RESEARCH PAPER

Evaluation of Yogasana and Pranayama in Reducing Preoperative Anxiety among Patients Undergoing operative Procedures: A Narrative Review

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ABSTRACT

Background: Preoperative anxiety is a highly prevalent psychophysiological state affecting a large proportion of patients awaiting surgical intervention, including those undergoing Shalya Tantra (Ayurvedic surgical and parasurgical) procedures such as Kshara Karma, Ksharasutra therapy, and Shastra Karma. Unmanaged preoperative anxiety is associated with altered autonomic and endocrine responses, increased anaesthetic requirement, delayed wound healing, and poorer patient satisfaction. Yogasana (postural yoga) and Pranayama (yogic breath regulation) are low-cost, non-pharmacological interventions rooted in classical Indian tradition, philosophically continuous with Ayurveda, that have shown anxiolytic potential across multiple surgical and medical settings.

Objective: To critically review the available scientific and classical evidence on the role of Yogasana and Pranayama in reducing preoperative anxiety, to examine the Ayurvedic conceptual framework of surgical anxiety (Chittodvega), and to evaluate the relevance and applicability of these interventions to the perioperative framework of Shalya Tantra.

Methods: A narrative review was conducted using PubMed/MEDLINE, ScienceDirect, and other indexed biomedical and Ayurveda-specific sources, combining search terms related to yoga, pranayama, preoperative anxiety, perioperative/surgical care, Chittodvega, and Shalya Tantra/Ayurvedic surgery. Randomized controlled trials, systematic reviews and meta-analyses, mechanistic physiology studies, and classical/contemporary Ayurveda literature were synthesized qualitatively.

Results: Across cardiac, interventional cardiology, oncologic, orthopedic, and pediatric surgical settings, short-duration yoga-based breathing and postural practices were consistently associated with reductions in state-anxiety scores, decreased sympathetic arousal, and, in some studies, lower intraoperative analgesic requirement. A dedicated meta-analysis of randomized trials found small-to-large short-term reductions in anxiety with yoga compared with no treatment or active comparators. Proposed biological mechanisms include enhancement of vagal/parasympathetic tone, attenuation of hypothalamic-pituitary-adrenal axis activity, increased heart-rate variability, and modulation of amygdala-prefrontal emotion-regulation circuits. From an Ayurvedic standpoint, preoperative anxiety maps closely onto the classical construct of Chittodvega, understood as vitiation of Vata and the Rajas/Tamas Manas Doshas, for which Yoga and Satwavajaya Chikitsa are explicitly recommended non-pharmacological measures. Dedicated trials of Yogasana and Pranayama specifically within Shalya Tantra perioperative pathways remain scarce, although the classical emphasis on Purva Karma (pre-procedural preparation) provides a conceptually compatible framework for integration.

Conclusion: Convergent modern clinical evidence and classical Ayurvedic theory support the anxiolytic potential of Yogasana and Pranayama in the perioperative period. Structured, adequately powered trials embedded within Shalya Tantra clinical practice-particularly for high-volume, awake procedures such as Ksharasutra therapy for Bhagandara and Arsha-are needed to establish standardized, evidence-based, dosha-informed protocols.

Keywords: Pranayama; Yogasana; preoperative anxiety; Shalya Tantra; Ayurvedic surgery; Ksharasutra; Chittodvega; integrative perioperative care

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INTRODUCTION

Shalya Tantra, one of the eight classical branches (Ashtanga) of Ayurveda, is the systematized science of surgical and parasurgical intervention described extensively in the Sushruta Samhita, dated to approximately 600 BCE. It encompasses Shastra Karma (instrumental surgery) and Anushastra Karma (parasurgical procedures such as Kshara Karma, Agnikarma, and Raktamokshana), and is most widely practiced today in the management of ano-rectal disorders (Arsha, Bhagandara, Parikartika), abscesses, wounds, fractures, and minor surgical ailments.[1] Classical Shalya Chikitsa already recognizes the importance of thorough pre-operative preparation and post-operative care for optimizing surgical outcomes, but contemporary integration of validated psychological-preparation tools into this pathway remains limited; this has been explicitly flagged as an active research gap in recent narrative reviews mapping Shalya Tantra onto modern perioperative science, including Enhanced Recovery After Surgery (ERAS) principles.[2]

