evidence.

Herb (Ayurvedic name)	Botanical name / Family	Rasa · Guna · Virya · Vipaka	Key phytoconstituents	Documented pharmacological action
Musta	<i>Cyperus rotundus</i> L. (Cyperaceae)	Tikta, Kashaya, Katu · Laghu, Ruksha · Sheeta · Katu	Stilbenoids — piceatannol, scirpusin A & B; flavonoids (quercetin, luteolin); phenolic acids	Inhibits adipogenesis via down-regulation of PPAR γ and aP2/FABP4; reduces body weight, BMI and waist circumference in RCTs; enhances GLUT4 expression ^[15-21,22]
Vacha	<i>Acorus calamus</i> L. (Acoraceae)	Tikta, Katu · Laghu, Tikshna · Ushna · Katu	β -asarone, α -asarone, essential oils, sesquiterpenes	Used clinically in Udvardhana Churna for Sthoulya case management; classically Kapha-Vata-hara, Deepana (digestive-stimulant) and Lekhana. ^[40]
Kulattha	<i>Macrotyloma uniflorum</i> (Lam.) Verdc. (Fabaceae)	Kashaya · Laghu, Ruksha · Ushna · Katu	Phenolic acids, flavonoids (kaempferol,	Anti-hypercholesterolaemic and anti-obesity activity demonstrated in animal models; lipid-lowering,

Herb (Ayurvedic name)	Botanical name / Family	Rasa · Guna · Virya · Vipaka	Key phytoconstituents	Documented pharmacological action
			cyanidin, delphinidin, malvidin), tannins, urease	anti-glycaemic effects. ^[32-38]
Yava	Hordeum vulgare L. (Poaceae)	Kashaya, Madhura · Laghu, Ruksha · Sheeta · Katu	β-glucan, phenolic acids, tocots	Classically Medohara and Lekhaniya; low glycaemic-index carbohydrate matrix used as a base powder in anti-obesity Churna
Triphala	Terminalia chebula + T. bellirica + Phyllanthus emblica	Predominantly Kashaya with all Rasa except Lavana · Laghu, Ruksha · Ushna/Anushna · Madhura	Gallic acid, chebulinic/chebulagic acid, ellagic acid, tannins	Composite Rasayana with documented antioxidant and lipid-modulating actions; classically the archetypal Lekhana-Shodhana polyherbal formulation. ^[31]

6. Herb-wise Biochemical and Pharmacological Evidence

6.1 Musta (Cyperus rotundus) — the principal anti-adipogenic constituent

Musta possesses the most extensive contemporary evidence base among Udgharshana ingredients. A standardised rhizome extract containing 5–8% total stilbenoids (piceatannol, scirpusin A and scirpusin B) reduced lipid accumulation in 3T3-L1 adipocytes with an IC₅₀ of approximately 9.4 µg/mL without cytotoxicity, and down-regulated expression of PPARγ and adipocyte protein-2 (aP2/FABP4), the master transcriptional regulators of adipogenesis.^[17,21] In diet-induced obese mice, the same extract reduced weight gain and lowered circulating corticosterone and leptin levels, and in a randomised, double-blind, placebo-controlled clinical trial in obese adults (BMI 30–40 kg/m²) over 90 days, supplementation produced significant reductions in body weight, BMI, waist circumference and serum lipid parameters relative to placebo.^[15,16] A separate ethyl-acetate extract additionally up-regulated GLUT4 translocation in skeletal-muscle myotubes while suppressing GLUT4 expression in maturing adipocytes, indicating a dual action on both glucose disposal and lipid storage.^[19] High-performance liquid chromatography of Musta extracts further identifies quercetin, luteolin and its glucosides, and apigenin-7-glucoside as major flavonoid constituents with demonstrated inhibitory activity on pancreatic lipase, α-glucosidase and dipeptidyl peptidase-4 — enzyme targets directly relevant to the Ayurvedic description of Musta as Lekhaniya (scraping/depleting).^[18]

6.2 Vacha (Acorus calamus)

Vacha, classically Tikshna, Ushna and Katu-Vipaka, is used in contemporary integrative case management of Sthoulya specifically as an Udvartana Churna ingredient combined with Swedana (steam fomentation using Nirgundi and Dashamoola Kwatha), producing

documented improvement in anthropometric and BMI parameters in published case reports.^[40] Its principal bioactive constituents, α- and β-asarone, contribute to its classical Deepana-Pachana (digestive-stimulant) properties, which are proposed to correct the Agnimandya component of Sthaulya Samprapti.

