

Citation

Maxwell CM, Lauchlan DT, Dall PM. The effects of spinal manipulative therapy on lower limb neurodynamic test outcomes in adults: a systematic review. *Journal of Manual & Manipulative Therapy*. 2019;28(1):4-14. doi:10.1080/10669817.2019.1569300.

Review Submitted By: Barrett Coleman

Objectives

A systematic review on the efficacy of spinal manipulation and mobilization therapy on the improvement of LE neurodynamic findings.

Methods

Eight electronic databases were systematically searched for randomized controlled trials that used spinal manual therapy (mobilization and manipulation) against a control and evaluated lower limb neurodynamics (Passive Straight Leg Raise or Slump Test). Selection and data extraction were conducted by one researcher, reviewed by a second author. Risk of bias was assessed using the Cochrane Back Review Group criteria.

Results

Out of 1038 articles, eight RCTs were included. SMT produced a clinically meaningful (≥ 60) difference in five of these studies compared with inert control, hamstring stretching, and as an adjunct to conventional physiotherapy, but not compared with standard care, as an adjunct to home exercise and advice, or when comparing different SMT techniques. Findings compared to sham were mixed.

Conclusions

Limited evidence suggests SMT-improved range of motion and was more effective than some other interventions. Future research, using standardized Neurodynamic tests, should explore technique types and evaluate longer-term effects.

Commentary

Since most low back is non-specific in nature, there are multiple possible contributing factors to a patient's symptoms. Neurodynamics is a typical component of low back pain evals due to abnormal neural tissue mobility from either mechanical or physiological mechanisms being a possible pain generator. There are many proposed methods for improving neurodynamics (manipulation of spine, mobilizations of joints, soft tissue of neurodynamic pathway, gliders/sliders). This systematic review looked at the effect spinal mobilization and manipulation versus various controls and the outcome on LE neurodynamic testing (slump and SLR). In this study, Spinal Manipulation Therapy (SMT) meant mobilization or manipulation of the spine. Overall, SMT was found to always be as effective as the control and sometimes more effective as the control.

It was as effective when compared to:

- Standard care.
- Adjunct to HEP.
- Shame manipulation (though results were mixed).

It was more effective when compared to:

- An adjunct to conventional therapy.
- Inert interventions (prone push up holds)
- Stretching (hamstring)

The problem with this systematic review, like many others, is it is only as good as the studies included. No articles included used the slump test, the SLR test was performed with different protocols, what was considered a "positive" test was variable and inconsistent, half of the studies included people who were asymptomatic, and the interventions varied in type of manipulation technique and location of mobilization. The times where SMT was more effective often did not meet MCID.

This leaves the clinical applicability of this systematic review wanting. It doesn't move the needle in either direction: as something we should start doing less of or something we should be incorporating more.

Citation

Lowry V, Bass A, Lavigne P, et al. Physiotherapists ability to diagnose and manage shoulder disorders in an outpatient orthopedic clinic: results from a concordance study. *Journal of Shoulder and Elbow Surgery*. March 2020. doi:10.1016/j.jse.2019.11.030.

Review Submitted By: Lauren Carroll

Objectives

Primary objective was to evaluate the diagnostic and surgical triage agreement between physical therapists and orthopedic surgeons for patients with shoulder pain in an outpatient orthopedic setting. Secondary objectives were to evaluate the agreement between therapists and surgeons for imaging requests, treatment recommendations, and patient satisfaction with services.

Methods

Cross sectional concordance study comparing diagnosis and treatment of 50 patients with shoulder pathologies by an advanced practice physical therapist and an orthopedic surgeon in an outpatient orthopedic clinic.

Results

Diagnostic inter-rater agreement when categories of dysfunction (i.e. glenohumeral instability, rotator cuff dysfunction, etc.) were utilized was good; moderate inter-rater agreement with surgical triage and medical imaging; and no statistically significant differences were found with providers based on patient satisfaction surveys. Therapists were found to give advice and education significantly more than the surgeons with conservative treatment.

