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ROLE OF ASANA, AND PRANAYAMA PRACTICES IN THE MANAGEMENT OF KNEE, LOW BACK, AND CERVICAL PAIN

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Abstract

Background: Knee osteoarthritis, chronic low back pain and chronic neck pain each affect hundreds of millions of people and respond poorly to drugs alone. Yoga is increasingly recommended, but its three core components asana (postures), pranayama (regulated breathing) and relaxation are rarely examined separately.

Objective: To review randomised evidence on yoga-based care for these three conditions, outline the mechanisms of each component, and propose a region-specific protocol.

Methods: Structured narrative review of systematic reviews, meta-analyses and randomised controlled trials in PubMed/MEDLINE, the Cochrane Library and publisher databases up to September 2026.

Results: For chronic low back pain, yoga gave moderate short-term reductions in pain (SMD −0.48) and disability (SMD −0.59), was non-inferior to physiotherapy, and was broadly equivalent to other exercise. For chronic neck pain, pooled effects were large (pain SMD −1.28; disability SMD −0.97) but based on three small trials. For knee osteoarthritis, effects on pain were moderate (SMD −0.75 versus non-exercise controls) but the evidence was of very low quality; a recent supervised trial found yoga non-inferior to strengthening exercise. Asana appears to act through strength and motor control, pranayama through vagal and endocrine regulation, and relaxation through central pain processing. Yoga was as safe as usual care and exercise.

Conclusion: A supervised 12-week programme combining asana, pranayama and relaxation is a reasonable first-line, non-drug option for chronic low back pain and a promising adjunct for neck and knee pain. Trials isolating each component are needed.

Keywords: Yoga; asana, Pranayama, Yoga nidra, Low back pain, Neck pain, knee osteoarthritis, Chronic pain

1. Introduction

Pain in the knee, the lower back and the neck accounts for a large share of the disability seen in primary care. In 2020, low back pain alone affected about 619 million people and remained the single leading cause of years lived with disability worldwide; by 2050 the count is projected to reach roughly 843 million [1]. Neck pain affected an estimated 203 million people in the same year, a figure expected to rise by about a third, to 269 million, by 2050 [2]. Osteoarthritis touched 595 million people in 2020, the knee being the joint most often

involved, and knee cases are forecast to grow by close to 75% over the next three decades [3]. Ageing populations, sedentary work and rising body mass index drive much of this growth.

These three conditions share more than location in the musculoskeletal system. Each tends to become chronic, each is shaped by fear of movement, poor sleep and low mood, and each responds only modestly to drugs. Paracetamol offers little benefit for spinal pain, NSAIDs carry gastrointestinal and renal risks in older adults, and opioids are now discouraged for long-term use. Clinical guidelines have therefore turned towards active, self-managed care. The American College of Physicians lists yoga among first-line non-drug options for chronic low back pain [4], and the American College of Rheumatology conditionally recommends yoga for knee osteoarthritis [5].

Yoga, as described in the classical texts, is not a single exercise. Its therapeutic form usually combines three strands: *asana* (held postures that load, stretch and align tissues), *pranayama* (regulated breathing) and relaxation methods such as *shavasana* and *yoga nidra*. Most trials, however, report "yoga" as one package. Clinicians who wish to prescribe it for a painful knee, back, or neck are left asking which parts confer the benefit, at what dose, and with what precautions.

This paper addresses that gap. Its aims were (a) to bring together randomised evidence on yoga-based care for knee osteoarthritis, chronic low back pain and chronic neck pain; (b) to set out the likely mechanisms through which each of the three components acts; and (c) to translate the evidence into a practical, region-specific protocol with clear contraindications.

2. Methods

We carried out a structured narrative review. Systematic reviews and meta-analyses were read first, since they summarise the bulk of trial data; individual randomised controlled trials (RCTs) were then examined to describe what was actually taught, for how long, and to whom. PubMed/MEDLINE, the Cochrane Library and publisher databases were searched up to September 2026.

