A Randomized Clinical Trial of Manual Versus Mechanical Force Manipulation in the Treatment of Sacroiliac Joint Syndrome

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Abstract

Objective: To investigate the effect of instrument-delivered compared with traditional manual-delivered thrust chiropractic adjustments in the treatment of sacroiliac joint syndrome.

Methods: Prospective, randomized, comparative clinical trial. Sixty patients with sacroiliac syndrome were randomized into two groups of 30 subjects. Each subject received 4 chiropractic adjustments over a 2-week period and was evaluated at 1-week follow-up. One group received side-posture, high-velocity, low-amplitude chiropractic adjustments; the other group received mechanical-force, manually-assisted chiropractic adjustments using an Activator Adjusting Instrument (Activator Methods International, Ltd, Phoenix, Ariz).

Results: No significant differences between groups were noted at the initial consultation for any of the outcome variables. Statistically significant improvements were observed in both groups from the first to third, third to fifth, and first to fifth consultations for improvements ($P < .001$) in mean numerical pain rating scale 101 (group 1, 49.1-23.4; group 2, 48.9-22.5), revised Oswestry Low Back Pain Disability Questionnaire (group 1, 37.4-18.5; group 2, 36.6-15.1), orthopedic rating score (group 1, 7.6-0.6; group 2, 7.5-0.8), and algometry measures (group 1, 4.8-6.5; group 2, 5.0-6.8) for first to last visit for both groups.

Conclusions: The results indicate that a short regimen of either mechanical-force, manually-assisted or high-velocity, low-amplitude chiropractic adjustments were associated with a beneficial effect of a reduction in pain and disability in patients diagnosed with sacroiliac joint syndrome. Neither mechanical-force, manually-assisted nor high-velocity, low-amplitude adjustments were found to be more effective than the other in the treatment of this patient population.
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Key Indexing Terms: *Chiropractic; Sacroiliac Joint; Manipulation; Spinal; Pain*

Low back pain (LBP) is a significant health problem that has a major impact on quality of life and on health care costs.[1] The sacroiliac joint (SIJ) has been found to be a significant source of pain in 30% of mechanical LBP sufferers.[2] Sacroiliac joint syndrome has been described as pain and decreased mobility of the SIJ, resulting from the mechanical derangement of the joint.[3] Kirkaldy-Willis and Burton[4] describe the symptoms of SIJ syndrome to include pain over the posterior aspect of the SIJ that varies in its degree of severity; referred pain to the groin, over the greater trochanter, down the back of the thigh to the knee, and occasionally down the lateral or posterior calf to the ankle, foot, and toes. Clinical findings including pain and palpable tenderness over the SIJ; aggravation by provocation tests; pain referral to the groin, trochanter, and buttock; and clinical asymmetry of movement of the SIJ are considered important in arriving at an SIJ syndrome diagnosis.[5,6] However, identifying the SIJ as a sole or primary pain generator has been controversial. This controversy stems from the inherent anatomic location of the SIJ and its close proximity to adjacent spinal structures known to cause back pain. In

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addition, referred pain from the lumbar spine to the SIJ, as well as pain referral patterns from the SIJ to the buttock, lower lumbar spine, groin, and lower extremity confound the identification to a specific source.[3] Nevertheless, some studies have identified the SIJ to be a primary source of back pain both experimentally[2] and clinically.[7]

Several treatments for SIJ syndrome have been advocated by clinicians, although research into their efficacy remains sparse or even nonexistent. In a recent study of patients diagnosed with SIJ syndrome, radiofrequency denervation of the involved SIJ was found to provide at least a 50% decrease in visual analog scores for a period of at least 6 months in 36.4% (12 of 33) of patients.[8] The invasiveness of this procedure, however, makes other conservative SIJ treatments attractive options for patients suffering SIJ syndrome. Although several studies have reported various physiological or functional outcomes resulting from SIJ manipulation, such as a reduction in muscle inhibition,[9,10] electromyographic neuromuscular reflex response,[11,12] decreased Hoffman reflex,[13] improvement in gait symmetry,[14] and improved innominate bone tilt,[5] few clinical outcome studies have evaluated the effectiveness of SIJ manipulation.[15]

