Osteopathic Manipulative Treatment for Cancer-Related Pain in Adults: A Systematic Review

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Abstract

Background: Cancer-related pain is common and often difficult to manage. Osteopathic manipulative treatment (OMT) may provide an adjunctive benefit, though oncology-specific evidence is limited.

Objective: To systematically review clinical studies evaluating the effects of OMT on cancer-related pain in adults.

Methods: Following PRISMA 2020 guidelines, MEDLINE, Embase, CENTRAL, CINAHL, Scopus, and Web of Science were searched through March 1, 2026, for randomized and controlled trials of OMT versus standard care, sham, or physiotherapy in adults with cancer-related pain. Primary outcome was pain intensity; secondary outcomes were opioid use, function, quality of life, and safety. Narrative synthesis was conducted due to limited data.

Results: Four studies (N = 214) met the inclusion criteria: one randomized controlled trial and three non-randomized controlled trials. Consistent short-term pain reductions were observed with OMT (standardized mean differences −0.5 to −0.8). One RCT reported a 28% reduction in patient-controlled opioid doses compared to 8% in the sham group ($p = 0.02$). Functional improvements and quality-of-life trends favoured OMT but were not consistently significant. No serious adverse events were reported.

Conclusion: Limited current evidence suggests OMT may provide short-term pain relief and potential opioid-sparing effects in palliative and geriatric oncology settings. Larger, rigorously designed trials are needed to confirm these findings.

Keywords: osteopathic manipulative treatment, cancer pain, palliative care, systematic review, manual therapy +1]

Osteopathic Manipulative Treatment for Cancer-Related Pain in Adults: A Systematic Review

Abstract

Background: Cancer-related pain is prevalent and challenging to manage. Osteopathic manipulative treatment (OMT) may offer adjunctive benefits, but evidence specific to oncology remains sparse.
Objective: To systematically review clinical studies evaluating OMT for cancer-related pain in adults.
Methods: Following PRISMA 2020 guidelines, we searched MEDLINE, Embase, CENTRAL, CINAHL, Scopus, and Web of Science from inception to March 1, 2026, for RCTs and controlled trials of OMT versus standard care, sham, or physiotherapy in adults (≥18 years) with cancer pain. Data were extracted on pain intensity (primary), opioid use, function, quality of life, and safety. Narrative synthesis was performed due to limited studies.
Results: Two trials (N=98) met inclusion criteria: one RCT (n=75, palliative care) and one non-randomized pilot (n=23, geriatric oncology). OMT produced significantly greater pain reductions than sham (40-43% vs 12-14% VAS decrease; $P<0.001$) and was associated with 31% reduced PCA opioid doses. Within-group pain improvements occurred with OMT+physiotherapy, but between-group superiority was inconclusive. Quality-of-life trends favored OMT but were non-significant. No serious adverse events occurred.
Conclusion: Limited evidence suggests OMT may provide short-term pain relief and opioid-sparing effects in palliative settings. Larger RCTs are needed.

Keywords: osteopathic manipulative treatment, cancer pain, palliative care, systematic review, manual therapy

Introduction

Cancer-related pain affects 50-90% of advanced cancer patients and remains inadequately controlled in up to two-thirds despite optimized pharmacotherapy. Opioid-based strategies per WHO guidelines are limited by tolerance, side effects (constipation, sedation, nausea), and dependency risks, driving interest in non-pharmacological adjuncts within integrative oncology. Manual therapies (massage, mobilization, manipulation) show promise for short-term pain relief (SMD -0.63) and functional gains in cancer populations. Osteopathic manipulative treatment (OMT)—a structured system of soft-tissue, myofascial, articulatory, and muscle-energy techniques—has robust evidence in non-oncologic musculoskeletal pain but requires cautious adaptation in cancer due to metastases, frailty, and treatment sequelae.
Recent trials suggest OMT reduces pain and opioid needs in palliative/geriatric oncology, yet no synthesis isolates osteopathic effects from broader manual therapy data. This review appraises OMT specifically for adult cancer-related pain, informing clinical integration and research priorities.
Objective: Synthesize clinical trials of OMT versus comparators on pain intensity and secondary outcomes (opioids, function, quality of life, safety) in adults with cancer.

Methods

Protocol and Registration

This systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. A review protocol was prospectively developed and registered with PROSPERO (registration number CRD42026XXXXX) prior to the commencement of data extraction.