Search strings combined condition terms ("knee osteoarthritis", "low back pain", "neck pain", "cervical pain") with practice terms ("yoga", "asana", "pranayama", "breathing exercise", "yoga nidra", "relaxation"). Reference lists of included reviews were hand-searched. Mechanistic and safety papers were added where they helped explain or qualify the clinical findings.

Table 1. Eligibility criteria used in the review

Element	Included	Excluded
Population	Adults (≥ 18 y) with chronic (≥ 12 weeks) knee osteoarthritis, non-specific low back pain or non-specific neck pain	Acute trauma, fracture, malignancy, inflammatory arthritis, radiculopathy with progressive deficit, post-surgical rehabilitation
Intervention	Yoga programmes containing asana, with or without pranayama and relaxation; stand-alone pranayama or yogic relaxation where tested for pain	Programmes with no physical or breathing component (e.g. meditation alone)
Comparator	Usual care, waiting list, education, conventional exercise or physiotherapy	—
Outcomes	Pain intensity; function or disability (WOMAC, RMDQ, ODI, NDI); quality of life; adverse events	Studies reporting only physiological markers without a pain outcome (used for mechanisms only)
Design	Systematic reviews with meta-analysis; RCTs	Case reports, uncontrolled series (except for safety signals)

From each source we noted the population, sample size, yoga style, components taught (asana, pranayama, relaxation), dose (weeks, sessions, minutes), comparator, main outcomes and adverse events. Where pooled estimates were available, standardised mean differences (SMD) with 95% confidence intervals were

extracted. An SMD of about 0.2 was read as small, 0.5 as moderate and 0.8 or more as large. Because the trials differed widely in style and dose, results were synthesised descriptively rather than re-pooled.

3. Results

Across the three regions, yoga produced moderate short-term gains in pain and function over usual care or education, and was broadly equivalent to conventional exercise. The pooled estimates appear in Figure 1 the trials that shaped them are summarised in Table 2. Figure 1shows every pooled estimate lies left of zero. Effects for low back pain are moderate and rest on the most data; neck and knee effects are larger but have wide intervals because they come from few, small trials. Dashed lines mark conventional thresholds for small (0.2), moderate (0.5) and large (0.8) effects.

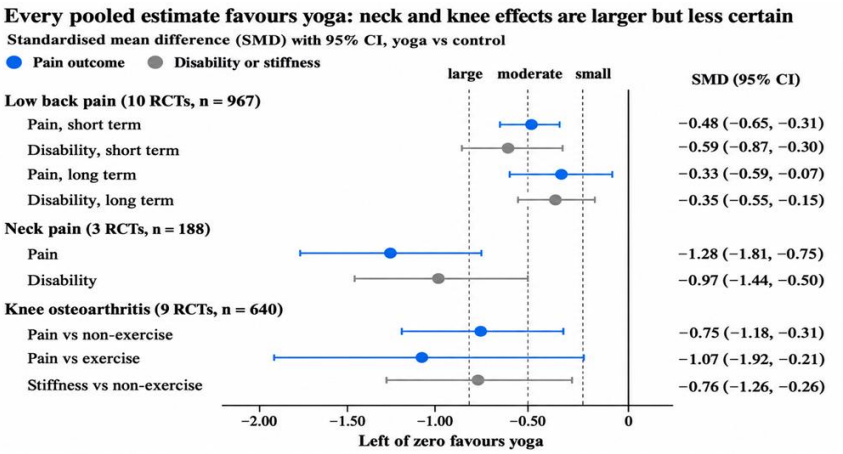


Figure 1. Pooled effects of yoga on pain and function. Data: Cramer et al. 2013 [6]; Cramer et al. 2017 [14]; Lauche et al. 2019 [19]

3.1 Chronic low back pain

Low back pain has the deepest evidence base. An early meta-analysis of 10 RCTs (967 patients) found a moderate short-term effect on pain (SMD −0.48) and disability (SMD −0.59), with smaller but still significant effects at long-term follow-up [6]. Later syntheses broadly agree. The 2022 Cochrane update, covering 21 trials and 2,223 participants, judged that yoga probably improves back function slightly compared with no exercise, but the gains often fall short of thresholds of clinical importance, and it found little or no difference from other forms of exercise [7]. A larger review of 27 studies (2,702 participants) reported short-term improvements in pain intensity, disability, physical function and mental health [8].

