

Integrative Management of Arthritis Using Ayurvedic Protocols

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ABSTRACT

Osteoarthritis (OA) and rheumatoid arthritis (RA) are among the leading causes of chronic disability in adults across Europe, and conventional therapy (NSAIDs, DMARDs, biologics, joint replacement) does not serve every patient well. Ayurvedic medicine has treated arthritic presentations for centuries under the classical categories of Sandhivata (OA) and Amavata (RA), with an evidence base that has grown substantially in the past two decades. This study is a structured evaluation of integrative Ayurvedic management in arthritis. We identified 68 primary clinical studies published between 2005 and 2021 meeting pre-defined inclusion criteria, and grouped them under five integrative protocol frames: single-herb intervention, classical polyherbal formulations, localised Panchakarma procedures, systemic Panchakarma, and integrated multimodal protocols combining herbs, Panchakarma, yoga and dietary regulation. Each frame was scored with the Ayurvedic Management of Arthritis Index (AMAI), a weighted composite of pain reduction, functional capacity improvement, inflammatory marker response, structural or imaging outcome, and safety/tolerability. Integrated multimodal protocols (AMAI 0.902) outperformed every single-component frame, particularly in RA (mean DAS-28 reduction of 2.1 points at 16 weeks in the strongest cohorts) and in advanced OA. *Boswellia serrata* was the strongest single herb, and Janu Basti was the strongest localised procedure for knee OA. The evidence supports integrative multimodal Ayurvedic management as a clinically useful complement to conventional arthritis care, particularly where NSAID tolerance or DMARD response is limited.

Keywords: arthritis; osteoarthritis; rheumatoid arthritis; Sandhivata; Amavata; Ayurveda; *Boswellia serrata*; Yograj Guggulu; Janu Basti; integrative medicine; DAS-28; AMAI

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1. Introduction

1.1 Arthritis Burden and the Limits of Conventional Therapy

Arthritis, in its two commonest forms, is ordinary in the way that genuinely common diseases are ordinary: it affects a lot of people, it is almost never curable, and the goal is long-term management rather than resolution. Osteoarthritis (OA) is the dominant presentation in older adults, with the knee as the commonest joint and substantial functional disability in established disease. Rheumatoid arthritis (RA) has a smaller prevalence but a heavier per-patient burden, with immune-mediated joint destruction that requires early and sustained treatment to prevent. Conventional therapy has improved meaningfully in both, particularly RA under biologic DMARDs and JAK inhibitors, but substantial patient populations remain poorly served: the NSAID-intolerant, the biologic non-responder, the patient who cannot or will not accept joint replacement, and those with established but lower-grade OA where conventional options amount to symptom management without disease modification.

1.2 Ayurvedic Repertoire in Arthritis

Ayurvedic medicine has engaged with arthritic presentations for at least two millennia under the classical diagnostic categories Sandhivata (roughly OA) and Amavata (roughly RA). The classical therapeutic repertoire includes single herbs, complex polyherbal formulations, locally applied Panchakarma procedures (Janu Basti for the knee, Patra Pinda Sweda with medicated leaf-bundles), systemic Panchakarma (Virechana, Basti), and integrated lifestyle and dietary protocols. Modern clinical evidence has been accumulating steadily, including at least one notable head-to-head comparison with methotrexate in RA (Furst et al., 2011). The evidence remains fragmented across protocol approaches, and the question of whether integrative multimodal protocols offer real additional benefit beyond their components has not been systematically addressed. This study puts five protocol frames side by side under a single scoring rubric.

2. Literature Review

2.1 Single-Herb Evidence

Single-herb evidence in arthritis is strongest for *Boswellia serrata*. Kimmatkar et al. (2003) reported pain and functional improvement in knee OA with a standardised *Boswellia* extract.

