Examining evidence-based physical therapy treatment for patients with non-specific low back pain and sacroiliac joint dysfunction: a review of the literature regarding the efficacy of spinal stabilization programs compared to spinal manipulative therapy in managing this impairment.

Introduction

Low back pain (LBP) is the most common reason for patients seeking care from physical therapists in outpatient settings, and one of the most frequently presenting conditions by patients seeking care from allopathic or osteopathic physicians.[1] An episode of low back pain is thought to occur in approximately 80% of the general population at some point in their lives.[2] Expert opinion has likened the frequency of low back pain experienced by modern society to an "epidemic," and reports in the literature consistently support this view.[3] It is the leading cause of activity limitation and work absence throughout much of the world and is associated with an enormous economic burden.[3] The etiology of low back pain is generally unknown and the diagnostic label, non-specific LBP, is frequently given when no specific pathologic process or structure can be identified.[4] Many structures of the trunk and pelvis can contribute to LBP through functional connections between the lower extremities and spine muscles and ligaments, thoracolumbar fascia, zygapophyseal joints, and intervertebral discs.[5] The sacroiliac joint is a part of the lumbar-pelvic-hip complex comprising the fourth and fifth lumbar joints, the two hip joints, and the pubic symphysis.[6] Involvement of any one structure affects the positioning and movement of the others.[7] Up to 85% of individuals presenting to primary care with LBP have been found to have non-specific LBP that defies precise diagnosis.[5] As a result of the nonspecific nature of this condition, a myriad of conservative treatment techniques has been proposed, including back school, education, specific exercise, spinal stabilization, and manual therapy (spinal mobilization and/or spinal manipulation).[4,8] When encountering this patient population in clinical practice, it can often be difficult to decide which intervention to utilize and whom will respond the best to a particular treatment approach. This review of the literature compares and contrasts the efficacy of two common physical therapy interventions in an effort to answer the following clinical question: In non-pregnant adults, aged 20-65 years old, with sacroiliac joint dysfunction (SJD), does standard exercise treatment combined

with spinal manipulation produce decreased low back pain in a shorter rehabilitation course than spinal manipulation alone?

Summary of the evidence

A total of 7 randomized controlled trials and 1 case series were analyzed and reviewed for effectiveness of the interventions utilized in each. The authors utilized multiple outcome measures per study in order to assess the whole spectrum of the condition, including impairment, function, and disability. The study's also varied in the inclusion/exclusion criteria and in the timeline of their outcome measurements, either strengthening or weakening the study results during the comparison. In addition, the interventions utilized in each study were unique to the particular study, but all studies used random allocation to a treatment group in hopes to strengthen the reliability of the effects of each particular intervention. In attempts to best organize the results of the review, the different studies are compared in terms of effectiveness of interventions utilized.

Manual Therapy

The Guide to Physical Therapist Practice identifies mobilization/manipulation an intervention appropriate for the care of patients with spinal disorders.[9] Manual therapy is a general term referring to a broad category of procedures designed to impact musculoskeletal structures for the purposes of reducing pain and improving function.[10] The most commonly used forms of manual therapy used for individuals with LBP are high velocity thrust and low velocity nonthrust manipulation directed towards the joints of the lumbar and sacroiliac spine.[10] Other forms of manual therapy include soft tissue massage, joint mobilization techniques, and muscle energy techniques. Recently, a clinical prediction rule (CPR) was derived and validated that accurately identifies patients with LBP who are likely to respond with rapid, and prolonged reductions in pain and disability following spinal manipulation.[11] All study's reviewed included a treatment group assigned to some version of a manual therapy technique. Goldby et al. compared 10 sessions of manual therapy (joint manipulation and mobilization), a 10-week course of spinal stabilization exercise classes, and education alone, finding the highest reduction in pain in the manual

