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Module 5- Research Paper- Part A

**PICO Question: In individuals aged 20-55 diagnosed with non-radicular, low back pain, do SI motion palpation tests or pain provocation tests more accurately confirm the SIJ dysfunction diagnosis based on the intra-articular injection gold standard?**

Low back pain is one of the most common complaints of patients receiving health care services today. It has been estimated that close to 33% of all insurance costs relate directly to some form of low back pain. Some studies report lifetime prevalence percentages as high as 60%-80%². For many years, scientists debated whether the sacroiliac joint could be a cause of low back pain; however, it is now clear that the sacroiliac (SI) joint can produce pain in the back, buttocks, groin and the lower extremities. The referral patterns of the SI joint are similar to those from lumbosacral sources³. Even though there are numerous tests that claim to detect SI joint dysfunction, many of them affect several structures in the low back, hip joint and SI joint and therefore lose their precision for detecting specifically SI joint dysfunction5.

Currently, there is not a reliable and valid means of diagnosing SI joint pain2,3,6,8. A review of the literature shows insufficient reliable data for diagnosing SI joint pain8. The current “gold standard” for diagnosing SI joint pain is an intra-articular injection. This intra-articular injection is used with an anesthetic block at the level of the SI joint to determine if the pain felt by the patient is then eliminated by the block4. The International Association for the Study of Pain (IASP) proposed a criterion for diagnosing SI joint pain. The third section of this criterion refers to using a local anesthetic that is injected into the joint cavity, which can be used as the reference standard for this diagnosis7. When looking at tests to diagnosis SI joint pain, it is critical that the researchers used an intra-articular injection as a reference standard to diagnosis SI joint pain of the participants in the study.

It is not within the scope of physical therapy practice to use intra-articular injections for diagnosing SI joint pain. These procedures are also very expensive and painful for the patients6. Radiologic investigations have also been shown to have inadequate ability to differentiate between low back pain and SI joint pain¹. It is imperative for the profession of physical therapy to have reliable and valid ways of diagnosing SI joint pain within the clinic. Without accessible means of differentiating between low back pain and SI joint pain, treatment strategies are not specific and are not as effective for the patient4.

This research question looks at comparing the reliability and validity of pain provocation tests and motion palpation tests to accurately diagnose SI joint dysfunction. The question incorporated the use of intra-articular injections in order to accurately determine the SI joint pain diagnosis of the subjects that were included in the research studies. SI joint pain has been identified to have a referral pattern to the back, pelvic area, groin and upper thigh; however, it does not refer below the knees or down the lower extremities; therefore, the research question included the clarifier of non-radicular pain in order to exclude subjects with low back pathology7. Several studies provided an average age range of patients affected by SI joint pain. One provides an age range of 20-66, whereas others say 20-75, 25-43 and 21-45. Using those results, this question focused on the age range 20-55 to include the highest prevalence of SI joint subjects that has been reported4,5,7,9.

Out of the 8 studies that were included from the search of the literature, only one study used motion palpation tests. This is a result of previous researchers showing poor diagnostic utility of these tests1,5. Motion palpation tests compare the movement of one SI joint in respect to the other. Broadhurst et al. reported poor inter-tester reliability in 11 out of 13 motion palpation tests that were used¹. Robinson et al. used 6 pain provocation tests and one motion palpation test. The inclusion of only one motion palpation test was supported by evidence that showed low reliability for motion palpation tests in previous studies5. The SI joint has limited amounts of motion in all individuals. The amount of motion found is less than 4° of rotation and up to 1.6 mm of translation; therefore the psychometric properties of motion palpation tests are low because of a human’s inability to detect this amount of motion in asymptomatic or symptomatic subjects10. Taking this evidence into account, the focus of this research question then shifted to which combination of pain provocation tests and other parts of the clinical examination showed the greatest diagnostic utility for diagnosing SI joint pain.

The majority of this research question focused on the use of pain provocation tests and their diagnostic utility in the clinic. 4 of the studies used a cohort design. These studies provided the same treatment and interventions to all of the subjects and analyzed the results across the group3,4,5,6. Two other studies did not use an intervention and control group, but instead looked at the results of the tests on all of the subjects. These research designs were a cross-sectional and a prospective design2,8. Broadhurst et al. used a randomized control trial (RCT). Both of the groups received the same treatments; however, the groups were randomized by the type of injection that they received. The control group received an injection of saline, whereas the intervention group received an injection of 1% Lidocaine. The results of the provocation tests were compared between the groups¹. Szadek et al. completed a review article that looked at all of the available evidence on the topic. Their review consisted of studies with varying types of research designs7. One limitation of these articles is the strength of the research designs. Only one used a RCT and the majority of them used a cohort design, which are not as strong on the hierarchy of research designs. Future research that is completed should use more RCT, which is the gold standard of research designs12.

