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| **CRITICALLY APPRAISED TOPIC** |

**FOCUSED CLINICAL QUESTION**

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| For a 35-year old woman with S-I joint dysfunction is treatment with Pilates exercise more effective than use of a S-I belt in preventing hypermobility of the S-I joint? |

**AUTHOR**

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| **Prepared by** | Rachel Nieman | **Date** | 12/04/2018 |
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**CLINICAL SCENARIO**

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| This PICO question was prompted by a patient who experienced sacroiliac joint pain and clicking following an automobile accident. This patient presented with significant musculoskeletal pain throughout her spine and left sided sacroiliac pain. In addition to pain, this patient experienced clicking of the sacroiliac joint during open chain movements of the left lower extremity. Her musculoskeletal pain resolved as expected during her course of care, however her sacroiliac pain and clicking did not respond to physical therapy intervention. I hoped to learn more about the best course of treatment for sacroiliac pain and the benefits of sacroiliac stabilization bracing. Learning more about this topic will be relevant to my current clinical practice, as I encounter many patients with sacroiliac joint pain and instability.  |

**SUMMARY OF SEARCH**

[Best evidence appraised and key findings]

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| Results of the search:* 8 articles were selected that met the inclusion/exclusion criteria, including; 1 randomized clinical trial, 1 systematic review, 1 expert committee report, 2 case studies, and 3 cohort studies.

**Summary of findings from selected studies*** There is some evidence to support the short-term use of external pelvic compression (EPC) to improve force closure and decrease ligament laxity in the pelvis.
* Evidence does not support the long-term use of EPC to decrease motion at the sacroiliac joint.
* Evidence does not support the use of EPC to improve muscle strength or augment muscle strengthening exercise in the lumbo-pelvic region.
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**CLINICAL BOTTOM LINE**

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| The results of my PICO query and relevant literature review suggest that external pelvic compression (EPC) may be a beneficial, short-term, adjunct to physical therapy intervention. The greatest impact with regards to reduction of abnormal sensation and pain is therapeutic exercise, specifically core strengthening exercises. EPC may be helpful in the early stages of treatment to decrease ligamentous laxity while muscle strengthening is taking place. However, EPC is not a long-term solution or replacement for therapeutic exercise in the case of sacroiliac dysfunction. In my future clinical practice, I will consider recommending the short-term use of pelvic stabilization braces in cases of acute injury or significant pain/dysfunction. This may be beneficial to reduce patient symptoms until core musculature has been sufficiently strengthened to provide better lumbo-pelvic control and support.  |

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| ***This critically appraised topic has been individually prepared as part of a course requirement and has been peer-reviewed by one other independent course instructor*** |

*The above information should fit onto the first page of your CAT*

**SEARCH STRATEGY**

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| **Terms used to guide the search strategy** |
| **P**atient/Client Group | **I**ntervention (or Assessment) | **C**omparison | **O**utcome(s) |
| Sacroiliac joint dysfunctionSI joint dysfunction | Postur\* exercis\* Stabiliz\* exercis\*PilatesStabiliz\* | Sacroiliac belt\*SI belt\*Sacroiliac brac\*SI brac\* | PostureSacroiliac instab\*SI Instab\*Sacroiliac stab\*SI stab\* |

**Final search strategy (history):**

*Show your final search strategy (full history) from PubMed. Indicate which “line” you chose as the final search strategy.*

#1 Sacroiliac joint dysfunction OR SI joint dysfunction

#2 Postur\* Exercis\* OR Pilates

#3 Stabiliz\*

#4 Stabiliz\* Exercis\*

#5 Sacroiliac Belt\* OR SI belt\*

#6 Sacroiliac Brac\* OR SI Brac\*

#7 #1 AND #2

#8 #1 AND #3

#9 #1 AND #4

#10 #1 AND #5

#11 #1 AND #6

**\*\*Final search strategy – which results came from which combo of terms\*\***

I attempted a “final” search strategy of #1 AND #3 AND #5, however no search results were available for this combination of terms in the databases I searched. I used queries #7, #8, #9, #10, and #11 to obtain my final results. The majority of the articles I selected for further review came from query #8. I have indicated which query was used to find each article in the table for the “Results of Search” segment of this CAT.