Anxiety before a planned surgical or parasurgical procedure is one of the most consistently reported psychological experiences of surgical patients worldwide, irrespective of the surgical system involved. It is conventionally assessed using validated tools such as the Amsterdam Preoperative Anxiety and Information Scale (APAIS), developed to capture both anxiety related to anaesthesia/surgery and the patient's need for information.[3] Because Ksharasutra therapy, Kshara application, and minor Shastra Karma procedures for anorectal disease are frequently performed under local or regional anaesthesia with the patient conscious throughout, and often require repeated outpatient visits over several weeks, preoperative anxiety is arguably even more clinically relevant-and more repeatedly triggered-in the Shalya Tantra context than in a single, one-time procedure performed under general anaesthesia.

Yogasana and Pranayama-postural and breath-regulation practices that form part of the classical Ashtanga Yoga system codified by Patanjali-have attracted growing scientific interest as adjunctive, non-pharmacological means of reducing anxiety across medical and surgical populations. Given their shared philosophical and historical roots with Ayurveda, and their demonstrated feasibility as brief bedside or pre-procedural interventions requiring no equipment and negligible cost, Yogasana and Pranayama represent a logical and culturally congruent addition to the Purva Karma (preparatory) phase of Shalya Tantra. This review synthesizes the current biomedical evidence on yoga-based interventions for preoperative anxiety, situates this evidence within the classical Ayurvedic understanding of surgical/mental distress (Chittodvega), and considers their practical applicability to Shalya Tantra clinical practice.

The specific aims of this review are threefold: (i) to summarize the epidemiology, assessment, and clinical consequences of preoperative anxiety; (ii) to synthesize controlled evidence for Yogasana and Pranayama as anxiolytic interventions across surgical specialties, together with their proposed physiological mechanisms; and (iii) to critically examine how these practices might be operationally integrated into the Purva Karma phase of Shalya Tantra, while identifying the specific research gaps that must be closed before such integration can be evidence-based rather than merely plausible.

2. The Ayurvedic Conceptual Framework of Surgical Anxiety: Chittodvega

Ayurveda does not use the biomedical term "anxiety" but describes a closely corresponding clinical entity, Chittodvega (also referred to as Udvega), classified under Manasavikara (mental disorders).[21,22] Charaka enumerates Anavasthita Chittatwa-instability or restlessness of the mind-among the Nanatmaja Vyadhi (disorders exclusively caused by vitiated Vata), and later scholarship has correlated this description closely with the modern construct of anxiety disorder, characterized by excessive worry (Chinta), fear (Bhaya), restlessness (Anavasthitatva), palpitation, and disturbed sleep.[22]

Mechanistically, Ayurveda attributes Chittodvega to vitiation of Vata dosha-particularly its Prana, Vyana,

and Udana subtypes, which govern sensory-motor coordination, circulation, and higher mental functions respectively-occurring in conjunction with imbalance of the Manas Doshas, Rajas (excessive activity/restlessness) and Tamas (inertia, clouding of judgement), superimposed on the mind's normal Sattva (clarity) quality.[23,24] A surgical or parasurgical procedure is, from this framework, a potent precipitating event: the anticipation of pain, instrumentation, and loss of bodily integrity aggravates Vata through fear and irregular breathing, which in turn destabilizes Manas and produces the clinical picture of preoperative Chittodvega.