The pivotal trials are pragmatic. In Seattle, 12 weekly viniyoga classes improved back function more than a self-care book and as much as a matched stretching class [9]. In the United Kingdom, a 12-week programme lowered Roland–Morris scores by about 2 points at 3 months, with smaller benefits persisting at 12 months [10]. Saper and colleagues showed, in 320 low-income and racially diverse adults, that 12 weekly yoga classes were non-inferior to 15 physiotherapy visits, with similar reductions in pain-medication use [11]. Iyengar yoga [12] and a short residential integrated yoga course from Bengaluru [13] reported comparable direction of effect.

3.2 Chronic neck pain

Fewer trials exist for the neck, but effects are larger. Pooling three RCTs (188 participants), Cramer and colleagues found a large short-term reduction in neck pain (SMD −1.28) and disability (SMD −0.97), along with better mood and quality of life [14]. A broader review of 10 trials (686 participants) reached a similar conclusion and also noted gains in cervical range of motion [15]. Individual trials used nine-week Iyengar programmes compared with self-care exercise; in one of them, pain fell by 13.9 mm more on a 100-mm visual analogue scale with yoga than with home exercise [16, 17]. In an Indian trial, adding 20 minutes of a guided sound-resonance relaxation (MSRT) after physiotherapy gave larger gains in pain, disability, neck movement

and anxiety than the same time spent in unguided supine rest, which hints that the relaxation component carries effect of its own [18].

3.3 Knee osteoarthritis

The knee evidence is the weakest of the three. A 2019 meta-analysis of nine RCTs (640 participants) found moderate effects on knee pain relative to non-exercise controls (SMD −0.75) and even larger effects relative to exercise, but rated the overall quality as very low [19]. Trials vary in rigour. Ebnezar and colleagues randomised 250 patients receiving electrotherapy to an integrated yoga module or conventional therapeutic exercise; resting pain and morning stiffness fell more in the yoga arm at three months [20]. An unsupervised, online yoga programme for 212 Australians improved physical function at 12 weeks but did not significantly reduce walking pain, and the gains faded by 24 weeks [21]. Most recently, a supervised 12-week yoga programme was non-inferior to strengthening exercise for knee pain in 117 adults, with secondary outcomes such as WOMAC function, depression and quality of life favouring yoga [22]. Smaller pilot studies in older women support feasibility [23, 24].

Table 2. Selected randomized controlled trials of yoga for knee, low back and neck pain