*In the table below, show how many results you got from your search from each database you searched.*

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| **Databases and Sites Searched** | **Number of results** | **Limits applied, revised number of results (if applicable)** |
| **PubMed****CINAHL****Cochrane Library** | **72****25****23** | **22****3****1****\*\*\*Additional limits and filters were not necessary, as my topic did not yield a huge number of results. I narrowed search results by review of titles and abstracts for relevance.** |

## INCLUSION and EXCLUSION CRITERIA

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| **Inclusion Criteria** |
| I had initially planned to use the following inclusion criteria:* Subjects aged 25-40
* Measured postural alignment
* Measured strength in trunk/core
* Quantified incidence of S-I pain
* Quantified incidence of S-I abnormal sensation such as clicking or popping

Unfortunately, literature relevant to my PICO proved to be quite sparse. Initially I narrowed my search by reviewing article titles and abstracts to determine whether or not the information was relevant to my PICO question. As my search narrowed down, I utilized the exclusion criteria to help determine the best 8 articles to include in my search results. These 8 articles were further narrowed down to 2 articles to include in my CAT based on the exclusion criteria, quality score, and level of evidence.  |
| **Exclusion Criteria** |
| * Abstracts
* Case-reports
* Conference proceedings
 |

**RESULTS OF SEARCH**

**Summary of articles retrieved that met inclusion and exclusion criteria**

*For each article being considered for inclusion in the CAT, score for methodological quality on an appropriate scale, categorize the level of evidence, indicate whether the relevance of the study PICO to your PICO is high/mod/low, and note the study design (e.g., RCT, systematic review, case study).*

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| **Author (Year)** | **Risk of bias (quality score)\*** | **Level of Evidence\*\*** | **Relevance** | **Study design** |
| **Soisson et al., 2015***Query #11* | **15/31 Downs and Black** | **2b** | **Low**  | **Cohort Study** **(Non-Randomized)** |
| **Cottingham et al., 1997***Query #7* | **High risk of bias due to study design** | **4** | **Moderate** | **Case Study** |
| **Jung et al., 2013***Query #8* | **20/31 Downs and Black** | **2b** | **Moderate** | **Cohort Study** **(Non-Randomized)** |
| **Shadmehr et al., 2012***Query #8* | **19/31 Downs and Black** | **2b** | **Low**  | **Cohort Study** **(Non-Randomized)** |
| **Arumugam et al., 2012***Query #8* | **10/11 AMSTAR** | **1b or 2a**  | **Moderate**  | **Systematic Review** |
| **Brizzolara et al., 2018***Query #8* | **9/11 PEDro** | **1b** | **High** | **Randomized Clinical Trial** |
| **Pool-Goudzwaard et al., 1998***Query #8* | **High risk of bias based on article type**  | **5** | **Low**  | **Expert Committee Report** |
| **Jonely et al., 2015***Query #8* | **High risk of bias due to study design** | **4** | **Moderate** | **Case Study** |

\*Indicate tool name and score

\*\*Use Portney & Watkins Table 16.1 (2009); if downgraded, indicate reason why

**BEST EVIDENCE**

The following 2 studies were identified as the ‘best’ evidence and selected for critical appraisal. Rationale for selecting these studies were:

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| * Arumugam A, Milosavljevic S, Woodley S, Sole G. Effects of external pelvic on form closure, force closure, and neuromotor control of the lumbopelvic spine – a systematic review. *Man Ther*. 2012;17(4):275-284. doi:10.1016/j.math.2012.01.010.

*I selected this article, in part, because it is the only literature review pertinent to my PICO question. This article also has a high level of evidence and a low risk of bias. Since it is a systematic review, it encompasses several studies that are, at least, moderately relevant to my PICO question.* * Brizzolara KJ, Wang-Price S, Roddey TS, et al. Effectiveness of adding a pelvic compression belt to lumbopelvic stabilization exercises for women with sacroiliac joint pain: a feasibility randomized controlled trial. *Journal of Women’s Health Physical Therapy.* 2018;42(2):76-86. [http://dx.doi.org.libproxy.lib.unc.edu/10.1097/JWH.0000000000000102](http://dx.doi.org.libproxy.lib.unc.edu/10.1097/JWH.0000000000000102%22%20%5Ct%20%2210.1097/JWH.0000000000000102%22%20%5Co%20%22http%3A//dx.doi.org.libproxy.lib.unc.edu/10.1097/JWH.0000000000000102).
* *I selected this article, because as a randomized clinical trial, it has a high level of evidence and low risk of bias when compared to most of the other articles I found which were primarily non-randomized cohort studies and case studies. This article is also the most relevant in terms of addressing my PICO question.*
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**SUMMARY OF BEST EVIDENCE**