Classical and contemporary Ayurvedic management of Chittodvega is explicitly two-pronged: Aushadha Chikitsa (pharmacological management, using Medhya Rasayana such as Brahmi, Ashwagandha, and Jatamansi) and non-pharmacological Achara Rasayana and Satwavajaya Chikitsa (psychological restraint and behavioural regulation), within which Yoga is repeatedly and specifically named as a first-line, non-drug intervention for calming Rajas and stabilizing Vata.[21,24] This is directly relevant to Shalya Tantra: because Yogasana and Pranayama are already textually and philosophically endorsed within Ayurveda's own model of anxiety management, their proposed use in the preoperative period of Shalya Tantra is not an external graft from another medical system but an internally consistent extension of Ayurvedic Manasika Chikitsa into the surgical domain. This conceptual alignment strengthens the rationale for empirical testing within Shalya Tantra specifically, rather than relying solely on extrapolation from biomedical surgical trials.

Figure 1. Ayurvedic conceptual framework of Chittodvega (preoperative anxiety)

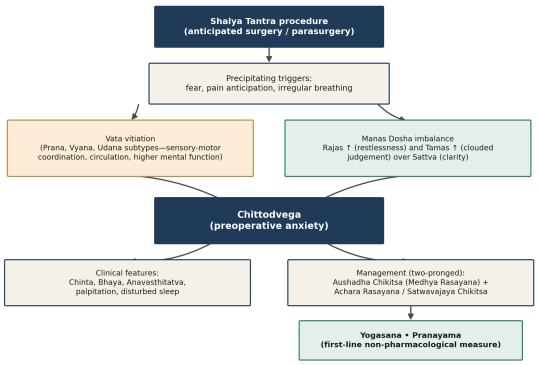

Figure 1. Ayurvedic conceptual framework of Chittodvega (preoperative anxiety), showing the proposed pathway from surgical anticipation through Vata/Manas Dosha vitiation to clinical anxiety and its two-pronged management.

3. Preoperative Anxiety: Burden, Assessment, and Consequences

Preoperative anxiety is reported across a wide range of surgical populations. A systematic review and meta-analysis of studies from low- and middle-income countries estimated a pooled prevalence of approximately 56% among patients awaiting surgery, with substantial heterogeneity across settings and assessment instruments.[4] Even in better-resourced settings using standardized tools, roughly one-fifth to one-quarter of elective surgical patients meet threshold criteria for clinically significant preoperative anxiety, with female sex, younger age, shorter interval to surgery, and prior surgical complications identified as consistent risk factors.[5,6]

The APAIS remains the most widely used brief instrument, comprising six items across two domains-anxiety about anaesthesia/surgery and need for information-scored on a five-point Likert scale, with strong reliability and validity demonstrated across multiple translated versions, including Kannada and German adaptations relevant to Indian clinical practice.[3] Total anxiety scores of 11 or higher on the APAIS-A subscale are conventionally used to denote clinically significant preoperative anxiety.[5]

3.1 Table 1. Selected assessment tools for preoperative anxiety

Instrument	Domains assessed	Format	Notes
APAIS	Anxiety re: anaesthesia/surgery; need for information	6-item, 5-point Likert	Brief, validated in multiple languages incl. Kannada, German
STAI (State-Trait)	State anxiety (current) and trait anxiety (baseline tendency)	20 + 20 items	Widely used research gold standard; longer administration time
Visual Analogue Scale-	Single-dimension subjective	0–10 scale	Fast bedside use;

Anxiety (VAS-A)	anxiety		correlates well with APAIS
Hospital Anxiety and Depression Scale (HADS)	Anxiety and depression subscales	14 items	Useful when comorbid mood symptoms are of interest

Unaddressed preoperative anxiety is not merely a subjective discomfort. It has been linked to heightened intraoperative anaesthetic and analgesic requirements, increased postoperative pain scores, delayed wound healing, prolonged hospital stay, and reduced patient satisfaction with the overall surgical experience.[6] In cardiac surgical populations specifically, trait anxiety measured preoperatively has been identified as a predictor of long-term mortality over a 7.5-year follow-up period, underscoring that preoperative psychological state is not an isolated phenomenon confined to the immediate perioperative window but may have durable prognostic significance.[10] These downstream consequences make preoperative anxiety a legitimate, clinically actionable target for structured, low-risk, non-pharmacological intervention within any surgical system, including Shalya Tantra.