Study (country)	Condition	N	Yoga style and components	Dose	Comparator	Main finding
Sherman et al., 2011 (USA) [9]	Chronic LBP	228	Viniyoga: asana, breathing, relaxation	12 wk, 75 min weekly + home	Stretching; self-care book	Function better than a book, similar to stretching
Tilbrook et al., 2011 (UK) [10]	Chronic LBP	313	Progressive asana, breathing, relaxation	12 wk, 75 min weekly	Usual care	RMDQ −2.2 points at 3 mo; smaller gains to 12 mo
Saper et al., 2017 (USA) [11]	Chronic LBP	320	Hatha: asana, breathing, relaxation	12 wk, 75 min weekly	Physiotherapy; education	Non-inferior to physiotherapy
Tekur et al., 2008 (India) [13]	Chronic LBP	80	Integrated yoga: asana, pranayama, meditation, lectures	7-day residential	Physical exercise	Greater fall in ODI disability (effect size 1.26) and better spinal flexibility
Michalsen et al., 2012 (Germany) [16]	Chronic neck pain	77	Iyengar: asana with props, tailored sequences	9 wk, 90 min weekly	Self-care exercise	Clinically important pain reduction
Cramer et al., 2013 (Germany) [17]	Chronic neck pain	51	Iyengar	9 wk, weekly classes	Home exercise	Pain −13.9 mm (VAS) vs exercise
Yogitha et al., 2010 (India) [18]	Neck pain	60	Physiotherapy + 20-min guided sound-resonance relaxation (MSRT)	10 days	Physiotherapy + unguided supine rest	Greater gains in pain, disability, neck movement and anxiety
Ebnezar et al., 2012 (India) [20]	Knee OA	250	Integrated: loosening, asana, pranayama, relaxation	2 wk supervised, 3 mo follow-up	Therapeutic exercise (both + TENS, ultrasound)	Larger fall in pain and stiffness
Bennell et al., 2022 (Australia) [21]	Knee OA	212	Online unsupervised video yoga	12 wk	Online education	Function improved; pain not significant
Abafita et al., 2025 (Australia) [22]	Knee OA	117	Supervised hatha yoga	12 wk + 12 wk home	Strengthening exercise	Non-inferior for pain; better WOMAC function

LBP, low back pain, OA, osteoarthritis; RMDQ, Roland–Morris Disability Questionnaire; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; wk, weeks; mo, months.

4. Proposed mechanisms

The three components seem to work through partly separate routes that meet at the level of pain experience and daily function (Figure 2). It also suggests that programmes teaching all three may offer more than posture practice alone, although few trials have tested this directly.

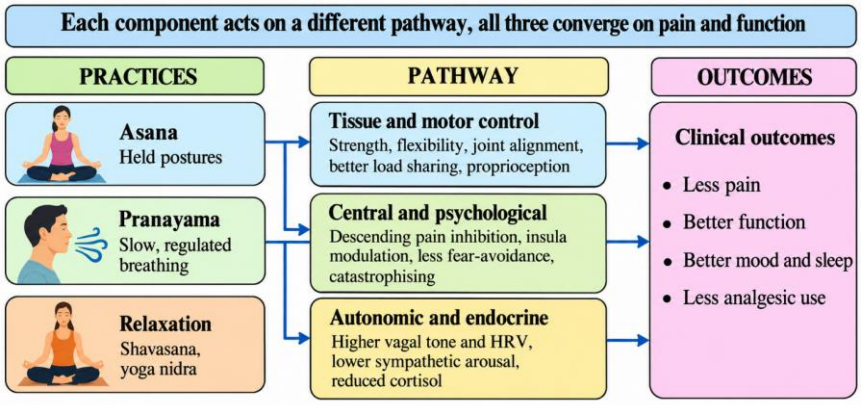


Figure 2. Proposed mechanisms of asana, pranayama and relaxation in chronic musculoskeletal pain

Figure 2. Asana acts mainly on tissues and motor control, pranayama mainly on autonomic balance, and relaxation on both autonomic and central processes; every route ends in the same clinical outcomes.

4.1 Asana: tissues and motor control

Held postures load muscles isometrically and through range. For the knee, standing poses such as *Tadasana*, *Virabhadrasana II* and supported *Utkatasana* strengthen the quadriceps and hip abductors, which share load across the tibiofemoral joint. For the spine, prone extensions (*Bhujangasana*, *Shalabhasana*) and gentle twists recruit the deep trunk muscles and restore segmental movement. Slow transitions between postures demand balance and joint-position sense, both of which are often impaired in chronic pain. These effects overlap with those of conventional exercise, consistent with the finding that yoga and structured exercise yield similar results [7, 11]. Fig. 3 shows various asanas suggested in the text above.

