Original Article

Comparison of Efficacy between Manipulation and Exercise Therapy in the Treatment of Patients with Sacroiliac Joint Dysfunction: A Randomized Clinical Trial

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Abstract

Background: Sacroiliac joint dysfunction is one of the main sources of lower back pain affects 16-30% of these patients. Various treatments had proposed for subluxation and sacroiliac syndrome but the current evidence on this subject is not confirmatory and few surveys have assessed the efficacy of manipulation in the treatment of this condition. The present study aimed to compare the efficacy of manipulation with exercise therapy in patients with sacroiliac pain syndrome.

Materials and Methods: In this single-blinded clinical trial, the 30 patients categorized (to two groups) to receive either manipulation or exercise therapy. Required data gathered via medical history and the Persian translation of the Beck and Oswestry questionnaires and the pain assessed according to the visual analogue scale (VAS). Data entered into SPSS v.22 software for analysis.

Results: Changes in VAS (p=0.011) and Oswestry score (p=0.012) after one week were significantly greater in the manipulation group. In addition, changes in the Oswestry disability index (ODI) score in the manipulation group of one week and one month after treatment were significantly different from the pre-treatment.

Conclusion: Based on the findings of this survey, manipulation had a better efficacy on pain severity and disability of patients with sacroiliac pain syndrome, compared to exercise therapy and considering its low risks and non-invasiveness, its application by trained physicians recommended.

Keywords: Manipulation, Exercise therapy, Sacroiliac pain syndrome

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Introduction

Sacroiliac joint (SIJ) dysfunction (also called sacroiliac syndrome or sacroiliac subluxation) is one of the causes of chronic low back pain, which has not considered sufficiently. The prevalence of SIJ dysfunction reported being 16-30% of patients with low back pain[1-3]. Sacroiliac joint is a diarthrodial synovial

joint including an anterior segment (a true synovial joint) and a posterior segment (a syndesmosis comprising gluteus minimus and medius muscles, piriformis muscle and sacroiliac ligaments[3]. These ligamentous structures and the muscles influence the stability of SIJ. History, physical examination, and imaging have low sensitivity and specificity for the diagnosis of SIJ dysfunction. Therefore, due to the complex anatomy and biomechanics of this joint, diagnosis and treatment is usually challenging.

Sacroiliac joint dysfunction can occur in the form of localized or referral pain. The most common complaints of patients include pain in affected sacroiliac joint, lower back and buttocks[4,5], groin, thigh[3] and the genitalia[6]. The quality of the pain can be vague or sharp[5,7]. Aggravating factors include all types of physical activity, bending, climbing stairs and sexual activity[4]. Most physicians use provocative maneuvers to achieve the diagnosis. The most commonly used tests for this purpose are the Patrick test that causes pain in the sacroiliac joint in flexion, abduction and external rotation, and Gaenslen test, which the hip extension aggravates the joint pain[5,7].

Imaging studies also do not have more diagnostic value than clinical examinations in SIJ dysfunction. Both bone and CT scan have sensitivity between 40 to 60%[8,9] plain x-ray and MRI study rarely shows abnormality in SIJ dysfunction[5]. The most reliable method for sacroiliac joint pain is local anesthetic injections in the joint. Significant pain relief has high diagnostic value[10]. Injection at the correct location using the blind technique is also very difficult, in one study, the correct injection rate within the sacroiliac joint has been reported 22%[11], but an ultrasound-guided injection of the SIJ demonstrated to have a high success rate up to 90%[12]. Treatment in the acute phase includes partial rest, avoidance of pain intensifying factors and the use of nonsteroidal anti-inflammatory drugs[13,14]. Manipulation is another treatment in patients with SIJ dysfunction. Several studies have shown the efficacy of manipulation in the improvement of pain in these patients[15-18]. In addition, in some studies, showed exercise therapy can improve pain and function of patients with SIJ dysfunction[19-21]. In addition, physical modalities such as ultrasound with and without phonophoresis, diatremia, cold and warm heat, TENS[3,22] and Kinesio tape[23,24] have been used.

The intra-articular injection has both diagnostic and therapeutic roles. Significant effects of intra-articular injection of steroid showed in many previous studies[25,26]. Minimum invasive methods by radiofrequency nerve degeneration can also be effective in improving pain in patients that confirmed by some studies[27,28]. In patients not responding to conservative treatment or in recurrent cases and if there was significant osteoarthritis in the joint, joint failure or fracture surgical arthrodesis could be considered[29,30].