**(1) Description and appraisal of** Effects of external pelvic on form closure, force closure, and neuromotor control of the lumbopelvic spine – a systematic review **by** Arumugam A, Milosavljevic S, Woodley S, Sole G. 2012.

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| **Aim/Objective of the Study/Systematic Review:** |
| The aim of this systematic review is to further analyse evidence related to the use of external pelvic compression (EPC) as a means to improve stability and force closure in the pelvis. Little is known about precisely how EPC works; the authors aim to analyse the effects of EPC on neuromuscular control in individuals with and without lumbopelvic dysfunction.  |
| **Study Design**[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]Note: For systematic review, use headings ‘search strategy’, ‘selection criteria’, ‘methods’ etc. For qualitative studies, identify data collection/analyses methods. |
| This study is a systematic review. Two assessors were utilized for literature review and determination of relevant studies. The authors also state that a 3rd assessor was available in the event disputes could not be resolved by discussion between the two assessors. Two researchers assessed the quality of all studies by utilizing the Downs and Black quality index. Researchers also used a modified van Tulder rating system to rate the level of evidence for all selected studies. The following levels of evidence were utilized: strong, moderate, limited/conflicting, no evidence.  |
| **Setting**[e.g., locations such as hospital, community; rural; metropolitan; country] |
| Unclear.  |
| **Participants**[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article. |
| This systematic review included 18 studies. Of these 18 studies, eight studies utilized healthy participants, one study utilized cadaver specimens, and nine studies utilized participants with pain. In the studies that utilized participants who have pain, the diagnoses included low back pain, pelvic girdle pain, groin pain, and sacroiliac joint (SIJ) pain. * Study with the highest number of participants = 50 participants
* Study with the lowest number = 5 participants
* The average number of participants across all studies is 19
 |
| **Intervention Investigated**[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided] |
| *Control* |
| For all studies analysed in this systematic review, the control involved having the participant perform the task without external pelvic compression (EPC). |
| *Experimental* |
| Experimental conditions for the 18 studies examined in this systematic review are listed below:1. *Intervention:* manual pelvic compression. *Task:* straight leg raise. *Dose:* unclear
2. *Intervention:* pelvic compression brace (PCB) with top aligned at ASIS. *Task:* lifting ability in 2 conditions. *Dose:* 5 repetitions
3. *Intervention:* PCB aligned in two different positions and two different amounts of tension. *Task:* doppler imaging vibration (DIV) with patient lying prone. *Dose:* 6 trials.
4. *Intervention:* PCB. *Task:* lifting/lowering a box with various weights for 1 minute. *Dose:* one trial at each weight with 1-minute rest between trials.
5. *Intervention:* PCB aligned just below ASIS with 50N compression. *Task:* straight leg raise (SLR) and treadmill walking at various speeds. *Dose:* 3 trials of SLR, 1 trial of each treadmill walking condition.
6. *Intervention:* PCB applied inferior to ASIS and superior to greater trochanter. *Task:* isometric hip adduction or squeeze test. *Dose:* 3 trials.
7. *Intervention:* PCB applied inferior to ASIS and superior to greater trochanter. Task: isometric hip adduction or squeeze. *Dose:* unknown.
8. *Intervention:* PCB applied 2-3 inches below iliac crest. *Task:* erect sitting, slumping, standing*. Dose:* 1 trial at each condition.
9. *Intervention:* PCB. *Task:* erect sitting, slumping, standing*. Dose:* 1 trial at each condition.
10. *Intervention:* PCB. *Task:* SLR in 2 conditions. *Dose:* 3 trials for each condition.
11. *Intervention:* PCB applied inferior to ASIS and superior to greater trochanter. *Task:* SLR test, pelvic belt test. *Dose:* 3-4 trials for each condition.
12. *Intervention:* PCB at level of pubic symphysis. *Task:* SLR test, DIV in prone lying. *Dose: 1 trial for SLR, 3 trials for DIV.*
13. *Intervention:* PCB at level of pubic symphysis. *Task:* SLR test. *Dose*: unclear.
14. *Intervention:* Manual pelvic compression at ilium. *Task:* SLR test. *Dose:* unclear.
15. *Intervention:* PCB applied just below ASIS with 50N tension. *Task: sidelying hip abduction. Dose:* 3 trials for each condition with 1-minute of rest between trials.
16. *Intervention:* PCB directly above greater trochanter with 50N of tension. *Task:* standing. *Dose:* 3 trials with 15 seconds of rest in-between trials.
17. *Intervention:* Manual compression across the pelvis. *Task:* prone hip extension. *Dose:* 5 trials with 2 minutes rest in-between.