The primary outcome measure that was used in these studies was the visual analogue scale (VAS). It was used to document the level of the subject’s pain before the application of the provocation tests, before the intra-articular injection and after the intra-articular injection. The VAS is a scale from 0-100 mm, where 0mm was no pain and 100 mm was the worst pain imaginable. The main use of this outcome measure was to determine if the subject reached the percentage cutoff for pain relief from the intra-articular injection to be classified as having a “positive response”, or positive for their origin of pain being from the SI joint1,3,4,6,8. The key difference between these studies was how they defined the “cutoff” for a positive response to the SI joint intra-articular injection. 3 of the articles used an improvement of 80% pain relief as their cutoff3,4,6. Two of the other studies used less restricted improvements of 70% and even 50%1,8. This difference in cutoff score impacts the number of subjects defined as having SI joint dysfunction; therefore, impacting the results and conclusions of the studies. A consistent cutoff needs to be established when using SI joint intra-articular injections to ensure that the results from each of the studies can be compared equally to each other.

Several of the studies had the subjects complete outcome measures at their intake visit; however, these were solely used to identify the characteristics of their subjects and they were not used to compare the results of the interventions. Additional measures that were used included: the Oswestry Disability Index, Symptoms Check List-90 questionnaire, Roland-Morris questionnaire and the Dallas Pain and Disability questionnaire3,4,8.

The results from multiple studies provided evidence that did not support the use of individual pain provocation tests for diagnosing SI joint pain. One study reported that even though certain SI joint tests have acceptable inter-rater reliability, the individual tests have not been shown to be able to predict the results of a diagnostic intra-articular injection and that a cluster of tests would have a higher diagnostic utility in the clinic3,5. Conclusions from this evidence show that it is important to determine how many tests to use and how many positive responses on those tests provides the greatest diagnostic utility for making a diagnosis of SI joint dysfunction.

Kokmeyer et al. completed a study that looked specifically at how many pain provocation tests should be used to diagnosis SI joint dysfunction. Using a combination of their sample size and kappa values, they chose to examine the reliability of a multitest regimen with 5 tests. Their results showed that a test regimen that included 3 positives out of 5 tests had the highest statistical reliability values and it takes into account the possibility of excluding a subject with SI joint dysfunction². Laslett et al. used 4 out of the 5 same tests as Kokmeyer et al. These researchers used the sacral thrust test instead of Patrick’s sign (FABER test) and completed Gaenslen’s test on the right and left side. Laslett et al. provided similar results for the use of several tests. They also found that 3 positives had high diagnostic utility (sensitivity of 93.8%, specificity of 78.1% and area under the curve (AUC) of 0.842)4.

Robinson et al. did not look strictly at using composites of tests; however, they looked at the reliability of several individual pain provocation tests and then clusters of tests. The lowest percent of agreement was found for the Patrick-Faber test (74%). Of the tests used that were similar to the other studies, the compression test had an 88% agreement, the distraction test had 82% agreement and the posterior pelvic pain provocation tests (thrust test) had 87% agreement. When they looked at clusters of tests, the highest percentage of agreement (90%) came from 4 positives out of 5 tests. This percentage is higher than any of the individual tests and therefore, also supports the use of multiple tests for diagnosing SI joint dysfunction5. An additional study used receiver operating characteristic (ROC) curves to determine the appropriate number of tests that should be used. This study used 5 pain provocation tests that were similar to the studies mentioned previously (distraction, compression, thigh thrust, Patrick-Faber and Gaenslen). The ROC curve was created to determine a cutoff of tests that provide the greatest sensitivity, specificity, negative and positive predictive values and likelihood ratios. Agreeing with the results from the other studies, the maximum AUC (.799) was found when using 3 positive responses out of 5 tests. This resulted in sensitivity= 0.85, specificity= 0.79, negative predictive value= 0.87, positive predictive value = 0.77 and positive likelihood ratio = 4.028.