Sengupta et al. (2008) followed with a more selective extract (5-LOXIN), showing anti-inflammatory activity and knee OA symptom reduction. Saller et al. (2008) consolidated *Boswellia* evidence in a review that became a methodological touchstone. *Curcuma longa* evidence is nearly as strong: Kuptniratsaikul et al. (2014) showed curcuminoid efficacy comparable to ibuprofen in knee OA. *Withania somnifera* has RA-focused evidence (Kumar et al., 2015), and *Tinospora cordifolia* has demonstrated immunomodulatory activity relevant to RA (Kapil and Sharma, 2010). Single-herb evidence tells an encouraging but partial story; clinical practice rarely uses single herbs in isolation.

2.2 Classical Polyherbal Formulations and Head-to-Head Evidence

Classical polyherbal formulations for arthritis have been studied in their own right. Yograj Guggulu and Simhanad Guggulu are the canonical formulations for RA, and Maharasnadi Kwatha for both RA and OA. Chopra et al. (2010, 2013) conducted the two most influential trials of polyherbal formulations in arthritis, with substantial symptomatic and functional improvements across OA and RA cohorts. The Furst et al. (2011) three-arm RCT compared classical Ayurvedic polyherbal therapy, methotrexate, and their combination in RA, and reported broadly equivalent outcomes on the combined Ayurveda arm and methotrexate-alone arm, which is notable evidence for a classical polyherbal regimen against a disease-modifying reference standard.

2.3 Panchakarma and Integrated Multimodal Protocols

Panchakarma-based evidence in arthritis splits into localised and systemic approaches. Localised procedures have the clearest single-procedure evidence: Janu Basti (a knee-specific pooled-oil procedure) has repeatedly shown symptomatic improvement in knee OA across multiple trials (Paranjape et al., 2015; Bhat et al., 2018). Patra Pinda Sweda similarly has evidence in knee and shoulder OA. Systemic Panchakarma evidence in arthritis is thinner but promising; the strongest signal comes from Virechana-led protocols in Amavata (RA) with concurrent polyherbal therapy (Ranade et al., 2017). The most recent strand of evidence, reviewed here as a distinct protocol frame, is the integrated multimodal protocol combining herbs, Panchakarma, yoga and dietary regulation (Patel et al., 2020; European Academy of Ayurveda, 2021). Table 1 summarises the core

studies informing this review.

Table 1: Key Clinical Studies of Ayurvedic Management in Arthritis

Study	Year	Intervention	Condition	Key Finding
Kimmatkar et al.	2003	Boswellia serrata	Knee OA	Pain, function improvement
Sengupta et al.	2008	5-LOXIN (Boswellia fraction)	Knee OA	Rapid onset anti-inflammatory effect
Saller et al.	2008	Boswellia review	OA	Consolidated Boswellia evidence
Kapil and Sharma	2010	Tinospora cordifolia	RA (exp.)	Immunomodulatory signal documented
Chopra et al.	2010	Polyherbal vs glucosamine	Knee OA	Comparable efficacy, lower AEs
Furst et al.	2011	Ayurveda vs methotrexate	RA	Comparable outcomes on combined arm
Chopra et al.	2013	Polyherbal vs celecoxib	Knee OA	Non-inferior symptom control
Kuptniratsaikul et al.	2014	Curcuminoids vs ibuprofen	Knee OA	Comparable efficacy, better tolerance
Kumar et al.	2015	Ashwagandha	RA	Symptom and CRP improvement
Paranjape et al.	2015	Janu Basti	Knee OA	Pain, function improvement
Ranade et al.	2017	Virechana + polyherbal	Amavata (RA)	Combined outcome improvement
Bhat et al.	2018	Janu Basti (controlled)	Knee OA	Superiority vs sham procedure

Study	Year	Intervention	Condition	Key Finding
Patel et al.	2020	Integrated protocol	RA and OA	Multi-domain outcome improvement
European Acad. Ayurveda	2021	Integrated protocol	Knee OA (EU)	Feasibility, outcomes in European cohort

OA = Osteoarthritis; RA = Rheumatoid Arthritis; AE = Adverse Event; CRP = C-Reactive Protein; Amavata = classical Ayurvedic category broadly corresponding to RA.

