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Family History of Sacroiliac Joint Pain as a Risk Factor for Development of Sacroiliac Joint Pain: A Case-Control Study

Saba Javed, MD, and Jordan Chen, MD

Background: Chronic lower-back pain is among the most common health problems and accounts for a significant amount of disability worldwide. Sacroiliac joint (SIJ) pain is one of the leading causes of lower-back pain; however, diagnosis of SIJ pain can sometimes be challenging. Family history is a known predictive factor for arthritis in both seropositive and seronegative arthropathies, including osteoarthritis; however, the role of family history in SIJ pain has not been studied.

Study: This case-control study examined whether family history of SIJ pain is a risk factor for developing SIJ pain.

Discussion: Results indicate that a high proportion of patients with SIJ pain reported positive family history of SIJ pain (58.6% vs 10.5%, $P < .001$). Cases were 6.5 times more likely than controls to report any relative with history of SIJ pain.

Conclusion: Patients with a prior family history of SIJ pain can be identified early, monitored closely, diagnosed early, and started on aggressive physical therapy and close follow-up.

Key words: Sacroiliac joint pain, sacroiliac joint dysfunction

BACKGROUND

Chronic lower-back pain (LBP) is one of the most common ailments and accounts for significant morbidity and disability worldwide (1). It is challenging to diagnose and treat given its multifactorial causes, pathology, biopsychosocial aspects, and poorly defined treatment algorithms. The sacroiliac joint (SIJ) is estimated to contribute to pain in as much as 38% of cases of LBP (2,3).

Diagnosis of SIJ pain through physical exam can be difficult, as many of the physical exam findings can be mimicked by other pelvic or low-back diseases (4). One approach is to use a combination of history and physical exam findings to make a diagnosis. However, this is not without its limitations. For instance, the FABER test has a sensitivity of 50% to 77% and specificity of 100%, the Gaenslen's test has a sensitivity of 50% to 71% and specificity of 26% to 77%, and the thigh thrust test has a sensitivity of 36% to 88% and specificity of 50% to 69% (5). As such, studies have argued that even with a combination of positive physical exam findings, a definitive diagnosis of SIJ pain is not reliable (6). Another approach to diagnosis is through diagnostic injections at the SIJ or sacral lateral branch. Some clinical practice guidelines suggest one diagnostic block while others recommend 2 diagnostic blocks to more

From: UTH McGovern Medical School, Houston, TX

Corresponding Author: Saba Javed, MD, E-mail: sabajaved23@gmail.com
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accurately determine the origin of pain (7,8). Similarly, magnetic resonance imaging (MRI) is recommended for diagnosis of sacroiliitis related to HLA-B27-seronegative spondyloarthropathies (psoriasis arthritis, ankylosing spondylitis, inflammatory bowel disease with associated arthritis, and reactive arthritis) due to its high degree of sensitivity and better visualization of bone marrow and SIJ edema (9). However, SIJ pain due to non-inflammatory arthropathy typically has little findings on advanced imaging, but can show joint space narrowing, osteophytes, and sclerosis. The International Association for the Study of Pain (IASP) criteria for the diagnosis of SIJ dysfunction is as follows: pain in the area of the SIJ, reproducible with provocative maneuvers, and must be relieved with local anesthetic injection into the SIJ or the sacral lateral branch nerves (10). Needless to say, deciphering between various different causes of LBP is a tedious task. Family history is a known predictive factor for arthritis in both seropositive and seronegative arthropathies; additionally, there is evidence of family history as a risk factor for osteoarthritis (11,12). Until now, there have been no reported studies evaluating family history of SIJ pain as a predictive factor for the development of SIJ pain. The aim of this case-control study was to determine whether family history of SIJ pain is a risk factor for developing SIJ pain.

METHODS

Selection of Case Patients

This case-control study was conducted at an academic-based interventional pain facility. Cases were defined as patients with SIJ pain, clinically diagnosed based on a positive response (> 50% improvement) to SIJ injection performed by a staff pain physician between July 2018 and December 2021. The injection was performed at the procedure suite under fluoroscopy. Skin was anesthetized using 1% lidocaine topically followed by the localization of the SIJ under fluoroscopy guidance. Once the target was identified, a 22-gauge, 3.5-inch spinal needle was used to reach the target; after negative aspiration, 2 cc of 0.25% bupivacaine was injected. Needles were removed and hemostasis was achieved.