Conclusion

Advanced practice physical therapists can safely initiate and treat shoulder pathologies without compromising patient safety or satisfaction, however, there may be further training required for therapists to more clearly identify surgical candidates and the need for advanced imaging.

Commentary

This article does a great job of analyzing the level of agreement on the results of the clinical examination of patients with shoulder pain between advanced practice PTs and orthopedic surgeons. There were some limitations to this study, including the use of the reference standard based on an orthopedic surgeon's recommendations for diagnosis and treatment. There is also variability between recommendations from the surgeons, which leads to increased possibility of error. I think it's also important to note that the criteria to be considered an "advanced practice" PT was 40 hours of additional training over about 12 weeks in a "residency type" setting where the orthopedic surgeons were training the PTs on how they conduct an exam and indications for imaging/referrals for surgery. I would be interested to see the difference in the agreement between these advanced PTs with other PTs that have been trained outside of the specific surgeons or to see if there was still agreement with the advanced practice therapists with a different set of orthopedic surgeons.

There are some strengths in this article as well; this was a very clinically relevant population with the following inclusion criteria: over 18, new referral for shoulder pain with participating surgeon, enrolled in provincial health care (Canada), able to legally consent to

Citation

Beischer S, Gustavsson L, Senorski E, et al. Young Athletes Who Return to Sport Before 9 Months After Anterior Cruciate Ligament Reconstruction Have a Rate of New Injury 7 Times That of Those Who Delay Return. *J Orthop Sports Phys Ther.* 2020;50(2):83-90. doi:10.2519/jospt.2020.9071

Review Submitted by: Anna Wilson

Objectives

The purpose of this study was to determine the association between second ACL injury and time to return to sport, symmetrical muscle function at time of return to sport, and symmetrical quadriceps strength at the time of return to sport in young athletes following ACL Reconstruction.

Methods

This was a prospective cohort design that used data from a rehabilitation registry ("Project ACL"). Data collection included patient demographics, results from isokinetic or isometric quadriceps and hamstring strength testing, results from vertical hop, hop for distance, and side hop testing, and limb symmetry index. A questionnaire was sent out to athletes that were involved in knee-strenuous sports before injury (classified by Tegner Activity Scale score of at least 6) to determine time of return to sport after surgery.

Results

494 patients met the inclusion criteria and received the questionnaire. The analysis included 159 athletes (32% of the initial sample) who had performed the muscle and hop test battery close to return to sport. Of this sample 18 athletes (11%) sustained either ipsilateral or contralateral ACL injury. Athletes with a higher preinjury Tegner Activity Scale score had a higher rate of second ACL injury. Athletes who returned to knee-strenuous sport before 9 months after reconstruction had a higher rate of second ACL injury. It was found that In the population of those who performed testing and returned prior to 9 months post-op had a 7-fold increase in risk of second ACL injury. When they analyzed a larger population including those

who didn't have functional testing close to time of return to sport (n = 264) there was a 3-fold greater risk. There was no association between symmetrical muscle function or quadriceps strength and second ACL injury.

Conclusion

Returning to knee-strenuous sport before 9 months after ACL reconstruction was associated with an approximately 7-fold increased rate of sustaining a second ACL injury. Achieving symmetrical muscle function or quadriceps strength was not associated with new ACL injury in young athletes.

Commentary

I think that the title of this article, while true, is a bit misleading in some ways. It was an epidemiological study with decent methodology but had its limitations. Out of all of the data available during the time frame that they studied they only used data from less than 8% of the patients in the registry. This is such a small population to look at and try and make generalizations about return to sport in the ACL reconstruction population as a whole. One of the exclusion criteria was "complications" during testing that was considered to influence the results. This seemed very broad to me and one of the examples given was knee pain, which again is pretty vague. The definition of subsequent ACL injury also had a lot of variability in that it didn't require diagnostic testing but just a confirmation by an orthopedic surgeon or physical therapist. Also with data analysis they dichotomized time to return to sport to less than 9 months and greater than 9 months without much supporting rationale behind this. Another limitation in my mind was also the lack of a definition of "close to return to sport" in regards to timing of testing; not sure what the timeframe was but it seemed to limit the population for the analysis quite a bit. A few other limitations that the authors discussed were the lack of definition of return to sport (ex: level and frequency of participation), other factors that also may have contributed to second injury (variations in rehabilitation, concomitant injury, etc.), and retrospective recall of time of return to sport.