A variety of spinal manipulative techniques exist to provide clinicians with choices in the delivery of particular force-time profiles deemed appropriate for a patient or condition. In this manner, clinicians rely on mechanical advantages in performing spinal manipulation through patient positioning and mechanical assistance from a table or instrument.[16] Manual articular manipulative and chiropractic adjusting procedures are classified into 4 categories to better describe their technique and mechanism of force production: specific contact thrust procedures (eg, high-velocity, low-amplitude [HVLA] thrusts), nonspecific contact thrust procedures (eg, mobilization), manual force, mechanically assisted procedures (eg, drop tables or flexion-distraction tables), and mechanical-force, manually-assisted (MFMA) procedures (eg, stationary or handheld instruments).[17] Today, HVLA and MFMA procedures are reported to be the first and second most popular chiropractic adjusting techniques, used by 93% and 72% of chiropractic practitioners in the US, respectively, and similar numbers internationally.[18] Few studies have evaluated the relative effectiveness of HVLA vs MFMA spinal manipulation in the treatment of musculoskeletal disorders,[19-21] and no study has compared these two chiropractic adjustive techniques for their effectiveness in the treatment of SIJ syndrome. The objective of this study was to determine the relative effectiveness of MFMA as compared with HVLA chiropractic adjustments in patients diagnosed with SIJ syndrome.

Methods

Subject Recruitment and Inclusion Criteria

Subjects were recruited from the greater Durban area (outpatient chiropractic clinic, Durban Institute of Technology, Durban, South Africa) by means of advertisements placed in local newspapers; pamphlets placed in local sports clubs, gyms, and shopping centers; and advertising by word of mouth. All respondents were screened telephonically and subsequently scheduled for an initial consultation provided they met the initial criteria of having LBP. No stratification of subjects took place, and they were accepted regardless of race, occupation, sex, and severity of their condition. Patients were included in the study if they had a recent history of LBP longer than a 2-week duration at the time of initial consultation with a total of more than 4 weeks of LBP in the preceding year[22] and diagnosed with SIJ syndrome at the initial examination. Only patients between the ages of 18 and 59 years were included in this study to avoid parental consent and the possibility of the development of fibrous ankylosis in the SIJ after the sixth decade.[4] Any mechanical conditions associated with but secondary to sacroiliac syndrome (eg, active myofascial involvement or facet syndrome) were assessed and noted in the lower back regional examination, but no treatment of these conditions was administered. Patients already taking anti-inflammatory or analgesic medication (ibuprofen, paracetamol, etc) were included in the study only after a 3-day washout period[23] and willingness to discontinue its usage for the duration of the clinical trial.

Exclusion Criteria

Subjects presenting with conditions that were contraindicated to manipulation including destructive lesions of spine, ribs, and pelvis; healing fracture or dislocation; gross instability; cauda equina syndrome; abdominal aneurysm; or visceral-referred pain were excluded from the study. Specific to SIJ syndrome, differential diagnosis, infection, inflammatory arthritis (rheumatoid, Reiters, psoriasis, gout, degenerative, and ankylosing spondylitis), and neoplasms were grounds for exclusion as well. Collectively, these pathologies were excluded on the grounds of clinical history and examination, and in such event, no further investigations were performed (eg, radiographs or treatment). Patients who were receiving workers' compensation or disability insurance for LBP, had previous lumbar surgery, were pregnant women (due to hormone-induced ligament laxity and possible resultant instability of the SIJ occurring during pregnancy),[24] or had participated in any other previous research project at the Durban Institute of Technology Day Clinic during the past 3 months were excluded from the study. Further information on those excluded from the study can be found in Table 1. Once included in the study, participants were excluded only if they underwent any other form of treatment of LBP during participation in the research or if they changed their everyday activity levels or normal lifestyle, which was monitored by the examining clinician.