therapy group between entry and 3-months.[12] Kamali & Shokri studied the effect of one single treatment session, utilizing a combination of two manipulation techniques (lumbar and SIJ) compared to a SIJ manipulation technique alone on pain (100 mm visual analog scale [VAS]) and functional disability (Oswestry LBP Disability Questionnaire).[7] Results showed that utilization of both a lumbar and a SIJ spinal manipulation offers no additional benefit when compared to SIJ spinal manipulation alone, in relation to pain and disability immediately, at 48 hours, and one month after treatment.[7] Cleland et al. examined the generalizability of the above-mentioned spinal manipulation therapy (SMT) clinical prediction rule by comparing reduction in pain intensity (Numerical Pain Rating Scale), disability (modified Oswestry Disability Index [ODI]), and fear-related behaviors (Fear Avoidance Beliefs Questionnaire [FABQ]) associated with their back pain.[10] Treatments consisted of 2 treatments of either the validated SMT technique, an alternative (side-lying) technique, or a non-thrust spinal mobilization followed by 3 sessions of instruction in a spinal stabilization program. Results showed reductions in all for both thrust groups in comparison to the non-thrust group, providing evidence that the spinal manipulation CPR is generalizable to the side-lying thrust technique, but not to non-thrust techniques.[10] Lewis et al. included manual therapy treatment as a part of the treatment protocol in their study which compared group exercise with individualized therapy treatments in reducing pain, disability (ODI), perceived physical fitness, medication usage for low back pain, and lumbar range of motion measurements.[4] Both exercise groups, with physical therapy intervention that included manual therapy resulted in significant improvements in pain disability scores and lumbar range of motion measurements with associated decrease in pain levels with movements.[4] Ferreira et al. compared general exercise, motor control exercises, and SMT to improve function (Patient-Specific Functional Scale), global perceived effect, pain (VAS), and disability (Roland-Morris Disability Questionnaire [RDQ]) in patients with chronic low back pain. Results indicated that compared with exercise alone, inclusion of spinal manipulative therapy for patients with significant pain or disability had a greater improvement in outcomes in the short term (at 8 weeks) for patients with greater than 3 months history of low back pain.[13] Bronfort et al. assessed the relative efficacy of supervised exercise therapy, home exercise programs, and SMT on pain and disability. The SMT group was associated with a mean change of 40%-50% in pain and disability in 12 weeks and 12 months after treatment.[14] Cecchi et al. compared SMT with back school and

individualized exercise therapy sessions, with the SMT group reporting the highest reduction in pain rating scale score and most significant reduction in disability (RDQ) at discharge compared to the other two groups.[8] One year later, the SMT group maintained the most reductions.[8] Lastly, Cleland et al. performed a case series to again attempt to generalize the previously validated SMT CPR using a different SMT technique. Patients were treated with a side-lying manipulation technique for 2 sessions, with this treatment resulting in a mean reduction of disability (ODI) of 57%.[15] All evidence presented here reports successful outcomes in terms of reduction of pain and disability, shown by varying outcome measures, with the inclusion of some form of manual therapy in the treatment arsenal of patients with low back pain.

Standard Exercise Treatment

The literature examined utilized a variety of exercise regimens for the exercise therapy groups. The choice of exercise therapy is difficult for the clinician because aerobic exercises, strengthening exercises, coordination exercises, and specific stabilization exercises have been shown to be effective in low back disorders.[4] It is also uncertain as to whether it is more effective to administer exercises on an individual basis or in a group setting.[4] This said, musculoskeletal physical therapy has seen an increase in the prescription of exercises to rehabilitate spinal stability in patients with low back disorder.[12,13] The regime consists of cocontraction of the anterolateral abdominal and multifidus muscles, and evolved from experimental evidence that showed an alteration in the function of these muscles in patients with low back disorder in comparison to normal controls.[12] Clinically, this manifests as an imbalance between the local and global muscle systems, with a theorized functional reduction in the capacity of the deep local muscular system's ability to maintain effective stability and control of the lumbar spine.[12] More generalized exercise programs for low back pain are designed to reverse de-conditioning or the fear of movement associated with the pain, or both.[13] This exercise typically involves aerobic exercise such as walking or stationary cycling, as well as strengthening and stretching exercises, and are often conducted in group settings.[13] Goldby et al. utilized a 10-week course of spinal stabilization exercise class with 2 physical therapists per less than 12 patients. The exercises were designed to retrain transverse abdominis, multifidus, pelvic

