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*Methods Used by Members of the Australian  
Osteopathic Profession to Assess the Sacroiliac Joint*

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# Methods Used by Members of the Australian Osteopathic Profession to Assess the Sacroiliac Joint

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## ABSTRACT

The range and frequency of clinical tests used by Australian osteopaths to detect sacroiliac joint dysfunction (SIJD) is unknown. The aim of this study was to determine what clinical tests are employed by Australian osteopaths to assess for SIJD, and determine whether a correlation existed between these tests and clinical experience. Surveys were mailed to all Australian osteopathic practice locations listed in the current phone directory. 168 osteopaths responded to the survey, with an estimated response rate of 30%. Most respondents reported they utilise asymmetry of bony landmarks, motion tests and pain provocation tests to detect SIJD. The PSIS (94%) was most frequently examined for asymmetry, sacral springing (prone) (73%) was the most frequently reported motion test, and the piriformis (80%) was most frequently examined for tenderness and/or tissue texture change. Only 14% of respondents completely abstained from using pain provocation testing. It appeared that many osteopaths used diagnostic procedures consistent with the model proposed by Mitchell, but supported them with other motion and pain provocation tests. The use of standard tests commonly advocated in the osteopathic literature declined with increasing practitioner experience, whereas the use of a wide range of idiosyncratic

tests increased. It appeared that the majority of osteopaths use pain provocation tests, which are not advocated by any osteopathic text, but commonly referred to in the wider manual therapy literature.

**Keywords:** Sacroiliac, dysfunction, osteopathy, clinical testing

## INTRODUCTION

The mobility and dysfunction of the joints of the pelvis have created much passion and debate within the osteopathic profession.<sup>1</sup> Varying descriptions of sacroiliac joint (SIJ) biomechanics, sacroiliac joint dysfunction (SIJD), and corrective techniques abound.<sup>2-5</sup>

The majority of osteopathic literature that describes detailed assessment of the SIJ has its origins in the United States.<sup>4-9</sup> It would seem the most widely described model is that devised by Fred Mitchell Snr, which has now “...*become embedded in very many parts of osteopathic practice throughout Europe and America.*”<sup>10</sup> The Mitchell model draws from both the Fryette and MacKinnon models, with personal additions. It was an attempt to simplify and systematise the biomechanics of this complex joint for assessment and treatment purposes.<sup>10</sup>

In a review of SIJ anatomy and biomechanics, motion occurring at the SIJ was reported to be a combination of rotation and translation that did not occur around a simple axis.<sup>11</sup> The motions available at the SIJ have been repeatedly found to be small,<sup>12,13</sup> not exceeding 2-3° or 1-2mm.<sup>11</sup>

The SIJ has been implicated as a common source of LBP.<sup>3,11,14</sup> Stressing the SIJ with injections of contrast medium has produced somatic pain directly over the joint, and concurrent somatic referred pain of a variable nature into the lower limb. Bogduk has discussed the evidence relating to sources of LBP, and reported that the SIJ is likely to be the cause in 15% of chronic sufferers.<sup>14</sup> Research has failed to reveal a standard

symptomatic presentation for patients considered to have the SIJ as their source of pain.<sup>11,15</sup>

According to Levangie,<sup>3</sup> the two most common hypotheses for implication of the SIJ in LBP are that asymmetry within the pelvic ring results in areas of increased stress and subsequent production of pain, or that hypomobility at either SIJ results in tissue stress and pain. Dreyfuss *et al.*<sup>2</sup> considered relative hypomobility with altered anatomical relationship between sacrum and ilium to be the more common cause of SIJ pain. Bogduk<sup>14</sup> stated that the pathology of the joint is unknown, although ventral capsular tears may underlie some cases. Presently there is no gold standard testing procedure to confirm the presence of SIJD.<sup>15</sup>

Many osteopathic authors have advocated that the detection of static bony asymmetry, soft tissue texture change and motion tests be used in combination to form a diagnosis. The most commonly cited landmarks to be examined for asymmetry are iliac crests, medial malleoli, pubic symphysis, greater trochanters, sacral sulci, inferior lateral angles of the sacrum, anterior superior iliac spines (ASIS), posterior superior iliac spines (PSIS), ischial tuberosities, heel pads, gluteal folds, popliteal creases, medial longitudinal arches of feet, and sacral base.<sup>4-9</sup>

The motion tests for assessing SIJD most commonly cited in osteopathic texts include the standing flexion test,<sup>4-9</sup> seated flexion test,<sup>4-9</sup> sacral springing,<sup>1,4-9</sup> pelvic rocking,<sup>1,4,5,8</sup> ASIS Compression Test,<sup>4,7,8</sup> sacral motion with respiration and cranial rhythmic impulse,<sup>5,6,8</sup> one-legged Stork test / Gillet Test,<sup>4,6</sup> Trendelenburg Test,<sup>4,8</sup> lumbosacral spring test,<sup>6,8</sup> backward bending test,<sup>6,8</sup> standing trunk sidebending,<sup>6</sup> sacroiliac gapping (prone with internal rotation of hip),<sup>6</sup> and fascial preference of sacroiliac area.<sup>7</sup>

The areas of tissue texture change investigated for SIJD most commonly cited are sacrotuberous ligament,<sup>6-8</sup> lumbar paraspinal muscles,<sup>4,8</sup> iliolumbar ligament, posterior sacroiliac ligament, rotator cuff muscles of the hip, thoracolumbar and lumbosacral fascias, trochanteric bursa, piriformis and location of the sciatic nerve, abdominal wall, and pelvic diaphragm.<sup>8</sup>