4. Yogasana and Pranayama: Classical Basis, Techniques, and Proposed Mechanisms

4.1 Classical basis and commonly studied techniques

Within classical yoga philosophy, Asana (steady, comfortable posture) and Pranayama (regulation of the breath) are described as preparatory limbs (the third and fourth of the Ashtanga Yoga system) that calm the mind (Chitta) and stabilize the nervous system before deeper practices of concentration are attempted. Several specific techniques recur across the anxiety and perioperative literature and merit individual description because their physiological effects differ meaningfully.

- Sukha Pranayama - slow, rhythmical breathing at a fixed low rate (commonly around ten breaths per minute); studied specifically as a brief pre-procedural intervention before coronary angiography and cardiac surgery.[9,14]
- Bhastrika Pranayama - a more vigorous, forceful diaphragmatic breathing technique; studied in a four-week randomized controlled trial using functional MRI to demonstrate anxiolytic and limbic-modulatory effects.[9]
- Nadi Shodhana (alternate-nostril breathing) and Anulom Vilom - techniques classically described as balancing sympathetic and parasympathetic activity through alternating nostril airflow; frequently included in composite pre-procedural protocols.[8]
- Bhramari Pranayama (humming-bee breath) - combines slow exhalation with vocal vibration, proposed to enhance vagal stimulation via laryngeal and nasal mechanoreceptor activation.[8]
- Restorative Asanas - Shavasana (corpse pose), Sukhasana (easy seated pose), Balasana (child's pose), and gentle Setu Bandhasana (bridge pose) are the postures most frequently used in bedside or pre-procedural protocols because they require minimal exertion, can be performed on a trolley or examination couch, and are explicitly recommended in Ayurvedic anxiety-management literature for calming aggravated Vata.[24]

For Shalya Tantra application, the practical relevance of this distinction is important: vigorous techniques such as Bhastrika, which transiently increase sympathetic arousal before autonomic rebalancing occurs, may be less suitable immediately before a procedure than slower, purely parasympathetic-dominant techniques such as Sukha Pranayama, Nadi Shodhana, or Bhramari, particularly in patients with cardiovascular comorbidity.

4.2 Proposed physiological mechanisms of anxiolysis

Slow, deep pranayamic breathing is proposed to functionally reset autonomic balance through stretch-induced inhibitory signalling from pulmonary afferents (slowly adapting stretch receptors) and hyperpolarization currents that synchronize neural elements across the brainstem, limbic system, and cortex, favouring a shift toward parasympathetic dominance and away from sympathetic arousal.[7]

A more recent stepwise physiological model proposes that pranayama sequentially engages respiratory and circulatory mechanoreceptors and chemoreceptors, brainstem respiro-circulatory control centres, the cerebellum, the limbic system, and finally the cerebral cortex.[8] This model, synthesized from seventeen full-text studies including systematic reviews, clinical trials, and observational

studies, links slow-breathing pranayama practice to increased high-frequency heart-rate variability (a marker of parasympathetic tone), reduced cortisol output, and increased release of prolactin, vasopressin, oxytocin, and brain-derived neurotrophic factor.[8] Cardiorespiratory coherence achieved through rhythmic breathing is further proposed to suppress amygdala and thalamic excitability via modulation of the locus coeruleus and hypothalamic-pituitary-adrenal (HPA) axis.[8]

Direct neuroimaging support for these proposed mechanisms comes from a randomized controlled trial of a four-week Bhastrika pranayama programme in healthy adults, which demonstrated significant reductions in state anxiety and negative affect alongside altered functional connectivity and activity in the amygdala, anterior cingulate cortex, anterior insula, and prefrontal cortex-regions central to emotional processing and top-down emotion regulation.[9] Collectively, these findings provide a coherent neuroendocrine and autonomic rationale for why brief courses of Yogasana and Pranayama might plausibly reduce the acute anxiety state that characterizes the immediate preoperative period, independent of any pharmacological sedation.

