Abstracts Augst 2023

Effectiveness of Exercise Treatments with or without Adjuncts for Common Lower Limb Tendinopathies: A Living Systematic Review and Network Meta-analysis

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Challoumas Sports Medicine – Open August 09,2023
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Abstract:

Introduction: Exercise therapy is usually prescribed as first-line treatment for lower limb tendinopathies. The multitude of exercise- and non-exercise-based management options can be overwhelming for the treating sports professional and patient alike. We chose to investigate the comparative effectiveness of exercise therapy with or without adjuncts for managing the commonest lower limb tendinopathies.
Methods: Through an extensive systematic literature search using multiple databases, we aimed to identify eligible randomized controlled trials (RCTs) on Achilles tendinopathy, patellar tendinopathy or greater trochanteric pain. syndrome (GTPS) that included at least one exercise intervention in their treatment arms. Our primary outcomes were patient-reported pain and function (Victorian Institute of Sport Assessment; VISA). Follow-up was defined as shortterm (≤12 weeks), mid-term (>12 weeks to <12 months) and long-term (≥12 months). The risk of bias and strength of evidence were assessed with the Cochrane Collaboration and GRADE-NMA tools, respectively. Analyses were performed separately for each one of the three tendinopathies.
Results: A total of 68 RCTs were included in the systematic review. All pairwise comparisons that demonstrated statistically and clinically significant differences between interventions were based on low or very low strength of evidence.
Based on evidence of moderate strength, the addition of extracorporeal shockwave therapy to eccentric exercise in patellar tendinopathy was associated with no short-term benefit in pain or VISA-P. From the network meta-analyses, promising interventions such as slow resistance exercise and therapies administered alongside eccentric exercise, such as topical glyceryl trinitrate for patellar tendinopathy and high-volume injection with corticosteroid for Achilles tendinopathy was based on low/very low strength of evidence.
Conclusion: In this network meta-analysis, we found no convincing evidence that any adjuncts administered on them own or alongside exercise are more effective than exercise alone. Therefore, we recommend that exercise monotherapy continues to be offered as first-line treatment for patients with Achilles and patellar tendinopathies and GTPS for at least 3 months before an adjunct is considered.
We provide treatment recommendations for each tendinopathy.

Identifying characteristics of resistance-based therapeutic exercise interventions for Achilles tendinopathy: A scoping review

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Physical Therapy in Sport June 19, 2023
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Abstract:

Objective: This scoping review describes resistance-based therapeutic exercise intervention characteristics for Achilles tendinopathy (AT) treatment (e.g., therapeutic dose, underlying mechanisms targeted by exercise) and assesses participant reporting characteristics.
Methods: Seven electronic databases were searched; studies delivering a resistance exercise-focused treatment for individuals with AT were included. The Template for Intervention Description and Replication (TIDieR) and the ICON 2019 'Recommended standards for reporting participant characteristics in tendinopathy research' checklists framed data extraction, and study quality was assessed using the Mixed Methods Appraisal Tool 2018 version.
Results: 68 publications (describing 59 studies and 72 exercise programs) were included. Results demonstrate that therapeutic exercise interventions for AT are well reported according to the TIDieR checklist, and participant characteristics are well reported according to the ICON checklist. Various underlying therapeutic mechanisms were proposed, with the most common being increasing tendon strength, increasing calf muscle strength, and enhancing collagen synthesis.
Conclusions: While evidence suggests that resistance-based therapeutic exercise interventions are effective in treating AT, more reporting on program fidelity, adherence, and compliance is needed. By summarizing currently published AT exercise programs and reporting key intervention characteristics in a single location, this review can assist clinicians in developing individualized resistance training programs for people with AT.

The influence of directional preference on lateral patellar dislocation: a case report

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https://doi.org/10.1080/10669817.2023.2242203

Abstract:

Background: There is little consensus on the conservative management of lateral patellar dislocations (LPD). Mechanical diagnosis and therapy (MDT) are an established classification system in the spinal and extremity population. This case report describes the use of MDT in the management and classification of a patient with LPD.

