

Commonly Used Tests in the Assessment of Sacro-iliac Joint Dysfunction by Physiotherapists in India: A Cross-sectional Study

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ABSTRACT

Introduction: Sacroiliac Joint Dysfunction (SIJD) refers to a condition that causes pain and discomfort, commonly due to dysfunction of the Sacroiliac Joint (SIJ). It is a plausible source of Low Back Pain (LBP). Static palpation tests, motion palpation, and pain provocation tests are mostly employed to check for SIJD.

Aim: To determine the commonly used tests in the assessment of SIJD by physiotherapists.

Materials and Methods: A cross-sectional Questionnaire-based study was conducted among physiotherapists in India from November 2022 to April 2023 at the Nitte Institute of Physiotherapy, NITTE (deemed to be University), Mangalore, Karnataka, India. The study included physiotherapists specialising in orthopaedics and obstetrics and gynaecology. The practitioners' years of experience were considered. An online survey was conducted using a questionnaire developed to determine the frequently used bony landmark for checking SIJ asymmetry, commonly affected structures, and commonly used motion palpation and pain provocation tests for examining

SIJD. Questionnaires were sent to at least 100 physiotherapists, and 72 responses were included in the study. Data was collected and analysed using descriptive statistics: frequency and percentage. Data analysis was performed using Statistical Package for Social Sciences (SPSS) software version 26.0.

Results: Seventy-two practitioners responded to the online survey. The commonly assessed bony landmark was the Posterior Superior Iliac Spines (PSIS) with 52 responses (28%). The most frequently preferred motion palpation examination test was the compression test with 36 responses (17.2%). Tenderness or tissue texture change was mainly checked at the PSIS with 54 responses (37.8%), and the commonly used pain provocation tests were the thigh thrust test and supine SIJ springing test with 46 responses (26.6%).

Conclusion: According to this study, many physiotherapists employed diagnostic techniques congruent with Mitchell's model, but they also frequently added additional motion tests, measured tenderness, and used pain provocation techniques. Most preferred the ASIS compression and thigh thrust tests to assess SIJD.

Keywords: Diagnostic test, Questionnaire, Physiotherapists

INTRODUCTION

SIJD refers to a condition that causes distress and discomfort, commonly due to dysfunction of the SIJ [1,2]. Between 6.2% and 92% of Indians suffer from LBP. According to a study, there is a significant population with disabilities if the prevalence of SIJD is between 15 and 30% [3]. Current research has shown that the SIJ can cause LBP [4,5]. The two typical explanations show the implication of the SIJ in LBP: uneven pelvic position leads to increased stress and discomfort, and hypomobility at the SIJ causes tissue stress and pain [6,7]. Joint laxity, ageing, trauma, postural errors, asymmetry, muscle imbalances, derangement, and hypomobility at the SIJ constitute a few underlying causes of discomfort [8]. Usually, the SIJ becomes inflamed, and it can be extremely painful during weight-bearing positions [9]. Improper lifting techniques and muscle imbalances can cause SIJD by putting excessive and ongoing pressure on the sacral base through the spine [7]. It represents a LBP radiated to the hip, buttocks, groin, and thigh, and it aggravates on climbing stairs, getting out of bed, tingling or numbness, activities which demand asymmetric loading, coughing, and high heels. Another commonly seen symptom is pain and tenderness with the Fortin finger test in the area beneath the PSIS [8,10,11].

The SIJ is the most likely but underdiagnosed source of LBP and lacks a gold standard tool for examination [12]. Many studies showed intra-articular anaesthetic injection or joint block helped

in the diagnosis of SIJD [11,13,14]. However, current studies have shown that it helped in understanding the intra-articular source of pain rather than the whole joint, and secondly, there exists controversy across the likelihood that an anaesthetic block might affect each aspect of the joint capsule; also, it is not cost-effective [15]. This led the clinicians to predominantly choose a battery of tests. There are three types of tests used in the assessment of SIJD, namely positional palpation tests, motion palpation tests, and pain provocation tests [16]. Osteopathic authors suggest using a combination of mobility tests, soft tissue texture changes, and the identification of static bony asymmetry to diagnose SIJD. The use of provocative maneuvers to detect SIJD is controversial due to the high likelihood of false positives and difficulty in determining the exact source of damage [4,17].