Subjects

Ninety-six patients displayed an interest in participating in the research study. Patients were excluded immediately if

Table 1. *Demographic data of patients excluded from the study*

Exclusion criteria	Number	%
Age <18 y	1	1
Age >59 y	3	3.1
Lumbar facet syndrome dominant	5	5.2
Recent lumbar spine surgery	2	2.1
Signs of nerve root entrapment	4	4.2
Noncompliance	6	6.3
Score <6 for ORS	15	15.6

they did not meet the age criterion or displayed any obvious signs of dermatomal radiculopathy indicative of spinal nerve root compression. Seventy-nine patients were further assessed at the Durban Institute of Technology Chiropractic Day Clinic, 66 of whom met the selection criteria and were accepted into the trial. Demographic data of the 36 subjects excluded from the study are shown in Table 1. Six patients were excluded during the course of the study because of noncompliance, leaving 60 participating patients (31 men, 29 women; age range, 18-59 years; mean age, 39.1 years; SD, 12.2 years) who completed the clinical trial. Sixty subjects exceeded the minimum sample size that was determined by power analysis.

The research in its entirety was approved by the institutional review board of the Durban Institute of Technology and monitored by a supervising senior clinician (HLW). All study participants were provided with an information sheet describing the study and its risks and benefits and provided written informed consent for their participation. Patients were randomly allocated into one of two groups, without the use of stratification, depending on a number drawn from a box. Table 2 provides the age distribution of the study participants for the two groups. At the initial consultation, all prospective participants in the study underwent a full case history, physical examination, and a regional examination of the lumbar spine and pelvis.

Sacroiliac Joint Syndrome Diagnosis

During the patient history and examination, subjects were initially screened for SIJ syndrome by noting whether their pain was unilaterally focused with intensity at the level of the SIJ or sacral sulcus. In addition to inclusion criteria of a minimum of 2 weeks of LBP focused unilaterally with intensity at the level of the SIJ, specific orthopedic tests were performed to confirm the presence of SIJ syndrome. The specific tests included posterior shear or "thigh thrust test,"[25] Patrick's FABER test,[26] Gaenslen's test,[26] and Yeoman's test.[27] Each of these orthopedic tests was allocated a specific score when testing positive to collectively contribute to the orthopedic rating score (ORS). The posterior shear test was allocated 4 points; according to Laslett and Williams,[25] it is a more sensitive test for the presence of SIJ syndrome. The other 3 orthopedic tests were each allocated two points. Completion of the tests resulted

Table 2. *Age distribution within the study participants*

	Group 1		Group 2	
Age (y)	Frequency	Percentage	Frequency	Percentage
18-30	10	33.3	11	36.7
31-40	5	16.7	5	16.7
41-50	8	26.7	5	16.7
51-59	7	23.3	9	30.0

in an ORS with a maximum of 10. Those scoring 6 or more of 10 were included in the study. A respective change in the patient's score indicated a change in the condition. The ORS is based on the principle that the specificity of the diagnosis is improved when based on a combination of diagnostic tests.[28] The most symptomatic area of the SIJ was then confirmed by static and motion palpation of the SIJs[27] and pain pressure threshold quantified with algometry. Motion Palpation was also used to identify the SIJs with restricted and/or abnormal motion in both groups. Furthermore, if the SIJ was found to be fixated in flexion, it was treated as a posterior inferior (PI) ilium subluxation, and likewise, an extension fixation was treated as an anterior superior (AS) ilium subluxation.[27]

Treatment Intervention

Group 1 received treatment via side posture HVLA manipulation of the symptomatic SIJ using the diversified technique of chiropractic adjustment in accordance with the corrective line of drive for the AS or PI ilium subluxation, as determined from the examination in each case.[27] Group 2 received treatment via MFMA chiropractic adjustment of the symptomatic SIJ using a handheld instrument, the Activator Adjusting Instrument (Activator Methods International, Ltd, Phoenix, Ariz).[29] In the presence of a PI ilium subluxation, MFMA thrusts were administered to the segmental contact points as follows[29]: (1) on the same side as the flexion fixation, the tip of the instrument was positioned in the soft tissue of the gluteus maximus muscle just medial to the ischial tuberosity and directed toward the spine of the ilium. The line of drive was superior, lateral, and posterior; (2) on the same side as the flexion fixation, the tip of the instrument was placed in the sciatic notch, under the sacrotuberous ligament. The line of drive was superior, lateral, and posterior; and (3) on the same side as the flexion fixation, the tip of the instrument was placed in the fossa just lateral to the SIJ, on the lateral aspect of the ilium. The line of drive was superior and anterior.