Case Description: The patient was a 20-year-old female with a 3-month history of left knee pain precipitated by a lateral patellar dislocation. The patient described pain and a feeling of instability with standing and walking and limitations in work and recreational activities which involve lifting, squatting, and running. Based on the patient's response to repeated end range knee movements, the patient was found to have a directional preference (DP) for knee extension and instruction in performance of knee extension DP exercises was provided.
Outcomes: The patient's knee examination and subsequent intervention included her responses to repeated end range knee movements. Her knee pain was abolished, and strength, function, and motion were fully restored in five visits.
A minimal clinically important difference (MCID) was achieved on the Lower Extremity Functional Scale (LEFS). At discharge, the patient was able to independently manage symptoms and perform all work and recreational activities at a pre-injury level and these improvements were maintained at a 9-month follow-up.
Discussion: There are various management strategies for lateral patellar dislocation. This case demonstrated the use of classifying, subgrouping, and treating a patient with lateral patellar dislocation using the principle of DP.
Conclusion: The patient's outcomes suggest that MDT may be used in the nonoperative management of people with LPD who present with a DP.

Exercise therapy for treatment of acute non-specific low back pain

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Cochrane Library August 30, 2023
https://doi.org/10.1002/14651858.CD009365.pub2

Abstract:

Background: Low back pain (LBP) is the leading cause of disability globally. It generates considerable direct costs (healthcare) and indirect costs (lost productivity). The many available treatments for LBP include exercise therapy, which is practiced extensively worldwide.
Objectives: To evaluate the benefits and harms of exercise therapy for acute non-specific low back pain in adults compared to sham/placebo treatment or no treatment at short-term, intermediate-term, and long-term follow-up.
Search methods: This is an update of a Cochrane Review first published in 2005. We conducted an updated search for randomized controlled trials (RCTs) in CENTRAL, MEDLINE, Embase, four other databases, and two trial registers. We screened the reference lists of all included studies and relevant systematic reviews published since 2004.
Selection criteria: We included RCTs that examined the effects of exercise therapy on non-specific LBP lasting six weeks or less in adults. Major outcomes for this review were pain, functional status, and perceived recovery. Minor outcomes were return to work, health-related quality of life, and adverse events. Our main comparisons were exercise therapy versus sham/placebo treatment and exercise therapy versus no treatment.

Data collection and analysis: We used standard Cochrane methods. We evaluated outcomes at short-term follow-up (time point within three months and closest to six weeks after randomization; main follow-up), intermediate-term follow-up (between nine months and closest to six months), and long-term follow-up (after nine months and closest to 12 months); and we used GRADE to assess the certainty of the evidence for each outcome.
Main results: We included 23 studies (13 from the previous review, 10 new studies) that involved 2674 participants and provided data for 2637 participants. Three small studies are awaiting classification, and four eligible studies are ongoing. Included studies were conducted in Europe (N = 9), the Asia-Pacific region (N = 9), and North America (N = 5); and most took place in a primary care setting (N = 12), secondary care setting (N = 6), or both (N = 1). In most studies, the population was middle-aged and included men and women. We judged 10 studies (43%) at low risk of bias regarding sequence generation and allocation concealment. Blinding is not feasible in exercise therapy, introducing performance and detection bias. There is very low-certainty evidence that exercise therapy compared with sham/placebo treatment has no clinically relevant effect on pain scores in the short term (mean difference (MD) −0.80, 95% confidence interval (CI) −5.79 to 4.19; 1 study, 299 participants). The absolute difference was 1% less pain (95% CI 4% more to 6% less), and the relative difference was 4% less pain (95% CI 20% more to 28% less). The mean pain score was 20.1 (standard deviation (SD) 21) for the intervention group and 20.9 (SD 23) for the control group. There is very low-certainty evidence that exercise therapy compared with sham/placebo treatment has no clinically relevant effect on functional status scores in the short term (MD 2.00, 95% CI −2.20 to 6.20; 1 study, 299 participants). The absolute difference was 2% worse functional status (95% CI 2% better to 6% worse), and the relative difference was 15% worse (95% CI 17% better to 47% worse). The mean functional status score was 15.3 (SD 19) for the intervention group and 13.3 (SD 18) for the control group. We downgraded the certainty of the evidence for pain and functional status by one level for risk of bias and by two levels for imprecision (only one study with fewer than 400 participants). There is very low-certainty evidence that exercise therapy compared with no treatment has no clinically relevant effect on pain or functional status in the short term (2 studies, 157 participants). We downgraded the certainty of the evidence by two levels for imprecision and by one level for inconsistency. One study associated exercise with small benefits and the other found no differences. The first study was conducted in an occupational healthcare center, where participants received one exercise therapy session. The other study was conducted in secondary and tertiary care settings, where participants received treatment three times per week for six weeks. We did not pool data from these studies owing to considerable clinical heterogeneity. In two studies, there were no reported adverse events. One study reported adverse events unrelated to exercise therapy. The remaining studies did not report whether any adverse events had occurred. Owing to insufficient reporting of adverse events, we were unable to reach any conclusions on the safety or harms related to exercise therapy.
Authors' conclusions: Exercise therapy compared to sham/placebo treatment may have no clinically relevant effect on pain or functional status in the short term in people with acute non-specific LBP, but the evidence is very uncertain. Exercise therapy compared to no treatment may have no clinically relevant effect on pain or functional status in the short term in people with acute non-specific LBP, but the evidence is very uncertain. We downgraded the certainty of the evidence to very low for inconsistency, risk of bias concerns, and imprecision (few participants).