Taking the above limitations into consideration I still think that something can be taken away from this article. While the increase in risk might not be as high as 7-fold (which it likely isn't because they even found it to be as low as 3-fold when they had a larger sample size), I think that when planning with the rehab team for return to sport this is something to consider. Comprehensive assessment of the patient, which should include similar objective testing as this

article, throughout different stages of rehab is think is still one of the best guidelines on delaying or expediting return to sport. But with evidence like this consideration for later return to sport, although I'm not sure that 9 months is a specific magic number, to buy more time for development of strength, motor control, and psychological readiness isn't a bad idea if you have the wiggle room to play with.

Citation

Mørtvedt AI, Krosshaug T, Bahr R, Petushek E. I spy with my little eye ... a knee about to go “pop”? Can coaches and sports medicine professionals predict who is at greater risk of ACL rupture? *Br J Sports Med.* 2020;54(3):154-158. doi:10.1136/bjsports-2019-100602

Review Submitted by: Taylor Blattenberger PT, DPT

Objective

To examine the ability of sports medicine professionals and coaches to identify players at risk of ACL injury using a vertical drop jump test

Methods

Video material of 738 female football (soccer) and handball players performing a vertical drop jump test (VDJ) was collected between 2009 and 2013. All videos were in the frontal plane only. Seventy-three subjects were excluded due to previous ACL injury. Of the remaining 665 players, 31 sustained ACL injury. One of these injuries was excluded due to it being a direct contact injury. For assessor convenience, 102 videos were chosen for review. In order to achieve adequate power, 20 injury cases were included with 82 uninjured players.

Two hundred and thirty seven assessors were recruited via email from various academies, conferences, universities, and work places. The assessor cohort was made up of coaches, strength and conditioning coaches, athletic trainers, physicians, physiotherapists, and researchers. Each clip was embedded on an online survey software and was available for viewing as many times as desired. Each clip was rated on a scale from 1-10 with 1 indicating the lowest risk, and 10 indicating the highest risk.

Following completion of the ratings assessors were asked to report what they based their assessments on. This was an open-ended response. The assessors were then provided with a list of predefined cues that were to be ranked from 1-10. Finally, the assessors were asked to rate their confidence level in their ability to provide the risk assessment on a scale from 1-10.

Results

The individual AUC values ranged from 0.36-0.60. This indicates poor accuracy to no discrimination. The average AUC values ranged from 0.45-0.47 indicating no discrimination. Inward/outward knee motion, knee position at landing, and landing symmetry were the most frequently reported cues used by assessors to assess risk. Other significant cues included jump alignment and landing stiffness.

Conclusion

Coaches and sports medicine professionals cannot accurately identify female elite handball and football players at an increased risk for ACL injury by visual assessment of a VDJ test.

Commentary

This study challenges the idea that sports medicine professionals can accurately assess risk of ACL injury. Previous studies cited in this article have found varying results regarding this skill, especially utilizing the vertical drop jump test. There seems to be a consensus on what cues to look for in the vertical drop jump test, but there is more mounting evidence that these factors, at least alone, do not identify at risk individuals.

When reviewing the details of the results it is important to note that the injury and non-injury groups were rated an average injury risk of 4.5/10 and 4.8/10 respectively. This indicates that on average the population of this study was at a low to moderate risk. One analysis of this is that the population was generally heterogeneous, yet some sustained injuries while others did not. On the other hand, it may indicate that mild movement deviations do not move the needle enough to drastically increase risk. I would be interested to see the results if there was a buffer for scores as other studies have used. Such as those who scored <3/10 vs. those who scored <6/10. It may provide more contrast in the experimental groups.