Regarding the dispersion of the results of previous studies, the lack of reliable controlled studies and reduced the tendency of patients to medical and surgical intervention, this study designed to compare the effectiveness of exercise therapy and manipulation in the treatment of SIJ dysfunction.

Methods

This single-blind study conducted in Shohadaye Tajrish Hospital, Shahid Beheshti University of Medical Sciences, on patients aged 15-65 years old with low back pain. The Ethics Committee reference number was IR.SBMU.REC.1395.363. Inclusion criteria were unilateral low back pain, SIJ dysfunction diagnosed based on medical history and the findings of physical examination including Gillet, Gaenslen and forward bending tests and tendency to participate in this study. Exclusion criteria were cognitive disorders, a history of lumbosacral radiculopathy, trauma, back surgery, and the presence of comorbidities such as fibromyalgia and rheumatoid arthritis.

In total, thirty patients with SIJ dysfunction divided into two groups with a randomized sampling method. At the first session patient's data, including demographic characteristics (age, gender, BMI and the onset time of pain) collected. The anxiety in the patients was assessed using the Persian translation of Beck anxiety index which its validity and reliability were reviewed and approved by Davian et al[31]. The questionnaire consists of 21 questions about the severity of various symptoms of anxiety. Any questions from zero to three points given that the lower rating means less anxiety.

In manipulation group, in the first visit, patients underwent manipulation using high velocity-low amplitude technique (trust technique) and after a week at the clinic examined. In this session, patients, which

still had positive findings in physical examination, were again subjected to manipulation. In the exercise group, at the first visit, physical medicine and rehabilitation resident trained patients. The exercise program included stretching of quadriceps, hamstrings and hip adductors, posterior pelvic tilt and gluteus maximus and medius strengthening. The patients were asked to do exercises every day throughout the study period, each time you train each of the exercises ten times each time in ten seconds. The pain and disability of patients, respectively, based on the visual analogue scale (VAS) and Oswestry disability index (ODI) were recorded by physical medicine and rehabilitation resident for each patient in three times: the first visit, one week and one month after treatment. The visual analogue scale is used to assess the severity of pain that a person is asked to rate their pain intensity from zero to ten (painless = zero and highest pain = 10).

Oswestry disability index is widely used to assess the disability of patients with low back pain. Validity and reliability of its Persian translation approved by Mousavi and his colleagues[32]. The questionnaire includes 10 questions about pain intensity, the patient's ability in personal care, lifting, walking, sitting, standing, sleeping, sex, social life and traveling and moving that each question has 6 options that were 0, 2, 4, 6, 8 and 10 points, that patient chooses and patients' overall rating is from zero to 100. The higher score indicates a severe disability. In addition, the amount of painkiller used by the patient based on the number of naproxen 500 capsule recorded during the study period.

Based on previous studies[16,17] using a sample size calculation formula for RCT studies that comparing the two groups of mean, taking into account the factor for 15% loss to follow up, 30 patients were enrolled. The power of the study 80% and P value <0.05 were considered significant. Finally, the collected data from the studied patients entered into the statistical software version 22 of SPSS and analyzed statistically. The results of qualitative variables as frequencies and percentages and the results of the quantitative variables as mean and standard deviation were calculated and reported. To evaluate the relationship between qualitative variables we used Chi-squared test and Fisher's Exact test when was necessary. Relationships between quantitative variables analyzed by T-test and ANOVA.

Results

In total, thirty patients (16.7% male and 83.3% female) with the sacroiliac syndrome who referred to Shahdaye