Figure 2. Proposed physiological mechanism of Pranayama-induced anxiolysis

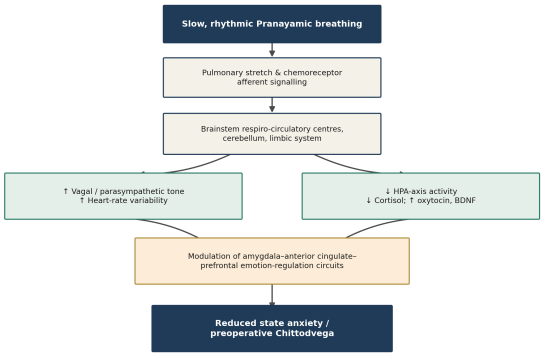

Figure 2. Proposed physiological mechanism by which slow Pranayamic breathing produces anxiolysis, from afferent signalling through autonomic and neuroendocrine pathways to limbic-cortical emotion regulation.

5. Evidence from Surgical, Interventional, and General Anxiety Literature

5.1 General evidence for yoga in anxiety

Outside the surgical setting, a systematic review and meta-analysis of eight randomized controlled trials (319 participants) found small short-term reductions in anxiety with yoga compared with no treatment (standardized mean difference [SMD] = -0.43), and larger effects compared with active comparators (SMD = -0.86); evidence specifically for formally diagnosed anxiety disorders was less conclusive than evidence for elevated, sub-threshold anxiety, and the review's authors concluded that yoga is a plausible and safe intervention warranting further high-quality trials.[20] This general evidence base establishes biological plausibility and a reasonable expectation of effect size before considering surgery-specific data.

5.2 Cardiac and cardiovascular interventional surgery

The largest body of controlled evidence on yoga-based breathing in the perioperative period comes from cardiac and cardiovascular interventional settings. A randomized controlled trial of short-term yoga-based breathing administered before cardiac surgery reported measurable reductions in peri-operative anxiety compared with standard care, building on earlier work showing that even a five-minute session of Sukha Pranayama reduced anxiety in patients awaiting coronary angiography in a double-blind randomized controlled trial of 80 patients, measured using the Spielberger State Anxiety Inventory before, thirty minutes after, and one hour after the intervention.[11,14] A separate randomized trial in patients undergoing on-pump cardiac surgery found that short-term preoperative pranayama practice was associated with reduced intraoperative opioid consumption, shorter duration of mechanical ventilation, and shorter intensive care unit stay,

suggesting that the anxiolytic effect may translate into measurable reductions in intraoperative drug requirement and downstream resource utilization.[12] A systematic review and meta-analysis following Cochrane and PRISMA methodology, searching PubMed, Cochrane CENTRAL, EMBASE, CINAHL, Scopus, and Web of Science, further concluded that yoga-based interventions reduced anxiety and favourably modulated inflammatory and stress biomarkers in patients undergoing coronary artery bypass grafting, supporting yoga as adjuvant, nurse- or therapist-delivered perioperative therapy.[13]

5.3 Oncologic, orthopedic, and pediatric surgical populations

Outside cardiac surgery, a randomized controlled trial combining Pranayama and Yoga Nidra in seventy women with cervical cancer receiving standard

oncologic treatment-delivered as thirty-minute sessions twice daily, five days a week, for six weeks-demonstrated significant within-group improvement in anxiety and depression scores measured using the Hospital Anxiety and Depression Scale at two, four, and six weeks.[15] A narrative systematic review of preoperative yoga therapy in orthopedic surgery, synthesizing twenty studies published between 2019 and 2024, reported a 20–35% reduction in pain scores alongside improvements in preoperative psychological distress, although the authors noted considerable heterogeneity in intervention protocols and outcome measures across the included studies.[16] Registered clinical trial protocols have also begun to formally test structured preoperative yoga and meditation programmes in pediatric populations-for example, in children awaiting idiopathic scoliosis correction surgery, where anxiety is being prospectively measured using a visual analogue scale from the preoperative period through the first postoperative day, alongside a pain scale and satisfaction ratings for both parents and children.[17]

