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Immediate and Short-Term Effects of Physiotherapy Interventions on Pain and Physical Function in Dentists with Mechanical Spine Pain: A Systematic Review

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ADMINISTRATIVE INFORMATION

Support - No support.

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 November 2026 and was last updated on 19 November 2026.

INTRODUCTION

Review question / Objective The objective of the review is to systematically-summarize the immediate(immediately-after-a-single-session) and short-term(more-a-one-session-upto-12-weeks) effect of physical-therapy-interventions (exercise-intervention, manual-therapy-and-electrotherapy) for reducing pain and improving function in dentists-with-mechanical-spine-pain.

Rationale Dentists are at increased risk of mechanical spine pain due to prolonged static postures, repetitive movements, and sustained neck and trunk flexion during clinical procedures. Although ergonomic modifications and preventive strategies are recommended, physiotherapy interventions targeting pain reduction and restoration of physical function have received comparatively limited attention. Existing studies have investigated various non-invasive interventions, including stretching, strengthening, core stabilization exercises, manual therapy, soft tissue release, and other therapeutic approaches. However, the evidence regarding their effectiveness, particularly in terms of immediate and short-term outcomes, remains scattered. A systematic synthesis of available evidence is therefore essential to understand the effectiveness of these interventions, identify the most beneficial therapeutic approaches, and evaluate the methodological quality of existing studies. This review aims to address this evidence gap and provide recommendations for integrating physiotherapy-based rehabilitation and preventive strategies into occupational health practices for dentists.

Condition being studied Mechanical spine pain is a common musculoskeletal condition affecting dentists due to the occupational demands of dental practice, which frequently involve prolonged static sitting, sustained neck and trunk flexion, repetitive movements, and awkward working postures while accessing the intraoral workspace.

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Mechanical spine pain refers to pain arising from musculoskeletal structures of the spine, including muscles, ligaments, intervertebral discs, and facet joints, without necessarily involving an underlying systemic or neurological disorder. It may affect different spinal regions, including the cervical spine (neck pain), thoracic spine (upper and mid-back pain), and lumbar spine (low-back pain).

Dentists are particularly susceptible to mechanical spine pain because of prolonged exposure to constrained working postures and repetitive occupational activities. These exposures may contribute to persistent or recurrent pain, reduced spinal mobility, impaired muscle endurance, decreased flexibility, and limitations in physical functioning. Mechanical spine pain can adversely affect work performance, occupational efficiency, and quality of life.

This systematic review focuses on mechanical spine pain, including neck, upper-back, mid-back, and low-back pain, among dentists and dental students. It examines the effects of non-invasive physiotherapy interventions, including stretching and strengthening exercises, core stabilization, virtual reality-based training, manual therapy, and soft tissue release techniques, on pain reduction and improvement in physical function. The review considers immediate and short-term intervention outcomes.

METHODS

Search strategy An electronic literature search was conducted on 31 July 2026 using PubMed, Google Scholar, Cochrane Library, and CINAHL (EBSCOhost) to identify studies investigating the immediate and short-term effects of non-invasive physiotherapy interventions on pain and physical function in dentists with mechanical spine pain. The search was restricted to English-language publications published up to July 2026.

The search strategy incorporated three main concepts:

1. Population: Dentists, dental professionals
2. Condition: Mechanical spine pain, spinal pain, neck pain, back pain, upper-back pain, mid-back pain, low-back pain
3. Intervention: Physiotherapy, physical therapy, exercise therapy, stretching, strengthening, core stabilization, manual therapy, electrotherapy, TENS, traction, rehabilitation, and yoga.

The search terms were combined using Boolean operators AND and OR, as appropriate for each database.

PubMed: The search used Medical Subject Headings (MeSH) and Title/Abstract (tiab) fields. The search strategy was:

("Dentists"[Mesh] OR dentist[tiab] OR "dental professional"[tiab] OR "dental personnel"[tiab] OR "oral healthcare personnel"[tiab])
AND
("Neck Pain"[Mesh] OR "Back Pain"[Mesh] OR "Spinal Diseases"[Mesh] OR "neck pain"[tiab] OR "midback pain"[tiab] OR "back pain"[tiab] OR "upper back pain"[tiab] OR "low back pain"[tiab] OR "lower back pain"[tiab] OR "spinal pain"[tiab] OR "mechanical spine pain"[tiab] OR "musculoskeletal pain"[tiab])
AND
("Physical Therapy Modalities"[Mesh] OR "Exercise Therapy"[Mesh] OR "Rehabilitation"[Mesh] OR physiotherapy[tiab] OR "physical therapy"[tiab] OR exercise[tiab] OR stretching[tiab] OR strengthening[tiab] OR "manual therapy"[tiab] OR electrotherapy[tiab] OR TENS[tiab] OR traction[tiab] OR rehabilitation[tiab])

Google Scholar: Supplementary searches were conducted using combinations of dentist/dental professional terms, spinal and back pain terms, and physiotherapy/intervention terms. A total of 1,450 records were identified.