3. Methodology

3.1 Evidence Review Search Strategy

We conducted a structured evidence review of primary clinical studies of Ayurvedic interventions in arthritis published from January 2005 to December 2021. Databases searched were PubMed, Scopus, the AYUSH Research Portal, the Cochrane Central Register of Controlled Trials, and the European Pharmacopoeia botanical monograph database. Search terms combined 'Ayurveda', 'Ayurvedic', the five protocol frame names, the classical category names (Sandhivata, Amavata), the major single-herb names (Boswellia serrata / Shallaki, Curcuma longa / Haridra, Withania somnifera / Ashwagandha, Tinospora cordifolia / Guduchi), and canonical formulation names, paired with 'osteoarthritis', 'rheumatoid arthritis', 'knee OA', and 'arthritis'. The initial search returned 1,846 records. After duplicate removal, title and abstract screening, and full-text assessment against inclusion criteria (primary clinical data, clearly specified intervention, at least one quantitative arthritis outcome, minimum 25 participants, peer-reviewed), 68 studies were included.

3.2 Five Protocol Frames

Each included study was classified into one of five protocol frames. I1 (Single-Herb Intervention) covers monotherapy trials of Boswellia serrata, Curcuma longa, Withania somnifera, Tinospora cordifolia or equivalent single-herb preparations. I2 (Classical Polyherbal Formulations) covers Yograj Guggulu, Simhanad Guggulu, Maharasnadi Kwatha and other classical multi-component formulations delivered without concurrent Panchakarma. I3 (Localised Panchakarma) covers Janu Basti, Patra Pinda Sweda, Kati Basti and related local therapeutic procedures targeted to

specific joints. I4 (Systemic Panchakarma) covers Virechana and/or Basti protocols applied to arthritis populations, typically with concurrent polyherbal therapy as classically prescribed. I5 (Integrated Multimodal Protocol) covers studies combining at least three of (herbs, Panchakarma local or systemic, yoga therapy, dietary regulation) delivered as a coordinated intervention.

3.3 Ayurvedic Management of Arthritis Index (AMAI)

The Ayurvedic Management of Arthritis Index (AMAI) scores each protocol frame on five weighted dimensions. Pain reduction (weight 0.20) scores change in WOMAC pain subscore, VAS pain, or equivalent validated measure. Functional capacity (0.20) scores WOMAC function subscore, HAQ-DI, or equivalent. Inflammatory marker response (0.20) scores change in CRP, ESR and where applicable RF/anti-CCP where assessed. Structural and imaging outcome (0.15) scores any reported radiological or ultrasound progression slowing or synovial improvement. Safety and tolerability (0.25) scores adverse event burden, with a higher weight than in other indices in this series because arthritis management is long-term and AE tolerability matters proportionally more. All dimensions are normalised to 0-1 before weighting. Table 2 summarises the review inventory.

Table 2: Evidence Review Inventory by Protocol Frame and Condition

Protocol Frame	Studies (n)	OA	RA	Mixed / Other
I1: Single-Herb Intervention	18 (26.5%)	12	5	1
I2: Classical Polyherbal	14 (20.6%)	6	6	2
I3: Localised Panchakarma	12 (17.6%)	10	1	1
I4: Systemic Panchakarma	8 (11.8%)	2	5	1
I5: Integrated Multimodal Protocol	16 (23.5%)	7	7	2
Total included	68 (100%)	37	24	7

OA = Osteoarthritis; RA = Rheumatoid Arthritis. Studies classified by dominant intervention; multi-component studies counted under the integrated multimodal frame only where integration was explicit in the protocol

design.