Authors in the field of osteopathy have not advocated pain provocation testing for sacroiliac joint dysfunction. Pain provocation tests have been described in the wider manual therapy field and are designed to stress the SIJ and reproduce the patient's familiar pain.<sup>16-18</sup> Pain provocation tests advocated by non-osteopathic authors include the "thigh thrust" or POSH (the hip is flexed to 90<sup>0</sup> and axial pressure is applied along the femur),<sup>18</sup> Patrick (FABER) test,<sup>16-18</sup> sacral spring (prone),<sup>16,17</sup> Gaenslen test,<sup>16,17</sup> ASIS distraction test,<sup>16</sup> ASIS compression test,<sup>16</sup> resisted external rotation of the hip (prone),<sup>16</sup> springing of the pubic symphysis,<sup>16</sup> shear test,<sup>17</sup> standing extension,<sup>17</sup> Yeoman maneuver,<sup>17</sup> and resisted abduction (REAB).<sup>18</sup>

The ability to clinically diagnose SIJD by current non-invasive methods is under debate. Research suggests that intra-articular injection of local anaesthetics or irritants are diagnostic for SIJ pain.<sup>14</sup> Other authors, however, have concerns regarding validity of joint blocks as a "gold standard" for SIJD, citing the difficulty of joint capsule penetration, problems with leakage, and the possibility of local non-joint anaesthetising or irritation producing concomitant effects.<sup>2,11</sup>

Due to the controversy that exists regarding the validity and reliability of clinical assessment of the SIJ, and the uncertainty of what osteopaths currently use in practice, this research paper aimed to determine the most common methods employed by the Australian Osteopathic Profession in regard to diagnosing SIJD. In addition, it was aimed to determine if there was a correlation between the type of tests employed and practitioner experience.

## **MATERIALS AND METHODS**

### ***Subjects***

A database of Australian osteopathic practice addresses was produced with a resultant 953 records using information publicly available at [www.yellowpages.com.au](http://www.yellowpages.com.au). Of these, 168 surveys were returned complete and included in the study.

## *Procedure*

Survey questions were developed based on SIJ tests described in current osteopathic textbooks to include the most likely tests to be employed when assessing the sacroiliac joint for dysfunction or as a possible cause of a patient's symptomatology. Two osteopaths and one medical practitioner assessed and commented on the survey for its validity.

The survey asked the respondents the following questions:

- 1) Detection of asymmetry of pelvic bony landmarks. Please indicate which, if any, of the following tests you routinely employ when assessing the sacroiliac joint as a possible source of patient complaint or mechanical dysfunction:
  - Anterior Superior Iliac Spines (ASIS)
  - Pubic Symphysis
  - Posterior Superior Iliac Spines (PSIS)
  - Sacral Sulci
  - Sacral Base
  - Inferior Lateral Angles (ILA) of the Sacrum
  - Ischial Tuberosity
  - Iliac Crests
  - Greater Trochanters
  - Gluteal Folds
  - Popliteal Creases
  - Medial Malleoli
  - Medial Longitudinal Arches of feet
  - Other (Please describe)
- 2) Motion testing of pelvis. Please indicate which examination(s) you commonly use to detect SIJD / pelvic dysfunction:
  - 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, “thigh thrust”
  - Sacral springing – patient prone
  - SIJ gapping using internal hip rotation as lever
  - Functional Diagnosis
  - Cranial Diagnosis
  - Other (Please describe)
- 3) Detection of tenderness and/or tissue texture change: Please indicate which area(s) you commonly assess to detect SIJD / pelvic dysfunction:
- Posterior Superior Iliac Spine (PSIS)
  - Iliolumbar ligament
  - Sacrotuberous ligament
  - Gluteal Muscles
  - Piriformis muscle
  - Other (Please describe)
- 4) Pain Provocation Tests. Please indicate which examination(s) you commonly use to detect SIJD / pelvic dysfunction:
- Anterior Superior Iliac Spine (ASIS) compression test
  - Supine SIJ springing using femur as lever, “thigh thrust”
  - Sacral springing – patient prone
  - Other (Please describe)
- 5) Do you believe that the SIJ can be mechanically dysfunctional but not necessarily symptomatic (a direct source of pain)?
- 6) Do you believe that the SIJ can be symptomatic (a direct source of pain) but not mechanically dysfunctional?
- 7) Do you believe that SIJD may produce reflex changes in the segmentally related viscera?
- 8) Have you referred a patient for cortisone injection for suspected SIJD? If yes, approximately how many? Of these, what percentage had a resolution of their complaint? Was resolution permanent? If resolution was not permanent, what was the average time of improvement?

## *Statistical Analysis*

Raw data was collated according to year and institute of osteopathic education each participant graduated from. Data was then grouped by year of graduation such that categories consisted of 0-5, 5-10, 10-15, 15-20, greater than 20 and unknown years of experience. Data was analysed using the SPSS for Windows Version 10.0 statistical program. A Chi-square analysis testing for independence, or relatedness of tests employed, compared to an osteopaths experience was performed.

## **RESULTS**

Of the 953 surveys mailed, 168 surveys (18%) were returned complete (Figure 1) and 68 surveys (7%) were returned to sender. On closer inspection of a sample of the 953 records generated, it was clear that there was a large proportion of redundant and repeat information (multiple practice locations, old addresses). The authors had no accurate way of determining which addresses were correct and/or current, but estimated that the true response rate to this survey was likely to be about 30%.

The greatest participation was from those osteopaths with 0-5 years experience because they accounted for approximately 40% of all surveys returned. This reflects the composition of the Australian profession, which has undergone a recent boom in university osteopathic courses. Based on membership of the Australian Osteopathic Association, practitioners with 0 – 3 years experience comprise 42% of the Australian profession, and those with 0 – 8 years experience make up 72% of the profession.<sup>19</sup>

Figure 2 demonstrates the areas examined for static asymmetry in descending order of frequency. The PSIS (94%) was most frequently examined for asymmetry, followed by ASIS (89%), and iliac crests (77%). Significant differences existed between practitioner experience and assessment of the ASIS ( $p=0.013$ ), inferior lateral angle ( $p=0.002$ ), sacral base ( $p=0.019$ ), medial malleoli ( $p=0.002$ ), ischial tuberosities ( $p=0.000$ ) and gluteal folds ( $p=0.010$ ) (Figure 3). The more experienced osteopaths tested for asymmetry of the ASIS, ILA, sacral base and medial malleoli landmarks with less frequency than their less experienced counterparts. Conversely, assessment

of gluteal folds and ischial tuberosities became relatively more popular as experience increased.