In the presence of an AS ilium subluxation, MFMA thrusts were administered to the following segmental contact points[29]: (1) on the side opposite to the extension fixation, the tip of the instrument was placed on the base of the sacrum, approximately half an inch lateral to the first sacral tubercle. The line of drive was inferior and anterior; (2) on the side opposite to the extension fixation, the tip of

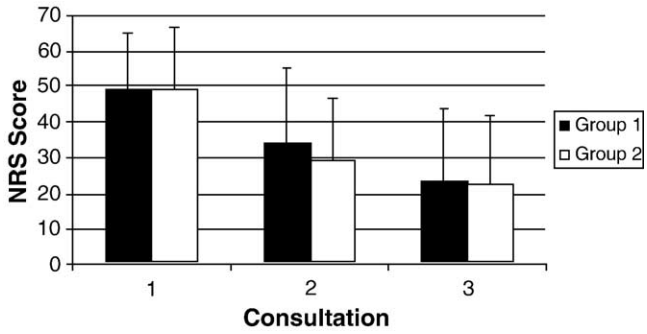

Fig 1. *Mean NRS values (0-100) comparing groups 1 and 2 from initial consultation (1) to the third (2) and final consultation (3). Error bars indicate the SDs of the mean values.*

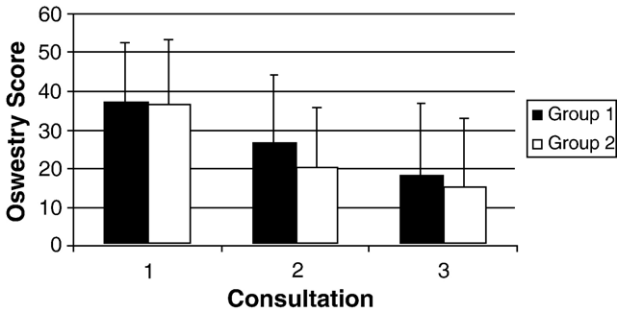

Fig 2. *Mean Oswestry values (0-100) comparing groups 1 and 2 from initial consultation (1) to the third (2) and final consultation (3). Error bars indicate the SDs of the mean values.*

the instrument was placed on the crest of the ilium approximately 1 in superior the posterior superior iliac spine. The line of drive was parallel to the plane line of the SIJ (medial and inferior); and (3) on the side opposite to the extension fixation, the tip of the instrument was placed on the superior aspect of the ischial tuberosity. The line of drive was inferior and anterior.

This study did not make use of the leg length inequality assessment or stress tests used in Activator Methods Chiropractic Technique protocols.[29] Purported safety of using a device such as the Activator Adjusting Instrument (Activator Methods International) is thought to be due to the prone neutral positioning of the patient during the spinal manipulation procedure (thus, no rotation) combined with the controlled repeatable low force of the thrust in the joint plane line.[30]

Each participant attended 4 consultations and treatments over a 2-week period, and then a follow-up consultation within 1 week after the fourth treatment. Objective and subjective outcomes data were collected at the beginning of the first, third, and follow-up consultations. If the patient became asymptomatic in subjective clinical findings before the final consultation, the patient continued to be evaluated for the remainder of the treatment period but received no further treatment.

Outcome Measures

Subjective pain was assessed by means of the numerical pain rating scale (NRS) 101, a questionnaire used to measure the changing intensities of pain experienced by the patient.[31] The questionnaire includes two separate graphs; both ranging from 0 to 100, where 0 indicates "no pain" and 100 indicates "pain as bad as it could be." The subjects were asked to rate their pain firstly according to the pain intensity when it is at its worst, and secondly, the pain intensity when the pain is at its least. The average of these two scores is an indication of the patients' pain level. This method of pain rating has been found to enhance the responsiveness of the measures and is a more representative perspective of their pain experience.[32] The validity of the NRS has been well documented in demonstrating positive and significant correlation with other measures of pain intensity.[33] Self-reported pain and disability was recorded by means of the Revised Oswestry Low Back Pain Disability Questionnaire (Oswestry).[34,35] The Oswestry is a validated questionnaire consisting of 10 sections encompassing pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and changing degree of pain. Each section consists of 6 statements, each allocated a score between 0 (indicating no disability) and 5 (indicating maximum disability). The final score was totaled out of 50 and then converted to a percentage, indicating perceived disability at that time.