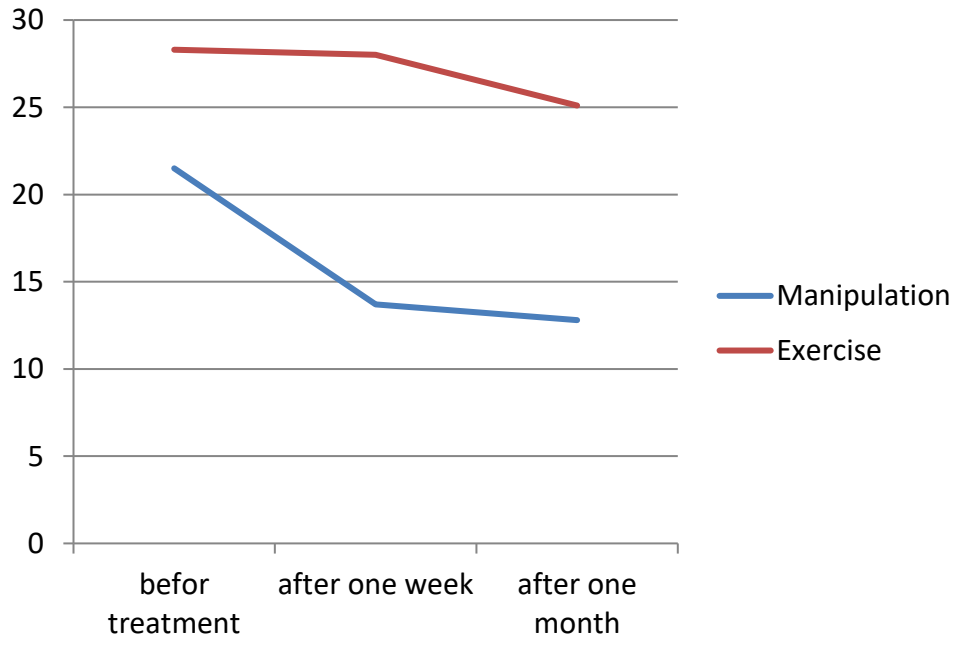

Figure 1. Comparison of the Oswestry average trend in two groups.

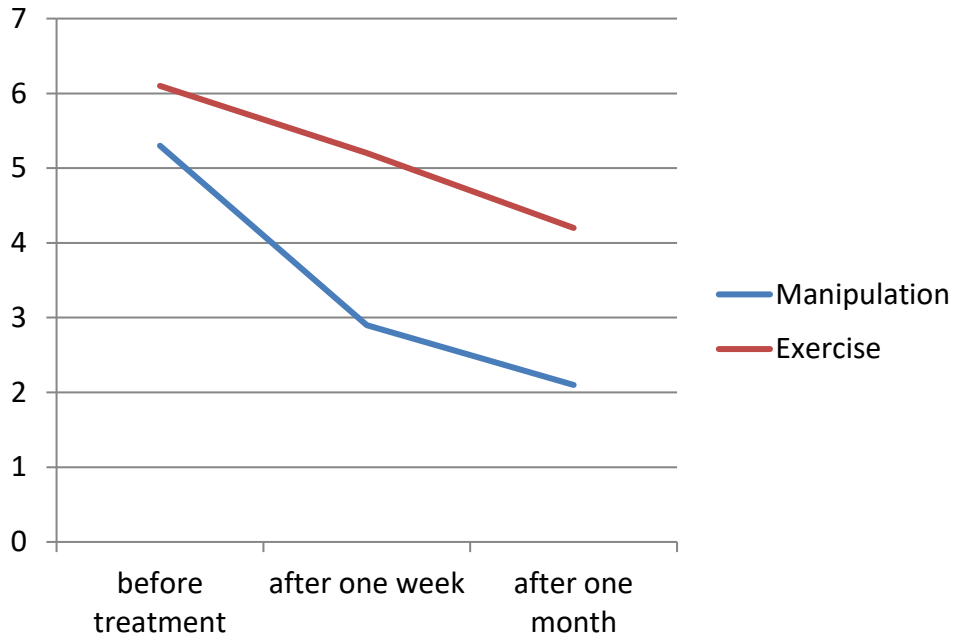

Figure 2. Comparison of VAS average trend in two groups.

Table 1: Differences between the two groups in terms of variables studied.

Variables	Total	Group		P value
		Manipulation	Exercise	
Gender (Female/Male ratio)	25/5	12/3	13/2	0.624
Age (years)	39.0 (13.5)	35.5 (13.6)	42.5 (12.9)	0.159
BMI (kg/m^2)	25.4 (3.1)	25.4 (3.1)	25.4 (3.2)	0.968
Pain Duration (months)	5.4 (5.4)	5.5 (5.4)	5.4 (5.5)	0.960
Anxiety	10.7 (7.7)	9.1 (8.0)	12.3 (7.2)	0.250
VAS before	5.7 (1.5)	5.3 (1.5)	6.1 (1.5)	0.196
Oswestry before	24.9 (11.6)	21.5 (9.2)	28.3 (12.9)	0.110