Figure 4 demonstrates the motion tests utilised by practitioners in descending order of frequency. Sacral springing (prone) (73%) was the most frequently reported motion test, followed by the standing flexion test (71%) and ASIS compression (60%). Significant differences existed between practitioner experience and employment of the standing flexion test ( $p=0.029$ ), ASIS compression ( $p=0.010$ ), “other” tests ( $p=0.000$ ), and the Stork / Gillet test ( $p=0.001$ ) (Figure 5). The more experienced practitioners were more likely to use tests not commonly referred to in current osteopathic literature and have a higher frequency of use of “other” testing protocols. The contrary finding was that the Stork / Gillet test was more frequently used among practitioners with greater experience.

Figure 6 demonstrates the areas for detection of tenderness and/or tissue texture change utilised by practitioners in descending order of frequency. The piriformis (80%) was most frequently examined for tenderness and/or tissue texture change, followed by PSIS (77%) and gluteal muscles (77%). Significant differences existed between practitioner experience and the assessment of piriformis ( $p=0.011$ ), PSIS ( $p=0.005$ ), other ( $p=0.005$ ) and the pelvic floor ( $p=0.029$ ) (Figure 7). Use of recognised osteopathic assessments for detecting tissue texture change mimicked the trends for detection of bony asymmetry and motion, because as a practitioner’s experience increased, the frequency with which they employed recognised osteopathic assessments decreased significantly. Practitioners tend to employ tests within the category of “other” as experience increased (Figure 7).

Pain provocation tests used by respondents included (in descending order) sacral spring (prone) (68%), followed by ASIS compression test (46%), and SIJ spring (thigh thrust) (60%). Of the pain provocation tests the only significant difference was apparent between practitioners who chose not to perform pain provocation testing ( $p=0.019$ ), but no pattern was apparent between experience and abstinence from pain provocation testing (Figure 8).

Clinical reasoning outcomes associated with SIJD returned no significant difference with regard to practitioner experience. Ninety percent of respondents were of the opinion that the SIJ can be mechanically dysfunctional but not necessarily symptomatic. Fifty-seven percent indicated that the SIJ might be symptomatic but not necessarily mechanically dysfunctional. Eighty-six percent claimed that the SIJ could produce reflex changes in segmentally related viscera.

Twenty-one (13%) of the practitioners surveyed have referred patients for a cortisone injection associated with suspected SIJD. Those practitioners with greater experience had a greater individual frequency of referral (Figure 9). Three practitioners claimed permanent resolution of the patient's pain following injection, nine were unaware of the outcome, three had no effect at all, and the remaining six reported resolution ranging from 7 days to two years.

## **DISCUSSION**

This study examined the range and frequency of clinical SIJ diagnostic tests used by Australian osteopaths. To the authors' knowledge this is the first study that has attempted to determine what tests osteopaths actually use in practice, and whether this is influenced by practitioner experience. It appeared that many osteopaths used diagnostic procedures consistent with the tests and model proposed by Mitchell and advocated by most American authors.<sup>4-9</sup> The number of these commonly advocated tests used declined with increasing practitioner experience, whereas the use of a wide range of non-standard "other" tests increased. It appeared that the majority of osteopaths use some form of pain provocation test, which have not been advocated by any osteopathic author, but are commonly referred to in the wider manual therapy literature.

Caution must be used when attempting to generalise the results of this study to the Australian osteopathic profession as a whole because of the low response rate (estimated 30%). A low response rate may affect the validity of any generalisation to the profession because it is possible for sample bias to exist in the osteopaths who responded. It is possible, for example, that those osteopaths who felt a zeal for their

model or methods of SIJ assessment would be more likely respond, whereas osteopaths who did not place importance on SIJ assessment may be less likely to do so. For these reasons, extrapolation of the results of this study is difficult.

Diagnosis of SIJD using the Mitchell model involves identification of static pelvic bony asymmetry combined with motion tests (either the standing or seated flexion test) as a basis for determining the presence and nature of SIJD.<sup>4</sup> Detection of static asymmetry was clearly the most popular of the four modalities reported for the detection of SIJD by Australian osteopaths. Ninety four percent of respondents assess the ASIS for asymmetry, and over 65% reported they assess seven landmarks. Landmarks such as the inferior lateral angle (ILA) of the sacrum are unique to the Mitchell model, and the reportedly high use (69%) of this landmark again suggested widespread use of this model. Stone<sup>10</sup> believed that the Mitchell model has become entrenched in much of osteopathic practice throughout Europe and America, although she is not convinced that British osteopaths adhere as closely. Practitioners with greater than 15 years experience were less likely to employ assessment of the ASIS, ILA, sacral base and medial malleoli than their less experienced counterparts. These landmarks are essential areas within the Mitchell diagnostic model, and it could be hypothesised that the less experienced practitioners are more likely to incorporate the Mitchell model clinically.

Palpation of bony landmarks has recognised limitations. Reliability may be reduced by anatomical variation of bony prominences from left to right,<sup>20</sup> lower limb inequality, obesity of patient, examiner skill and experience or the presence of pain.<sup>15</sup> The validity of static asymmetry as an indicator of SIJD is uncertain, because bony asymmetry is likely to be normal and no correlation between asymmetry and LBP has been found.<sup>3</sup>

Springing of the sacrum and SIJ (with the patient prone) was the most popular motion test reported, used by 73% of the surveyed osteopaths. The same test was also the most popular pain provocation test (used by 68%). Significant differences in levels of practitioner experience were apparent for the standing flexion test, ASIS compression test, the Stork test, and the collection of “other” tests. Consistent with earlier findings, the more experienced practitioners put greater faith in idiosyncratic tests not

widely utilised by the wider population of respondents, with the exception of the Stork test.

