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*Original article*

# Sacroiliac joint dysfunction is one of an important cause of low back pain

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**Abstract:**

- ***Background*:** The SIJ, formed between the sacrum and ilium, is subject to disorders mainly classified as intra-articular inflammation or dysfunction due to minor subluxation, with the latter being more common. Diagnosing SIJ-related pain is difficult, as clinical history, examination, and imaging often lack specificity. This prospective study evaluates the role of sacroiliac joint (SIJ) dysfunction as a significant cause of low back pain (LBP) and estimates its prevalence among affected patients.
- ***Methods:*** Fifty patients with LBP below the L5 level were assessed over 18 months (October 2017 to March 2019). Those with three or more positive provocative SIJ tests underwent diagnostic lidocaine injection into the SIJ. A positive diagnosis was confirmed by ≥70% pain relief within 30–60 minutes post-injection.
- ***Result:*** Of the fifty patients, 20% were diagnosed with SIJ dysfunction. The condition was more prevalent in females and obese individuals. SIJ pain was more common on the left side (70%) than the right (30%).
- ***Conclusions:*** SIJ dysfunction is an underrecognized cause of LBP, with prevalence ranging from 15% to 30% in various studies. Increased clinical suspicion and accurate diagnosis are essential to avoid unnecessary spinal surgeries and reduce the risk of failed back surgery syndrome (FBSS).
- **Keywords:** low back pain, SIJ dysfunction, SIJ injection and diagnosis.

## INTRODUCTION

The etiology of low back pain (LBP) is often difficult to establish, as it may stem from a complex interplay of pathophysiological and psychosocial causes that present with overlapping clinical features. Sacroiliac joint (SIJ) dysfunction, in particular, remains a cryptic and underdiagnosed condition in routine medical practice. LBP is a prevalent health concern, accounting for approximately 14% of outpatient visits, and more than 90% of individuals experience at least one episode during their lifetime (1).

SIJ pain is believed to arise from either joint injury or increased ligamentous laxity, which may result in minor joint subluxation and subsequent tension in the posterior ligaments, leading to localized pain (2) (Figure 1). SIJ disorders are broadly categorized into two groups: those involving intra-articular inflammation, such as infection or seronegative spondyloarthropathy—which are relatively rare—and mechanical dysfunction associated with subtle joint subluxation, which constitutes the majority of cases. Patients typically report pain in the lower back, buttocks, lateral thigh, groin, hip, or leg, with lateral thigh pain being non-dermatomal and not radicular in nature (3). The most common areas of referred pain are the buttocks (94%) and lower back (72%) (4).

Clinically, SIJ dysfunction may be suspected based on signs such as pain when sitting on the affected side, discomfort while standing on one leg, and stumbling during ambulation (2,5). Diagnostic and therapeutic approaches include SIJ injections, with intra-articular injections demonstrating a 18–60% success rate and periarticular injections showing up to 80% efficacy in pain relief (6).

In this study, patients were considered to have SIJ dysfunction if they presented with low back and/or buttock pain localized over the SIJ, had at least three positive SIJ provocation tests—including either Gaenslen's or Patrick's test—experienced 70% or more pain relief following intra-articular SIJ injection (while similar injections elsewhere were ineffective), and showed negative results on both the dural tension and straight leg raising tests.