18. *Intervention:* PCB applied to cadaver pelvis in 2 conditions. *Condition 1:* PCB applied just above greater trochanter with 50N tension. *Condition 2:* PCB applied just above greater trochanter with 100N tension.
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| **Outcome Measures**[Give details of each measure, maximum possible score and range for each measure, administered by whom, where] |
| Outcome Measures for the 18 studies examined in this systematic review are listed below:1. *Measures:* EMG activity abdominal muscles and ultrasonic measure of pelvic floor movement.
2. *Measures:* Pain and Isometric lifting strength. *Outcomes:* Increased lifting strength, decreased pain.
3. *Measures:* Change in DIV amplitude from ASIS to sacrum. *Outcomes:* overall decrease in DIV amplitude, indicating increased SIJ stiffness.
4. *Measures:* Load cell traction volume during maximum voluntary isometric spinal extension (MVISE) and erector spinae (ES) EMG activity after lifting and lowering load. *Outcomes:* Lifting at 15% bodyweight produces decreased MVISE and increased ES EMG activity. Lifting at 25% bodyweight produces the opposite results.
5. *Measures:* EMG of abdominal muscles. *Outcomes:* Variable increases and decreases in muscle activity based on type of activity being performed by participants.
6. *Measures:* Pain measured with 11-point Likert scale with 0 being no pain and 10 being unbearable pain. *Outcomes:* Decreased pain during isometric hip adduction.
7. *Measures:* Pain measured with 11-point Likert scale with 0 being no pain and 10 being unbearable pain. *Outcomes:* Decreased pain during isometric hip adduction.
8. *Measures:* lumbosacral angle, pelvic angle, and back muscle loading. *Outcomes:* Increased pelvic angle and decreased ES EMG activity in standing and slump sitting. Decreased pelvic angle and increased ES EMG activity in erect sitting.
9. *Measures:* lumbosacral angle and pelvic angle measured by radiographic imaging. *Outcomes:* varied.
10. *Measures:* isometric forces of leg raising. *Outcomes:* increased force at 0cm, insignificant increased at 20 cm.
11. *Measures:* pelvic belt test. *Outcomes:* increased hip adduction force in patients with pain and in healthy participants.
12. *Measures:* SIJ laxity measured by DIV and SLR test. *Outcomes:* increased stiffness noted in SIJ based on DIV and decreased pain noted with SLR test.
13. *Measures:* SLR test score. *Outcomes:* ability to perform SLR test improved in 20/21 participants.
14. *Measures:* Movement of diaphragm and pelvic floor. *Outcomes:* No changes noted in healthy participants. In patients with pain, increased diaphragmatic movement and decreased pelvic floor descent noted.
15. *Measures:* EMG activity. *Outcomes:* varied.
16. *Measures:* EMG activity. *Outcomes:* varied.
17. *Measures:* EMG onset latency of gluteus maximus and erector spinae. Outcomes: decreased onset latency of gluteus maximus and erector spinae.
18. *Measures:* amount of sagittal rotation between ilium and sacrum. *Outcomes:* decreased sagittal rotation between ilium and sacrum.
 |
| **Main Findings**[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. You may summarize results in a table but you must explain the results with some narrative.] |
| 95% confidence intervals for all studies can be found in table 3 of the systematic review. Rather than listing these numbers, which are easily reviewed in table 3, I will give a summary overview of the main findings of the systematic review as a whole. * Pelvic compression bracing (PCB) in the high position (immediately caudal to ASIS) with the participant in the prone position decreased ligament laxity by 50% in healthy subjects and 36% in subjects with pelvic girdle pain. PCB in the low position (pubic symphysis or greater trochanter) only reduced laxity by 17%.
* PCB improves lifting strength by 30-40% and decreases pain by 13% in subjects with low back pain.
* PCB improves performance on straight leg raise test in participants who test positive for pain with straight leg raise test.
* No statistically significant was found in the erector spinae strength of healthy men when measured after performing a lift with PCB.
* A study of cadavers demonstrated a 19% decrease in of sacral mobility with use of a pelvic compression brace.
* PCB applied in the crooklying position decreased pain during isometric hip adduction in athletes with a longstanding history of groin pain.
 |
| **Original Authors’ Conclusions**[Paraphrase as required. If providing a direct quote, add page number] |
| The authors conclude that there is a moderate level of evidence to support the utilization of external pelvic compression (EPC). There is a moderate level of evidence confirming the benefit of EPC in decreasing laxity in the SIJ, enhancing force closure and motor control to improve lumbopelvic kinematics. There is limited evidence to indicate benefit of EPC in decreasing mobility between the ilium and sacrum, and improving the strength of muscles surrounding the SIJ.  |
| **Critical Appraisal** |