Many researchers who have examined clinical SIJ motion tests – such as the standing flexion test,<sup>2,3,21</sup> seated flexion test,<sup>2,3</sup> Stork / Gillet test,<sup>2,7,22</sup> and supine to sit test<sup>3</sup> – have questioned their clinical worth due to a lack of reliability and validity. Dreyfuss *et al.*<sup>2</sup> reported that 20% of asymptomatic subjects returned a positive finding in at least one of the standing flexion, seated flexion or Stork tests. Furthermore, it has been reported that the seated flexion, standing flexion or stork test were unable to predict, either as stand alone tests or as a cluster of tests, the presence of asymmetry of pelvic bony landmarks.<sup>3</sup> Harrison *et al.*<sup>11</sup> has urged practitioners not to be dogmatic and to keep in mind that asymmetric motion between left and right SIJs, even if palpable, may very well be a normal finding due to anatomical form development.<sup>6</sup>

The piriformis, PSIS, gluteal muscles, iliolumbar ligament and sacrotuberous ligament were reported to be commonly assessed for tenderness and tissue texture abnormality as a sign of SIJD by more than 50% of surveyed practitioners. The reliability and validity for detection of tissue texture changes as an indicator of SIJD has not come under the same scrutiny as bony landmark and motion testing, and requires investigation.

Pain provocation testing has not been championed by contemporary osteopathic texts, and no osteopathic text could be found that recommended them. Instead, authors in the field of osteopathy<sup>4-9</sup> have ignored or downplayed pain provocation, and emphasized the importance of palpation for static symmetry and motion. Despite this, only 14% of respondents indicated that they did not employ any pain provocation testing, with 86% of respondents stating that they would aim to reproduce or provoke pain in the SIJ as a diagnostic aid. The only test employed by more than half of the respondents was that of sacral springing.

The evidence for the reliability and validity of SIJ pain provocation tests appears more promising than for either static asymmetry or motion testing, but still results are conflicting. Broadhurst and Bond,<sup>18</sup> in a double blind trial, tested subjects who responded to three pain provocation tests with either sacroiliac blocks or control

injections of saline. They found the three tests (Faber, “thigh thrust”, and resisted abduction) had a high predictive value for pain arising from the sacroiliac joint. Kokmeyer *et al.*<sup>23</sup> reported that a regimen of five SIJ pain provocation tests (SIJ compression, distraction, “thigh thrust”, and Faber) had good reliability between two independent examiners (kappa = 0.70). Other researchers, however, have reported no value in various provocation tests.<sup>16,17</sup>

Researching the validity of SIJ provocation tests requires a “gold standard” to measure against, and anaesthetizing joint blocks have been offered as this standard.<sup>16-18</sup> Diagnostic blocks may be a poor indicator of SIJD, because they are likely to anaesthetize the inner joint, but not the external capsule and SIJ ligaments.<sup>11,23,24</sup> It is these external structures that may potentially be sprained in traumatically induced SIJD, and provoked by manual testing. It may be that until it is possible to more precisely isolate and detect the exact tissue source of SIJ pain, investigation of the validity of pain provocation testing will yield mixed results.

The current study examined the use of SIJ tests by Australian osteopaths. Evidence of the common use of clinical tests does not imply reliability or validity, and many of these tests need to be further examined for clinical usefulness. According to Dreyfus *et al.*,<sup>2</sup> the non-invasive tests for determining SIJD have become accepted not because of scientific clinical studies, but because they have been continually propagated within orthopaedic, medical, manual medicine, osteopathic and chiropractic texts. Fryer<sup>25</sup> has argued that assessment of static asymmetry and the forward flexion tests lack reliability and validity and has urged the osteopathic profession to reconsider the value placed on these tests, but it appears they are still favoured by the majority of Australian osteopaths.

The question must be asked as to why osteopaths apparently place so much importance on assessment of static pelvic asymmetry (at least 94% of respondents in this survey) when existing evidence shows that the reliability and validity of this is highly questionable. Perhaps the common use of palpation for static asymmetry has derived from the difficulty in determining the source of lumbo-pelvic pain, as well as the mechanistic themes of A. T. Still’s philosophy. Modern osteopathic authors continue to describe some types of SIJD as pelvic “subluxations”,<sup>4,6</sup> which may

promote the view of SIJD as a “bone out of place.” The commonly reported use of the standing and seated flexion tests in this study (recommended by many American authors to determine the presence and side of SIJD),<sup>4,6,9</sup> – despite the evidence of poor reliability and validity – may be a sign of the influence that osteopathic “authorities” continue to have on the profession.

## **CONCLUSION**

It appeared that many osteopaths used diagnostic procedures consistent with the model proposed by Mitchell, but supplemented with other motion tests, assessment of tissue texture, and use of pain provocation. The use of well-described, standard tests declined with increasing practitioner experience, whereas the use of a wide range of “other” tests increased. It appeared that the majority of osteopaths use some form of pain provocation testing, which are not advocated by any osteopathic text, but commonly suggested in the wider manual therapy literature. Caution must be used in extrapolating the results of this study to the whole profession because of the low response rate.

## **Acknowledgements**

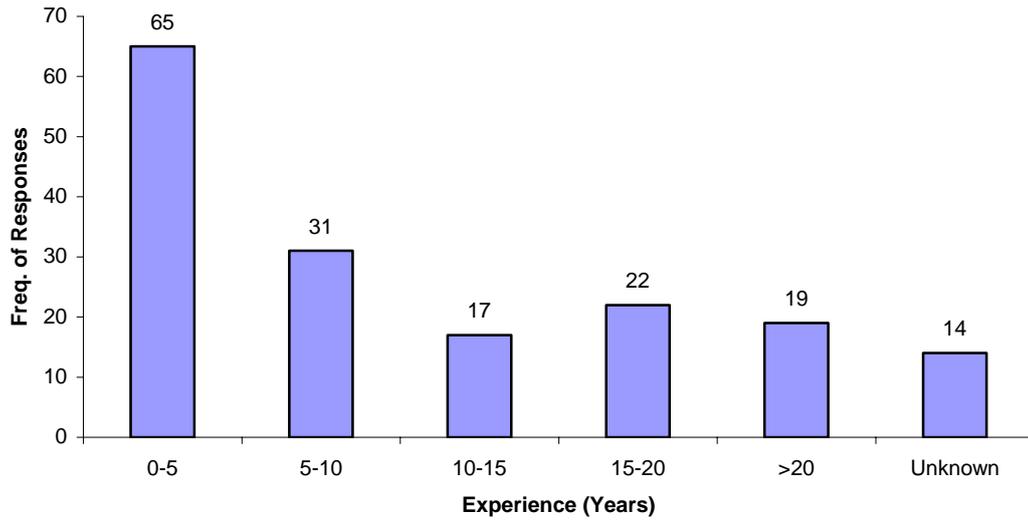
The authors would also like to thank the 168 osteopaths who took the time to complete and return the survey.