6.3 Kulattha (Macrotyloma uniflorum)

Horse gram is both a dietary Pathya (recommended food) and an Udgharshana Churna ingredient in Sthaulya management.^[40] Systematic reviews of its phytochemistry document a rich profile of phenolic acids, flavonoids (kaempferol, cyanidin, delphinidin, malvidin) and tannins with antioxidant, anti-diabetic and anti-inflammatory activity, and experimental studies report that M. uniflorum extracts exert strong anti-hypercholesterolaemic and anti-obesity effects in animal models, consistent with its classical designation as Kashaya-Rasa, Ushna-Virya and Lekhana in action.^[32-38]

6.4 Triphala and adjuvant Dravyas

Triphala — the combination of Terminalia chebula, Terminalia bellirica and Phyllanthus (Emblica) officinalis — is among the oldest polyherbal preparations in Ayurvedic external therapy and is described as reducing peripheral Kapha and inflammation while improving dermal microcirculation when applied as Udvartana; it is rich in hydrolysable tannins (chebulinic acid, chebulagic acid, gallic and ellagic acid) with well-characterised antioxidant activity.^[31]

7. Summary of Clinical and Experimental Evidence

Table 3 summarises the principal clinical and experimental sources reviewed. It should be noted that most Udvartana-specific clinical data derive from case studies and narrative reviews rather than adequately powered randomised controlled trials, whereas the strongest randomised-trial-level evidence currently available pertains to an isolated constituent herb

(Musta/Cyperus rotundus) administered orally rather than to the topical Udgharshana procedure itself — a distinction of importance discussed in Section 9.

Table 3: Summary of clinical and experimental evidence on Udvartana/Udgharshana and its principal constituent herb.

Study / Source	Design	Intervention	Reported outcome
Effect of Udvartan therapy in Sthoulya (Obesity) – A Review, Int. Res. J. Ayurveda & Yoga, 2022 ^[4]	Narrative clinical review	Udvartana as Bahiparimarjana Chikitsa, combined with Shodhana/Shamana	Reduction in Kapha-Vata-predominant symptom complex; improvement in associated anthropometric parameters
Udvartana and Virechana in Effective Weight Management for Obesity, Ayushdhara, 2025 ^[8]	Single case study	Combined Udvartana with Virechana (therapeutic purgation)	Post-treatment weight reduction of 7 kg, with improvement in body-circumference measurements and overall well-being
Case Study on Management of Overweight (Sthoulya) through Ayurveda, PMC, 2025. ^[40]	Single case study	Udvartana with Vacha Churna + Peti Swedana (Nirgundi – Dashamoola Kwatha) + Tryushanadi Guggulu	Improvement in subjective symptoms, anthropometric measurements and BMI after 15 days of Udvartana plus 1 month of Shamana therapy
2024 IJHSR review, cited in Mirasa Ayurveda clinical summary. ^[6]	Review of clinical/observational studies	Udvartana (various Churna)	Statistically significant reductions in body weight, BMI, waist and hip circumference, waist-hip ratio, skin-fold thickness; improved lipid profile
Efficacy and safety of Cyperus rotundus extract, randomised double-blind placebo-controlled trial ^[15]	RCT, 96 obese participants, 90 days	Oral standardised Musta extract with piperine (bioavailability enhancer)	Significant reduction in body weight, BMI, waist circumference and lipid parameters versus placebo

8. Integrated Ayurveda–Biomedicine Correlation

Table 4 maps each classically enumerated action of Udgharshana/Udvartana against a plausible, evidence-

supported biomedical mechanism, drawing on the physiological and pharmacological data reviewed in Sections 4–7.

Table 4: Correlation of classical Karma with proposed biomedical mechanisms.