5.4 Table 2. Summary of key controlled studies of yoga/pranayama for perioperative or clinically relevant anxiety

Study / Setting	Design	Intervention	Key Outcome
Cardiac surgery [11]	RCT	Short-term yoga-based breathing, pre-op	Reduced peri-operative anxiety vs standard care
Coronary angiography [14]	Double-blind RCT (n=80)	5-min Sukha Pranayama pre-procedure	Reduced state anxiety at 30 min and 1 hr post-intervention
On-pump cardiac surgery [12]	RCT	Short-term preoperative pranayama	Decreased intraoperative opioid use; shorter ICU/ventilation time
CABG patients [13]	Systematic review + meta-analysis	Various yoga protocols	Reduced anxiety; improved inflammatory/ stress biomarkers
Cervical cancer, standard care [15]	RCT (n=70)	Pranayama + Yoga Nidra, 30 min BID, 6 wks	reduction in HADS anxiety and depression scores
Orthopedic surgery [16]	Systematic narrative review (20 studies)	Preoperative yoga therapy	20–35% pain reduction; reduced psychological distress
Pediatric scoliosis surgery [17]	Registered trial protocol	Structured yoga and meditation programme	VAS-anxiety and pain being prospectively assessed (ongoing)
Healthy adults, fMRI study [9]	RCT with fMRI (n=30)	4-week Bhastrika Pranayama	Reduced state anxiety/negative affect; altered amygdala–PFC connectivity
Anxiety disorders/elevated anxiety, general [20]	Meta-analysis (8 RCTs, n=319)	Various yoga styles	SMD -0.43 vs no treatment; SMD -0.86 vs active comparator

Taken together, these studies span a wide range of surgical severity, patient age groups, and clinical specialties, lending consistency to the broader observation that brief, structured yoga-based intervention in the days to minutes before a procedure reduces measurable anxiety, and in several instances also reduces downstream indices of physiological stress such as opioid consumption and inflammatory biomarkers.

6. Relevance and Integration Within Shalya Tantra Perioperative Care

6.1 The Shalya Tantra clinical context

A substantial proportion of contemporary Shalya Tantra practice centres on ano-rectal disorders-Arsha (hemorrhoids), Bhagandara (fistula-in-ano), and Parikartika (fissure-in-ano)-managed through Ksharasutra therapy, Kshara Karma, and minor Shastra Karma, most of which are performed under local or spinal anaesthesia with the patient awake throughout.[18,19] Patients presenting with these

conditions frequently describe considerable psychological distress related to the anticipated procedure, the sensitive anatomical location involved, and, in the case of Ksharasutra therapy, the need for repeated weekly thread changes over eight to twelve sessions until the fistulous tract is fully cut and healed.[18] This distinctive perioperative trajectory-repeated outpatient visits under regional or local anaesthesia rather than a single general-anaesthesia event-arguably creates more, not fewer, opportunities for a brief, repeatable Yogasana/Pranayama protocol than conventional one-time surgery would allow, since the same patient can be taught and can reinforce the practice across multiple visits.

6.2 Compatibility with Purva Karma

Classical Shalya Chikitsa already incorporates structured Purva Karma (pre-procedural preparation), including counselling, dietary regulation, and local preparation of the surgical site, aimed at ensuring a smoother procedure and greater patient comfort.[1] Embedding a short, standardized Yogasana and Pranayama module-drawing on techniques already validated in the general surgical literature (Sukha Pranayama, Nadi Shodhana, Bhramari) and explicitly endorsed within Ayurveda's own Chittodvega management framework-within this existing Purva Karma structure represents a conceptually seamless extension rather than the introduction of an entirely foreign practice.[21,24] Given that most of the supportive controlled evidence to date originates from cardiac, oncologic, and orthopedic surgery rather than from Ayurvedic surgical settings themselves, this represents an area of clear translational opportunity for Shalya Tantra research rather than an established, directly transferable protocol.