## **References**

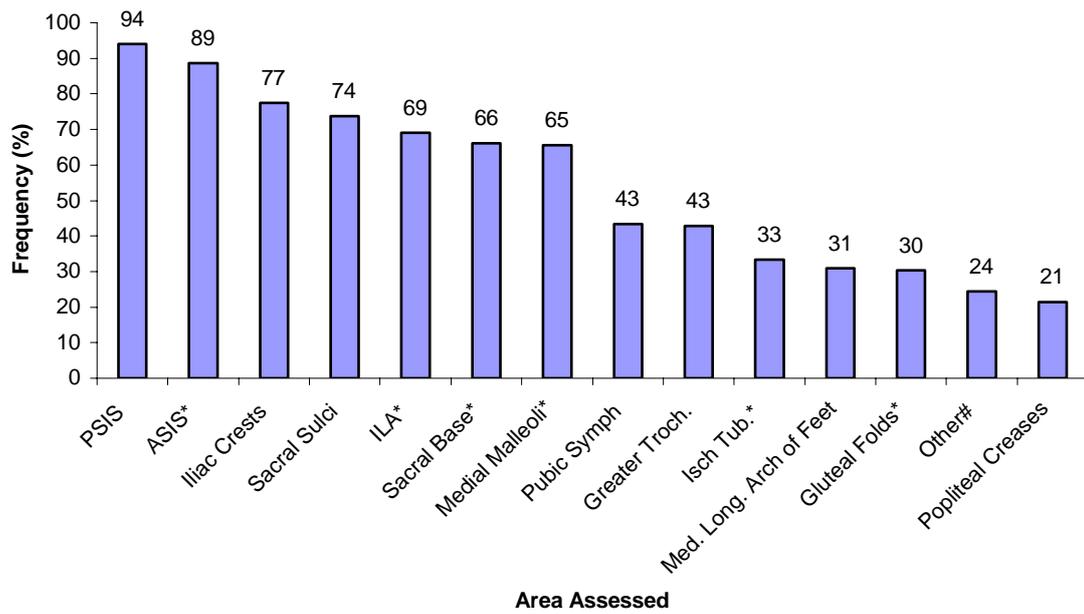
1. Hartman L. *Handbook of Osteopathic Technique 3ed.* Cheltenham: Stanley Thornes; 1997
2. Dreyfuss P, Dreyer S, Griffin J, Hoffman J, Walsh N. Positive Sacroiliac Screening Tests in Asymptomatic Adults. *Spine.* 1994; 19(10):1138-1143
3. Levangie PK. Four Clinical Tests of Sacroiliac Joint Dysfunction: The Association with Innominate Torsion among Patients With and Without Low Back Pain. *Physical Therapy.* 1999;79(11):1043-1057

4. Mitchell, FL and Mitchell, PKG. *The Muscle Energy Manual Vol 3: Evaluation and Treatment of the Pelvis and Sacrum*. Michigan, MET Press; 1999
5. Di Giovanna EL, Schiowitz S. *An Osteopathic Approach to Diagnosis and Treatment*. Pennsylvania: J.B. Lippincott Company; 1991
6. Greenman PE. *Principles of Manual Medicine (2ed.)*. Baltimore: Williams & Wilkins; 1996
7. Kuchera,WA, Kuchera ML. *Osteopathic Principles in Practice (2ed rev)*. Ohio: Greyden Press, 1994
8. Heinking P, Kappler R. Pelvis and Sacrum. In: Ward, RC. Ed, *Foundations for Osteopathic Medicine*. Baltimore. Williams & Wilkins; 1997.
9. Bourdillon JF. *Spinal Manipulation*. 5th ed: Butterworth - Heinemann; 1992.
10. Stone C. *Science in the Art of Osteopathy – Osteopathic Principles and Practice*. Cheltenham: Stanley Thornes Ltd; 1999
11. Harrison D, Harrison D, Troyanovich S. The Sacroiliac Joint: A Review of Anatomy and Biomechanics with Clinical Implications. *Journal of Manipulative and Physiological Therapeutics*. 1997;20(9): 607-617
12. Stuesson B. A Radiostereometric Analysis of Movements of the Sacroiliac Joints During the Standing Hip Flexion Test. *Spine*. 2000;25(3):364-368
13. Williams PL. (Ed.) *Gray's Anatomy 38<sup>th</sup> Ed*. Edinburgh; New York: Churchill Livingstone, 1995
14. Bogduk N. *Clinical Anatomy of the Lumbar Spine & Sacrum*. London: Churchill Livingstone; 1997
15. Cibulka MT, Koldehoff R. Clinical Usefulness of a Cluster of Sacroiliac Joint Tests in Patients With and Without Low Back Pain. *Journal of Orthopaedic & Sports Physical Therapy*. 1999; 29(2):83-92
16. Maigne JV, Aivalikilis A, Pfefer F. Results of Sacroiliac Joint Double Block and Value of Sacroiliac Pain Provocation Tests in 54 Patients with Low Back Pain. *Spine*. 1996; 21(16):1889-1892
17. Slipman CW, Sterenfild E., Chou LH, Herzog R, Vresilovic E. The Predictive Value of Provocative Sacroiliac Joint Stress Maneuvers in the Diagnosis of Sacroiliac Joint Syndrome. *Arch Phys Med Rehabil*. 1998;79:288-292