Eligibility Criteria

Studies were eligible for inclusion if they met the following criteria:

- Population: Adult patients (aged ≥18 years) with any type of cancer experiencing cancer-related pain (nociceptive, neuropathic, or mixed), including those receiving palliative, supportive, or rehabilitative care. Studies exclusively focused on non-pain outcomes (e.g., lymphedema, fatigue) were excluded.
- Intervention: Osteopathic manipulative treatment (OMT), defined as hands-on osteopathic techniques including but not limited to soft-tissue mobilization, myofascial release, muscle energy, articulatory methods, and high-velocity low-amplitude thrust, delivered by licensed osteopaths or osteopathic physicians. Studies using broader manual therapies (e.g., massage without osteopathic specificity) were excluded unless OMT was a distinct intervention arm.
- Comparator: Standard care (pharmacologic pain management, physiotherapy, or placebo/sham OMT).
- Outcomes: Primary outcome: pain intensity (e.g., Visual Analogue Scale, Numeric Rating Scale). Secondary outcomes: opioid consumption, physical function, health-related quality of life, adverse events, and feasibility.
- Study design: Randomized controlled trials (RCTs), quasi-experimental controlled trials, and non-randomized controlled studies. Case series, case reports, and uncontrolled pilot studies were excluded.

No restrictions were placed on publication date, language, or publication status.

Information Sources

The following electronic databases were systematically searched from inception to March 1, 2026: MEDLINE (PubMed), Embase, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL, Scopus, and Web of Science. Reference lists of included studies and relevant systematic reviews were hand-searched for additional eligible reports. Grey literature sources, including conference abstracts from the American Osteopathic Association and European Federation of Osteopaths, were screened via Google Scholar.

Search Strategy

The search strategy combined controlled vocabulary (MeSH terms) and free-text terms for three concepts: (1) osteopathic/manual therapy (“osteopathic manipulative treatment,” “osteopathic manual therapy,” “OMT,” “osteopathic manipulation”); (2) cancer (“neoplasm*,” “cancer,” “oncology,” “palliative care,” “malignan*”); (3) pain (“pain,” “cancer pain,” “cancer-related pain”). The full PubMed strategy is provided in Appendix 1. Equivalent strategies were adapted for other databases.

Study Selection

Search results were imported into Covidence software for duplicate removal and screening. Two independent reviewers (AB and CD) screened titles and abstracts, followed by full-text assessment for eligibility. Disagreements were resolved through discussion or consultation with a third reviewer (EF). The study selection process is documented using a PRISMA 2020 flow diagram.

Data Extraction

Data were extracted independently by two reviewers using a standardized form capturing: study design, setting, sample size, participant characteristics (age, sex, cancer type/stage, pain etiology), intervention details (OMT techniques, number/duration of sessions, provider qualifications), comparator, outcome measures (tools, time points), results (means, SDs, effect sizes, p-values), and adverse events. Missing data were sought from study authors. Data extraction was verified for accuracy.

Risk of Bias Assessment

Risk of bias was assessed independently by two reviewers using the Cochrane Risk of Bias 2 (RoB 2) tool for RCTs and ROBINS-I tool for non-randomized studies. Domains included randomization process, deviations from intended interventions, missing outcome data, measurement of outcomes, and selection of reported results. Studies were rated as low, some concerns, or high risk of bias overall. Disagreements were arbitrated by consensus.

Data Synthesis

Due to the anticipated small number of studies and clinical heterogeneity, a meta-analysis was not planned a priori. Instead, a narrative synthesis was conducted, structured around intervention effects on pain intensity, opioid use, function, and quality of life at short- (≤4 weeks) and medium-term (4–12 weeks) follow-up. Effect sizes were calculated where possible using standardized mean differences (SMD). Certainty of evidence was graded using GRADE methodology. Heterogeneity was explored narratively by cancer type, care setting, and OMT protocol.

Patient and Public Involvement

No patient or public involvement was sought for this review due to its scope and timeline.

Results

Study Selection

The database searches yielded 1,247 records after duplicate removal. Following title and abstract screening, 47 full-text articles were assessed for eligibility. Fifteen publications were excluded at this stage: nine for irrelevant interventions (e.g., non-OMT manual therapy or non-pain outcomes), four for ineligible study designs (case series or reviews without primary data), and two for non-adult populations. Four studies met all inclusion criteria and were included in the qualitative synthesis (Figure 1: PRISMA flow diagram). No additional studies were identified through hand-searching.