Cochrane Library: The following search combination was used:

dentist AND "physiotherapy intervention" AND ("back pain" OR "neck pain" OR "upper back pain" OR "spine pain")

No records were identified through this search.

CINAHL (EBSCOhost): The proposed search strategy used Title (TI) and Abstract (AB) fields with the following search sets:

- S1 – Population: dentist OR "dental professional" OR "oral healthcare personnel".
- S2 – Condition: "mechanical spine pain" OR "spinal pain" OR "neck pain" OR "low back pain" OR "lower back pain" OR "upper back pain" OR "back pain" OR "musculoskeletal pain".
- S3 – Intervention: physiotherapy OR "physical therapy" OR exercise OR stretching OR strengthening OR "manual therapy" OR electrotherapy OR TENS OR traction OR rehabilitation OR yoga.
- S4 – Combined search: S1 AND S2 AND S3.

Participant or population The review includes dentists, experiencing mechanical spine pain. Eligible participants include males and females with mechanical pain affecting one or more spinal regions, including the cervical (neck), thoracic (upper-back and mid-back), and lumbar (low-back) regions.

The included studies involved participants aged 23 years and above. Participants with occupationally associated mechanical spine pain, including chronic or task-related spinal pain, were considered eligible. The review focuses on

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individuals receiving non-invasive physiotherapy interventions aimed at reducing pain and improving physical function.

Intervention Therapeutic exercise: Structured physical exercises prescribed to improve muscle strength, flexibility, endurance, coordination, and functional capacity. These may include stretching, strengthening, isometric exercises, and postural correction exercises targeting the cervical, thoracic, and lumbar regions.
Stretching exercises: Exercises involving the controlled elongation of muscles and associated soft tissues to improve flexibility, reduce muscle tightness, and maintain or increase joint range of motion. These may include static, active, and dynamic stretching techniques.
Strengthening exercises: Exercises involving repeated muscle contractions against resistance or body weight to improve muscle strength and endurance. These may target the cervical flexors and extensors, scapular stabilisers, trunk muscles, and other spinal supporting musculature.
Core stabilisation exercises: Exercises designed to improve the activation, coordination, and endurance of deep and superficial trunk muscles responsible for maintaining lumbo-pelvic and spinal stability during functional activities.
Proprioceptive training: Exercises designed to improve joint position awareness, neuromuscular coordination, postural control, and sensorimotor function through controlled movements and position-repositioning activities.
Manual therapy: Hands-on therapeutic techniques applied to spinal joints and surrounding soft tissues to address pain, mobility restrictions, and musculoskeletal dysfunction. These may include mobilisation, manipulation, myofascial release, and soft tissue techniques.
Soft tissue release techniques: Manual therapeutic procedures involving the application of controlled pressure, mobilisation, or stretching to muscles and associated connective tissues to address soft tissue restrictions and pain.
Virtual reality-based interventions: Technology-assisted therapeutic programmes using virtual environments and interactive visual feedback to facilitate prescribed movements, postural awareness, and movement-related exercises.
Traction: Application of controlled longitudinal distraction forces to spinal structures with the intention of reducing mechanical loading and alleviating spinal pain.
Electrotherapy: Application of non-invasive therapeutic electrical modality to reduce pain and improve function stimulation
Yoga-based interventions: Structured therapeutic yoga practices involving physical postures, controlled movements, and breathing techniques intended to reduce pain and improve flexibility, muscular endurance, postural control, and physical function.
Telerehabilitation: Delivery of physiotherapy assessment, supervision, exercise prescription, and follow-up through digital communication platforms without requiring the participant and therapist to be physically present at the same location.
Home-based exercise programme: A structured physiotherapy exercise programme prescribed by a physiotherapist professional to be performed independently by participants at home.
Intervention duration: Interventions may be delivered as a single session to evaluate immediate effects or through multiple sessions extending from more than one session up to 12 weeks to evaluate short-term effects.
Comparison: Alternative physiotherapy interventions, conventional care, ergonomic advice, postural education, or any other comparison.

Comparator The comparator groups include participants receiving alternative physiotherapy interventions, conventional physiotherapy or standard care, ergonomic advice, postural education, or no structured physiotherapy intervention. Comparisons may also include different modes of delivering the same intervention, such as supervised exercise versus home-based exercise or face-to-face physiotherapy versus telerehabilitation.
Where applicable, comparisons between different exercise approaches, such as stretching versus strengthening, core stabilisation versus conventional exercises, or manual therapy combined with exercise versus exercise alone, will also be considered.
The effects of the interventions will be compared in terms of changes in pain intensity and physical function, considering immediate effects following a single session and short-term effects following multiple sessions over more than one session up to 12 weeks.

Study designs to be included Experimental study including both randomized , non randomized and quasi experimental study.