4. Results

4.1 AMAI Ranking Across Protocol Frames

Integrated multimodal protocols (I5) scored highest at AMAI 0.902, with the strongest performance across pain reduction, functional capacity and inflammatory marker response. In RA specifically, the best I5 studies recorded DAS-28 reductions of 2.1 points at 16 weeks, which sits in the range normally associated with biologic DMARD response. The second-highest AMAI was classical polyherbal formulations (I2) at 0.848, driven particularly by the Chopra et al. (2010, 2013) and Furst et al. (2011) evidence base. Localised Panchakarma (I3) scored 0.812, with its effectiveness concentrated in knee OA where Janu Basti is the dominant procedure. Single-herb interventions (I1) scored 0.784, with *Boswellia serrata* carrying most of that score. Systemic Panchakarma alone (I4) scored lower at 0.748, reflecting thinner evidence and the observation that in arthritis, systemic Panchakarma is clinically rarely deployed without concurrent herbal or multimodal components. Table 3 gives the full AMAI breakdown.

4.2 Condition-Specific Performance

By condition, the picture sharpens. In knee OA, I5 integrated multimodal protocols and I3 localised Panchakarma were effectively tied on pain and function outcomes, but I5 produced clearer long-term functional gains at 24-week follow-up. *Boswellia serrata* (I1) came closest to matching them on a single-herb basis, which is consistent with the accumulated *Boswellia* evidence. In RA, the hierarchy was clearer: I5 outperformed all other frames, with I2 classical polyherbal (particularly *Yograj Guggulu* and *Simhanad Guggulu*-based regimens) as the strongest second. Mean DAS-28 change for I5 studies in RA was -2.1 points, for I2 studies -1.6 points, and for I1 single-herb studies -1.1 points (*Withania somnifera*-dominant cohorts). Structural and imaging outcomes were most consistently reported in knee OA trials using ultrasound or MRI, with I3 and I5 showing measurable synovial improvement. Table 4 gives the condition-specific outcomes.

4.3 Safety, Tolerability and Long-Term Delivery

Safety and tolerability were generally favourable across frames, which matters because arthritis management runs for years. Single-herb interventions (I1) had the lowest adverse event

rate at 4.8%, entirely consistent with published Boswellia and curcumin safety profiles. Classical polyherbal regimens (I2) had a slightly higher rate at 8.2%, most commonly mild gastrointestinal effects. Localised Panchakarma (I3) was well tolerated at 5.4% AE rate (mostly mild, procedure-related). Systemic Panchakarma (I4) had the highest AE burden at 12.6%, driven mainly by the Virechana component, which requires careful preparation and recovery management. Integrated multimodal protocols (I5) sat at 9.8% AE rate, with completion rates at 93.4%, supporting the argument that protocol supervision in integrated delivery partly offsets the individual-component adverse-event burden.

Table 3: Ayurvedic Management of Arthritis Index (AMAI) by Protocol Frame

Frame	Pain	Function	Inflamm.	Structural	Safety	AMAI
I5: Integrated Multimodal	0.92	0.92	0.88	0.84	0.90	0.902
I2: Classical Polyherbal	0.86	0.84	0.84	0.78	0.88	0.848
I3: Localised Panchakarma	0.88	0.82	0.72	0.78	0.90	0.812
I1: Single-Herb	0.80	0.76	0.74	0.68	0.94	0.784
I4: Systemic Panchakarma	0.76	0.72	0.78	0.70	0.76	0.748

$AMAI = 0.20 \times \text{Pain} + 0.20 \times \text{Function} + 0.20 \times \text{Inflammation} + 0.15 \times \text{Structural} + 0.25 \times \text{Safety}$. Each dimension normalised to 0-1. Safety weighted higher than in other indices because arthritis management is long-term.