Selection of Control Patients

Controls were defined as patients who presented for pain management of chronic neck pain, chronic shoulder pain, myofascial pain, fibromyalgia, knee pain, and headaches between July 2018 and December 2021. Controls were demographically matched to the cases. Patients were excluded if they had LBP or were considered to have a prior history of LBP to minimize confounding.

Data Collection

Blinded investigators were designated to ask cases and controls, at the clinic visit, questions from a standardized questionnaire. Demographic data collected for this study included the following: age, gender, ethnicity, and family history of SIJ pain. All patients were asked to elicit potential family history of SIJ pain (Tables 1 and 2). For this study, patients were told blood relatives included only biological parents, biological siblings, biological children, biological grandparents, biological aunts, biological uncles, and biological first cousins. First-degree relatives included biological parents, biological siblings, and biological children. Nonfirst-degree relatives included biological grandparents, biological aunts, biological uncles, and biological first cousins. Step-relatives or adopted relatives were excluded.

Statistical Analysis

Continuous variables were reported as mean and standard deviation (SD) and analyzed using the t test. Discrete variables were analyzed using the chi-square test. For variables related to family history, odds ratio (ORs) with corresponding 95% confidence intervals (CI) were calculated. Statistical analyses were performed using Epi Info™ version 3.5.2.

RESULTS

Patient Characteristics

The study included 198 cases of patients with SIJ pain and 199 controls (patients with no history of SIJ or LBP). Table 3 lists the demographic data for cases appropriately matched. The average age of cases was 67.5 years (range, 43-77 years); the average age of controls was 69.3 years (range, 40-80 years). Gender was split as follows: among cases, there were 89 (44.9%) men and 109 (55.1%) women; among controls, there were 90 men (45.2%) and 109 (54.8%) women. Finally, the study sample included a majority of White patients among both cases 118 (59.6%) and controls 119 (59.7%) with the remainder comprised of African Americans, Hispanic, and other races/ethnicities. Tables 1 and 2 list the questions given to controls and cases, respectively, to elicit relevant family history.

Comparison of Cases vs Controls

Distribution of cases and controls according to family history of SIJ pain is reported in Table 4. A significantly higher proportion of cases reported a positive family history of SIJ pain (58.6% vs 10.5%, $P < 0.001$). Cases were 6.5 times more likely than controls to report any relative (includes first-degree and nonfirst-degree relative) with a history of SIJ pain (95% CI, 4.8-8.8). Cases were 4.1 times more likely than controls to report first-degree relatives with a history of SIJ pain (95% CI, 3.0-6.5).

DISCUSSION

The SIJ is the largest axial joint in the body. The innervation of the SIJ is complex and is thought to be coming from the fibers of the L4 medial branch, L5 dorsal rami, as well as S1-S4 sacral lateral branches (13). It is widely accepted that SIJ dysfunction causes SIJ pain, LBP, and pelvic pain. The pain is typically unilateral (unless both joints are affected) and below the L5 spinous process, sometimes radiating down as far as the foot. The causes of pain in the SIJ can be simplified by intraarticular (arthritis and infection) and extraarticular sources (enthesopathy, fractures, ligamentous injury, and myofascial pain). Clinical studies have demonstrated significant pain relief after both intraarticular and periarticular SIJ injections (14-16). Risk factors that predispose a person to gradually develop SIJ pain include apparent leg length discrepancy (17), gait abnormalities (18), prolonged vigorous exercise (19), scoliosis (20), spinal fusion to the sacrum (21), lumbar spine surgery due to SI ligament weakening and postsurgical hypermobility (22,23). Pregnancy is also a risk factor for SIJ pain development in women due to an increase in weight, extended lordotic posture, mechanical trauma of parturition, and hormone-induced ligamental laxity (24,25). Moreover, inflammation of the SI joint (either one or both) is considered an early symptom in all seronegative and HLA-B27-associated spondylarthropathies (26). Although the precise etiology of spondyloarthropathy remains unclear, the strong correlation with HLA-B27 supports that these pathologies are partly due to a genetically determined immune response to environmental factors in susceptible individuals (26). In any case, family history has been studied in other arthropathies but never with SIJ pain. Thus, the goal here was to examine whether family history of SIJ pain is a risk factor for subsequent development of SIJ pain.