18. Broadhurst N, Bond MJ. Pain Provocation Tests for the Assessment of Sacroiliac Joint Dysfunction. *Journal of Spinal Disorders*. 1998;11(4):341-345
19. Australian Osteopathic Association. *AOA Continuing Professional Development Discussion Document*. 2003. Australian Osteopathic Association
20. Lewit K, Rosina A. Why Yet Another Diagnostic Sign of Sacroiliac Movement Restriction? *Journal of Manipulative and Physiological Therapeutics*. 1999; 22(3):154-160.
21. Strender L, Sjoblom A, Sundell K, Ludwig R, Taube A. Interexaminer Reliability in Physical Examination of Patients With Low Back Pain. *Spine*. 1997;22 (7):814-820
22. Meijne W, van Neerbos K, Aufdemkampe G, van der Wurff P. Intraexaminer and Interexaminer Reliability of the Gillet Test. *Journal of Manipulative and Physiological Therapeutics*. 1999;22(1):4-9
23. Kokmeyer DJ, van der Wurff P, Aufdemkampe G, Fickenscher TCM. The reliability of Multitest regimens with specific sacroiliac pain provocation tests. *Journal of Manipulative and Physiological Therapeutics*. 2002;25(1):42-48)
24. Tanner J. Letter to the editor. *Spine*. 1997;22(14):1673
25. Fryer G. Muscle energy concepts – a need for change. *Journal of Osteopathic Medicine*. 2000; 3(2): 54-59



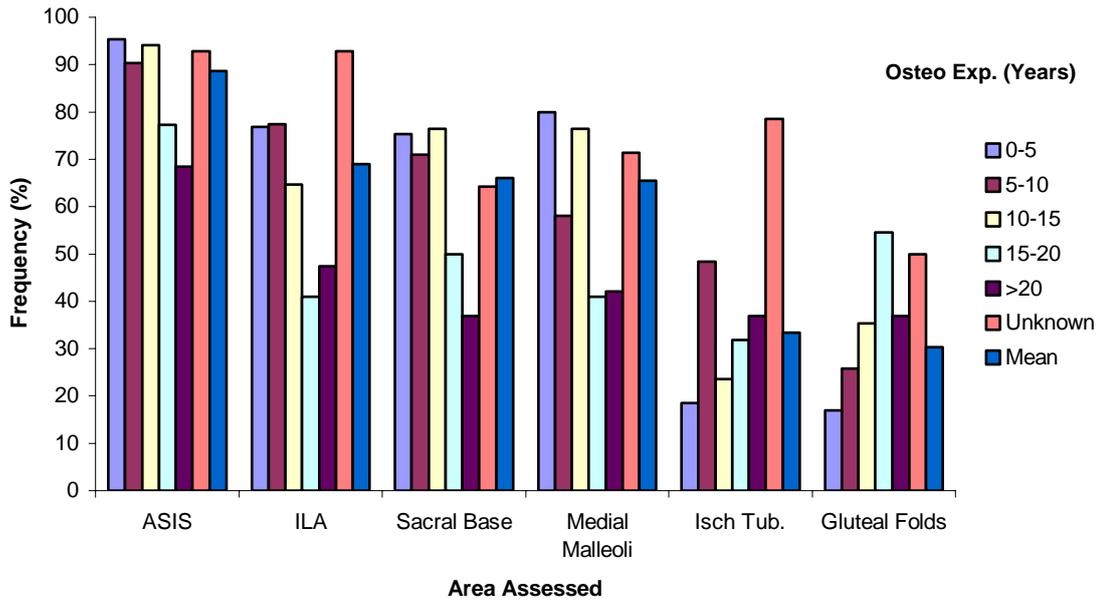
**Figure 1: Survey Participation and Osteopathic Experience**



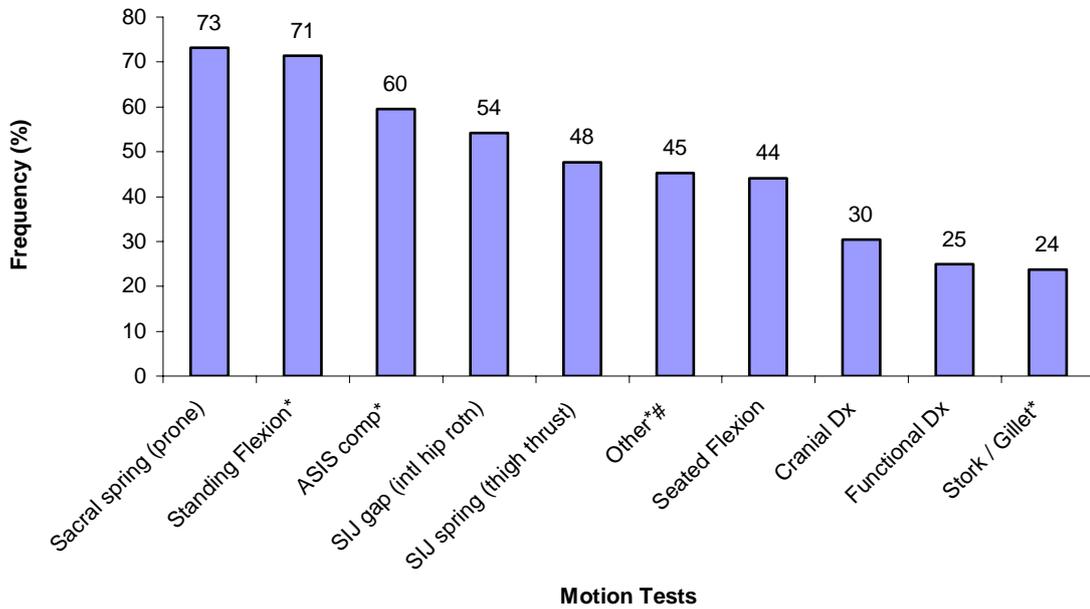
**Figure 2: Detection of asymmetry of pelvic bony landmarks**