While many clinical tests are available to identify SIJD, none are considered valid or reliable when applied alone. A model of SIJ function suggests that muscle force and ligament tension play a role in maintaining SIJ stability and adapting to different loading scenarios. Various sacroiliac and pelvic somatic dysfunctions are identified through static pelvic landmark asymmetries and forward flexion tests to pinpoint the problematic side (right or left SIJ). A recent study conducted by Van Der Wurff P et al., demonstrated that a battery of pain provocation tests is valid in the diagnosis of SIJD when three out of five tests are positive [18] (FABER, Gaenslen, thigh thrust, compression, and distraction test; six provocation tests) [19].

In developed nations, as per surveys conducted in Australia, the United Kingdom, and the United States, physiotherapists and various practitioners were found to have an inclination towards certain tests, irrespective of the suggested evidence [20-22]. The literature mentions various methods for the evaluation of SIJD; however, less is known about the methods used for the assessment of SIJD by physiotherapists in India. Since there is ambiguity in the tests usually utilised in the assessment of SIJD, this survey aims to identify the commonly used tests or the trends followed by physiotherapists and practitioners in India in the assessment of SIJD.

MATERIALS AND METHODS

A cross-sectional study was conducted among physiotherapists working in India from November 2022 to April 2023 at the Nitte Institute of Physiotherapy, NITTE (Deemed to be University) Mangalore, Karnataka, India. The study protocol was approved by the institutional ethical committee NIPT/IEC/Min/30/2022-2023 in October 2022.

Sample size estimation: According to the study by Srivastava S et al., the prevalence was 17.5%, with an absolute precision of 9%, a 5% level of significance, and a minimum sample size required of 61 [3]. The formula $n = \frac{Z^2 \times p(1-p)}{2 \times 1.2}$ was used to estimate the sample size.

Inclusion criteria: The study included physiotherapists specialising in Orthopaedics and Obstetrics and Gynaecology.

Exclusion criteria: Those physiotherapists specialising in other fields and practicing abroad were not included.

Procedure

Demographic data for age, gender, and years of experience were collected from the participants. The questionnaire was referenced from a previous study [23]. The main aim of the survey was to identify the commonly used tests in the assessment of SIJD. The tests for SIJD are categorised under static palpation, movement palpation, and pain provocation, hence only 4 questions were considered and approved by a team of three physiotherapists, including academicians and clinicians, and were validated by two senior physiotherapists of the required specialty. The Content Validity Index (CVI) of the questionnaire was 0.95; however, the reliability was not tested. The final questionnaires were sent to physiotherapists practicing across India through emails and social media platforms. The questionnaire [Table/Fig-1] consisted of two sections (A/B). Section A contained questions about their years of experience, the current practicing city, and their field of specialisation. Section B contained four questions with multiple-choice options. It focused on bony landmark assessment to check asymmetry, commonly affected structures, and widely used motion palpation and pain provocation tests. Questionnaires were sent to at least 100 physiotherapists, and 72 surveys were received and included in the study.

STATISTICAL ANALYSIS

The data were collected and reviewed using Descriptive Statistics, including frequency and percentage. Data analysis was performed using SPSS software (SPSS Inc.; Chicago, IL), version 26.

RESULTS

A total of 72 responses were received. Among these, the majority of the responses came from the southern part of India (Karnataka, Kerala, and Tamil Nadu). In Section A, out of 72 participants, 41 were females and 31 were males. A total of 40% of the practitioners had 0-5 years of experience, while 60% had 6-10 years of experience. 70% specialised in orthopaedics physiotherapy, and 30% specialised in Obstetrics and Gynaecology. In Section B, the pelvic bony landmarks frequently assessed for asymmetry of SIJ were PSIS 52 (28%), ASIS 41 (22%), and iliac crests 27 (14.5%) [Table/Fig-2].