Orthopedic rating scores were collected at each consultation to compare as an objective outcome measure in each group. In addition, to quantify the symptomatic status of the SIJ, an algometer was used. In this manner, pain pressure threshold, defined as the minimum pressure inducing pain or discomfort, was assessed using the Wagner FDK20 Force Dial (Wagner Instruments, Greenwich, Conn) using protocols developed by Fischer.[36-39] The readings were taken over the most painful area of the symptomatic SIJ and over the same anatomic location from the asymptomatic SIJ. Such anatomic position was noted for follow-up assessment. Measurements were taken by placing the tip of the algometer to the most painful part of the symptomatic SIJ (and then the corresponding area of the other SIJ) and applying a posterior to anterior pressure at a rate of 1 kg/cm^2 per second until the patient verbally indicated pain. The readings were measured in kilograms per square centimeter (kg/cm^2). A higher reading indicated lower pain sensitivity or higher pain threshold.

Statistical Analysis

Statistical analysis was performed using SPSS Version 9.0 statistical software program (SPSS Inc, Chicago, Ill). The statistical evaluation was aimed at measuring any significant changes occurring between the initial and third consultations, initial and fifth consultations, and the third and fifth

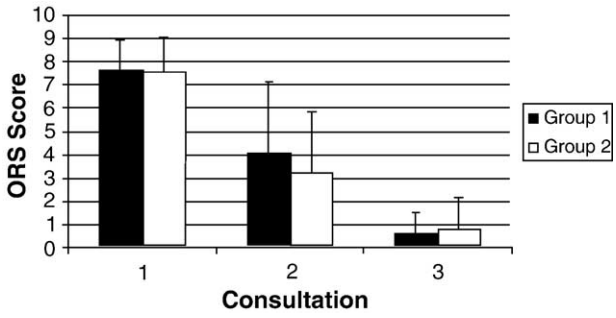

Fig 3. *Mean ORS values (0-10) comparing groups 1 and 2 from initial consultation (1) to the third (2) and final consultation (3). Error bars indicate the SDs of the mean values.*

consultations between the two study groups. Both parametric and nonparametric testing were used to analyze the data obtained. Parametric tests were used to analyze the algometer data, ORS (percentage analysis), NRS, and Oswestry scores. Statistical tests included Mann-Whitney U-Test for intergroup analysis, and Friedman *t* test for intragroup analysis. This analysis would determine any significant changes between the initial, third, and fifth consultations within each study group. All data were analyzed using a 5% significance level. The null hypothesis stated that there was no difference between the two groups. The Friedman *t* test was used to determine if there was any significant difference between groups in Oswestry, ORS, and algometer readings between the first, third, and follow-up consultations. The null hypothesis was that there was no difference between groups for any of the subjective or objective variables. If the null hypothesis was rejected for Friedman *t* test, then a multiple comparison procedure, Dunn procedure, was applied to determine which treatments are significantly different.

Results

Of the 60 participating subjects 51.7% were men and 48.3% were women, with 16 men and 14 women randomized to group 1 and 15 men and 15 women randomized to group 2. The age distribution of the study participants is shown in Table 2. The number of patients in each age grouping was evenly spread across both groups with the highest proportion of subjects in the 18 to 30–year age range (33% and 37%, respectively, for groups 1 and 2). The 50 to 59–year-old grouping was the second largest (23% and 30%, respectively, for groups 1 and 2), whereas 5 subjects each made up the 31 to 40–year-old group (17%) and 27% and 17% were aged 41-50 years for groups 1 and 2, respectively.