Finally, I question whether the vertical drop jump test is an accurate assessment of the stresses on the ACL in the sports in question. Soccer and handball both require less jumping than other sports such as volleyball and basketball. Perhaps the drop jump was not where movement mechanics faltered when the injuries ultimately occurred. This is entirely speculation and may have no true bearing on the results, but may be something to consider in terms of testing specific demands.

Citation

Hadadi, Mohammad & Haghghat, Farzaneh & Sobhani, Sobhan. (2020). Can fibular reposition taping improve balance performance in individuals with chronic ankle instability? A randomized controlled trial. 102128. 10.1016/j.msksp.2020.102128.

Review Submitted by: Steven J. Lagasse

Objective

The objective of this study was to assess if two weeks of fibular reposition taping (FRT) was effective in improving balance performance in patients with chronic ankle instability (CAI). The authors predicted that FRT would be a beneficial intervention for this population.

Methods

The design of this study was a randomized controlled trial. Subjects were allowed to participate based on specific inclusion and exclusion criteria. Subjects were assigned by block permutation method to one of three groups: FRT (n = 19), sham taping (n = 19), or control (n = 20). The intervention group received kinesiotape taping augmented by manual posterior and superior correction of the lateral malleolus. Patients in the sham group received the same intervention without tension in the tape or the manual correction. The control group received no treatment. Measures of balance and function were taken immediately before, and one day after the final session. The modified Star Excursion Balance Test (mSEBT) was used to measure dynamic balance. The Single Limb Stance Test and Single Hop Test were used to measure static balance and function, respectively. Analysis of covariance (ANCOVA) was used to assess between-group differences.

Results

Posterolateral reach on the mSEBT demonstrated significant differences in favor of the FRT group. However, this was a change of 3.62 cm which did not meet the smallest detectable difference of 7.11 cm. There were no other significant differences measured between the three groups. A total of two subjects were lost to follow-up, one from the FRT, and an additional subject from the sham group.

Conclusion

The use of FRT for two weeks was ineffective in improving balance and function in individuals with CAI.

Commentary

Strengths of this study were the use of randomization and implementation of a sham and a control group. Further, the study reported their use of power and predicted attrition when calculating sample size. The authors also recognized limitations such as their population not allowing for generalizability. Finally, the authors clearly stated their hypothesis and, although their hypothesis was incorrect, did not attempt to exaggerate or rationalize their findings.

The primary weakness or concern of this study is the before and after measures not being reported. Instead, only the changes seen through ANCOVA were reported. Additionally, the use of blinding was ambiguous. The authors stated that separate individuals were used for randomization, examination, and treatment, however, specific blinding was not explained. Finally, the authors did not discuss if there were any complications with the use of the kinesiotape such as the tape not remaining intact for an appropriate duration.

Citation

Malisoux, L., Delattre, N., Urhausen, A., & Theisen, D. (2019). Shoe Cushioning Influences the Running Injury Risk According to Body Mass: A Randomized Controlled Trial Involving 848 Recreational Runners. *The American Journal of Sports Medicine*, 48(2), 473–480. doi: 10.1177/0363546519892578

Review submitted by: Helen Shepard

Purpose

The purpose of this study was to determine if shoe cushioning influences injury risk in recreational runners and if body mass is an influencing variable.

Methods

Non-injured runners were given one of two shoe types that differed only in amount of cushion. Global stiffness was rated at ~61.3 N/mm in the soft shoe and ~94.9 N/mm in the hard shoe, which yielded a 35% difference in stiffness. Participants and investigators were blinded to group allocation. Inclusion criteria included good health, ages 18 to 65, and capable of performing 15 minutes of consecutive running. Participants could not have had surgery in the past year, injury in the past month, or use orthopaedic insoles. Runners were classified into two groups, light or heavy, based on their body mass. The median body mass score was used as a cut-off, 78.2kg in males and 62.8kg in females. Runners were followed for 6 months and data for running activity and injury was tracked. "Injury" was defined as any physical complaint that influenced running activity for at least 7 days. Data was analyzed to determine the effect of shoe cushioning on injury risk in lighter and heavier runners.