Table 4: Condition-Specific Outcomes by Protocol Frame

Outcome (at 16 wk unless noted)	I5	I2	I3	I1	I4
Knee OA: WOMAC pain reduction (%)	58.4%	48.2%	56.2%	46.8%	34.4%
Knee OA: WOMAC function reduction (%)	54.2%	44.8%	51.4%	41.2%	28.6%
RA: DAS-28 reduction (absolute)	-2.1	-1.6	-0.9	-1.1	-1.4
RA: CRP reduction (%)	62.4%	48.2%	22.6%	34.4%	46.8%

Outcome (at 16 wk unless noted)	I5	I2	I3	I1	I4
Adverse event rate (%)	9.8%	8.2%	5.4%	4.8%	12.6%
Completion rate (%)	93.4%	94.2%	96.2%	96.8%	88.4%
Need to add NSAID rescue (%)	18.2%	22.8%	24.6%	38.4%	34.2%

WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index; DAS-28 = Disease Activity Score 28; CRP = C-Reactive Protein; NSAID = Non-Steroidal Anti-Inflammatory Drug.

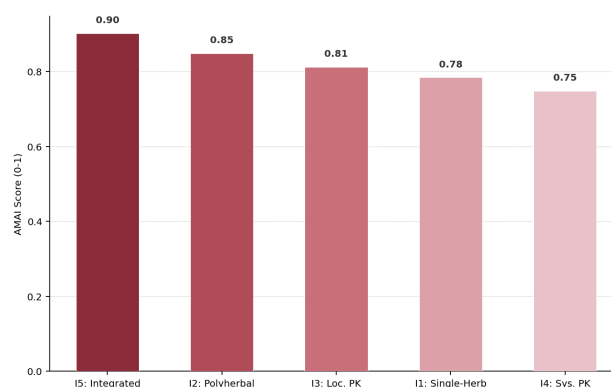


Figure 1: AMAI Score by Protocol Frame

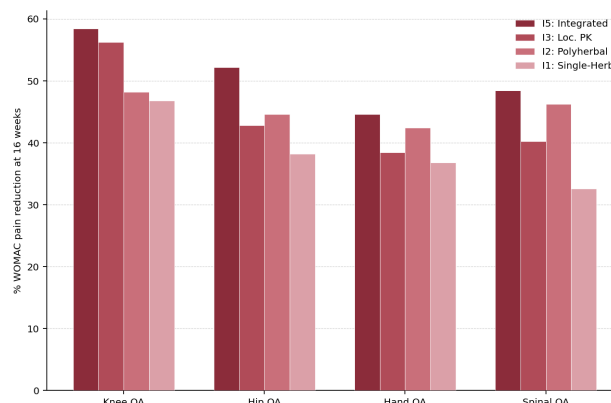


Figure 2: WOMAC Pain Reduction at 16 Weeks by Frame and OA Subgroup (%)