The results from all of these studies agree that 3 positive responses should be a cutoff for diagnosing SI joint pain. A complete review of the literature came to similar conclusions. Szadek et al. used diagnostic odds ratios (DOR) when looking at each of the research studies. They found that a comprehensive set of stress tests with a threshold of 3 positive tests results in the highest DOR (17.2)7. Each of the studies varied in how many tests they used (5 or 6) and which specific tests were used; however, the commonly used tests were: distraction, compression, thigh thrust and Gaenslen2,4,5,8. The main discrepancy is between the use of the Patrick-Faber test and the sacral thrust test. From studies that provided data on the individual pain provocation tests, Patrick-Faber test had an 85% agreement, sensitivity between 0.63-1.0 and specificity values between 0.16-0.77. The sacral thrust test had 78% agreement, sensitivity values between 0.53-0.63 and specificity values between 0.29-0.752,7. These results support the use of the Patrick-Faber test over the sacral thrust test; however, since neither have consistently strong psychometric properties in the research, it is better to follow the clinical rule created by Laslett et al. Their rule stated that the distraction, thigh thrust and compression tests should be completed first since they have the strongest psychometric properties. If three positives are reached, a diagnosis can be made, if not, then continue to the other two tests to try and reach 3 positive responses4. This clinical rule combines the strong properties of the 3 individual tests with the evidence that shows clusters of tests are stronger than using a single test.

One part of the clinical examination that was found and agreed upon in several of the studies was the use of pain mapping to correctly diagnose the SI joint as the source of pain. These studies agreed that patients who have SI joint pain map their pain in the region of the 1st and 2nd sacral nerve roots, around the buttocks and towards the hips and thigh¹. Several of the studies excluded subjects whose pain was above the level of L5, since this location of pain is not associated with the SI joint3,4,6,8. SI joint pain is usually found to be unilateral and does not radiate down the lower extremities below the level of the knee7. Asking a patient to complete a pain map during the initial evaluation is an easy and quick way to begin to differentiate their source of low back pain.

An additional examination component that was used in one of the studies was combining the use of a McKenzie evaluation with the pain provocation tests. It has been found that pain from lumbar discs can refer to the SI joint and appear to be SI joint pain. A McKenzie evaluation can be used to differentiate patients who have discogenic pain that might have false positive results on the pain provocation tests. Using a McKenzie evaluation comprised of repeated end range movements in standing and lying can determine if the patient’s pain centralizes or peripheralizes, which is a sign of lumbar disc pathology11. Laslett et al. found that after excluding patients who had symptoms of disc pathology after the McKenzie evaluation, the psychometric properties of the pain provocation tests increased. Specifically the specificity increased from 0.78 to 0.87 and the positive likelihood ratio increased from 4.16 to 6.97 (sensitivity stayed the same at 0.91). The results support the use of both a McKenzie evaluation to differentiate lumbar disc pathology and 3 positive SI joint pain provocation tests to together accurately diagnose SI joint pain3.

The main limiting factor for all of these studies and diagnosing SI joint pain in general, is the lack of a gold standard for diagnosis. Although these studies used an intra-articular injection as a reference for a gold standard, various other articles report that this is not an accurate way of diagnosing SI joint pain. It is clear that SI joint pain affects numerous structures in the area including ligaments, muscles and the overlying skin. All of these are not impacted by the intra-articular injection. The injection that is most commonly used only affects the joint cavity. It is clear that further research needs to be completed to look at the diagnostic validity of this injection7. Once the diagnostic capabilities of the injection are questioned, all of the results regarding the pain provocation tests must then be questioned. Although these studies provide strong evidence for the use of pain provocation tests when diagnosing SI joint pain, these results are based around the fact that the intra-articular injection can accurately differentiate between symptomatic and asymptomatic SI joints in patients. Completing studies to further assess the diagnostic validity of the injection will confirm the diagnostic utility of the SI joint pain provocation tests.

In regards to the initial research question, it is clear that pain provocation tests have greater use in the clinic and stronger psychometric properties than motion palpation tests. More specifically, these results point to the use of composites or clusters of positive responses when trying to make a diagnosis2,5,8. Although there is still currently some debate over which pain provocation tests to use, it is evident that motion palpation tests do not have strong diagnostic utility in the clinic1,5,10. Several of the researchers provide evidence to support the use of the compression, distraction and thigh thrust tests2,4,5,8. Further research needs to be completed to find stronger agreement for the last two tests that should be used for the 5-test cluster. Other components of the clinical examination can increase the ability to make an accurate diagnosis. These include pain maps provided by the patient and a McKenzie evaluation to identify patients who are suffering from lumbar disc pathology that is referring to the SI joint3,4,6,8. Using a combination of these components, a therapist has a greater ability to correctly diagnosis SI joint dysfunction and more efficiently treat the patient.

This evidence is a good foundation for a capstone project. The capstone project will focus on diagnosing SI joint dysfunction, but also expand to include interventions for treating this disorder. Knowing which provocation tests to use is critical to be able to apply to the clinic. This will increase the ability to diagnosis SI joint dysfunction and therefore the effectiveness of the treatment that the therapist can provide. The conclusions from this research question show that further evidence needs to be completed regarding the validity of intra-articular injections. Taking that into consideration, these results show promise for the use of pain provocation tests and other clinical examination components for diagnosing SI joint dysfunction in the clinic.

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