Early triage of a patient with metastatic melanoma presenting as mechanical knee pain – a case report

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Abstract:

Physical therapists (PTs) working in primary care settings commonly encounter mechanical causes of knee pain. Non-mechanical causes of knee pain, such as bone tumors, are rare, and therefore, PTs often have a low index of suspicion regarding sinister pathology. The purpose of this case report is to describe the physical therapist's clinical reasoning process for a 33-years old female presenting with medial knee pain and a subsequent history of metastatic melanoma. Initially, subjective and objective testing pointed to a mechanical internal derangement of the knee. However, symptom progression and poor treatment responses between physical therapy visits 2 and 3 raised suspicions as to the cause of the knee pain. This prompted an orthopedic referral and medical imaging, revealing a large bone tumor invading the medial femoral condyle, which was further characterized as metastatic melanoma by a specialty oncology team. Further imaging revealed several metastatic subcutaneous, intramuscular and cerebral lesions. This case highlights the importance of the ongoing medical screening process, including the monitoring of symptoms and treatment responses.
Summary: Clinicians should have a high index of suspicion in patients with a prior cancer diagnosis and unresolving pain without a relevant explanation or injury. – The screening process should include active monitoring of treatment responses and appropriate referral for plain radiographs where hypothesized timeframes are exceeded, or sinister pathology is suspected. – Early specialist referral and subsequent oncology team referral is imperative for bone tumors, to assess metastatic disease and initiate treatment.

Subgrouping individuals with migraine associated neck pain for targeted management.

Zhiqi Liang, Lucy Thomas, Gwendolen Jull, Julia Treleaven
Musculoskeletal Science and Practice June 10, 2023
https://doi.org/10.1016/j.msksp.2023.102801

Abstract:

Introduction: Neck pain is one of the most common and burdensome symptoms associated with migraine. Many individuals with migraine and neck pain seek neck treatment, but evidence for such treatment is limited. Most studies have treated this population as a homogenous group, providing uniform cervical interventions that have yet to show clinically important effects. However, different neurophysiological and musculoskeletal mechanisms can underlie neck pain in migraine. Targeting treatment to specific underlying mechanisms may therefore be the key to improving treatment outcomes. Our research characterized neck pain mechanisms and identified subgroups based on cervical musculoskeletal function and cervical