\* ~ Significant differences ( $p < 0.05$ ) occur with practitioner experience

# ~ Other includes assessment tests utilised by <1% of respondents



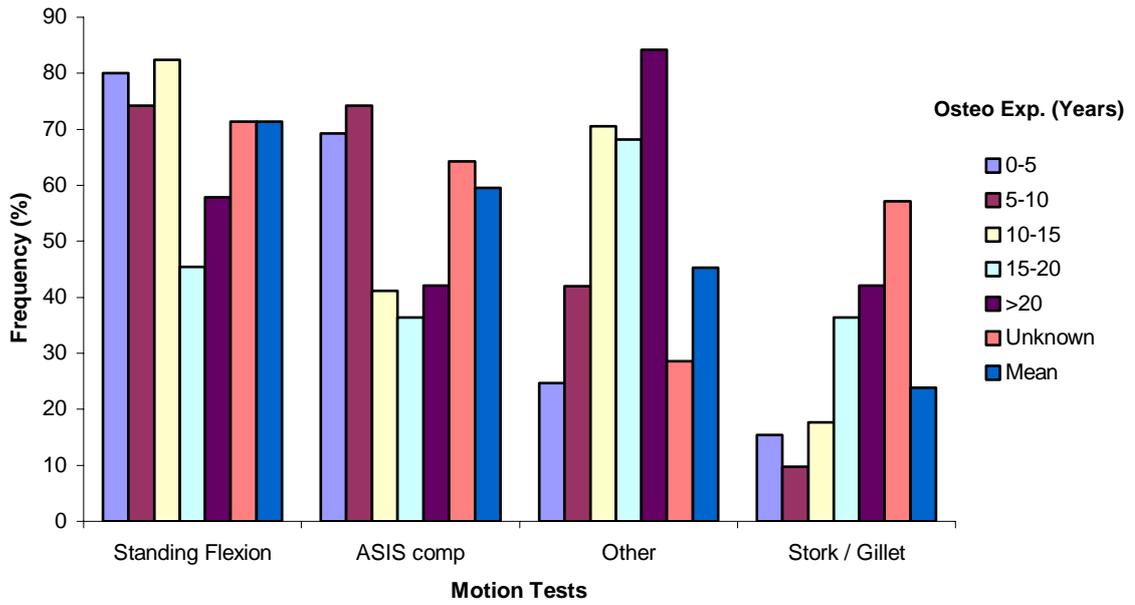
**Figure 3: Significant Differences with Osteopathic Experience and Detection of Static Asymmetry**



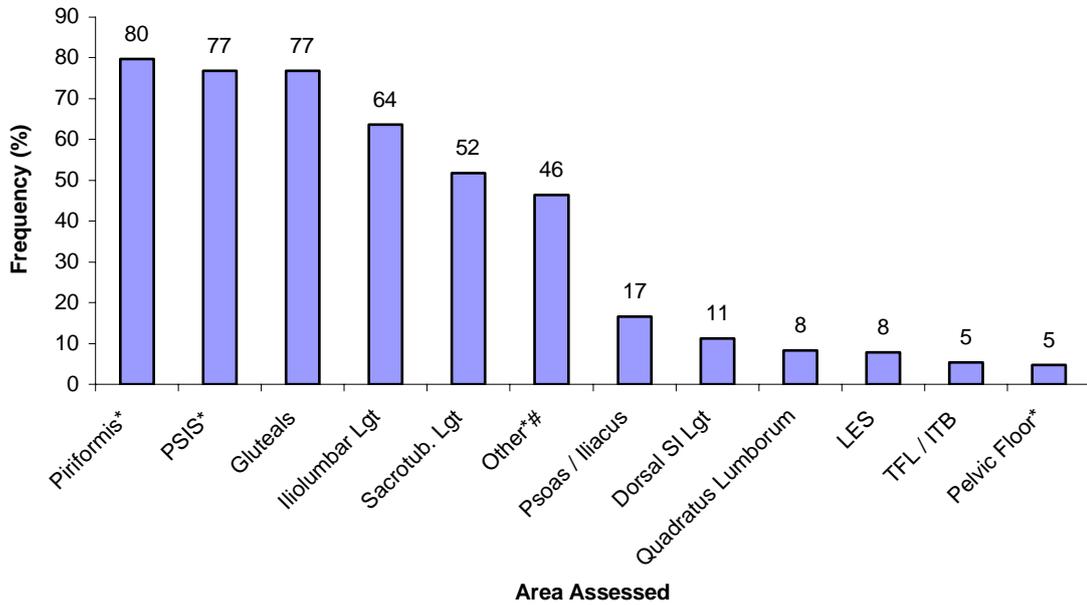
**Figure 4: Motion Testing of SIJ**

\* ~ Significant differences ( $p < 0.05$ ) occur with practitioner experience

# ~ Other includes assessment tests utilised by <1% of respondents



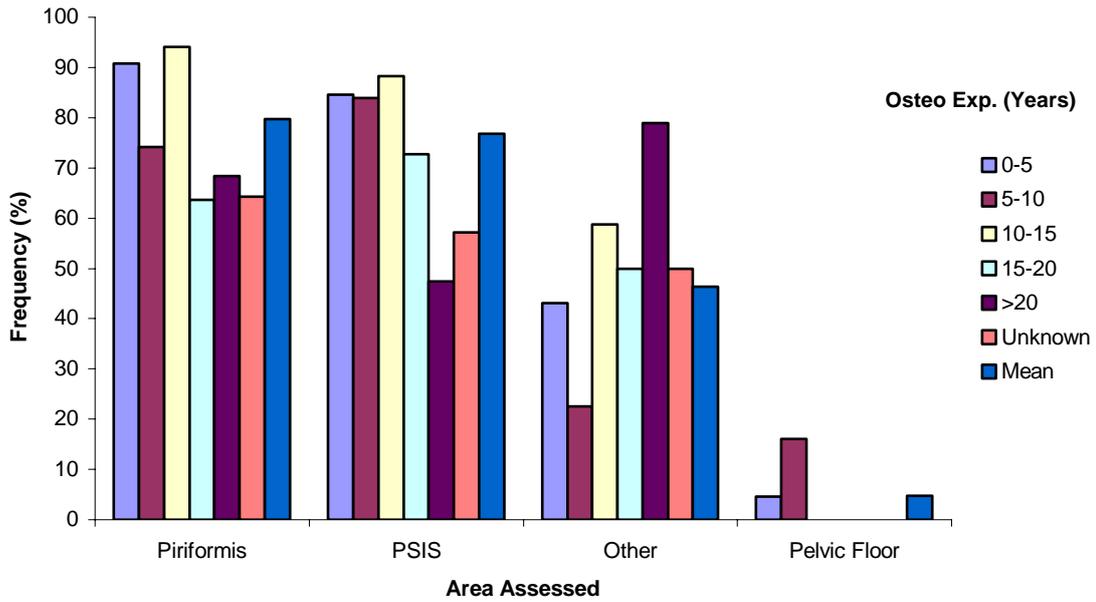
**Figure 5: Significant Differences with Osteopathic Experience and SIJ Motion Testing**