<p>Section A</p> <p>Email</p> <p>Physiotherapy specialised in?</p> <p>Age</p> <p>Gender</p> <p>Years of experience?</p> <p>Currently practising in which city?</p> <p>Section B</p> <p>1. Which pelvic bony landmark do you assess for asymmetry of SIJ frequently? Please indicate by marking one or multiple options.</p> <ul style="list-style-type: none"> • Anterior Superior Iliac Spines (ASIS) • Pubic Symphysis • Posterior Superior Iliac Spines (PSIS) • Sacral Sulci • Sacral Base • Gluteal Folds • Inferior Lateral Angles (ILA) of the Sacrum • Ischial Tuberosity • Iliac Crests • Greater Trochanters • Popliteal Creases • Medial Malleoli • Medial Longitudinal Arches of feet • Other: <p>2. Which tests do you utilise to conduct a movement testing of pelvis to identify SIJD? Mention the appropriate answer (s)</p> <ul style="list-style-type: none"> • Standing Flexion Test • Seated Flexion Test • One-legged Stork Test/Gillet Test • Anterior Superior Iliac Spine (ASIS) compression test • Supine SIJ springing using femur as lever, "high thrust" • Sacral springing-patient prone • SIJ gapping using internal hip rotation as lever • Functional Diagnosis • Cranial Diagnosis • Other: <p>3. Which structure do you assess to check the tenderness: Mention which area(s) you commonly assess to find out SIJD/pelvic dysfunction:</p> <ul style="list-style-type: none"> • Sacrotuberous ligament • Posterior Superior Iliac Spine (PSIS) • Iliolumbar ligament • Gluteal Muscles • Piriformis muscle • Other: <p>4. Pain Provocation Tests. Mention which tests you commonly use to check SIJD / pelvic dysfunction:</p> <ul style="list-style-type: none"> • Anterior Superior Iliac Spine (ASIS) compression test • Supine SIJ springing using femur as lever, "high thrust" • Sacral springing-patient prone • Other:
<p>[Table/Fig-1]: Questionnaire.</p>

	Frequency	%
Anterior Superior Iliac Spines (ASIS)	41	22
Gluteal Folds	12	6.5
Greater Trochanters	4	2.2
Iliac Crests	27	14.5
Inferior Lateral Angles (ILA) of the Sacrum	11	5.9
Ischial Tuberosity	7	3.8
Medial Longitudinal Arches of feet	1	0.5
Medial Malleoli	6	3.2
Popliteal Creases	2	1.1
Posterior Superior Iliac Spines (PSIS)	52	28
PSIS	1	0.5
Pubic Symphysis	5	2.7
Sacral Base	7	3.8
Sacral Sulci	9	4.8
SI joint landmarks on either side seen as dimples on skin	1	0.5

[Table/Fig-2]: Pelvic bony landmark frequently assessed for asymmetry of SIJ (N=186).
(In this data one person has multiple entries and the percentages are computed based on the total responses under each question.)

Two special tests were conducted: the motion palpation test and a pain provocation test. The tests used to perform a movement testing

of the pelvis to identify SIJD were ASIS compression test 17.2 (%), one-legged stork test/Gillet Test 34 (16.3%), standing flexion test 34 (16.3%), and “thigh thrust” 27 (12.9%) [Table/Fig-3].