At the initial consultation, no significant differences between groups were noted for age, sex, or any of the subjective and objective variables. Statistically significant improvements ($P < .001$) in mean NRS (group 1, 49.1-23.4; group 2, 48.9-22.5), Oswestry (group 1, 37.4-18.5; group 2, 36.6-15.1), ORS (group 1, 7.6-0.6; group 2, 7.5-0.8), and

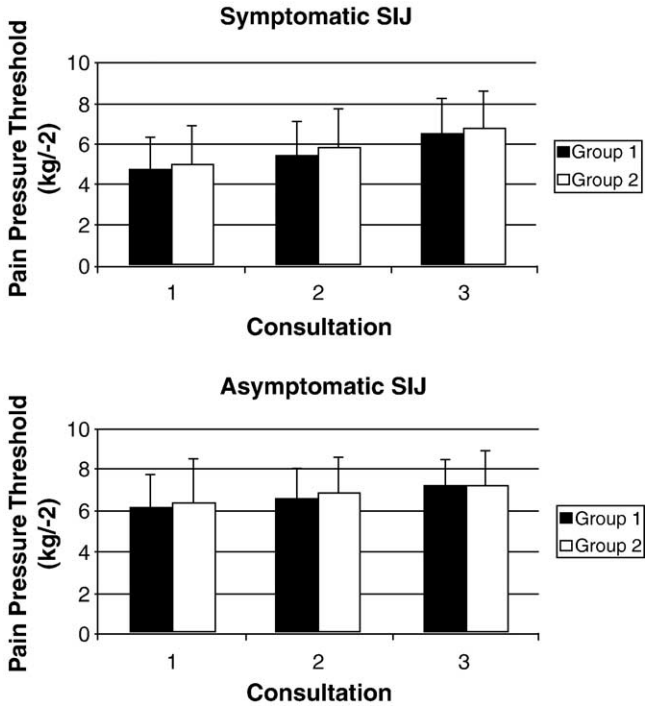

Fig 4. *Mean pain pressure threshold values (kg/cm^2) for algometer assessments obtained from the symptomatic (A) and asymptomatic (B) SIJs comparing groups 1 and 2 from initial consultation (1) to the third (2) and final consultation (3). Error bars indicate the SDs of the mean values.*

algometry measures (group 1, 4.8-6.5; group 2, 5.0-6.8) were observed from the first to last visit for both groups. From the first to the final consultations, statistical analysis of the subjective and objective data showed equal improvement for both groups with no difference in outcome between the groups. Intergroup analysis showed no statistically significant differences between groups for all the outcome measures examined.

With the exception of the algometry data, statistically significant improvements were observed for all subjective and objective outcome variables (NRS, Oswestry, and ORS) from the first to the third and third to fifth consultations. No statistically significant improvements in pain pressure threshold were observed in group 1 from the first to third consultation on either the symptomatic or asymptomatic SIJ. For group 2, no significant improvements in pain pressure threshold from the asymptomatic SIJ were noted from the first to third or third to fifth consultations. Mean NRS, Oswestry, ORS, and algometry (asymptomatic and symptomatic SIJ) values for groups 1 and 2 from initial, third, and final consultations are shown in Figs 1-4.

Discussion

The results of this study showed that chiropractic care including both HVLA and MFMA-type chiropractic adjust-

ments were associated with a positive effect in the treatment of SIJ syndrome in this patient population. Because group 1 did not exhibit a greater effect over group 2 in either subjective (self-perceived pain and disability) or objective (ORS, pain pressure threshold) findings as hypothesized, this study found that both chiropractic adjustment regimens had an equal effect in the treatment of SIJ syndrome. The improvement in LBP symptoms, combined with improvement in objective clinical findings in both groups, is consistent with anecdotal claims of efficacy among clinicians using these forms of chiropractic adjustments in patients with SIJ syndrome. This is the first study to compare different forms of chiropractic adjustment/spinal manipulation in the management and treatment of patients with SIJ syndrome.

Because this study did not include a control group, these results cannot be taken as proof supporting the clinical efficacy of chiropractic adjustment for SIJ syndrome; however, the positive trends observed suggest the call for a well-designed randomized controlled clinical trial in a similar patient population. Noteworthy was that patients included in the study had LBP for at least a 2-week duration at the time of initial consultation with a total of more than 4 weeks of LBP in the preceding year. The significant improvements in subjective and objective findings of SIJ syndrome associated with chiropractic treatment over a relatively brief treatment regimen (4 visits over 2 weeks with 1-week follow-up) are encouraging for the conservative treatment of this disorder.