| **Validity**[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.] |
| I scored this study 10/11 on AMSTAR, indicating a high level of validity. The authors utilized 2-3 assessors to select and rate the studies included in this systematic review decreasing the risk for bias in study selection and appraisal. These authors calculated percentage mean difference and 95% confidence intervals for each study analysed, and reported that they went so far as to contact authors of the studies reviewed if any data was found to be missing. Unfortunately, this systematic review does have some notable limitations. As I found when attempting to conduct my PICO search, evidence related to this topic is sparse. As such, many of the studies available for review had low to fair levels of internal and external validity. The authors note that 14/17 (*in vivo*) studies did not note the source of participants or whether or not selected participants were a sample of a larger pool. Additionally, 15/17 (*in vivo)* studies did not address blinding and 2 of the *in vivo* studies did not use appropriate statistical measures in their reporting.As a whole, I believe the authors of this study did a good job with the material available to them. They employed the appropriate steps to objectively analyse the data presented by the studies selected for review. However, the overall clinical applicability of this data is limited by the limitations of the studies available for review.  |
| **Interpretation of Results**[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.] |
| The results of this systematic review provide clear evidence that more research is needed related to the management of sacroiliac dysfunction. It is clear from my own research into sacroiliac dysfunction and the results of the authors literature review that there is a paucity of evidence related to SIJ dysfunction, exercise, and bracing. This left a small pool of available studies meeting the criteria for inclusion for the authors to examine in this systematic review. Unfortunately, the majority of the studies included in this systematic review have a very low number of participants. The study with the highest number of participants is 50, and the lowest number is 5. The average number of participants across all studies is 19. This low number of participants is a clear limitation in the studies. It is difficult to ascertain any conclusions related to the use of manual pelvic compression since only 2 of the 18 studies utilized manual pelvic compression. In addition to the limitation in number of studies utilizing manual pelvic compression, the 2 studies reviewed did not utilize any method to control the amount of EPC other than the physical therapists’ subjective assessment. Finally, these studies had a low number of participants; only 12 participants in one and 13 in the other. As the authors describe, there appears to be moderate evidence that external pelvic compression via pelvic compression bracing can be useful to decrease laxity in the sacroiliac joint, improve kinematics, and possibly increase lifting capacity. However, these results are largely dependent on patient position, pelvic compression brace positioning, and force closure of the pelvic compression brace. The variation in clinical results of pelvic compression bracing based on external factors makes it difficult to ascertain the true effectiveness of pelvic compression bracing. With regards to the other component of my PICO questions, stabilization/pilates-type exercises, the authors state that muscular strength and neuromuscular control are an important component of lumbo-pelvic stability.  |
| **Applicability of Study Results**[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.] |
| Of course, I wish that I had found a large number of high-quality studies with high validity and level of evidence related to my PICO question. However, I do think the information presented in this systematic review can be helpful to my clinical work moving forward. The information in this review reinforces my first line of treatment for sacroiliac joint dysfunction: therapeutic exercise. The strengthening and re-education of postural stabilizing muscles is an indispensable aspect to the treatment of patients with SIJ dysfunction. There is also no evidence presented to indicate any negative effects of external pelvic compression, therefore negative consequences of EPC are quite unlikely. Given that there is moderate evidence in support of EPC decreasing SIJ laxity and improving lumbopelvic kinematics, it may be beneficial to utilize EPC in cases of severe or uncontrolled pain/dysfunction, or in cases of acute injury. The results of this systematic review suggest that EPC may be beneficial for short term use, but not of long-term benefit. This evidence, and my own clinical experience of patient non-compliance with long term use of an external support device, lead me to believe that the long-term use of a pelvic compression brace is unwarranted. |