		Frequency	%
Which test/ tests do you utilise to conduct a movement examination or motion testing of pelvis to identify SIJD? Please indicate the appropriate answer (s)	“Thigh thrust”	27	12.9
	Anterior Superior Iliac Spine (ASIS) compression test	36	17.2
	FABER or Patrick’s test	1	0.5
	Faber’s	1	0.5
	Functional Diagnosis	18	8.6
	One leg stork test	1	0.5
	One-legged Stork Test/Gillet Test	34	16.3
	Sacral thrust test	1	0.5
	Sacral springing-patient prone	11	5.3
	Seated Flexion Test	9	4.3
	SIJ gapping using internal hip rotation as lever	9	4.3
	Standing Flexion Test	34	16.3
	Supine SIJ springing using femur as lever	27	12.9

[Table/Fig-3]: Tests that utilise to conduct a movement testing of pelvis to identify SIJD (209).
(In this data one person has multiple entries and the percentages are computed based on the total responses under each question.)

The structures used to assess for detecting tenderness were PSIS 54 (37.8%), Piriformis muscle 30 (21%), and Gluteal Muscles 28 (19.6%) [Table/Fig-4]. The pain provocation tests used to assess SIJD/pelvic dysfunction were “thigh thrust” 46 (26.6%), Supine SIJ springing 46 (26.6%), and ASIS compression test 43 (24.9%). More than three tests were used to assess [Table/Fig-5].

		Frequency	%
Which structure do you assess for detecting the tenderness and/or tissue texture change: Please indicate which area(s) you commonly assess to detect SIJD / pelvic dysfunction:	Gluteal Muscles	28	19.6
	Hamstrings	1	0.7
	Iliolumbar ligament	8	5.6
	Paraspinal muscles	1	0.7
	Piriformis muscle	30	21
	Posterior Superior Iliac Spine (PSIS)	54	37.8
	Psis	1	0.7
	Sacroterous ligament	20	14
	Total	143	100

[Table/Fig-4]: Structures assessed to check the tenderness (N=143).
(In this data one person has multiple entries and the percentages are computed based on the total responses under each question.)

		Frequency	%
Pain Provocation Tests. Please indicate which examination(s) you commonly used to detect SIJD/pelvic dysfunction:	“Thigh thrust”	46	26.6
	Anterior Superior Iliac Spine (ASIS) compression test	43	24.9
	Distraction test	1	0.6
	Faber’s test	2	0.9
			0.6
	Gaenslen’s test	4	1.8
			0.6
			0.6
	Sacral springing	1	0.6
	Sacral springing-patient prone	29	16.8
	SLR test	1	0.6
Supine SIJ springing using femur as lever	46	26.6	

[Table/Fig-5]: Pain provocation tests used to check SIJD/pelvic dysfunction (N=173).
(In this data one person has multiple entries and the percentages are computed based on the total responses under each question.)

DISCUSSION

The current study shows that PSIS is the most frequently assessed landmark for SIJD. The structure used to identify tenderness was also PSIS. The most commonly used motion palpation tests were ASIS compression test, and the pain provocation test was thigh thrust and ASIS compression test. The investigation looked at the variety and usage of clinical SIJ diagnostic procedures by physiotherapists across the country. Reports of preferences for evaluating the pelvis and SIJ were relatively similar to the Mitchell model, supported by Australian and American osteopathic texts [20]. Although no osteopathic author has ever endorsed pain provocation tests, they are frequently mentioned in the literature on manual therapy. It appears that most osteopaths employ some variation of these tests. According to the Mitchell model [7], mobility tests should be used to identify which pelvic bony landmark is asymmetric and to identify the dysfunction (either the standing or seated flexion test) as a basis for determining the presence and nature of SIJD. According to the study of United States osteopaths, the sacral base (82%), ASIS (87%), and PSIS (81%) were the landmarks most frequently evaluated [21], and Australian osteopaths found that the PSIS (94%) and ASIS (89%), as well as iliac crests (77%), were most frequently checked for asymmetry [20]. These three studies show that PSIS and ASIS were mainly assessed, and the Australian osteopaths’ study is more similar to the current study. Hence, there is concordance in the findings of the present study to the Mitchell model. In most of the responses, therapists individually assessed more than 3 landmarks.