hypersensitivity. This suggests that specific management aimed towards addressing mechanisms relevant to each subgroup might be beneficial.
Purpose: This paper explains our research approach and findings to date. Potential management strategies for the identified subgroups and future research directions are discussed.
Implications: Clinicians should perform skilled physical examination with the aim of identifying if patterns of cervical musculoskeletal dysfunction and or hypersensitivity are present in the individual patient. There is currently no research into treatments differentiated for subgroups to address specific underlying mechanisms. It is possible that neck treatments addressing musculoskeletal impairments may be most beneficial for those subgroups where neck pain is primarily due to musculoskeletal dysfunction. Future research should define treatment aims and select specific subgroups for targeted management to determine which treatments are most effective for each subgroup.

The Psychologically Informed Practice Consultation Roadmap: A Clinical Implementation Strategy

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Physical Therapy & Rehabilitation Journal May 09, 2023
https://doi.org/10.1093/ptj/pzad048

Abstract:

Psychologically informed practice (PiP) includes a special focus on psychosocial obstacles to recovery, but research trials have revealed significant difficulties in implementing PiP outside of research environments. Qualitative studies have identified problems of both competence and confidence in tackling the psychosocial aspects of care, with a tendency to prefer dealing with the more mechanical aspects of care. In PiP, the distinction between assessment and management is not clear-cut. Analysis of the problem is part of the intervention, and guided self-management begins with the initial detective work by the patient, who is encouraged to develop successful and relevant behavior change. This requires a different style and focus of communication that some clinicians find difficult to enact. In this Perspective, the PiP Consultation Roadmap is offered as a guide for clinical implementation to establish a therapeutic relationship, develop patient-centered communication, and guide effective pain self-management. These strategies are illustrated through the metaphor of the patient learning to drive, with the therapist as a driving instructor and the patient as a student driver. For convenience, the roadmap is depicted in 7 stages. Each stage represents aspects of the clinical consultation in a recommended order, although the roadmap should be viewed as a general guide with a degree of flexibility to accommodate individual differences and optimize PiP interventions. It is anticipated that the experienced PiP clinician will find it progressively easier to implement the roadmap as the building blocks and style of consultation become more familiar.

Red flags to screen for vertebral fracture in people presenting with low back pain.

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Cochrane Library August 24, 2023
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Abstract:

Background: Low back pain is a common presentation across different healthcare settings. Clinicians need to confidently be able to screen and identify people presenting with low back pain with a high suspicion of serious or specific pathology (e.g., vertebral fracture). Patients identified with an increased likelihood of having a serious pathology will likely require additional investigations and specific treatment. Guidelines recommend a thorough history and clinical assessment to screen for serious pathology as a cause of low back pain. However, the diagnostic accuracy of recommended red flags (e.g., older age, trauma, corticosteroid use) remains unclear, particularly those used to screen for vertebral fracture.
Objectives: To assess the diagnostic accuracy of red flags used to screen for vertebral fracture in people presenting with low back pain. Where possible, we reported results of red flags separately for different types of vertebral fracture (i.e., acute osteoporotic vertebral compression fracture, vertebral traumatic fracture, vertebral stress fracture, unspecified vertebral fracture).
Search methods: We used standard, extensive Cochrane search methods. The latest search date was 26 July 2022.
Selection criteria: We considered primary diagnostic studies if they compared results of history taking or physical examination (or both) findings (index test) with a reference standard test (e.g., X-ray, magnetic resonance imaging (MRI), computed tomography (CT), single-photon emission computerized tomography (SPECT)) for the identification of vertebral fracture in people presenting with low back pain. We included index tests that were presented individually or as part of a combination of tests.
Data collection and analysis: Two review authors independently extracted data for diagnostic two-by-two tables from the publications or reconstructed them using information from relevant parameters to calculate sensitivity, specificity, and positive (+LR) and negative (−LR) likelihood ratios with 95% confidence intervals (CIs). We extracted aspects of study design, characteristics of the population, index test, reference standard, and type of vertebral fracture. Meta-analysis was not possible due to heterogeneity of studies and index tests; therefore, the analysis was descriptive. We calculated sensitivity, specificity, and LRs for each test and used these as an indication of clinical usefulness. Two review authors independently conducted risk of bias and applicability assessment using the QUADAS-2 tool.
Main results: This review is an update of a previous Cochrane Review of red flags to screen for vertebral fracture in people with low back pain. We included 14 studies in this review, six based in primary care, five in secondary care, and three in tertiary care. Four studies reported on 'osteoporotic vertebral fractures', two studies reported on 'vertebral compression fracture', one study reported on 'osteoporotic and traumatic vertebral fracture', two studies reported on 'vertebral stress fracture', and five studies reported on 'unspecified vertebral fracture'. Risk of bias was only rated as