6.3 Table 3. Proposed structure for a brief preoperative Yogasana–Pranayama module in Shalya Tantra practice (illustrative, not yet clinically validated)

Phase	Timing	Technique	Rationale
Initial counselling visit	At diagnosis / first OPD visit	Orientation + Sukhasana with basic diaphragmatic breathing	Establishes familiarity before procedure day; addresses information-need component of anxiety
Immediate pre-procedure	5–10 min before Ksharasutra/Shastra Karma	Sukha Pranayama or Nadi Shodhana, seated or supine	Slow-breathing techniques show acute anxiolytic effect within 30–60 min in RCT data[14]
On the procedure table (awake, local/regional anaesthesia)	During the procedure, as tolerated	Bhramari Pranayama or paced slow exhalation	Maintains parasympathetic tone without requiring gross movement
Between Kshara sutra thread-change sessions	Weekly, at home	Short daily Yogasana/Pranayama routine (Shavasana, Balasana, Sukha Pranayama)	Reinforces skill and cumulative anxiolysis across the multi-week treatment course

Figure 3. Proposed timeline for a Yogasana-Pranayama module within the Purva Karma phase of Shalya Tantra (illustrative; not yet clinically validated)

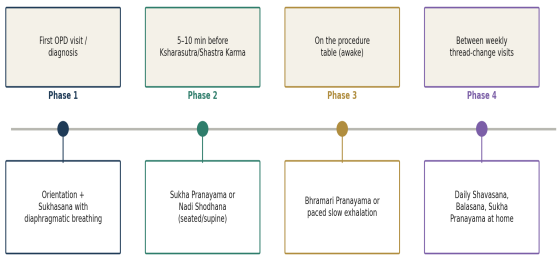

Figure 3. Proposed timeline for integrating a Yogasana–Pranayama module into the four phases of Purva Karma in Shalya Tantra practice (illustrative; not yet clinically validated).

This module is proposed as a testable clinical framework rather than a validated protocol; its components are drawn directly from techniques and timings already used in the cardiac, oncologic, and general-anxiety trials reviewed above, adapted to the specific procedural rhythm of Ksharasutra-based Shalya Tantra care. Formal feasibility and efficacy testing, described in Section 7, is required before any such module could be recommended for routine adoption.

7. Research Gaps and Future Directions

Several limitations temper the strength of current conclusions when applied specifically to Shalya Tantra. First, dedicated randomized trials evaluating Yogasana and Pranayama within Shalya Tantra perioperative pathways are lacking; the evidence reviewed here is extrapolated from conventional surgical and cardiological populations rather than generated within Ayurvedic surgical practice itself. Second, intervention protocols across the reviewed studies vary considerably in technique (Sukha Pranayama, Bhastrika Pranayama, Yoga Nidra, mixed Asana-Pranayama sequences), duration (five minutes to six weeks), and timing relative to the procedure, limiting direct comparability and precluding firm dose-response conclusions. Third, outcome assessment tools differ across studies (APAIS, State-Trait Anxiety Inventory, Hospital Anxiety and Depression Scale, visual analogue scales), and blinding of a behavioural intervention such as yoga is inherently difficult, introducing potential performance bias that the general yoga-anxiety meta-analysis explicitly flagged as a limitation of the underlying trial base.[20] Fourth, objective biomarkers of the hypothesized autonomic and neuroendocrine mechanisms-heart-rate variability, salivary cortisol, or functional neuroimaging-have rarely been co-measured alongside patient-reported anxiety in actual surgical (as opposed to laboratory) settings.