Eligibility criteria Inclusion criteria:
• Studies published in English up to 31 July 2026.
• Studies involving dentists, dental professionals aged 23 years and above.
• Studies involving participants experiencing mechanical spine pain, including cervical (neck),

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thoracic (upper-back and mid-back), and lumbar (low-back) pain.
• Randomized controlled trials, non-randomized controlled trials, and quasi-experimental studies evaluating non-invasive physiotherapy interventions including therapeutic exercises, stretching, strengthening, core stabilisation, proprioceptive training, manual therapy, soft tissue release, virtual reality-based interventions, telerehabilitation, and other physiotherapy approaches.
• Studies reporting at least one relevant outcome related to pain intensity or physical function.
• Studies reporting immediate effects following a single session or short-term effects following multiple sessions over more than one session up to 12 weeks.
Exclusion criteria:
• Studies involving populations other than dentists
• Studies involving spinal pain primarily associated with specific pathologies, systemic conditions, neurological disorders, or traumatic injuries rather than mechanical causes.
• Studies evaluating invasive surgical or pharmacological interventions as the primary treatment.
• Studies focusing exclusively on ergonomic assessment, workplace risk evaluation, or preventive education without evaluating a therapeutic intervention.
• Studies not reporting pain or physical function outcomes.
• Review articles, systematic reviews, meta-analyses, case reports, editorials, conference abstracts without sufficient outcome data, and other publications without original research findings.

Information sources The literature search was conducted using PubMed, Google Scholar, and the Cochrane Library. CINAHL through the EBSCOhost platform was considered as a supplementary information source. The searches were conducted on 31 July 2026. Reference lists of relevant full-text articles were also screened to identify additional potentially eligible studies. No separate searches of clinical trial registries or direct contact with study authors were undertaken. The search was restricted to English-language publications published up to July 2026.

Main outcome(s) The primary outcomes of this review are effect of non-invasive physiotherapy interventions on pain intensity and physical function in dentists, dental practitioners experiencing mechanical spine pain, including neck, upper-back, mid-back, and low-back pain.

Pain intensity - is operationally defined as the severity of mechanical spine pain experienced by participants in the cervical, thoracic, or lumbar regions.
Physical function - is operationally defined as the ability of participants to perform daily activities, occupational tasks, and functional movements. It encompasses the degree of functional disability, activity limitations, and work-related functional capacity resulting from spinal pain.
Immediate effects: Changes in pain intensity and physical function following a single intervention session.
Short-term effects: Changes following multiple intervention sessions, extending from more than one session up to 12 weeks.
Long-term effects (beyond 12 weeks) were considered; however there were no studies reporting outcomes beyond this period. Therefore, the review focuses on immediate and short-term intervention effects.

Quality assessment / Risk of bias analysis The methodological quality and risk of bias of the included studies were independently assessed by two reviewers. Any disagreements were resolved through discussion and consensus.
The National Institutes of Health (NIH) quality assessment tools were used to evaluate the methodological quality of randomized controlled trials, non-randomized controlled trials, and quasi-experimental studies.
Risk of bias was assessed using the Cochrane Risk of Bias (RoB) tool for randomized controlled trials and the Cochrane Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tool for non-randomized intervention studies.
The Cochrane RoB tool evaluated potential bias arising from the randomization process, deviations from intended interventions, missing outcome data, outcome measurement, and selection of reported results. ROBINS-I assessed potential bias in non-randomized studies across the pre-intervention, intervention, and post-intervention stages. The findings were used to evaluate the methodological quality and overall risk of bias of the included studies.

Strategy of data synthesis A qualitative synthesis was conducted to summarize the findings of the included studies. Owing to heterogeneity in study designs, participant characteristics, types of physiotherapy interventions, intervention duration, outcome measures, and reporting of results, a meta-analysis was not performed.
The extracted data were organized and synthesized according to the type of intervention, anatomical region affected (neck pain and low-

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back pain), and primary outcomes (pain intensity and physical function). Additional outcomes, including cervical range of motion, postural alignment, pressure pain threshold, muscle endurance, muscle fatigue, and work ability, were also considered.
The findings were categorized according to the duration of intervention into two groups:
1. Immediate effects: Outcomes assessed following a single intervention session.
2. Short-term effects: Outcomes assessed following multiple intervention sessions, extending from more than one session up to 12 weeks.
Pain intensity, disability, and physical function were summarized using the outcome measures and effect estimates reported in the individual studies. The methodological quality and risk of bias of the included studies were considered while interpreting the findings. Results were presented in tables and narrative form to compare intervention approaches, reported effects, and their implications for managing mechanical spine pain among dentists.

Subgroup analysis Not applicable. This systematic review involves a qualitative synthesis of the included studies and does not include a meta-analysis. Therefore, no subgroup analysis was planned or performed.

Sensitivity analysis Not applicable. This systematic review involved qualitative synthesis without meta-analysis. Therefore, no sensitivity analysis was planned or performed. The findings were interpreted considering the methodological quality and risk of bias of the included studies.

Language restriction Yes. The search was restricted to studies published in the English language.

Country(ies) involved India.

Keywords Mechanical spine pain; dentist; back pain;physiotherapy intervention; occupational health.

Contributions of each author
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