Because this study did not include a control group, the natural history of SIJ syndrome was not investigated. The natural progression of sacroiliac syndrome would be best observed in a group receiving placebo treatment (sham manipulation), as used in other studies.[40,41] Thus, implementing a control and sham group would also allow a greater understanding of the true clinical benefits of these manipulative procedures. In addition, blinding the examiner to the patient's clinical findings could have also eliminated observer bias. Larger group sample sizes would also increase the validity of the study and minimize the possibility of a type II error. Long-term follow-up consultations would also assist in the understanding of the efficacy and cost-effectiveness of chiropractic treatment of SIJ syndrome. Furthermore, individualizing the treatment regimen, as opposed to our standardized treatment protocol of two visits per week, may have produced different results.

Other limitations in the current study deserve discussion. Most noteworthy, perhaps, is the controversial nature of SIJ syndrome itself. Histologic examination of human SIJs has revealed nerve fibers compatible with a broad repertoire of sensory receptors including nociceptive afferents.[42,43] This innervation pattern may provide explanations for various patterns of local, pseudoradicular, and referred pain in afflictions of the SIJ that have been confirmed with direct SIJ capsular stimulation.[44-46] A reduction in pain in patients treated for presumptive SIJ pain by injection of an anesthetic into the SIJ has also been shown, validating its status as a pain generator.[47]

Although the SIJ has been shown to be a pain generator, confirming an SIJ syndrome diagnosis in the absence of SIJ block (arthrogram) is limited, thus presenting another limitation to the current study. Several noninvasive clinical methods such as the orthopedic tests as used in the current study have been found not to be reproducible[6,48] and, thus, should not be used alone by practitioners to provide reliable information concerning where to direct a manipulative procedure in patients with chronic mechanical LBP.[48] However, recent work has shown a strong correlation between 3 or more positive SIJ pain provocation tests (as used in the current study) and positive SIJ injection.[49] Because the current study did not confirm the SIJ as the pain generator via SIJ block, it is possible that false-positive and false-negative clinical indicators for differential diagnosis of SIJ syndrome were present in our patient population. Such misdiagnosis may have affected our results. Although it would be advantageous to have confirmation of the SIJ as the primary pain generator via arthrogram, we believe that the invasiveness of this procedure would have affected our subject recruitment. Future studies, however, should include diagnostic SIJ block to confirm the SIJ syndrome diagnosis.

Experimental stimulation of the SIJ has been further found to cause neuromuscular responses in the gluteus maximus, quadratus lumborum, and multifidus muscles.[50] Such muscular activation assists in providing control of locomotion and body posture and provides stability of the SIJ and lumbar spine.[50] Thus, sensitization of SIJ nociceptive afferents not only contributes to mechanical LBP, but also further plays a role in SIJ biomechanics via reflexogenic activation of the trunk and gluteal muscles.[50,51] This acts to restrict SIJ motion and promotes a subsequent SIJ inflammatory response, which most probably contributes to the presented positive subjective and objective findings in this patient population. Indeed, other studies have reported alterations in spinal motion in chronic LBP subjects.[52] Detecting alterations in SIJ biomechanics by qualitative means, such as palpation, has its limitations and is likely to have contributed to examiner error in the current study. Kinematic studies of SIJ motion have varied but similarly agree on the small amount of motion occurring at the joint, between 0.5° and 6° of rotation and 0.7 to 3 mm of translation.[53-57] This small amount of movement is difficult to differentiate clinically[58-60] and, thus, could have contributed to examiner error in the decision making of type of SIJ fixation and the subsequent direction to apply the chiropractic adjustment, consequently also affecting our results.