According to Australian osteopaths, the most often reported motion test was sacral springing (73%), standing flexion test (71%), and ASIS compression (60%) [20]. The US Osteopaths study shows ASIS compression (68%), OCF (61%), the standing flexion test (54%), and sacral springing (46%) as the most common motion tests used. In these three studies, ASIS compression, the standing flexion test, and sacral springing were the main tests used, with one main test used by US practitioners being cranial diagnosis, which was less used in other studies. The Australian osteopaths’ study shows that following the PSIS (77%) and gluteal muscles (77%), the piriformis (80%) muscle was recurrently checked for discomfort [20]. The US study did not mention tenderness. An Australian study showed that sacral spring (prone) (68%), SIJ spring (thigh thrust) (60%), and ASIS compression test (46%) were commonly used [20]. The US study showed the active straight leg raise (52%) and ASIS compression (48%), with sacral springing being commonly seen in these three studies [21]. Australians used sacral springing as both pain provocation and motion testing [20], while the majority of US practitioners have used the Straight leg raised test for the examination. In order to diagnose SIJD, practitioners rarely employ just one test. Yet when a number of tests were combined with the conclusion that at least three out of four tests were positive to identify the presence of SIJD [5]. This study shows the mainly used tests by the physiotherapists and their helpfulness in assessing SIJD.

Limitation(s)

The survey could not cover the whole of India. Therapists with more than 15 years of experience did not participate in the survey. Future studies could be conducted to encompass all of India. These studies could investigate the differences in the process of clinical decision-making between male and female therapists and their choices of tests.

CONCLUSION(S)

According to this study, many Indian physiotherapists employed diagnostic techniques that are deployed in Mitchell’s model and the tests used by osteopaths in the USA and Australia, including motion-palpation tests, tenderness assessments, and pain provocation tests. The survey identified that physiotherapists used a battery of tests, such as palpation of tenderness, pain provocation

tests, static palpation of landmarks, and motion-palpation tests in the assessment of SIJD. This survey can guide clinicians to focus on the tests provided in the survey for an overall assessment of the joint, thereby leading to better diagnosis and treatment. It also opens a platform for further studies in the area of SIJD.

Acknowledgement

The authors would like to thank all the therapists for taking out their valuable time and participating in the survey.