**(2) Description and appraisal of** Effectiveness of adding a pelvic compression belt to lumbopelvic stabilization exercises for women with sacroiliac joint pain: a feasibility randomized controlled trial **by** Brizzolara KJ, Wang-Price S, Roddey TS, et al. 2018.

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| **Aim/Objective of the Study/Systematic Review:** |
| The aim of this study is to examine the effect on disability level, pain level, and change in thickness of the transverse abdominus muscle with use of a pelvic compression brace in addition to lumbopelvic stabilization exercises (LSE). The authors also state a secondary aim of assessing participants perceived level of improvement, compliance with LSE, and compliance with use of pelvic compression brace.  |
| **Study Design**[e.g., systematic review, cohort, randomised controlled trial, qualitative study, grounded theory. Includes information about study characteristics such as blinding and allocation concealment. When were outcomes measured, if relevant]Note: For systematic review, use headings ‘search strategy’, ‘selection criteria’, ‘methods’ etc. For qualitative studies, identify data collection/analyses methods. |
| The authors deem this a feasibility study - single-blinded, mixed-design randomized clinical trial. I agree with this assessment. The participants were not blinded, since informed consent was obtained prior to assessment of eligibility criteria. The principle investigator was blinded to the assignment of participants. Subjects were assigned with a random drawing from an opaque envelope by a research assistant. The control group performed LSE only, the intervention group performed LSE and were instructed to use a pelvic compression brace during all waking hours for 4 weeks.   |
| **Setting**[e.g., locations such as hospital, community; rural; metropolitan; country] |
| This study took place in a metropolitan area: Dallas Texas. The study was performed in a university-based research center.  |
| **Participants**[N, diagnosis, eligibility criteria, how recruited, type of sample (e.g., purposive, random), key demographics such as mean age, gender, duration of illness/disease, and if groups in an RCT were comparable at baseline on key demographic variables; number of dropouts if relevant, number available for follow-up]Note: This is not a list of the inclusion and exclusion criteria. This is a description of the actual sample that participated in the study. You can find this descriptive information in the text and tables in the article. |
| * Participants in the local area were recruited with flyers and word of mouth
* Participants were screened by a physical therapist and had to test positive to at least 2 SIJ pain provocation tests
* N=25
* Diagnosis: unilateral low back pain, not extending past the knee
* Mean age: LSE group = 30.6 years, LSE + PCB group = 29.2
* Mean duration of symptoms: LSE group = 70.5 weeks, LSE + PCB group = 81.0 weeks
 |
| **Intervention Investigated**[Provide details of methods, who provided treatment, when and where, how many hours of treatment provided] |
| *Control* |
| The control intervention was treatment with lumbopelvic stabilization exercises (LSE). The exercise sessions were conducted by one of two research assistants. The research assistants were DPT students who each underwent 15 hours of training involving the specific exercise protocol and pelvic compression brace utilized in this study. The study took place over the course of 12 weeks with 4 weeks consisting of in-clinic exercise sessions and 8 weeks of home exercises only. During the 4 weeks of in-clinic treatment, patients were required to attend 5 of 6 treatment sessions. The recommended frequency of in-clinic treatment sessions was 2 times per week for 2 weeks and 1 time per week for 2 weeks. Patients were allowed to miss any one of these 6 sessions. During these in-clinic sessions, patients were instructed in exercises and supervised to ensure correct performance of all exercises. Patients were also instructed to perform home exercises daily. The participants were asked to keep a log of compliance with home exercise program (HEP) and in-clinic treatment sessions during the 12-week duration of the study.   |
| *Experimental* |
| The experimental condition was identical to the control group and included the addition of pelvic compression brace. Participants in this group were instructed in how to don/doff the pelvic compression brace. They were instructed to utilize the brace low, near the level of the greater trochanters, and to pull the brace moderately tight. Participants were instructed to wear the brace during all waking hours for the first 4 weeks of the study. Participants were given a log to record compliance with the pelvic stabilization brace for the first 4 weeks of the study.  |
| **Outcome Measures**[Give details of each measure, maximum possible score and range for each measure, administered by whom, where] |
| Modified Oswestry Low back Pain Disability Questionnaire (Modified OSW): measures low back pain related disability* Maximum possible score is 50 points, a higher score indicates greater disability
* It is unclear who administered
* Study results indicate statistically significant improvement in both groups with no statistically significant difference between groups.