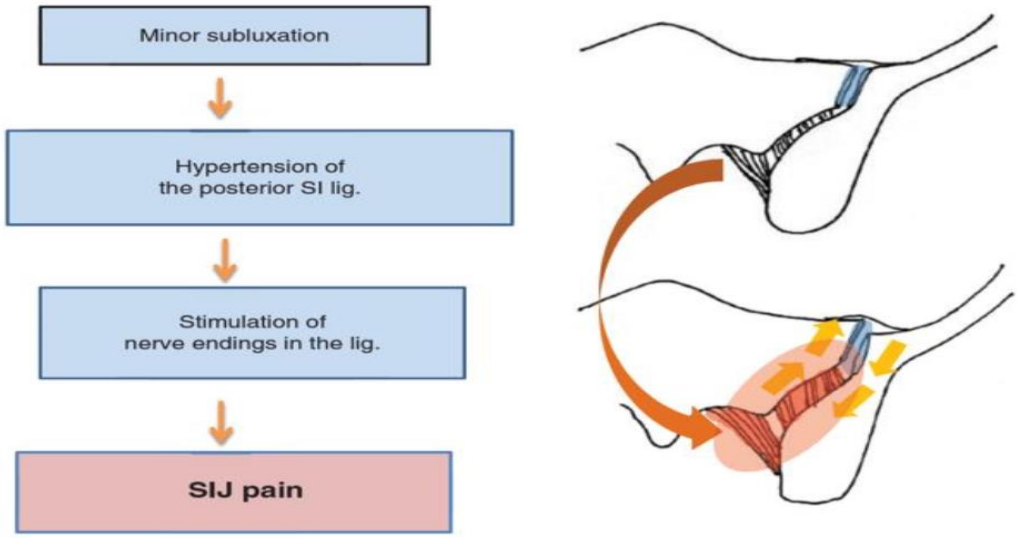


**Figure 1. Pathophysiology of SIJ pain. (2)**

## PATIENT and METHOD

This prospective study was conducted to evaluate sacroiliac joint (SIJ) dysfunction as a significant cause of low back pain. It was carried out in the Pain Management Department at the Neurosurgical Teaching Hospital and the Surgical Specialties Hospital (Medical City) over an 18-month period from October 2017 to March 2019. The study included 50 patients, all of whom presented with chronic low back pain located at or below the L5 level, persisting for more than six months. Some patients also reported varying degrees of referred pain into the thigh, buttock, or leg. All had been unresponsive to conventional medical treatment—including nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, opioids, and physical therapy—for a duration of one to three months.

Patients were included based on the following clinical criteria: presence of low back and/or buttock pain localized over the SIJ; at least three positive findings on sacroiliac provocation tests, including either Gaenslen's or Patrick's test; pain relief of 70% or more following diagnostic injection into the SIJ; and absence of positive findings on both the dural tension test and the straight leg raising test.

After obtaining informed consent, the procedure was performed under sterile conditions. Patients were placed in the prone position, and the lower back region was cleaned using povidone-iodine solution. Local anesthesia was administered by infiltrating the skin with 1 ml of 2% lidocaine. A 10 cm, 22-gauge echogenic needle was then used to access the periarticular region of the SIJ. The posterior superior iliac spine was first identified, and under ultrasound guidance, the needle was advanced from medial to lateral into the target

area. A mixture of 10 ml of 0.125% bupivacaine (marcain) and 40 mg of triamcinolone (Kenacort) was injected into the periarticular space.

Following the injection, patients were monitored in a recovery room and reassessed within one hour. Pain relief was evaluated by comparing the post-procedure pain level to the baseline, with attention to any significant improvement in symptoms.