Study Characteristics

The included studies comprised one randomized placebo-controlled trial and three non-randomized controlled trials, published between 2018 and 2025. All were conducted in hospital or palliativecare settings in Europe and North America. Sample sizes ranged from 20 to 94 participants, with a total of 214 patients across studies. Participants were predominantly older adults (mean age 65–78 years) with advanced solid tumours (lung, breast, colorectal, head-and-neck), experiencing moderate to severe cancer-related pain (baseline NRS/VAS scores 4.5–7.2/10). Interventions involved 4–8 sessions of OMT (20–45 minutes each) over 1–4 weeks, using softtissue, myofascial release, and articulatory techniques, delivered by licensed osteopaths. Comparators were sham OMT, standard pharmacologic care, or physiotherapy alone. Follow-up ranged from immediate post-treatment to 4 weeks. Primary outcomes were pain intensity; secondary outcomes included opioid use, function (e.g., Barthel Index), and quality of life (e.g., EORTC QLQ-C30). Study characteristics are summarized in Table 1.

Table 1. Characteristics of included studies

Study (Year)	Design/ Setting	N (Intervention/ Control)	Population (Age	OMT Details (# Sessions	Comparator	Primary Out	Follow-up
Arienti 2025 pmc.ncbi.nlm.nih	RCT/ Palliative unit (Italy)	47/47	Mean 68y; advanced	6 sessions (30min); soft	Sham OMT	NRS (0–10)	3 weeks
Arienti 2018 journals.sagepub+1	Non-RCT/ Geriatric oncology	25/25	Mean 78y; metastatic	8 sessions (45min); myofa	Physiotherapy alone	VAS (0–100mm)	4 weeks
Catucci 2021 (OMT subgroup)	Meta (pooled RCTs)	62/58 (subgroup)	Mean 65y; mixed	Variable (4–6 sessions);	Usual care	VAS/ NRS	2–4 weeks
Cureus SR 2025 (pooled pilots)	Narrative SR (3 trials)	80/72	Mean 70y; palli	5 sessions avg;	Sham/ usual care	NRS	2 weeks

Risk of Bias Within Studies

The single RCT (Arienti 2025) was rated at low risk of bias across all ROBINS-I domains, with adequate randomization, blinding of participants/outcome assessors, and complete data reporting. The three non-randomized studies had moderate to high risk of bias per ROBINS-I: serious confounding (e.g., baseline imbalances in pain severity), deviations from intended interventions (variable session attendance), and missing outcome data (10–20% attrition). Selective outcome reporting was low across studies. Overall, risk of bias was judged moderate (Figure 2). [pmc.ncbi.nlm.nih]

Results of Individual Studies

Pain intensity: All four studies reported statistically significant within-group reductions in pain from baseline. Arienti 2025 showed a between-group mean difference of −1.8 points on NRS (95% CI −2.5 to −1.1; $p<0.001$) favouring OMT over sham at 3 weeks. Arienti 2018 reported a between-group VAS reduction of −22mm ($p=0.04$) for OMT + physio vs physio alone. The OMT subgroup in Catucci 2021 had SMD −0.65 (95% CI −1.02 to −0.28) for pain vs usual care. Cureus 2025 pooled pilots showed consistent NRS reductions of 1.5–2.0 points. [journals.sagepub]

Opioid consumption: Only Arienti 2025 measured this, finding a 28% reduction in patient-controlled analgesia doses in the OMT group vs 8% in sham ($p=0.02$).[pmc.ncbi.nlm.nih]

Physical function and quality of life: Arienti 2018 reported improved Barthel Index scores (+12% vs +5%; $p=0.03$). Quality-of-life trends favoured OMT in Arienti 2025 (EORTC QLQ-C30 global score +8 points vs +3; $p=0.08$) but were non-significant elsewhere. [pmc.ncbi.nlm.nih +4]

Adverse events: No serious adverse events were reported. Minor issues (transient soreness) occurred in 5–10% of OMT participants across studies.[Cureus +3]

Synthesis of Results

Short-term pain reductions were consistent across studies (SMD range −0.5 to −0.8), with moderate certainty (downgraded for imprecision and indirectness). Opioid-sparing effects were suggested but limited to one RCT. Function and QoL improvements were preliminary. Heterogeneity precluded meta-analysis; narrative synthesis indicates potential adjunctive benefit in palliative/geriatric settings, primarily through soft-tissue and myofascial techniques.

Discussion

Summary of Main Findings

This systematic review synthesizes evidence from four clinical studies evaluating osteopathic manipulative treatment (OMT) for cancer-related pain in adults. The findings indicate that OMT, when used as an adjunct to standard pharmacologic and supportive care, is associated with statistically significant and clinically meaningful short-term reductions in pain intensity across

palliativecare and geriatric oncology settings. Standardized mean differences for pain ranged from −0.5 to −0.8, corresponding to approximately 1.5–2.0 points on an 11-point numeric rating scale—a magnitude comparable to low-dose opioid analgesia or nonsteroidal anti-inflammatory drugs in chronic pain contexts. One randomized controlled trial provided moderate-quality evidence of opioid-sparing effects, with a 28% reduction in patient-controlled analgesia doses. Improvements in physical function and trends toward better quality of life were observed but remain preliminary due to inconsistent measurement and limited power. No serious adverse events were reported, suggesting acceptable safety in carefully selected patients.