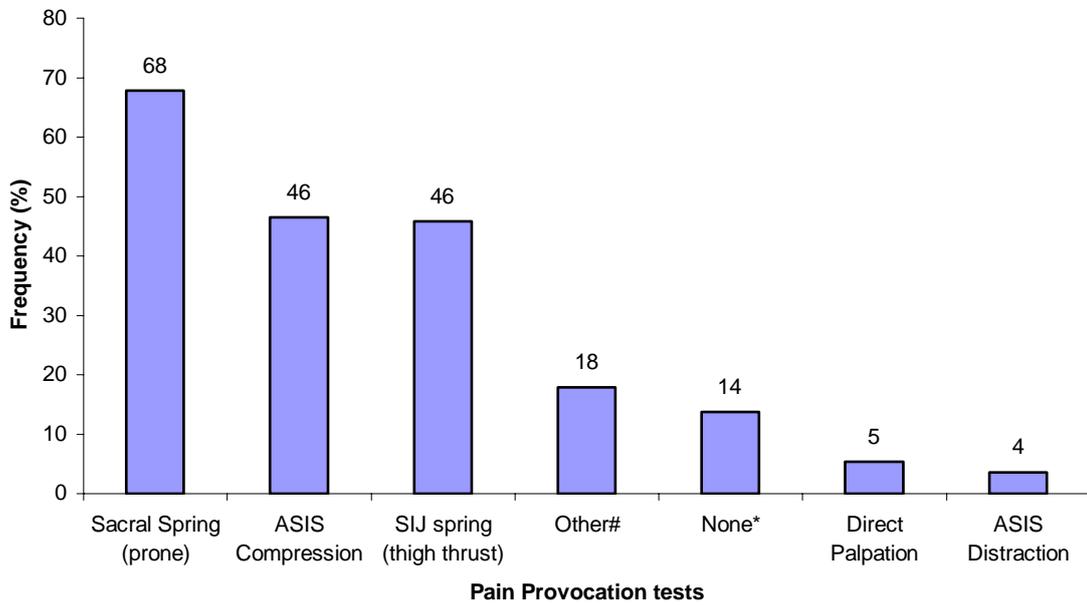
**Figure 6: Detection of Tenderness and/or Tissue Texture Change**

\* ~ Significant differences ( $p < 0.05$ ) occur with practitioner experience

# ~ Other includes assessment tests utilised by <1% of respondents



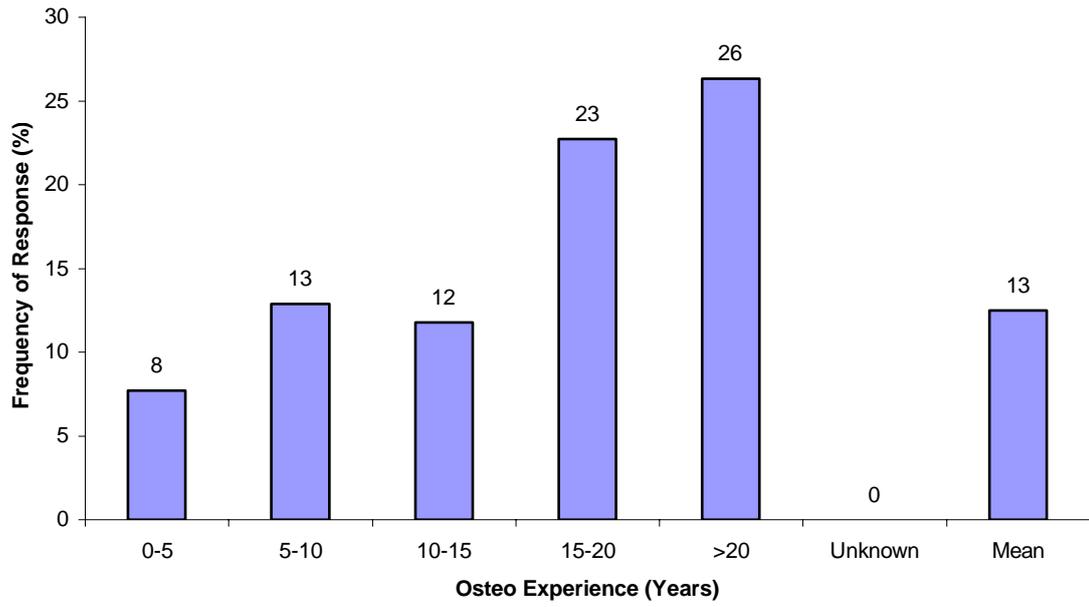
**Figure 7: Significant Differences with Osteopathic Experience and Detection of Tenderness and/or Tissue Texture Change**



**Figure 8: SIJ Pain Provocation Tests**

\* ~ Significant differences ( $p < 0.05$ ) occur with practitioner experience

# ~ Other includes assessment tests utilised by <1% of respondents



**Figure 9: Osteopathic Experience and Referral for Cortisone Injection Associated with SIJD**