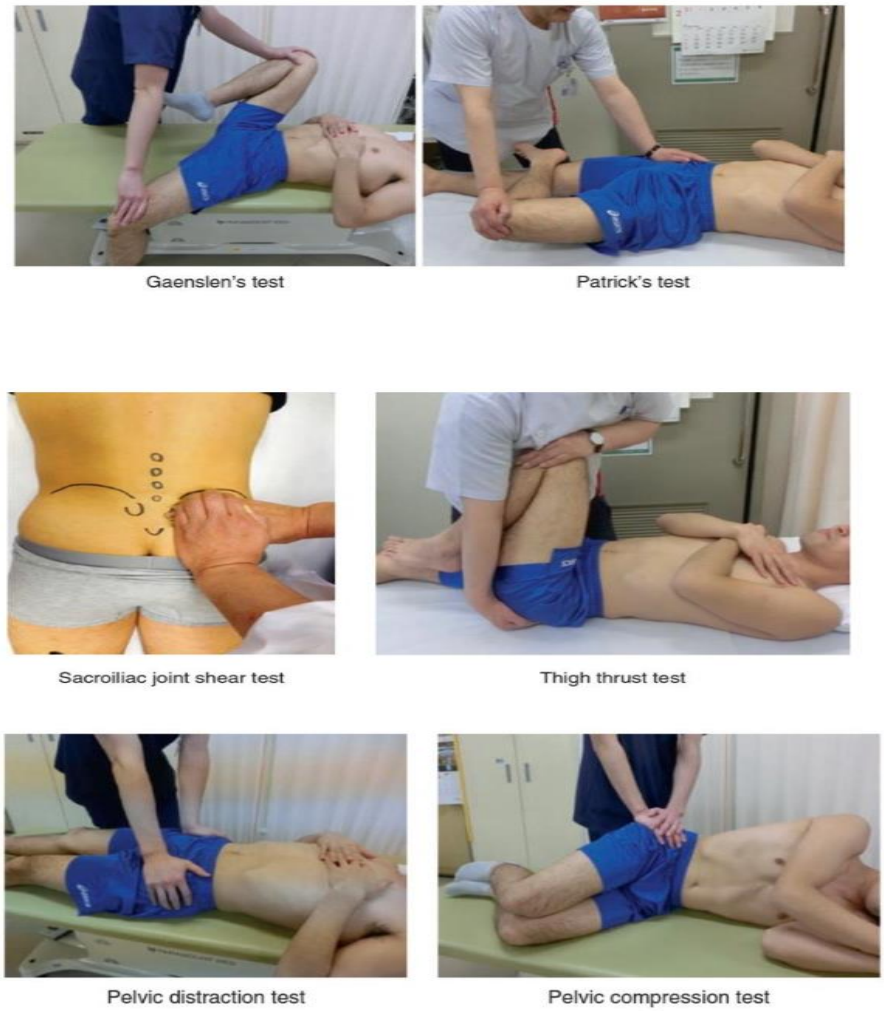


**Figure 2. Six provocative tests for SIJ. (2)**

## RESULTS

This study included 50 patients presenting with chronic low back pain. The age of participants ranged from 29 to 70 years, with a mean age of 49.1 years and a median age of 49.5 years. Notably, 80% of the patients were over the age of 40, indicating that low back pain and sacroiliac joint (SIJ) dysfunction are more prevalent in older adults (Table 3).

Regarding body mass index (BMI), the majority of patients were either overweight or obese. The mean BMI was 28 kg/m². Only 5 patients (10%) had a BMI below 25 kg/m², while 29 patients (58%) had a BMI between 25–29 kg/m², and 15 patients (30%) had a BMI of 30 kg/m² or higher. These findings suggest a higher occurrence of low back pain among individuals with elevated BMI.

SIJ dysfunction was diagnosed in 10 patients (20%) out of the total 50. Among these, 8 patients (80%) reported associated referred pain to the ipsilateral buttock or thigh, while 2 patients (20%) experienced localized low back pain without radiation. Lateralization showed that 6 patients (60%) had left-sided SIJ dysfunction, 2 patients (20%) had right-sided involvement, and 2 patients (20%) had bilateral SIJ dysfunction. All patients diagnosed with SIJ dysfunction were female.

In contrast, radicular pain was observed in 29 patients (58%) within the general low back pain group; however, none of these were among those diagnosed with SIJ dysfunction, reinforcing the non-radicular nature of SIJ-related pain.

Regarding provocation testing, 7 out of the 10 SIJ-positive cases had more than three positive SIJ tests (70%). Of the remaining, three patients had exactly three positive tests, and one patient exhibited up to six positive provocative signs. All 10 patients subsequently underwent SIJ injections under ultrasound guidance.