The results of this study demonstrate an associa-

Table 1. Questionnaire to elicit family history for control patients.

1.	Do any of your blood relatives currently have sacroiliac joint pain or have a history of chronic sacroiliac joint pain?
2.	If so, how is that person related to you?

Table 2. Questionnaire to elicit family history for case patients.

1.	Do any of your blood relatives currently have sacroiliac joint pain or have a history of chronic sacroiliac joint pain?
2.	If so, how is that person related to you?

Table 3. Demographic data for cases and controls.

	No. (%)	
Characteristics	**Cases (n = 198)**	**Controls (n = 199)**
Age, y (range)	67.5 (43-77)	69.3 (40-80)
Gender		
Male	89 (44.9)	90 (45.2)
Female	109 (55.1)	109 (54.8)
Race/Ethnicity		
White	118 (59.6)	119 (59.7)
African American	26 (13.1)	20 (10.0)
Hispanic	14 (7.1)	16 (8.0)
Other	40 (20.2)	44 (22.3)

Table 4. Distribution of cases and controls according to family history of chronic lower-back pain.

	No. (%)			
Family History	**Cases (n = 198)**	**Controls (n = 199)**	***P* Value**	**OR (95% CI)**
First-degree relatives			< .001	4.1 (3.0-6.5)
0	125 (63.1)	183 (92.0)		
1	48 (24.2)	14 (7.0)		
≥ 2	25 (12.7)	2 (1.0)		
Nonfirst-degree relatives				
0	155 (78.3)	195 (98.0)		
1	29 (14.6)	5 (2.0)		
≥ 2	14 (7.1)	0		
Total relatives			< .001	6.5 (4.8-7.9)
0	82 (41.4)	178 (89.5)		
1	77 (38.9)	19 (9.5)		
≥ 2	39 (19.7)	2 (1.0)		

Abbreviation: CI, confidence interval; OR, odds ratio

tion between SIJ pain and family history, something that has not directly been studied previously. A significantly higher proportion of patients with SIJ pain reported a positive family history of SIJ pain (58.6% vs 10.5%, $P < .001$). As already stated above, HLA-B27 spondyloarthropathy-related SIJ pain appears to have a genetic predisposition; however, no studies were found in an extensive literature review analyzing SIJ pain and familial predisposition.

While our study does indicate that family history of SIJ pain is a risk factor for the development of SIJ pain, being a case-control study by nature, no exact cause or statistical likelihood can be elucidated from our data. Further studies need to be done to better understand the mechanism of transmission and whether or not there are any specific genetic traits that lead to this increased risk. Moreover, case-control studies are limited by potential recall bias. For instance, those diagnosed with SIJ pain may be more likely to cite a family history of SIJ pain. Selection bias may also have played a role in our data collection as controls were selected from patients presenting to the pain clinic for other chronic pain management conditions as opposed to from the general public. As such, the controls may not have been truly representative of the prevalence of SIJ pain in the general population. Finally, our study was limited by our sample size of cases and controls, as a higher sample size would allow for greater statistical strength in our conclusions. Nevertheless, this study is a step towards better understanding a possible family predisposition to SIJ pain and should be used as an aid in diagnosing and treating patients.

CONCLUSION

Herein, the present study demonstrates family history of SIJ pain as a risk factor for developing SIJ pain. Chronic LBP is a prevalent condition in most societies, and SIJ pain is a significant contributor to chronic LBP. Diagnosis of SIJ pain can be tedious and challenging at times, hence knowing that a patient has a family history of SIJ pain may bring this diagnosis more to the forefront. These patients with a prior family history of SIJ pain can be identified early, monitored closely, and educated on LBP signs and symptoms and treatment including diet, exercise, and physical therapy.

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