Tajrish Hospital enrolled in the study. The mean age of participants in the study was 39±13.5 years, with a minimum of 18 and a maximum of 65 years. The mean BMI of these patients was 25.4±3.1 kg/m^2, ranged between 19.1 and 31.1. The duration of symptoms was between 15 days and 18 months, the average for the total population calculated to be 10.7±5.3 months. The mean of anxiety level of patients according to the Beck questionnaire was 10.7±7.7, which was the lowest, zero and the highest was 29. Fifteen patients (50.0%) randomly assigned to the exercise group and 15 patients (50.0%) were included in the manipulation group. Of the 15 patients in the manipulation group, six patients (40.0%) remained symptomatic after one week and were taking manipulation again.

According to the results presented in Table 1, there was no significant difference between the two groups in terms of age, sex, body mass index, duration of pain and anxiety level, indicating that the population studied was homogeneous between the two groups.

The differences between the two groups in terms of severity of pain and severity of the disability, which

Table 2: The mean of the variables at different time points.

Variables	Total	Group		P value
		Manipulation	Exercise	
Number of pain killer tablets	6.2 (6.8)	3.6 (4.6)	8.9 (7.7)	**0.030**
VAS before	5.7 (1.5)	5.3 (1.5)	6.1 (1.5)	0.196
VAS after 1 week	4.0 (1.9)	2.9 (1.4)	5.2 (1.7)	**<0.001**
VAS after 4 weeks	3.1 (2.1)	2.1 (1.7)	4.2 (2.0)	**0.004**
Oswestry before	24.9 (11.6)	21.5 (9.2)	28.3 (12.9)	0.110
Oswestry after 1 week	20.9 (13.9)	13.7 (9.8)	28.0 (14.0)	**0.003**
Oswestry after 4 weeks	18.9 (14.1)	12.8 (11.0)	25.1 (14.5)	**0.015**

Table 3: Changes in the variables at different times.

Change in variables		Group				P value for Change in variable / Initial value
		Manipulation		Exercise		
		Mean (Std. Dev.)	P value	Mean (Std. Dev.)	P value	
VAS	before - after 1 week	2.5 (1.6)	**<0.001**	0.9 (1.7)	0.072	**0.011**
	before - after 4 weeks	3.3 (2.2)	**<0.001**	1.9 (2.2)	**0.005**	0.058
	after 1 week - after 4 weeks	0.8 (1.4)	**0.041**	1.0 (0.8)	**<0.001**	0.099
Oswestry	before - after 1 week	7.7 (10.1)	**0.010**	0.3 (7.5)	0.893	**0.012**
	before - after 4 weeks	8.7 (11.8)	**0.013**	3.2 (8.1)	0.150	0.080
	after 1 week - after 4 weeks	0.9 (6.4)	0.582	2.9 (4.5)	0.125	0.074

was assessed by the VAS criteria and the Oswestry questionnaire which they were presented in Table 2 before treatment, one week and one month after treatment. The results of the changes in each of these components also presented by the two groups of study in each of the three times they evaluated in the study in Table 3.

As shown in Table 2 there was no significant difference in the level of VAS between the two groups before treatment (p=0.196). However, after one week of

treatment, in the manipulation group, VAS levels were significantly less than the exercise group ($p<0.001$), these differences were observed after a month and they were statistically significant ($p=0.004$).

According to the results presented in Table 2, there was no significant difference in the severity of disability according to the Oswestry questionnaire between the two groups before the treatment ($p=0.110$). But after one week of treatment in the manipulation group, mean ODI was significantly less than the exercise group ($p=0.003$). These differences were also observed after a month and they were statistically significant ($p=0.015$).

According to the results presented in Table 3, changes in ODI score in the manipulation group of one week ($p=0.01$) and one month ($p=0.013$) after treatment were significantly different from the pre-treatment, but no significant changes were reported between one month and one week after treatment ($p=0.582$). In addition, changes in ODI score one week after treatment compared to pre-treatment in patients with manipulation group were significantly more than those in the exercise therapy group ($p=0.012$).