The procedure was well-tolerated by all participants, and no complications were reported. A detailed summary of the study's results is presented in Tables 1 and 2.

**Table 1: Parameters of Low Back Pain**

| Parameters of low back pain | Categories | N | % |
|---|---|---|---|
| **Gender** | Male | 12 | 24% |
| | Female | 38 | 76% |
| **SIJ Dysfunction** | Yes | 10 | 20% |
| **Radicular pain** | Yes | 29 | 58% |
| | No | 21 | 42% |
| **Site of Radiating pain** | No | 21 | 42% |
| | Lt. buttock | 6 | 12% |
| | Rt. buttock | 1 | 2% |
| | Lt. thigh | 2 | 4% |
| | Rt. Thigh | 3 | 6% |
| | Lt. Or Rt. Leg | 15 | 30% |
| | Rt. Foot | 2 | 4% |
| **Special clinical six tests For SIJ dysfunction** | <3 | 40 | 80% |
| | 3 | 3 | 6% |
| | >3 | 7 | 14% |
| **SIJ injection** | Not done | 40 | 80% |

| | | | |
|---|---|---|---|
| | Left Injection | 6 | 12% |
| | Right Injection | 2 | 4% |
| | Bilateral Injection | 2 | 4% |
| **Other pathological lesions rather than SIJD Total number = 40** | L. stenosis | 14 | 28% |
| | Muscle spasm | 10 | 20% |
| | Lumber listhesis | 8 | 16% |
| | L spinal cord Mass | 4 | 8% |
| | L spine Fracture | 2 | 4% |
| | L3L4_L4L5 disc | 2 | 4% |

**Table 2: Parameters of SIJ Group**

| Parameters of SIJ group | Categories | SIJ Dysfunction | Exact test P-Values |
|---|---|---|---|
| **Sex** | Male | 0 (0%) | 0.046* |
| | Female | 10 (100%) | |
| **Age** | 29–39 Years | 0 (0%) | 0.542 |
| | 40–49 Years | 4 (40%) | |
| | 50–59 Years | 6 (60%) | |
| | 60–70 Years | 0 (0%) | |
| **BMI** | Underweight | 0 (0%) | 0.796 |
| | Normal | 0 (0%) | 0.512 |
| | Overweight | 3 (30%) | 0.011* |
| | Obese | 7 (70%) | 0.001** |
| **Radiating pain** | No | 2 (20%) | 0.120 |
| | Yes | 8 (80%) | |
| **Site of Radicular pain** | No | 2 (20%) | 0.420 |
| | Lt. buttock | 5 (50%) | |
| | Rt. buttock | 1 (10%) | |
| | Rt. Foot | 1 (10%) | |
| | Rt. Thigh | 1 (10%) | |
| **Special clinical six tests** | <3 | 0 (0%) | 0.212 |
| | 3 | 3 (30%) | 0.001** |
| | >3 | 7 (70%) | 0.001** |
| **Other pathological lesions rather than SIJD** | No other SIJD | 10 (100%) | 0.001** |

** Statistically significant at $p \leq 0.05$. ** Statistically significant at $p = 0.001$.*

*SIJ: Sacroiliac joint, SIJD: Sacroiliac joint dysfunction. Lt. = Left, Rt. = Right, BMI: Body mass index*

**Table 3: Descriptive Statistics**

| Variables | Min | Max | Mean | SD | Median |
|---|---|---|---|---|---|
| **Age** | 29 | 70 | 49.12 | 9.037 | 50 |
| **BMI** | 22 | 33 | 27.96 | 2.688 | 28 |

## DISCUSSION

There is sufficient evidence to support that the sacroiliac joint (SIJ) is a potential source of pain and should be considered in the differential diagnosis of low back pain (LBP), buttock pain, and radicular symptoms. Due to the absence of highly reliable clinical and radiologic tests, a combination of provocative maneuvers and diagnostic injections is necessary to confirm the diagnosis. In 2013, the American Society of Interventional Pain Physicians concluded in their evidence-based guidelines that there is good evidence for the use of controlled comparative local anesthetic blocks in diagnosing SIJ pain, fair evidence supporting provocative tests, and limited evidence regarding the diagnostic accuracy of imaging modalities for painful SIJ identification (7). These findings are corroborated by independent systematic reviews conducted by Rupert et al. and Simopoulos et al. (8,9).