low in one study for the domains reference standard and flow and timing. The domain patient selection had three studies and the domain index test had six studies rated at low risk of bias. Meta-analysis was not possible due to heterogeneity of the data. Results from single studies suggest only a small number of the red flags investigated may be informative. In the primary healthcare setting, results from single studies suggest 'trauma' demonstrated informative +LRs (range: 1.93 to 12.85) for 'unspecified vertebral fracture' and 'osteoporotic vertebral fracture' (+LR: 6.42, 95% CI 2.94 to 14.02). Results from single studies suggest 'older age' demonstrated informative +LRs for studies in primary care for 'unspecified vertebral fracture' (older age greater than 70 years: 11.19, 95% CI 5.33 to 23.51). Results from single studies suggest 'corticosteroid use' may be an informative red flag in primary care for 'unspecified vertebral fracture' (+LR range: 3.97, 95% CI 0.20 to 79.15 to 48.50, 95% CI 11.48 to 204.98) and 'osteoporotic vertebral fracture' (+LR: 2.46, 95% CI 1.13 to 5.34); however, diagnostic values varied, and CIs were imprecise. Results from a single study suggest red flags as part of a combination of index tests such as 'older age and female gender' in primary care demonstrated informative +LRs for 'unspecified vertebral fracture' (16.17, 95% CI 4.47 to 58.43). In the secondary healthcare setting, results from a single study suggest 'trauma' demonstrated informative +LRs for 'unspecified vertebral fracture' (+LR: 2.18, 95% CI 1.86 to 2.54) and 'older age' demonstrated informative +LRs for 'osteoporotic vertebral fracture' (older age greater than 75 years: 2.51, 95% CI 1.48 to 4.27). Results from a single study suggest red flags as part of a combination of index tests such as 'older age and trauma' in secondary care demonstrated informative +LRs for 'unspecified vertebral fracture' (+LR: 4.35, 95% CI 2.92 to 6.48). Results from a single study suggest when '4 of 5 tests' were positive in secondary care, they demonstrated informative +LRs for 'osteoporotic vertebral fracture' (+LR: 9.62, 95% CI 5.88 to 15.73). In the tertiary care setting, results from a single study suggest 'presence of contusion/abrasion' was informative for 'vertebral compression fracture' (+LR: 31.09, 95% CI 18.25 to 52.96).
Authors' conclusions: The available evidence suggests that only a few red flags are potentially useful in guiding clinical decisions to further investigate people suspected to have a vertebral fracture. Most red flags were not useful as screening tools to identify vertebral fracture in people with low back pain. In primary care, 'older age' was informative for 'unspecified vertebral fracture', and 'trauma' and 'corticosteroid use' were both informative for 'unspecified vertebral fracture' and 'osteoporotic vertebral fracture'. In secondary care, 'older age' was informative for 'osteoporotic vertebral fracture' and 'trauma' was informative for 'unspecified vertebral fracture'. In tertiary care, 'presence of contusion/abrasion' was informative for 'vertebral compression fracture'. Combinations of red flags were also informative and may be more useful than individual tests alone. Unfortunately, the challenge to provide clear guidance on which red flags should be used routinely in clinical practice remains. Further research with primary studies is needed to improve and consolidate our current recommendations for screening for vertebral fractures to guide clinical care.