Discussion

Our study was to compare two methods of manipulation and exercise therapy in the treatment of the sacroiliac syndrome. In addition, there is no possibility to compare results with other studies; however, researchers have evaluated their effect alone. Several studies reported the improvement of pain caused by sacroiliac joint following a manipulation technique[33,34], which is consistent with the results of this study. In one study by Kamali and Shokri, compared the effect of SIJ manipulation with SIJ and lumbar manipulation in the treatment of the sacroiliac syndrome. Manipulation technique was high-velocity and low-amplitude (HVLA). Both groups had a significant improvement in pain intensity and Oswestry disability index after 48 hours and 1 month after treatment, but no significant difference observed between the two groups[17]. Results of this study are in accordance with our study and support the efficacy of manipulation therapy on pain and disability of patients suffering from the sacroiliac syndrome.

In 1991, daly and his colleagues examined the effect of rotational manipulation on SI joint in eleven pregnant women with sacroiliac subluxation. In this retrospective study, 100 pregnant women who referred to a doctor in a village in New York evaluated, and 23 of them complained of back pain. Of these, eleven cases of sacroiliac joint subluxation confirmed as a cause of back pain. At the end of this study, 91% of the patients (10 out of 11 participants) had relief of pain and no signs of sacroiliac subluxation[33]. In this study such as ours, the effectiveness of manipulation therapy on sacroiliac dysfunction has proven.

In 2005, Shearer and colleagues compared two manual and mechanical manipulation methods to treat the sacroiliac joint syndrome. In this prospective randomized clinical trial, 60 patients with a diagnosis of the sacroiliac syndrome divided into two groups. All patients underwent 4 sessions of Chiropractic for 2 weeks and participated in follow-up sessions after one week. Patients in one of the two groups underwent chiropractic settings in the flattened, high-speed, and low-intensity positions, and the patients in the other group underwent manual manipulation and manual assistance using activator adjusting. According to the results of this study, there was no significant difference in the primary counseling session between the two groups. In both groups, significant improvement was observed from 1 to 3, 3 to 5, and 1 to 5 in terms of pain intensity, scores of low back pain, according to Oswestry questionnaire, and algometric measurements[35]. In this study, both manual and mechanical maneuvering techniques have been effective in improving pain and reducing disability in patients with sacroiliac pain, which is similar to the results of this study.

In 2018, Kamali et al in a similar study to our study compared the effect of manipulation and stabilization exercise in 30 patients with sacroiliac joint dysfunction. Both groups showed significant improvement in pain and Oswestry disability index but despite to results of the current study, there was no statistically significant difference between two groups in post-treatment pain or ODI[16].

Another study evaluated the efficacy of strengthening of gluteus maximus in eight patients with SIJ dysfunction. These patients underwent ten treatments over five weeks to increase gluteus maximus strength. VAS, ODI and strength assess via hand dynamometer

were measured pre- and post-intervention. After the treatment period, a significant increase in gluteus maximus strength ($p<0.002$) and function and decrease in pain were seen[21].

Nejati et al divided 51 patients with sacroiliac dysfunction into three study groups; the ET group (posterior innominate self-mobilization, sacroiliac joint stretching and spinal stabilization exercises), the MT group (posterior innominate mobilization and sacroiliac manipulation) and EMT group (manipulation maneuvers followed by exercise therapy). Pain and disability were assessed 6, 12 and 24 weeks after treatment. All three groups showed significant improvement in pain and disability score compared to pre-treatment ($p<0.05$). Difference between these three groups was time-related. After 6 weeks, MT showed notable after 12 weeks effect of ET was remarkable. At weeks 24, there was no significant difference between groups[15]. However, the number of patients was limited to comparing these two diseases and for a more accurate comparison need more people. The trait of this study was accurate evaluation taken by a specialist in this field, as well as to perform periodic examinations at different times. Recommended future studies to investigate this treatment for more samples as well as for a variety of therapies for the sacroiliac joint syndrome, it advised conducting studies to a review article about therapeutic ways for the sacroiliac joint syndrome to finding comprehensive concepts.

Conclusion

Thus, studies that have been done so far on the effects of exercise therapy and manipulation methods in treating patients with the sacroiliac joint syndrome have all shown a significant effect of both therapies. The present study, with a direct comparison of these two methods, showed that the effectiveness of manipulation is more than exercise therapy. However, these studies are only sporadic reports of the efficacy of these therapies, and further studies needed to reach a conclusive conclusion on their effects and to compare these two with each other. However, in this regard, we recommended the use of this method by trained specialists because of that given the low risk and non-invasive technique of manipulation.

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