Classical Ayurvedic action (Karma)	Proposed biomedical correlate	Supporting evidence
Kapha-hara / Medo-hara (fat-reducing)	Inhibition of adipogenesis ($\downarrow$ PPAR γ , $\downarrow$ aP2/FABP4) and activation of β -adrenoceptor-mediated lipolysis (HSL activation)	Cyperus rotundus in vitro/in vivo and clinical trial data ^[17–22] ; catecholamine-lipolysis physiology ^[49,50]
Shoshana (desiccant/absorbent action)	Modulation of eccrine sweat-gland secretion and evaporative water loss through mechanical and thermogenic stimulation	Sweat-gland physiology reviews ^[12] ; mechanotransduction literature. ^[53]
Sroto-shodhana (channel-clearing)	Enhanced local microcirculation and lymphatic drainage secondary to repetitive mechanical stimulation	Mechanical massage/lymph-drainage histological studies ^[47,48,54]
Twak-prasadana (skin-brightening)	Regulation of sebaceous gland holocrine secretion and lipid composition of sebum	Sebaceous gland physiology and network-pharmacology modulation studies ^[9,13,14,18]
Shrama-nashana (anti-fatigue effect)	Improved peripheral blood flow and reduced local metabolic by-product accumulation	Adipose-tissue blood-flow and adrenergic-stimulation studies ^[49,51]

9. DISCUSSION

The convergence between classical description and contemporary evidence is strongest for the Medo-hara claim: independent lines of evidence — adipocyte cell-culture studies, diet-induced-obesity animal models and a placebo-controlled human trial — corroborate an anti-adipogenic, lipolysis-promoting action for Musta, the herb most consistently incorporated into anti-obesity Udgharshana Churna.^[15-22] The mechanotransduction and catecholamine-lipolysis literature independently supports a Medo-hara contribution from the friction procedure itself, distinct from any specific herbal constituent, lending biological plausibility to the classical insistence on vigorous, direction-specific rubbing rather than passive powder application.^[47,49,51,53]

Evidence for the Twak-prasadana claim, while physiologically plausible given the central role of sebaceous glands in skin lustre and the demonstrated capacity of plant polyphenols to modulate sebocyte lipid metabolism via PPAR/SREBP pathways, remains largely inferential; no study located in this review directly measured sebum output or composition before and after Udgharshana in human subjects, representing a clear evidence gap.^[9-13,14-18]

A key methodological limitation across the Udvartana-specific literature is the predominance of single case studies and narrative reviews over randomised controlled trials, non-standardisation of Churna composition and duration across studies, and conflation of Udvartana with concurrent Shodhana or Shamana interventions (e.g., Virechana, Guggulu formulations, dietary modification), making it difficult to isolate the independent contribution of the external procedure from co-administered therapies.^[8,40] Future research would benefit from randomised, adequately powered trials employing a standardised Udgharshana Churna as a stand-alone intervention arm, with pre-specified anthropometric (BMI, waist circumference, waist-hip ratio, skin-fold thickness), biochemical (lipid profile, adipokines) and, where feasible, direct sebum-quantification and sweat-rate endpoints, to formally test the mechanistic hypotheses summarised in Table 4.

10. CONCLUSION

Udgharshana Karma, understood as the dry-powder-friction variant of the broader Udvartana procedure, is grounded in a classical Ayurvedic pathophysiological framework that attributes to it Kapha-hara, Medo-hara, Shoshana and Twak-prasadana properties in the management of Sthoulya. Contemporary cutaneous physiology and adipocyte biochemistry provide plausible, and in the case of Musta (*Cyperus rotundus*) directly demonstrated, mechanistic support for these classical claims, operating through both a herbal-pharmacological pathway (PPAR γ /aP2 down-regulation, enzyme inhibition, antioxidant activity) and an independent mechanical pathway (cutaneous sympathetic activation, β -adrenoceptor-mediated lipolysis, enhanced

microcirculation). Udgharshana therefore merits continued use as a safe, low-cost adjunct within a multimodal Ayurvedic weight-management protocol, while further well-designed clinical trials are required to quantify its independent effect size and to directly validate its proposed action on sebaceous and sweat-gland physiology.

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