In our prospective study involving 50 patients with LBP, the prevalence of SIJ dysfunction was found to be 20%, indicating a substantial role for SIJ pain in clinical practice. Previous studies have reported prevalence rates ranging from 14% to 22% (10,11), while Irwin et al. noted a 26.6% prevalence in a retrospective study of 158 patients with LBP. Additionally, Unoki et al. observed that SIJ disorder developed in 15% of patients who underwent lumbar spinal fusion, with a higher prevalence compared to non-fused patients (12).

The mean age in our SIJ dysfunction group was 49.1 years, with the majority falling between 40–60 years. This finding aligns with Murakami et al., who reported increasing SIJ dysfunction with age, predominantly between 30–90 years, with a peak between 60–80 years (13). The slightly younger age distribution in our study may reflect demographic and life expectancy differences.

Regarding body mass index (BMI), the mean BMI for all LBP patients was 28 kg/m², while patients in the SIJ dysfunction group had a mean BMI of 30.3 kg/m². Notably, 30% were overweight (BMI 25–29, $p = 0.011$), and 70% were obese (BMI ≥30, $p = 0.001$). No patients with normal BMI (20–25) were found in the SIJ group. This suggests a strong association between increased BMI and SIJ dysfunction, consistent with literature linking obesity with increased axial loading and SIJ stress.

Sex distribution in our study revealed that all SIJ dysfunction patients were female (100%, $p = 0.046$), with regression analysis also showing significance ($p = 0.012$). This supports previous findings that female sex is a risk factor for SIJ dysfunction, potentially due to hormonal influences, pelvic anatomy, and ligamentous laxity associated with childbirth. Other studies have reported higher SIJ pain prevalence in women (48.1%) compared to men (31.5%) in populations aged 55 years and older (14).

Radiating pain was reported by 80% of the patients in the SIJ dysfunction group. Among these, five of six patients with left-sided SIJ involvement experienced radiating pain—four to the ipsilateral buttock and one to the left foot. Of the two patients with right-sided SIJ

dysfunction, one reported radiation to the thigh and one to the buttock. Among two patients with bilateral involvement, one had radiation to the right thigh while the other had localized pain only. The p-value for this distribution was 0.008. Notably, the nature of this pain was non-dermatomal, often spreading to the lateral thigh, buttock, or foot, in contrast to radicular pain of spinal origin. Bernard et al. similarly found bilateral SIJ pain in 20% of their patients (10).

Importantly, none of the patients in our SIJ dysfunction group exhibited a positive straight leg raising test, despite the presence of radiating symptoms. This underscores the need to consider SIJ dysfunction in the differential diagnosis of LBP with atypical radiating pain—particularly when the distribution is non-dermatomal and traditional neurologic tests are negative (15,16).

## CONCLUSION

Sacroiliac joint (SIJ) dysfunction remains a frequently underdiagnosed cause of low back pain. A high index of suspicion and accurate diagnosis are essential for effective and cost-efficient management. Clinical evaluation should include a detailed history and the application of specific physical provocative tests to assess for SIJ involvement. Definitive diagnosis should be confirmed through image-guided diagnostic SIJ injections, which play a crucial role in validating the source of pain and guiding appropriate treatment.

### Ethical Clearance:

Ethical approval was obtained from the scientific and ethical committee of the Iraqi Board for Medical Specialization, and verbal informed consent was secured from all participants after explaining the study's aims and ensuring data confidentiality.

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Nil.

**Conflicts of interest:**
There are no conflicts of interest.

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