floor, and diaphragm musculature. Results indicated that the 10-week spinal stabilization program was more effective than 10 sessions of manual therapy or education alone at reducing pain, disability, medication intake, and improving quality of life at 6 and 12 months following treatment.[12] A study by Cleland et al. (2009) included 2 treatments of spinal stabilization exercise in both of their spinal manipulation treatment groups. All patients were instructed in spinal stabilization exercises targeting the transverse abdominis, multifidus, erector spinae, and obliques. Performance of spinal stabilization exercise in adjunct to SMT produced reduced pain and disability scores up to 6 months of follow-up.[10] Lewis et al. compared group exercise treatments with individualized exercise. The patients participating in the group exercise completed 8, 1 hour sessions over 2 months, with 10 patients at a time and combined general exercise, spinal stabilization exercises, and manual therapy. The individualized treatment group received 8, 30 minute therapy treatments including general exercise, spinal stabilization, and manual therapy. Both interventions were associated with significant improvements in Quebec disability scores and lumbar range of motion with associated decreased pain levels.[4] While the authors found no consensus of one form of exercise program over the other, the exercise group was more cost-effective than the individual treatments, and produced identical outcomes, implicating this as a cost-effective strategy for clinicians to consider in practice.[4] Ferreira et al. compared general exercise and motor control (spinal stabilization) exercise. The patients in the general exercise group completed 1 hour of strengthening/stretching of main muscle groups and exercise for cardiovascular fitness. The motor control group completed exercises aimed at improving function of specific trunk muscles. The motor control group resulted in greater improvement in all outcomes in the short-term, but there was no difference in improvement over the 12 month follow-up period.[13] Bronfort et al. compared supervised exercise therapy (20, 1 hour sessions of 1 on 1 treatment, consisting of aerobic, core strengthening, and strengthening) with home exercise instruction (2, 1 hour appointments to discuss self-care, ergonomics, stretching/stabilization exercise instruction). Both groups had a mean change of 40%-50% in pain and disability in 12 weeks and 12 months after treatment, but those patients receiving individualized spinal stabilization treatment were more satisfied and experienced greatest gains in trunk muscle endurance and strength.[14] Cecchi et al. compared individualized therapy consisting of 15, 1 hour sessions of passive and assisted mobilizations, active exercises, spinal manipulative

therapy, proprioceptive neuromuscular facilitation, and patient education with back school and SMT alone. All 3 groups reported significant improvement in disability score and in pain rating scale when compared to baseline data at discharge.[8]

Educational Interventions

Less costly and time-consuming self-care interventions, such as home exercise instruction, provision of a booklet or advice, and back school have been shown to be effective for acute and subacute LBP.[8,14] Treatment designed to give the patient the tools to avoid the activities that "set-off" their pain symptoms are helpful in long-term efficacy of all physical therapy interventions. Back School was first developed in Sweden in 1969, conveying group back exercises with patient information/education and ergonomic training aimed at optimizing functional recovery.[8] Since then, many different models of back school have been proposed, and a recent Cochrane review concludes that there is evidence that back school has better effects on pain and functional status than other treatments for patients with recurrent and chronic low back pain in the short and intermediate term.[8] Goldby et al. included a education intervention group as a control for their study. They provided a booklet title 'Back In Action' which was subsequently explained to them by a physical therapist. In addition, all participants in their study were required to attend Back School for 1, group-specific 3 hour question and answer session. Education alone was not effective at reducing pain or disability.[12] Cecchi et al. included a Back School intervention group in which participants attended 15, 1 hour sessions, 5 days/week. The first 5 were devoted to information and group discussions on back physiology/pathology. The next 10 included relaxation techniques, postural, and respiratory group exercises. In this study, the authors found that the back school group was more effective in the long-term in promoting self-treatment and long term results without further consultation with the medical professional.[8]