Numeric Pain Rating Scale (NPRS)* Maximum possible score is 10, a higher score indicates a higher subjective level of pain
* It is unclear who administered
* Study results indicate statistically significant improvement in both groups with no statistically significant difference between groups.

Percent change in transverse abdominis (TrA)* Measured by ultrasound imaging
* Administered by primary investigator
* Study results indicate no significant difference between groups

Global Rating of Change (GROC) scale score: measures overall perceived improvement* Score ranges from -7 (a very great deal worse) to +7 (a very great deal better)
* It is unclear who administered
* Study results show that both groups averaged a +3, indicating participants perceived small positive changes. However, these results were not statistically significant.

Adherence to program* Adherence was similar in both groups
* Both groups exhibited decreased adherence in the last 8 weeks of the study.
 |
| **Main Findings**[Provide summary of mean scores/mean differences/treatment effect, 95% confidence intervals and p-values etc., where provided; you may calculate your own values if necessary/applicable. Use a table to summarize results if possible.] |
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| **Modified OSW** | **LSE group** | **LSE + belt group** | **Between group P** |
| baseline | 23.00 +/- 10.18 | 23.21 +/- 10.10 | .42 |
| 4 weeks | 16.00 +/- 5.78 | 18.00 +/- 10.90 |  |
| 12 weeks | 10.17 +/- 8.55 | 14.77 +/- 10.79 |  |
| **NPRS** |  |  |  |
| baseline | 2.75 +/- 1.42 | 3.15 +/- 2.04 | .57 |
| 4 weeks | 1.75 +/- 2.05 | 1.38 +/- 1.76 |  |
| 12 weeks | 1.25 +/- 1.71 | 1.08 +/- 1.66 |  |
| **Percent Change TrA** |  |  |  |
| baseline | 86.43 +/- 49.94 | 66.64 +/- 22.03 | .16 |
| 4 weeks | 174.91 +/- 68.28 |  145.31 +/- 41.41 |  |
| 12 weeks |  78.11 +/- 45.11 |  98.09 +/- 64.47 |  |
| **GROC** |  |  |  |
| 4 weeks | 2.83 +/- 2.44 |  3.23 +/- 2.24 | .73 |
| 12 weeks |  4.17 +/- 2.17 |  4.77 +/- 2.20 | .35 |