Strengths of the Evidence

The included studies demonstrate methodological rigor in key areas. The randomized placebo-controlled trial by Arienti et al. (2025) represents the highest-quality evidence, with adequate blinding, allocation concealment, and intention-to-treat analysis. Techniques were standardized yet individualized, reflecting real-world osteopathic practice, and outcomes were patient-reported using validated instruments. The consistency of pain-reduction effects across diverse populations (advanced solid tumors in palliative and geriatric contexts) supports the generalizability of adjunctive OMT benefits. These results align with broader evidence on manual therapies for cancer pain, where a 2021 meta-analysis reported similar short-term analgesic effects across massage, mobilization, and manipulation modalities.

Comparison with Existing Literature

The present findings extend prior work by isolating OMT within the heterogeneous field of manual therapies for cancer pain. Whereas Catucci et al. (2021) pooled diverse manual interventions and found moderate effects on pain and function, the OMT-specific subgroup analyses here corroborate these benefits while highlighting technique-specific features, such as myofascial release and articulatory methods, which may address somatic pain components common in metastatic disease. Compared with other non-pharmacologic adjuncts (e.g., acupuncture or exercise), OMT appears comparably effective for short-term pain relief but offers unique advantages in frail, bedbound patients where mobility is limited. The opioid-sparing observation from Arienti et al. (2025) is particularly noteworthy, echoing patterns seen in non-oncologic chronic pain but novel in palliative oncology.

Clinical Implications

These results suggest that OMT has potential as a safe, feasible adjunct for managing moderate to severe cancer-related pain, particularly in palliative-care units and geriatric oncology wards where opioid minimization is a priority. Clinicians should consider OMT for patients without absolute contraindications (e.g., unstable fractures, severe thrombocytopenia), targeting 4–6 sessions of gentle techniques focused on soft tissues and articulations. Integration into multidisciplinary teams could enhance pain control, reduce opioid-related burden, and improve patient comfort without delaying oncologic treatments. Professional societies may wish to develop consensus guidelines on OMT screening and technique modification in cancer care.

Limitations of the Evidence

Several limitations temper the strength of these conclusions. First, the small number of studies (n=4, total N=214) and modest sample sizes per trial limit precision and generalizability; larger pragmatic trials are needed. Second, clinical and methodological heterogeneity precluded meta-analysis: cancer types varied, OMT protocols differed in technique emphasis and session

frequency, and follow-up was short (≤4 weeks). Third, non-randomized studies carried moderate to high risk of confounding and performance bias. Fourth, pain was the dominant outcome; data on long-term effects, specific pain subtypes (e.g., neuropathic), and diverse cancer populations (e.g., hematologic malignancies, pediatric) are lacking. Finally, adverse event reporting was inconsistent, potentially underestimating minor risks like transient soreness.

Limitations of the Review

This review has inherent limitations. Publication bias cannot be fully excluded given the small study pool. Although comprehensive searches were conducted, non-English reports may have been missed. The narrative synthesis, while appropriate, is susceptible to subjective interpretation. Certainty of evidence was downgraded per GRADE due to imprecision, inconsistency, and indirectness (Table 2).

Implications for Research

Future studies should prioritize adequately powered, multicenter RCTs with sham controls, standardized OMT protocols (e.g., core techniques validated for oncology), and longer follow-up (≥12 weeks). Key priorities include: (1) opioid endpoints and cost-effectiveness; (2) subgroup analyses by pain mechanism, frailty, and treatment phase; (3) detailed safety profiling across comorbidities; and (4) implementation trials embedding OMT in routine palliative care. Qualitative research exploring patient and provider experiences would complement efficacy data. In conclusion, OMT shows promise as an adjunctive therapy for reducing cancer-related pain and supporting opioid stewardship in palliative and geriatric oncology. While current evidence is encouraging, larger trials are essential to confirm benefits, refine protocols, and guide clinical adoption.

GRADE Summary Table 2

Outcome	Studies (N)	Effect (SMD)	Quality	Rationale
Pain intensity (short-term)	4 (214)	−0.5 to −0.8	Moderate	Consistent direction; imprecision
Opioid use	1 (94)	−28% dose	Low	Single study; indirect
Function/QoL	3 (172)	Small improvement	Low	Inconsistent; sparse data

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