Spinal Manipulative Therapy for Nonspecific Low Back Pain: Does Targeting a Specific Vertebral Level Make a Difference? A Systematic Review with Meta-analysis

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Journal of Orthopedic & Sports Physical Therapy July 28, 2023
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Abstract:

Objective: We aimed to examine whether targeting spinal manipulative therapy (SMT), by applying the intervention to a specific vertebral level, produces superior clinical outcomes than a nontargeted approach in patients with nonspecific low back pain.
Design: Systematic review with meta-analysis.
Literature Search: MEDLINE, Embase, CENTRAL, CINAHL, Scopus, PEDro, and Index to Chiropractic Literature were searched up to May 31, 2023.
Study Selection Criteria: Randomized controlled trials comparing targeted SMT (mobilization or manipulation) to a nontargeted approach in patients with nonspecific low back pain and measuring the effects on pain intensity and patient-reported disability.
Data Synthesis: Data extraction, risk of bias, and evaluation of the overall certainty of evidence using the GRADE approach were performed by 2 authors independently. Meta-analyses were performed using the restricted maximum likelihood method.
Results: Ten randomized controlled trials (n =931 patients) were included. There was moderatecertainty evidence of no difference between targeted SMT and a nontargeted approach for pain intensity at postintervention (weighted mean difference =−0.20 [95% CI: −0.51, 0.10]) and at follow-up (weighted mean difference = 0.05 [95% CI: −0.26, 0.36]). For patient-reported disability, there was moderate certainty evidence of no difference at postintervention (standardized mean difference =−0.04 [95% CI: −0.36, 0.29]) and at follow-up (standardized mean difference =−0.05 [95% CI: −0.24, 0.13]). Adverse events were reported in 4 trials, and were minor and evenly distributed between groups.
Conclusion: Targeting a specific vertebral level when administering SMT for patients with nonspecific low back pain did not result in improved outcomes on pain intensity and patient -reported disability compared to a nontargeted approach.

Prevalence of Chronic Pain After Spinal Surgery: A Systematic Review and Meta-Analysis

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Abstract:

Degenerative disc disease and low back pain are common challenges that persist even after a discectomy. However, characterizations and quantifications of these illnesses from the patients' perspective are insufficient. We aimed to perform a systematic review of the literature and meta-analysis to determine the frequency of chronic pain after spinal surgery. We searched MEDLINE (PubMed), Google Scholar, and the Saudi Digital Library to retrieve research articles describing the frequency of persistent back pain, reoccurring disc herniation, and undergoing another operation following primary lumbar discectomy. We excluded articles that did not disclose the proportion of patients who experienced ongoing back or leg pain for over six months after the operation. We included 16 studies evaluating 85,643 patients. The pooled prevalence of persistent pain was 14.97% (95% confidence interval: 12.38-17.76). With all advancements in technology and operation techniques, many patients (14.97%) still have failed back surgery syndrome. Appropriate preoperative communication and multidisciplinary and coordinated treatment strategies yielded the best results.

Stressful life events and low back pain in older men: A cross-sectional and prospective analysis using data from the MrOS study.

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European Journal of Pain August 09, 2023
https://doi.org/10.1002/ejp.2174

Abstract:

Background: Stressful life events, such as loss of a partner, loss of a pet or financial problems, are more common with increasing age and may impact the experience of pain. The aim of the current study is to determine the cross-sectional and prospective association between stressful life events and low back pain reporting in the Osteoporotic Fracture in Men Study, a cohort of older men aged ≥65 years.
Methods: At a study visit (March 2005–May 2006), 5149 men reported whether they had experienced a stressful life event or low back pain in the prior 12months. Following that visit, data on low back pain patients were gathered through triannual questionnaires every 4months for 1 year. Multivariable logistic regression analyses estimated the association of stressful life events with recent past low back pain or future low back pain.