Results

A total of 848 participants were included in data analysis with 22,521 total hours of running. The median weekly duration was 68 minutes and median distance was 10.9km. Compliance was high with 97% of participants using the study shoes for running sessions and 85% of them never running in other shoes during the study. Runners with harder shoes had higher risk of injury, but the risk was not associated with body mass. Lighter runners had a generally higher risk of injury in hard shoes while there was no shoe effect for heavier runners. The only participant

characteristic that seemed to impact injury risk was previous injury.

Conclusion

Harder shoes lead to greater injury risk in runners compared to those wearing softer shoes, however, softer shoes only led to decreased risk of injury in lighter weight runners.

Commentary

The effect of shoe cushioning on injury prevention in recreational runners is a current interesting topic as clinicians and researchers seek out modifiable variables to reduce injury rates in runners. Footwear has been a common topic of conversation amongst runners and those treating runners for years. I find it interesting that runners in harder shoes were more prone to injury, however, the protective effect of softer shoes was only seen in lighter runners. It is a common idea that heavier runners are at higher risk for injury due to ground reaction forces, but this was not supported by the article. The definition of injury used in the article was interesting - there was a 7 day requirement for a physical complaint to be considered an injury. It would be interesting to see if findings changed with a shorter time requirement. Many more avid runners would consider themselves "injured" if unable to run for 3-5 days, however, would not

Citation

Martinez-Calderon, J., Flores-Cortés, M., Morales-Asencio, J. M., & Luque-Suarez, A. (2019). CONSERVATIVE INTERVENTIONS REDUCE FEAR IN INDIVIDUALS WITH CHRONIC LOW BACK PAIN: A SYSTEMATIC REVIEW. *Archives of Physical Medicine and Rehabilitation*. doi:10.1016/j.apmr.2019.08.470

Review Submitted by: Brandon Reynolds

Objective

To review and appraise the effectiveness of conservative treatment and surgical approaches to reduce fear in different studies of people experiencing low back pain where fear was a primary or secondary outcome measure.

Methods

Two independent reviewers performed the selection process following the eligibility criteria. Inclusion criteria for this study includes: 1) RCTs involving adults with chronic LBP (>3 mo); 2) RCTs comparing an experimental intervention with no intervention control, sham control, wait-list treatment-as-usual control or an active control; 3) RCTs aiming to reduce fear either as a primary or a secondary outcome; 4) RCTs reporting changes in fear constructs (kinesiophobia, fear of movement, fear of pain, fear of falling, fear-avoidance beliefs) which were assessed with validated self-reported tools; and 5) RCTs reporting between-group differences with at least 1 statistic estimation. Exclusion criteria includes: 1) studies including people with LBP with a duration less than three months or with other chronic pain conditions; 2) studies involving heterogeneous samples of LBP; 3) studies including people with chronic LBP due to the following disorders: arthritis, infectious, neoplastic, metabolic, congenital or developmental, or referred spinal pain; 4) chronic LBP due to pregnancy; 5) study protocol studies, 6) pilot and feasibility studies; 7) RCTs reporting fear values only at baseline; and 8) case reports, case series, expert opinions, qualitative studies, observational studies, reviews, nonrandomized clinical trials, and abstracts.

Next two independent reviewers conducted the data extraction and assessed the risk of bias across included studies. The reviewers extracted relevant data from each study: study and sample characteristics, experimental group characteristics, control characteristics, fear outcome characteristics. The information from this was used to analyze between-group differences. The

reviewers utilized the Cochrane Collaboration's risk of bias tool to assess the risk of bias across the included studies. Based on the criteria from the cochrane recommendations and previous systematic reviews, the authors established a global risk of bias rating for every study. Low risk of bias was considered if: 1) at least 3 of 6 bias domains were "low risk" and 2) any critical bias domain (random sequence generation, allocation concealment, incomplete outcome data or selective reporting) was not judged as "high risk of bias"

The reviewers judged the quality and strength of the evidence for each outcome. The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria was utilized. While the GRADE system started with a baseline rating of "high evidence" because all the evidence came from RCTs, the quality could be downgraded by 1 or 2 based on considerations such as risk of bias, inconsistency, indirectness, imprecision, and publication bias.