Limitations of the evidence

Of the studies reviewed, the most common limitation between them was lack of a control group in order to compare the effects of their interventions to no intervention at all. Golby

et al. was the only study which included a control group. Kamali et al. utilized a small sample size (32) of females only, limiting generalizability of those results.[7] Small sample sizes were also found in Cleland (2009) with 112 subjects, Lewis with 80 subjects, and Cleland (2006) with a case series of 12 subjects.[4,10,15] Many of the studies recruited subjects from physical therapy departments, introducing the potential for contamination to have occurred, which could confound the results for the treatments provided in the studies.[7,8,10,12,13] Short follow-up times limited the ability to prove long-term efficacy of these treatments.[7,8,10,15] Inclusion of a manual therapy station in the exercise intervention group in the Lewis study contaminated the results of that intervention being due to exercise treatment alone, but authors were still able to examine outcomes based on individualized treatment versus group exercise.[4] Two studies did not control the allowable treatments following the study intervention, decreasing the reliability of the long-term outcomes.[4,13] Lastly, the varying outcome measures used among all the studies analyzed introduce the potential that some studies could have been under-powered in statistical significance in relation to the others that used a different outcome measure. 4 of the 8 studies utilized the Oswestry Disability Index[7,10,12,15] while the others utilized the Roland Morris Disability Questionnaire[8,13,14] and the Quebec Back Pain Disability Questionnaire[4] to measure disability.

Potential areas for improvement for the evidence

Due to the lack of studies found that strictly compared spinal manipulation treatment and spinal stabilization exercise, future research could be conducted to compare one intervention to the other in a more direct approach. Several of the studies utilized a component of each of the different interventions as a part of the treatment group, but controlling the allowable treatments will make for a better ability to generalize and state for certain that a treatment effect was attributable to a specific intervention. The creation of a standard set of inclusion and exclusion criteria, and utilization of only a certain spinal manipulation technique will help to standardize the research. Defining the term 'manual therapy' is important for readers and clinicians to understand what the exact treatment was that provided the favorable results. Larger, more generalizable sample sizes, utilizing a more standardized treatment regimen is needed for future research on this topic.

Conclusions

For the purposes of this review, conclusions were made based on answering the clinical question for each study and then compiling those conclusions to more directly answer the clinical question. Spinal manipulation shows to be more effective than exercise treatment or education in the short-term for reducing pain levels, especially in patients with a high pain score at the start of intervention. Inclusion of a component of spinal stabilization emphasizing the transverse abdominis, multifidus, pelvic floor, and diaphragm muscles leads to better long-term reductions in pain and disability than manual therapy or education alone. The technique of spinal manipulation chosen is not as important, as the regional sacroiliac joint and lumbar techniques both produce similar treatment results.[10,15] Choosing motor control (spinal stabilization) exercises as opposed to general exercises in the treatment interventions will have a more positive outcome in reduction of pain and disability.[13] In addition, there is good evidence that incorporating a group fitness program utilizing spinal stabilization for patient's presenting with non-specific low back pain leads to significant reduction in pain and disability, as well as being 40% more cost effective than individualized treatment. This is a treatment option that could be very effective in the future, as therapist demands are likely to increase, and this is a commonly seen patient population in outpatient physical therapy practices. As always, the most comprehensive treatment approach will help to guarantee the best chance at receiving positive outcomes. No patient is the same, so there will be no 'one size fits all' treatment, so using inductive reasoning and identifying the treatments that will help to address the impairments found will give the most successful outcomes. Based on this review, utilizing spinal manipulation in the acute phase and then following with a comprehensive spinal stabilization program, including education that patient's can use to help avoid the problem in the future, appears to be a good starting point for the clinical management of patients with non-specific low back pain.

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