Results: N=2930, (57%) men reported at least one stressful life event. The presence of a stressful life event was associated with greater odds of any low back pain (OR=1.42 [1.26–1.59]) and activity-limiting low back pain (OR=1.74 [1.50– 2.01]) in the same period and of any low back pain (OR=1.56 [1.39–1.74]) and frequent low back pain (OR=1.80 [1.55–2.08]) in the following year.
Conclusion: In this cohort of men, the presence of stressful life events increased the likelihood of reporting past and future low back pain.
Significance: Stressful life events such as accident or illness to a partner are common in later life and may impact the experience of pain. We present cross sectional and prospective data highlighting a consistent association between stressful life events and low back pain in older men. Further, there is evidence to suggest that this relationship is upregulated by an individual's living situation. This information may be used to strengthen a biopsychosocial perspective of an individual's pain experience.

The effect of manual therapies on tension-type headache in patients who do not respond to drug therapy: a randomized clinical trial.

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Journal of Manual & Manipulative Therapy August 25, 2023
https://doi.org/10.1080/10669817.2022.2107446

Abstract:

Backgrounds: Tension-Type Headache (TTH) is one of the most common types of headaches. In patients with TTH, manual therapy can be used to treat myofascial pain.
Objectives: This study aimed to evaluate the effect of manual therapy on TTH in patients who did not respond to drug therapy.
Methods: A total of 24 patients with TTH were randomly enrolled into this prospective trial. The participants were divided into an intervention and a control group. The intervention group received the common medication and manual therapy, while the control group only received the common medication. Headache pain intensity, frequency, and duration, tablet count, and Neck Disability Index (NDI) were measured in both groups before, after, and one week after the intervention.
Results: There were significant differences between the two groups (treatment, control) regarding pain intensity (3.04, 6.75, P = 0.0001; effect size (ES) = 1.85), headache frequency (2.33, 5, P = 0.004; ES = 1.48) and duration (91.29, 284.74, P = 0.002; ES = 1.48), tablet count (1.83, 4.91, P = 0.01; ES = 1.04), and NDI (7.33, 20.16, P = 0.003; ES = 1.37). Within group differences were recorded in intervention group only for all dependent variables immediately after intervention and one week after the intervention ($p < 0.05$).
Conclusion:
Manual therapy reduced headache pain intensity, frequency and duration, tablet count, and NDI score in patients with TTH.

Vertebral arteries do not experience tensile force during manual cervical spine manipulation applied to human cadavers.

Lindsay M. Gorrell, Andrew Sawatsky, W Brent Edwards; Walter Herzog
Journal of Manual & Manipulative Therapy November 15, 2022
https://doi.org/10.1080/10669817.2022.2148048

Abstract:

Background: The vertebral artery (VA) may be stretched and subsequently damaged during manual cervical spine manipulation. The objective of this study was to measure VA length changes that occur during cervical spine manipulation and to compare these to the VA failure length.
Methods: Piezoelectric ultrasound crystals were implanted along the length of the VA (C1 to C7) and were used to measure length changes during cervical spine manipulation of seven un-embalmed, post-rigor human cadavers. Arteries were then excised, and elongation from arbitrary in-situ head/neck positions to first force (0.1 N) was measured. Following this, VA were stretched (8.33 mm/s) to mechanical failure. Failure was defined as the instance when VA elongation resulted in a decrease in force.
Results: From arbitrary in-situ head/neck positions, the greatest average VA length change during spinal manipulation was [mean (range)] 5.1% (1.1 to 15.1%). From arbitrary in-situ head/neck positions, arteries were elongated on average 33.5% (4.6 to 84.6%) prior to first force occurrence and 51.3% (16.3 to 105.1%) to failure. Average failure forces were 3.4 N (1.4 to 9.7 N).
Conclusions: Measured in arbitrary in-situ head/neck positions, VA were slack. It appears that this slack must be taken up prior to VA experiencing tensile force. During cervical spine manipulations (using cervical spine extension and rotation), arterial length changes remained below that slack length, suggesting that VA elongated but were not stretched during the manipulation. However, in order to answer the question if cervical spine manipulation is safe from a mechanical perspective, the testing performed here needs to be repeated using a defined in-situ head/neck position and take into consideration other structures (e.g., carotid arteries).