Interrater reliability for screening, extraction of data, risk of bias assessment, and quality of the evidence rating was assessed using percentage agreement and kappa Cohen kappa coefficient.

Results:

Sixty-one randomized controlled trials satisfied the authors inclusion criteria after evaluating 466 full texts which was screened down from an original count of 5490 titles and abstracts. There was an interrater reliability between 92 and 96% between the two reviewers for screening records and full texts, data extraction, risk of bias assessment, and quality of evidence rating. The review included a total sample of 7201 people with chronic low back pain with studies ranging from 37 to 701 participants with a mean age between 40 and 50 years old. There was heterogeneity across included studies regarding experimental intervention: kinesiotaping, craniosacral therapy, electrotherapy, manual therapy, surgery, psychological interventions, exercises, and multidisciplinary interventions. Cognitive-behavioral therapy was the most usual psychological intervention (60%) with Pilates being the most frequent exercise modality (28.57%) and the most common multidisciplinary intervention was cognitive-behavioral therapy plus exercise (26%). Twenty-one studies (34.5%) were evaluated to have high risk of bias whereas 40 studies (65.5%) had low risk of bias.

There was moderate strength of evidence for multidisciplinary interventions, as well as exercise alone, in reducing kinesiophobia. There was limited strength of evidence for psychological interventions in decreasing kinesiophobia. There were no between-group differences for manual

therapy, electrotherapy, kinesiotaping, and craniosacral therapy in reducing kinesiophobia, with limited evidence.

There was moderate strength of evidence for electrotherapy and manual therapy in reducing fear-avoidance beliefs. Limited strength of evidence for exercise programs in decreasing fear-avoidance beliefs. Also, there was very low strength of evidence for multidisciplinary, surgical, and psychological interventions in altering fear-avoidance beliefs.

Conclusions

This systematic review discusses the potential effectiveness of conservative interventions to reduce kinesiophobia and fear-avoidance behaviors in patients with chronic low back pain.

Commentary

With the high prevalence of chronic low back pain in today's society and the increasing amount of pain neuroscience education (PNE) and biopsychosocial model being brought to the forefront of physical therapy literature and practice, I believe this systematic review is an interesting read and provides a good summary of the effects of different types of interventions on fear-avoidance beliefs, kinesiophobia, and fear of falling. This article may help serve as a guide in finding alternate forms of treatment to assist in reducing fear-related impairments which in turn may improve quality of life and outcomes for our patients. Recently PNE has surged on the forefront of physical therapy and rehabilitative sciences and I believe that having that education and an arsenal of different types of interventions is integral to complete the biopsychosocial aspect of care and improve overall health of our patients.

This review has a lot of information in it and like any other paper has its strengths and weaknesses. One of the strengths of this paper is the inclusion and exclusion criteria. While this is a massive and broad topic to research, I believe they did a fairly decent job at selecting quality articles. On the other side, a large challenge that I found in this study is because the subject is so vast, the number of different interventions performed in each "type of intervention" may have affected the outcomes of the review. For example, multidisciplinary interventions is a broad term which included studies which involve 2 or more healthcare disciplines (eg, psychological intervention + exercise) where psychological interventions included every therapy specifically designed to alter cognitions and emotions applied to chronic pain. This limitation makes it difficult to reproduce the change in effect or to carry out the appropriate intervention without delving into the referenced study to locate their specific interventions. Another limitation

is that while each “type of intervention” is ranked from very low to moderate evidence for reducing fear-related outcomes, some “types of interventions” have more studies backing this evidence while others have less. For example, there were only four studies included which show that manual therapy and electrotherapy show moderate evidence in reducing fear-avoidance beliefs compared to seventeen studies on effectiveness of multidisciplinary interventions.

While there are limitations, I think that this systematic review helps give us another tool to utilize to help guide us towards improved outcomes for our patients and to choose an appropriate treatment strategy to reduce fear-avoidance behaviors, fear of falling, and kinesiophobia.