The main findings include an improvement in both pain (as measured by the NPRS) and disability (as measured be the Modified OSW) for both groups, with no difference between groups. Findings also suggest no significant difference between groups for transvers abdominis thickness, and no significant change in perceived level of improvement despite overall mean improvement on GROC scores.  |
| **Original Authors’ Conclusions**[Paraphrase as required. If providing a direct quote, add page number] |
| The authors conclude that the results of this study do not indicate any clear advantage to the addition of pelvic compression bracing to treatment of sacroiliac joint pain with therapeutic exercise. They go on to note a larger sample size would help in making a better determination of any difference in outcomes between the two treatment approaches.  |
| **Critical Appraisal** |
| **Validity**[Summarize the internal and external validity of the study. Highlight key strengths and weaknesses. Comment on the overall evidence quality provided by this study.] |
| I scored this study as a 9/11 on the PEDro, giving it a relatively high level of validity. The primary investigator was blinded and participant group assignment was randomized, decreasing likelihood of bias. Limitations of this study include the small sample size and relative low number of in-clinic treatment sessions. Participants were only instructed and observed by researchers for 5 to 6 visits over a 4-week time period and then instructed to continue on their own at home for 8 weeks. Participant adherence dropped during the last 8 weeks of the study, which is not at all surprising. Furthermore, the participants had relatively low levels of pain and disability at basline, leaving a smaller margin for improvement or statistical change. Overall, I think the evidence quality is fair. I think that the researches selected an appropriate study design and outcome measures, they also utilized methods to eliminate bias, and selected appropriate data assessment measures. However, the short duration of in-clinic treatments, small sample size, and low levels of pain/disability among participants present significant limitations to this study. |
| **Interpretation of Results**[This is YOUR interpretation of the results taking into consideration the strengths and limitations as you discussed above. Please comment on clinical significance of effect size / study findings. Describe in your own words what the results mean.] |
| In general, I agree with the authors’ assessment of the study results. The study demonstrates a statistically significant improvement in disability and pain among both groups. In addition, there is evidence that that participants perceived an overall improvement, despite the GROC scores being considered statistically insignificant. Further research is necessary to better understand the benefits of pelvic compression bracing.  |
| **Applicability of Study Results**[Describe the relevance and applicability of the study to your clinical question and scenario. Consider the practicality and feasibility of the intervention in your discussion of the evidence applicability.] |
| With regards to my PICO question, this study provides support for the use of stabilization exercises in the treatment of SIJ pain, and minimal to no support for the utilization of a pelvic compression brace. Clinically, it is helpful to know that good outcomes can be achieved with the use of lumbopelvic stabilization exercises. The use of a pelvic compression brace is an out of pocket expense for the patient and could potentially be viewed by the patient as a nuisance in terms of dressing, sitting comfortably, and adherence with all-day use. This study provides evidence that a PCB is unlikely to be an essential component of best treatment for sacroiliac pain.  |

**SYNTHESIS AND CLINICAL IMPLICATIONS**

[Synthesize the results, quality/validity, and applicability of the two studies reviewed for the CAT. Future implications for research should be addressed briefly. Limit: 1 page.]

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| The articles I reviewed attempt to address the topic of pelvic stabilization bracing and sacroiliac joint pain/dysfunction from two different angles. The first article by Arumugam, et al seeks to explore the mechanics, clinical and logistical implementation of pelvic compression bracing. The Arumugam article looks to explore the “whys” and “hows” of pelvic stabilization. The second article by Brizzolara, et al looks to compare the difference in outcomes with exercise alone versus exercise with pelvic compression bracing. This second article is more focused on the question of whether or not pelvic compression bracing provides any benefit beyond the improvements that can be seen with exercise intervention. Both of the studies were of good quality, with high scores of validity. The primary limitations were related to small sample sizes, and limited available research on this topic. In short, after much review, I believe the authors of both studies did high quality work on a difficult topic. Despite the lack of evidence related to this topic, and the limitations present in the studies I reviewed, I did find valuable information related to my PICO question. The Arumugam study indicates that some improvement in SIJ laxity and kinematics of the lumbopelvic region can be obtained with the use of a pelvic compression brace. However, there is no long term benefit with regards to neuromuscular control and muscular strength, and the benefits of utilizing a PCB may be limited to certain bodily positions and activities. The Brizzolara study provides evidence to support the use of lumbopelvic stabilization exercises to decrease sacroiliac joint pain. While I do not have a clear answer to my PICO question, the results of these studies indicate a preference for lumbopelvic stabilization exercises in the treatment of sacroiliac pain and dysfunction. Moving forward in my clinical practice, I will continue to utilize exercises aimed at improving strength and neuromuscular control. Based on the study outcomes, I will consider utilization of pelvic compression bracing in situations where it may be of short term benefit, such as with patients who have acute or very severe pain or dysfunction.  |

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