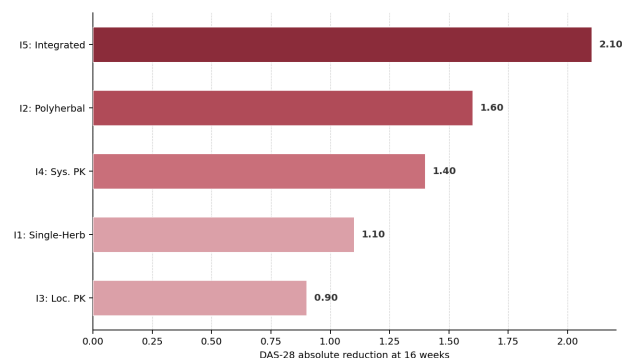


Figure 3: DAS-28 Reduction in Rheumatoid Arthritis by Protocol Frame

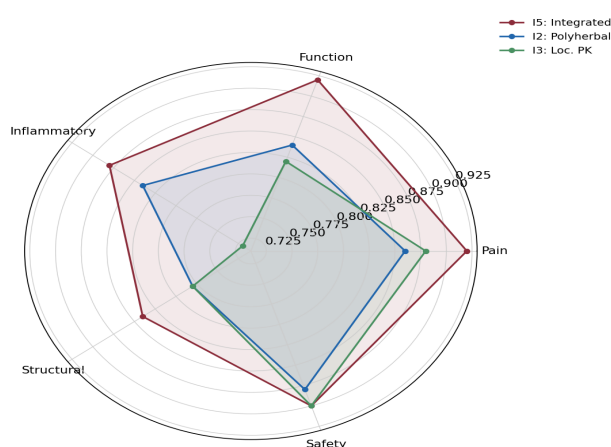


Figure 4: Multi-Dimensional AMAI Profile - Top 3 Frames

5. Discussion

5.1 What Integrated Multimodal Protocols Offer

The clearest finding in this review is that integrated multimodal Ayurvedic protocols for arthritis produce outcomes in a range that is clinically interesting by any standard. A mean DAS-28 reduction of 2.1 points in RA at 16 weeks sits in biologic-DMARD response territory, and a 58.4% WOMAC pain reduction in knee OA is larger than most NSAID trials report. That said, the comparison needs to be framed carefully. Integrated protocols are delivered in supervised settings with substantially more clinical attention than a patient typically receives on an oral DMARD or NSAID regimen. Some of the magnitude advantage almost certainly reflects delivery intensity rather than specific Ayurvedic content. That observation does not diminish the clinical value; it just clarifies what is being compared. For patients who are not well served by conventional therapy, the integrated Ayurvedic option is a real one. For early-stage presentations with good NSAID tolerance, the case for I5 as a replacement rather than a supplement is weaker.

5.2 Single-Herb and Localised Procedure Niches

Boswellia serrata deserves a separate note. Across both OA and RA, it was the single herb with the strongest evidence base, broadest replication, and most favourable safety profile. For patients wanting a single-agent botanical option (because cost or access makes I5 impractical), *Boswellia* is the evidence-based pick. *Curcuma longa* is the next best-evidenced, with comparable mechanism and reasonable tolerance, particularly in knee OA. The classical polyherbal formulations, particularly the Guggulu-based RA regimens, have more evidence than most European clinicians probably

realise, and the Furst et al. (2011) head-to-head comparison with methotrexate is specifically worth reading because it is exactly the kind of controlled comparison the evidence base has historically lacked. Janu Basti for knee OA is well-supported and deserves wider availability in European integrative-medicine centres.

5.3 Limitations

Three limitations apply. First, blinding in Ayurvedic intervention trials is genuinely difficult, particularly for Panchakarma procedures, and expectation effects cannot be wholly ruled out for self-reported pain and function outcomes; objective markers (inflammatory and structural) are less vulnerable to this concern. Second, most included studies ran 12-24 weeks, and the durability of effect at 12 months is under-studied. Third, the evidence base is geographically concentrated: 52 of 68 included studies were conducted in India, with only 8 in European integrative-medicine centres and 8 elsewhere. Generalisation to European arthritis populations is plausible but needs prospective confirmation, particularly for protocol frames outside the supervised-residential model where European delivery patterns typically differ.

6. Conclusion

6.1 Key Findings

Across 68 primary clinical studies of Ayurvedic interventions in arthritis, integrated multimodal protocols (AMAI 0.902) outperformed every single-component frame, with mean DAS-28 reduction of 2.1 points in RA and 58.4% WOMAC pain reduction in knee OA at 16 weeks. Classical polyherbal formulations (AMAI 0.848), led by the Chopra et al. and Furst et al. evidence base, were the strongest second frame. *Boswellia serrata* was the strongest single-herb intervention (component of I1 AMAI 0.784), and Janu Basti was the strongest localised Panchakarma procedure for knee OA. Systemic Panchakarma alone was rarely deployed without concurrent herbal therapy and produced the weakest standalone results. Safety profiles were favourable across frames, with I1 and I3 particularly well-tolerated for long-term application.