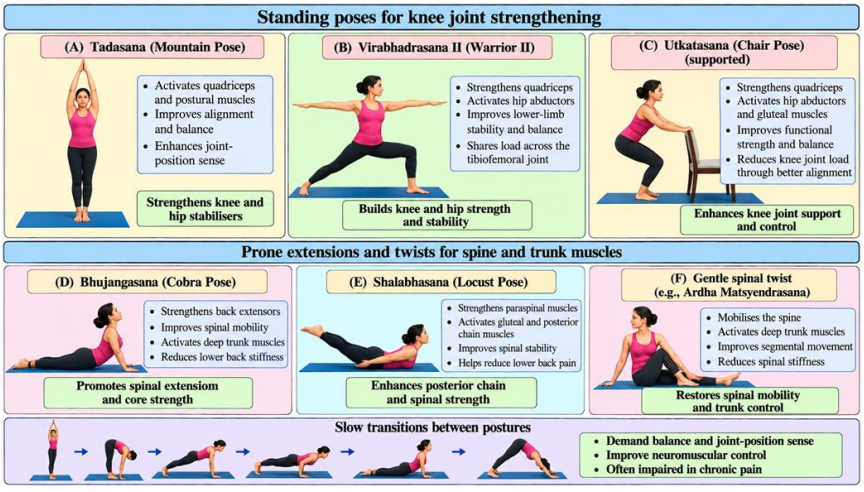


Figure 3. Various Asana to improve the knee joint and spine pain

4.2 Pranayama: autonomic regulation

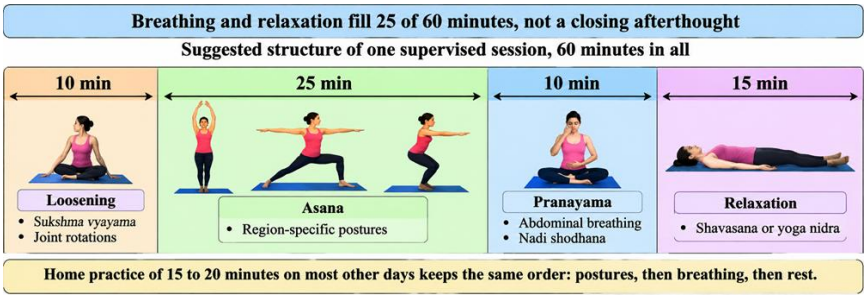
Slow breathing at about six breaths per minute raises vagally mediated heart-rate variability and lowers sympathetic drive. In a laboratory study, deep slow breathing reduced pain perception and sympathetic activity only when performed in a relaxed manner, not when it demanded effortful attention [25]. Prolonged exhalation, as in *Bhramari* or *Ujjayi*, is thought to enhance this effect. A related model links yoga-induced vagal stimulation to higher GABA activity and better stress regulation [26], and a meta-analysis of 42 trials found

that practices containing asana lowered evening and waking cortisol, resting heart rate and ambulatory systolic blood pressure [27].

4.3 Relaxation: central pain processing

Chronic pain is maintained in part by central sensitisation, hypervigilance and fear of movement. *Shavasana* and guided *yoga nidra* direct attention through the body in a non-judging way, which can weaken the link between sensation and threat. Experienced yoga practitioners tolerate cold pain for longer than matched controls, and this tolerance tracks with greater grey-matter volume in the insular cortex, a hub for interoception and pain appraisal [28]. Yoga programmes also improve mood in neck-pain trials [14], and better mood and sleep are themselves predictors of lower pain.

5. A practical protocol



The trials that worked share a common dose: about 12 weeks, one or two supervised classes of 60–90 minutes a week, and short home practice on most other days [9–11]. We suggest building each session in the same four phases (Figure 4) and tailoring the content by region (Table 3).

Figure 4. Proposed session structure, based on the doses used in the trials in Table 2

Figure 3. Suggested structure of a 60-minute therapeutic session. Asana is the largest block, but breathing and relaxation together take a similar share of time.