A fifth, Ayurveda-specific gap concerns outcome framing: virtually none of the biomedical trials reviewed incorporate classical assessment of Dosha status (particularly Vata) or validated Chittodvega rating scales alongside conventional anxiety instruments, meaning that the proposed dosha-level mechanism of action remains theoretically plausible but empirically untested in a surgical cohort.[22,23] Bridging this gap would require simultaneous administration of a validated Ayurvedic Manasika assessment tool (for example, a Chittodvega-specific rating scale, as used in recent generalized anxiety disorder trials comparing herbal and conventional pharmacotherapy) alongside the APAIS or STAI in future Shalya Tantra cohorts.[25]

Future research priorities include: (i) adequately powered randomized controlled trials of a standardized, brief Yogasana-Pranayama protocol administered before Ksharasutra therapy and other common Shalya Tantra procedures, using validated tools such as APAIS or the State-Trait Anxiety Inventory alongside a Chittodvega-specific instrument; (ii) inclusion of objective physiological endpoints (heart-rate variability, cortisol, intraoperative analgesic consumption) to corroborate patient-reported outcomes; (iii) evaluation of the feasibility and acceptability of repeated pre-session practice in patients undergoing serial Ksharasutra thread changes, including adherence and dropout data; (iv) comparison of specific techniques (e.g., Sukha Pranayama versus Bhramari versus combined Asana-Pranayama) to identify the most efficient protocol for a busy Shalya Tantra outpatient department; and (v) economic evaluation, given the near-zero material cost of these interventions relative to pharmacological anxiolysis, which is particularly relevant in the resource-constrained settings where much Shalya Tantra practice occurs.

8. Limitations of This Review

This is a narrative rather than a systematic review, and although a broad search of biomedical and Ayurveda-specific literature was conducted, formal dual-reviewer screening, risk-of-bias assessment, and meta-analytic pooling were not performed; the summary in Table 2 should therefore be read as a qualitative synthesis rather than a quantitative effect estimate. Publication and outcome-reporting bias affecting the underlying primary studies cannot be excluded. Most of the surgical evidence originates from cardiac, oncologic, and orthopedic contexts rather than Shalya Tantra itself, and extrapolation to ano-rectal and other Ayurvedic surgical procedures, while conceptually reasonable, remains unverified. Finally, the Ayurvedic and biomedical literatures use different outcome constructs (Chittodvega versus APAIS/STAI-defined anxiety) that have not yet been formally cross-validated in a single patient cohort, which limits the precision with which the two evidence streams can currently be integrated.

9. Conclusion

Preoperative anxiety is common, clinically consequential, and readily assessable using validated instruments, yet frequently under-addressed in routine surgical-including Ayurvedic surgical-practice. Yogasana and Pranayama are supported by a growing, methodologically diverse body of biomedical evidence, spanning cardiac surgery, interventional cardiology, oncology, orthopedics, and pediatric surgery, indicating consistent reductions in preoperative anxiety and, in some studies, reduced intraoperative analgesic requirement. Plausible neuroendocrine and autonomic mechanisms-vagal enhancement, HPA-axis modulation, increased heart-rate variability, and amygdala-prefrontal circuit changes-provide biological coherence to these observations, while the classical Ayurvedic construct of Chittodvega,

and its recommended management through Yoga and Satwavajaya Chikitsa, provides an independent, internally consistent theoretical rationale specific to Ayurveda. Given this convergence, and the existing emphasis on Purva Karma within classical Shalya Chikitsa, structured integration of brief Yogasana and Pranayama protocols into Shalya Tantra perioperative care is a low-cost, biologically plausible, philosophically congruent, and potentially high-value intervention. It merits dedicated, adequately powered clinical trials-incorporating both conventional and Ayurveda-specific outcome measures-before it can be recommended as standard practice for patients undergoing Ksharasutra therapy and other Shalya Tantra procedures.

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