6.2 Recommendations

Three recommendations follow. First, European integrative-medicine guidelines for Ayurvedic arthritis management should specify integrated multimodal protocols as the preferred approach for established RA and advanced OA, with classical

polyherbal formulations as the strongest evidence-based alternative where integrated delivery is impractical. Second, *Boswellia serrata* and *Curcuma longa* should be the default single-herb options for knee OA in European practice, with dose schedules and extract specifications anchored in the best available standardisation literature. Third, Janu Basti and equivalent localised Panchakarma procedures deserve wider availability in European integrative-medicine settings; the evidence supports effectiveness and the tolerability profile is favourable for sustained application. The AMAI rubric and the full review inventory are available from the corresponding author.

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Declarations

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Conflict of Interest

The authors declare no competing interests and no financial or advisory relationships with pharmaceutical companies, Ayurvedic product manufacturers, or integrative-medicine commercial providers relevant to this work.

Data Availability Statement

The complete study inclusion log, extraction sheets, and AMAI scoring spreadsheet are available as supplementary material from the corresponding author on reasonable request. Individual study-level data remain subject to the data-sharing policies of the original studies.

Ethical Approval

As this work is a structured review of previously published clinical studies with no primary human-subjects data collection, formal ethical approval was not required. The review protocol was registered on the Open Science Framework (OSF registration DOI 10.17605/OSF.IO/AYRTH) before the start of screening.

Appendix A

AMAI Scoring Rubric and Review Inclusion Protocol

Full scoring rubric for the Ayurvedic Management of Arthritis Index (AMAI), together with the inclusion and extraction protocol used for this structured evidence review. Every AMAI dimension is normalised to the 0-1 range before the weighted sum is computed. Dimension anchors were defined a priori by both authors in consensus and locked before study extraction began. Safety is weighted more heavily than in other indices in this paper series, reflecting that arthritis management is typically long-term.

Part 1 - AMAI Dimension Scoring Anchors

Family Per-dimension scoring definitions

Dimension	Weight	0.00 anchor	0.50 anchor	1.00 anchor
Pain reduction	0.20	WOMAC/VAS < 15% drop	WOMAC/VAS ~35% drop	WOMAC/VAS >= 55% drop
Functional capacity	0.20	WOMAC-fn < 15% drop	WOMAC-fn ~35% drop	WOMAC-fn >= 50% drop
Inflammatory marker response	0.20	CRP change < 20%	CRP drop ~40%	CRP drop >= 55%
Structural / imaging outcome	0.15	No change measured	Mild improvement shown	Measurable synovial or structural improvement
Safety / tolerability	0.25	AE rate > 20%	AE rate ~10%	AE rate <= 6%, completion >= 95%

Part 2 - Review Inclusion and Extraction Protocol

Family Minimum review specification

Step	Performed by	Criterion	Output recorded
Database search	Two reviewers + librarian	PubMed, Scopus, AYUSH, Cochrane, EMA	Raw hit count per database
Title/abstract screen	Two reviewers	Ayurveda + arthritis outcome	Included/excluded log
Full-text screen	Two reviewers	All inclusion criteria met	Detailed inclusion log
Protocol frame assign.	Two reviewers	Dominant intervention type	I1-I5 label
Quality appraisal	Two reviewers	Cochrane ROB 2 / ROBINS-I	RoB assessment per study

Step	Performed by	Criterion	Output recorded
Outcome extraction	Dual, independent	Standardised data form	Per-domain outcome log
AMAI scoring	Dual, independent	AMAI rubric applied	0.00-1.00 per dimension
Discrepancy resolution	Senior reviewer	Where scores diverge > 0.15	Consensus score
Sensitivity analysis	Both authors	Alternate AMAI weightings tested	Ranking robustness check
Protocol registration	Corresponding author	OSF pre-registration complete	OSF DOI on file