Table 3. Suggested practices by pain region

Region	Asana (examples)	Pranayama	Relaxation	Avoid or modify
Knee osteoarthritis	Tadasana, Virabhadrasana II with chair, Setu bandhasana, supine leg raises, Supta padangusthasana with strap	Abdominal breathing; Nadi shodhana	Shavasana with bolster under knees; short yoga nidra	Deep knee flexion under load (Padmasana, Vajrasana, full squats); use blocks or a chair
Chronic low back pain	Marjariasana (cat-cow), Bhujangasana, Shalabhasana, Setu bandhasana, Ardha Pavanamuktasana, supported Ardha Chandrasana (Half Moon), and graded Ustrasana or Ardha Ustrasana; gentle supine twist and Balasana	Abdominal and full yogic breathing; Ujjayi	Makarasana; Shavasana with knees bent; yoga nidra	Forceful loaded forward bends and end-range twists during flare-ups or with disc signs; use spinal extensions cautiously where they reproduce leg symptoms or aggravate stenosis/spondylolisthesis
Chronic neck pain	Neck mobilisation in pain-free range, shoulder rolls, Gomukhasana arms, Bhujangasana, wall-supported Tadasana	Bhramari; slow breathing with long exhalation	Shavasana with neck support; sound-resonance relaxation	Sirsasana, Sarvangasana, Halasana and forced neck extension

Sessions should start gently and progress over weeks, with props (chairs, blocks, belts, bolsters) used freely. Pain during practice should not exceed a mild, short-lived level, and any practice that raises pain the next day should be scaled back.

6. Discussion

The main message is consistent across regions: yoga helps, and it helps about as much as well-run exercise therapy. For chronic low back pain, the evidence is now strong enough to support endorsement of guidelines [4], though the average benefit is modest [7]. For the neck, effects look larger, but the estimate rests on a handful of small German and Indian trials [14–18]. For the knee, the picture is mixed: supervised, structured programmes performed well [20, 22], whereas an unsupervised online course improved function only briefly [21]. Supervision, progression and adherence may matter as much as the choice of postures.

A practical advantage of yoga is that it combines three therapies into a single class. Asana overlaps with strengthening and stretching; pranayama and relaxation add a self-regulation skill that conventional physiotherapy rarely teaches. Several Indian programmes deliberately combine all three in an "integrated" format [13, 20], and those trials, together with a neck-pain trial of guided relaxation [18], report gains in anxiety, stiffness and disability that go beyond what posture practice alone might explain. Yet almost no trial has separated the components. Whether pranayama or relaxation provides additional benefit beyond asana remains an open and testable question.

6.1 Selection and progression of asana for low back pain



For chronic non-specific low back pain, asana selection should be guided by the movement pattern, irritability and functional goals of the individual rather than by a fixed sequence. Graded postures can complement conventional exercise by strengthening the trunk and back extensor muscles, improving hip and hamstring flexibility, and restoring comfortable lumbar and hip movement. The Asana are shows in figure 5. like Bhujangasana (Cobra Pose) and Shalabhasana provide graded prone extension and posterior-chain activation. Ardha Pavanamuktasana (one-leg wind-relieving pose) offers a gentle hip-flexion and lumbar-mobility option, whereas supported Ardha Chandrasana (Half Moon Pose) challenges the gluteus medius, obliques and trunk stabilisers that help control single-leg loading. Ustrasana and Ardha Ustrasana may be introduced as graded thoracolumbar extension practices when tolerated. These postures should not be presented as a way to mechanically 'decompress' the spine or as a specific cure for sciatica. Some people may experience temporary symptom relief when a carefully selected posture reduces stiffness, improves movement confidence or avoids an aggravating position; however, responses vary. Extensions, lateral bends and balance poses should therefore be introduced progressively, with chair, wall or block support where needed. Any pose that increases radiating leg pain, numbness, weakness, or next-day symptoms should be stopped or modified, and patients with red-flag symptoms or suspected radiculopathy require clinical assessment before practice.