REFERENCES

- [1] Riddle DL, Freburger JK, Network NAORR. Evaluation of the presence of sacroiliac joint region dysfunction using a combination of tests: A multicenter intertester reliability study. *Phys Ther.* 2002;82(8):772-81.
- [2] Cohen SP. Sacroiliac joint pain: A comprehensive review of anatomy, diagnosis and treatment. *Anesth Analg.* 2005;101(5):1440-53.
- [3] Srivastava S, Singh A, Kumar KD, Mittal H. Prevalence of sacroiliac joint dysfunction among Indian low back pain patients-A cross sectional study. *Indian J Physiother Occup Ther-An International Journal.* 2018;12(2):20-23.
- [4] Barros G, Mcgrath L, Gelfenbeyn M. Sacroiliac Joint dysfunction in patients with low back pain. *Fed Pract.* 2019;36(8):370-75.
- [5] Cibulka MT, Koldehoff R. Clinical usefulness of a cluster of sacroiliac joint tests in patients with and without low back pain. *J Orthop Sports Phys Ther.* 1999;29(2):83-92.
- [6] Levangie PK. Four clinical tests of sacroiliac joint dysfunction: The association of test results with innominate torsion among patients with and without low back pain. *Phys Ther.* 1999;79(11):1043-57.
- [7] Mitchell Fred L, Mitchell P, Kai Galen. *The Muscle Energy Manual Evaluation and Treatment of the Pelvis and Sacrum.* 3rd ed. Mitchell P, Kai Gallen, Mitchell Carol P, Mc Glathon Weller, editors. United States of America: MET Press PO 4577, East Lansing Michigan; 1999.
- [8] Srivastava S, Kumar DKU, Mittal H, Dixit S. Short-term effect of "mechanical diagnosis and therapy" in the management of sacroiliac joint pain. *J Clin Diagn Res.* 2018;12(9):YC01-04.
- [9] Sinkov V, Klare C, McAuliffe K. Spine roundtable: Sacroiliac joint pain. *JBJS Journal of Orthopaedics for Physician Assistants* 2022;10(2). Available from: https://journals.lww.com/jbjsjopa/fulltext/2022/06000/spine_roundtable___sacroiliac_joint_pain.8.aspx.
- [10] Buchanan P, Vodapally S, Lee DW, Hagedorn JM, Bovinet C, Strand N, et al. Successful diagnosis of sacroiliac joint dysfunction. Vol. 14, *Journal of Pain Research.* Dove Medical Press Ltd. 2021. p.3135-43.
- [11] Thawrani DP, Agabegi SS, Asghar F. Diagnosing sacroiliac joint pain. *J Am Acad Orthop Surg.* 2019;27(3):85-93. Available from: https://journals.lww.com/jaaos/fulltext/2019/02010/diagnosing_sacroiliac_joint_pain.2.aspx.
- [12] Simopoulos TT, Israel Deaconess B, Manchikanti L, Singh V, Gupta S, Hameed H, et al. A Systematic Evaluation of Prevalence and Diagnostic Accuracy of Sacroiliac Joint Interventions. *Pain Physician.* 2012;15(3):E305-44.
- [13] Gitkind AI, Olson TR, Downie SA. Vertebral artery anatomical variations as they relate to cervical transforaminal epidural steroid injections. *Pain Medicine (United States).* 2014;15(7):1109-14.
- [14] Kennedy DJ, Engel A, Kreiner DS, Nampiaparampil D, Duszynski B, Macvicar J. Fluoroscopically Guided Diagnostic and Therapeutic Intra-Articular Sacroiliac Joint Injections: A Systematic Review. *Pain Med.* 2015;16(8):1500-18.
- [15] Van der Wulf P, Meyne W, Hagmeijer RHM. Clinical tests of the sacroiliac joint. A systematic methodological review. Part 2: Validity. *Man Ther.* 2000;5(2):89-96.
- [16] Orthopaedic Division Review [Internet]. Available from: www.orthodiv.org.
- [17] Hansen HC, Helm S. Sacroiliac joint pain and dysfunction current opinion. *Pain Physician.* 2003;6(2):179-89.
- [18] Van Der Wurff P, Buijs EJ, Groen GJ. A multitest regimen of pain provocation tests as an aid to reduce unnecessary minimally invasive sacroiliac joint procedures. *Arch Phys Med Rehabil.* 2006;87(1):10-14.
- [19] Telli H, Telli S, Topal M. The Validity and Reliability of Provocation Tests in the Diagnosis of Sacroiliac Joint Dysfunction. *Pain Physician.* 2018. 21(4):E367-76.
- [20] Peace S, Fryer G. Methods used by members of the Australian osteopathic profession to assess the sacroiliac joint. *Int J Osteopath Med.* 2004;7(1):25-32.
- [21] Fryer G, Morse CM, Johnson JC. Spinal and sacroiliac assessment and treatment techniques used by osteopathic physicians in the United States. *Osteopath Med Prim Care.* 2009;3:4.
- [22] Fryer G, Johnson JC, Fossum C. The use of spinal and sacroiliac joint procedures within the British osteopathic profession. Part 2: Treatment. *Int J Osteopath Med.* 2010;13(4):152-59.
- [23] Methods used by members of the Australian profession to assess the sacroiliac joint osteopathic [Internet]. Vol. 7, *Journal of Osteopathic Medicine.* 2004. Available from: <http://www.yellowpages.com.au>.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 26, 2023
- Manual Googling: Dec 21, 2023
- iThenticate Software: Dec 23, 2023 (9%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. No

Date of Submission: Jul 25, 2023

Date of Peer Review: Sep 11, 2023

Date of Acceptance: Dec 27, 2023

Date of Publishing: Feb 01, 2024