In this study, confirmation of the SIJ syndrome diagnosis was made through correlation of patient history and physical examination findings including both the orthopedic and

algometry findings. The application of the pressure of the algometer can be therapeutic. However, algometry measures have been shown to be stable across treatment days,[38,61] and inasmuch, we do not believe that the pressure applied during the algometry examinations contributed to the subjective and objective improvements observed in the study population. The pain pressure threshold on the symptomatic side was lowered on the side of SIJ syndrome from algometry measures in both groups (Fig 4). Algometry has been found to be a valid and reliable measure of pain pressure threshold.[36,37] It is likely that the chiropractic adjustment, as delivered in this study, was delivered on the true symptomatic side. It is also possible that anatomic positioning error existed in the test-retest conditions of the algometry protocol that also may have contributed to error in the algometry results. Until strict validated clinical measures are established as diagnostic criteria SIJ syndrome, the validity and, ultimately, the efficacy of the treatments for this condition will continue to be questioned.

In general, the benefits of chiropractic adjustment or spinal manipulation involve biomechanical and neurophysiologic mechanisms. These mechanisms include restoring joint play to dysfunctional joints through releasing entrapped synovial folds or plica, relaxing hypertonic muscles, and disrupting articular or periarticular adhesions.[62] Beneficial effects of chiropractic adjustments/spinal manipulation have been thought to be associated with mechanosensitive afferent stimulation and presynaptic inhibition of nociceptive afferent transmission in the modulation of pain,[63,64] inhibition of hypertonic muscles,[11,65,66] and improved functional ability.[62,67,68] Although improvements in SIJ function have been reported after SIJ manipulation,[5] manipulation has not been found to change the position of the SIJ.[69] It is likely that SIJ manipulation acts indirectly on the supporting musculature, improving the global function of the region.

Several studies have presented physiological or functional outcomes resulting from SIJ manipulation. Suter et al[9,10] found that SIJ manipulation caused a reduction in lower extremity muscle inhibition in patients suffering SIJ dysfunction and knee and anterior thigh complaints. Electromyographic reflex responses have been found to be elicited via both HVLA[11] and MFMA[12] manipulation of the SIJ. Murphy et al[13] reported decreased Hoffman reflex responses indicative of a decrease in motor neuron excitability after HVLA SIJ manipulation in clinically relevant patients with LBP. Herzog et al[14] found that HVLA SIJ manipulation was superior to a back school regimen on gait symmetry for patients with SIJ pain. Similarly, Cibulka et al [5] noted improved innominate bone tilt after HVLA SIJ manipulation in patients with SIJ dysfunction. Few clinical outcome studies, however, have evaluated the effectiveness of HVLA or MFMA SIJ manipulation. In a case series of 10 subjects diagnosed with chronic SIJ syndrome, Osterbauer et al[15] reported decreases in pain, disability, and pain pressure threshold initially and at 1-year follow-up in patients undergoing MFMA chiropractic treatment. In contrast to the findings of Herzog et al,[14] Osterbauer et al[15] found no effect on gait symmetry or postural sway in their patients receiving chiropractic (MFMA) treatment.

Despite its limitations, this study is one of few studies investigating conservative treatments of SIJ syndrome and the first study to compare different chiropractic techniques in its management. Noteworthy are the findings of the current study in contrast to the beliefs of an expert panel assembled to evaluate the efficacy of different chiropractic techniques in the treatment of LBP. In a recent report, Gatterman et al[70] rated HVLA manipulation as more efficacious than MFMA manipulation in the treatment of low back conditions, which included SIJ dysfunction in concordance with the available evidence and their expert opinions. On the contrary, the results of the current study showed no difference in subjective or objective outcomes with either HVLA or MFMA treatments in this population of patients with SIJ syndrome. In this regard, this study adds to the sparse body of literature on efficacy of conservative treatments for mechanical LBP involving SIJ syndrome and forms the basis for a more rigorous investigation using chiropractic adjustments/spinal manipulation.

Conclusions

The results of this trial indicate that a relatively short regimen (4 visits) of MFMA or HVLA chiropractic adjustments were associated with beneficial effects of reduction in pain and disability in patients diagnosed with SIJ syndrome. Neither MFMA nor HVLA adjustments were found to be more effective than the other in the treatment of this patient population. Acknowledging and overcoming the limitations of this study will allow for designing further research contributing to a greater understanding of the clinical benefits of chiropractic adjustments/spinal manipulation in patients with SIJ syndrome.

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