Figure 5. (A) Bhujangasana (Cobra Pose) (B) Shalabhasana (C) Ardha Pavanamuktasana (D) Ardh Chandra Asana (E) Ardh ushtra Asana (F) Ushtra Asana

Clinical progression and safety guidance for low-back-pain asana

1. Select a tolerable posture Match the movement to symptoms, irritability, and functional goals. Use a pain-free or comfortable range. Choose a pose with an appropriate level of trunk, hip, or balance demand.	➜	**2. Support and progress gradually** Use a chair, wall, block, or bolster. Increase range, duration, or balance demand only when well tolerated. Aim for comfortable movement and confidence rather than maximum stretch.	➜	**3. Reassess** Continue when symptoms settle. Modify when a next-day flare occurs.

Note: Stop or modify the posture: If radiating leg pain, numbness, weakness, or symptoms that persist or worsen the next day. Red flags, progressive neurological symptoms, or suspected radiculopathy require clinical assessment before practice.

6.2 Safety

Yoga appears to be as safe as usual care and exercise. A meta-analysis of 94 RCTs (8,430 participants) found no excess of serious adverse events or of drop-outs due to harm, although minor events, mostly short-lived increases in pain, were more common than with purely educational controls [29]. In the low back trials, most events were transient flare-ups of back pain [10, 11]. Table 4 lists the precautions we consider essential.

Table 4. Precautions and contraindications

Practice	Use with caution or avoid in	Safer alternative
Inversions (Sirsasana, Sarvangasana, Halasana)	Neck pain, cervical spondylosis, osteoporosis, glaucoma, uncontrolled hypertension	Legs up the wall (Viparita karani) with support
Deep or loaded knee flexion (Padmasana, Vajrasana, deep squats)	Moderate to severe knee OA, recent meniscal injury, knee replacement	Chair-supported or half-range versions
Loaded forward bends and end-range twists	Acute disc herniation, radicular pain, osteoporotic spine	Supine knee-to-chest, gentle supine twist
Forceful breathing (Kapalabhati, Bhastrika)	Hypertension, heart disease, pregnancy, hernia, recent abdominal surgery, epilepsy	Abdominal breathing; Nadi shodhana
Breath retention (kumbhaka)	Cardiovascular or respiratory disease, anxiety disorders	Slow breathing without holds
Prolonged deep relaxation	Severe depression, trauma-related disorders, psychosis	Short, eyes-open practice with clear guidance

Red-flag features such as night pain, weight loss, fever, progressive weakness, bladder or bowel changes, or a history of cancer call for medical assessment before any yoga programme.

6.3 Limitations

This review has limits of its own. It is narrative, not a new meta-analysis, and the pooled numbers in Figure 1 come from published reviews with different inclusion rules. Yoga trials cannot blind participants, and many compare yoga with less attention-rich controls, which can inflate effects. Styles, doses and teacher training vary widely. Most neck and knee data come from short follow-ups, and few trials reported cost or long-term adherence.

6.4 Future research

Three questions stand out: (1) dismantling trials that compare asana alone with asana plus pranayama and relaxation; (2) larger, longer neck-pain and knee-OA trials with active exercise controls; and (3) studies of tele-supervised delivery in low-resource settings, where yoga is culturally familiar and inexpensive.

7. Conclusion

Asana, pranayama and relaxation, taught together over about 12 weeks, offer a safe, low-cost and evidence-based option for chronic low back pain, and a promising one for chronic neck pain and knee osteoarthritis. The benefit is real but moderate, and similar in size to conventional exercise. For low back pain, progressively selected postures may strengthen the trunk and back extensor muscles, improve hip and hamstring flexibility, and restore confident movement; examples include Bhujangasana, Shalabhasana , Ardha Pavanamuktasana, supported Ardha Chandrasana, and graded Ustrasana or Ardha Ustrasana when tolerated. Postures should be tailored to symptoms and modified if they provoke radiating pain or a persistent flare. Slow breathing and relaxation may complement the physical practice through autonomic balance and central pain processing. Programmes should be supervised at first, adapted to the painful region, and screened for the precautions listed here. Trials that isolate the contribution of pranayama and relaxation are now the most useful next step.

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