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Effectiveness of Electroacupuncture Treatment for Sciatica Due to Piriformis Syndrome: Randomized Controlled Trial

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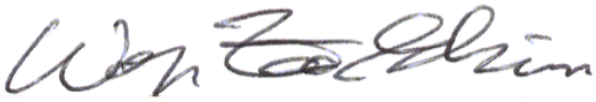

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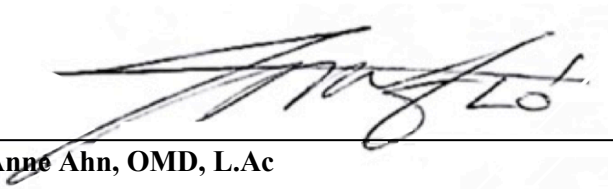

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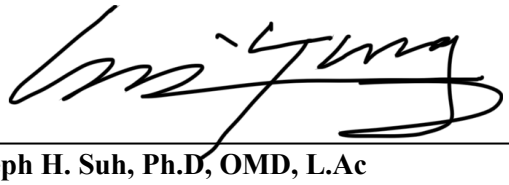

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ABSTRACT

This study is about Piriformis syndrome which is a neuromuscular disorder characterized by pain and discomfort in the buttocks and lower back region. It results from the compression or irritation of the sciatic nerve by the piriformis muscle, leading to symptoms such as sciatica, leg pain, and numbness. This research seeks to validate the efficacy of Acupuncture treatment by implementing specific clinical guidelines at the South Baylo University Anaheim Campus Clinic in the United States through a case-control study based on Randomized Controlled Trial (RCT). Anticipated positive outcomes are expected from this experimental research. In this preliminary investigation, a randomized controlled trial was conducted with the participation of eight individuals diagnosed with piriformis syndrome-induced low back pain under the same circumstances. The study cohort was evenly divided into two distinct groups: the Experimental Group and the Control Group. The Experimental Group received acupuncture treatment with the use of an electro stimulator, while the Control Group

received acupuncture treatment without the electro stimulator. The same acupoints were used and utilized for both groups. The therapeutic outcomes were assessed by examining Visual Analogue Scale (VAS) scores before and after each treatment, Range of Motion (ROM) utilizing a goniometer before and after each treatment, and Oswestry Disability Index (ODI) assessments. Treatments were conducted twice a week for 4 weeks total for each group, with each treatment duration of 30 minutes for each participant. Experimental group showed higher cumulative VAS differences, with the experimental group 5.2 ± 0.96 and the control group 6.5 ± 0.58 after fourth treatment. The cumulative ROM of difference for experimental group is 19.5 ± 6.96 and control group is 8.8 ± 4.79. The ODI difference of before and after treatment of experimental group is 24.5 ± 9.88 and the control group is 32.3 ± 5.26.

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I. INTRODUCTION

Piriformis syndrome is a relatively common but often misunderstood neuromuscular condition that can cause significant pain and discomfort. This syndrome is characterized by the compression or irritation of the piriformis muscle, a small but crucial muscle located deep within the buttocks. The piriformis muscle plays a vital role in the movement and stability of the hip joint, making it essential for activities like walking, running, and even sitting. When this muscle becomes inflamed, tense, or compresses the sciatic nerve that runs beneath or through it, it can lead to a range of distressing symptoms, including sharp or radiating pain in the buttocks, lower back, and down the leg. Piriformis syndrome often goes undiagnosed or is misattributed to other conditions, making it important to understand its causes, symptoms, and treatment options. In this exploration, we will delve deeper into the intricacies of piriformis syndrome, shedding light on its mechanisms, risk factors, diagnostic approaches, and management strategies to provide a comprehensive understanding of this challenging musculoskeletal disorder.

Piriformis syndrome can affect both males and females, and there is no significant difference in its occurrence between the two sexes. However, some studies have suggested that women might be slightly more prone to develop piriformis syndrome due to factors such as differences in pelvic anatomy and hormonal influences. Piriformis syndrome may be responsible for 0.3% to 6% of all cases of low back pain and/or sciatica. With an estimated number of new cases of low back pain and sciatica at 40 million annually, the incidence of piriformis syndrome would be roughly 2.4 million per year. In the majority of cases, piriformis syndrome occurs in middle-aged patients with a

reported ratio of male to female patients being affected 1:6. In one study at a regional hospital, 45 of 750 patients with LBP were found to have piriformis syndrome. Another author estimated that the incidence of piriformis syndrome in patients with sciatica is 6%.

Acupuncture is an alternative therapy that has gained popularity as a potential treatment option for piriformis syndrome. This traditional Chinese medicine practice involves the insertion of thin needles into specific points on the body to stimulate energy flow and promote natural healing. For individuals with piriformis syndrome, acupuncture may offer some relief by targeting the affected area and reducing muscle tension. By targeting key trigger points and encouraging relaxation of the piriformis muscle, acupuncture may help alleviate the pain and discomfort associated with the condition. While some individuals report positive outcomes with acupuncture, it's essential to note that its effectiveness can vary from person to person.

Among so many different acupuncture alternative treatment methods, it is important to know which method is more effective, many people including practitioners, patients or other people have been curious about and would like to compare these treatment results.

The objective of this clinical trial research was to assess the potential enhancement of acupuncture treatment effectiveness by applying an electro-stimulator to trigger points. Both the control group and the experimental group will receive acupuncture at the same trigger acupoints, under identical conditions. Participants in both groups have been diagnosed with piriformis syndrome and have not received any steroid injections. The

initial number of random participants was 24, but for various reasons, the final count dwindled to 8.

OBJECTIVES

The primary objective of this study is to investigate and confirm the efficacy of electroacupuncture as a treatment for sciatica caused by piriformis syndrome. The central aim is to alleviate tension and reduce radiating pain by targeting the piriformis muscle.

1. Assess the effectiveness of the experimental group, which receives electrical stimulation in addition to acupuncture, in treating piriformis syndrome compared to the control group (acupuncture only) using the Visual Analog Scale (VAS)
2. Evaluate the therapeutic effectiveness of the experimental group, which includes electrical stimulation in conjunction with acupuncture, in the treatment of piriformis syndrome, as compared to the control group receiving acupuncture alone, with a focus on assessing Range of Motion (ROM).
3. Examine and contrast the therapeutic outcomes between the experimental group, incorporating electrical stimulation alongside acupuncture, and the control group receiving acupuncture alone in the context of treating piriformis syndrome, utilizing the Oswestry Disability Index (ODI) as an assessment measure.

LITERATURE REVIEW

1. Piriformis Syndrome

1.1 What is Piriformis syndrome

According to WebMD, piriformis syndrome is an uncommon neuromuscular disorder that is caused when the piriformis muscle compresses the sciatic nerve. The piriformis muscle is a flat, band-like muscle located in the buttocks near the top of the hip joint. This muscle is important in lower body movement because it stabilizes the hip joint and lifts and rotates the thigh away from the body. The sciatic nerve is a thick and long nerve in the body. It passes alongside or goes through the piriformis muscle, goes down the back of the leg, and eventually branches off into smaller nerves that end in the feet. Nerve compression can be caused by spasm of the piriformis muscle .

Although the conditions are sometimes related and both affect the sciatic nerve, they are slightly different. A herniated disk or spinal stenosis can cause sciatica. The symptoms tend to affect the lower back and can travel down through the buttocks and legs. Piriformis syndrome can only involve the piriformis muscle or both low back and piriformis. The pain gets worse when piriformis muscle is pressed on one area of the sciatic nerve in the buttock.

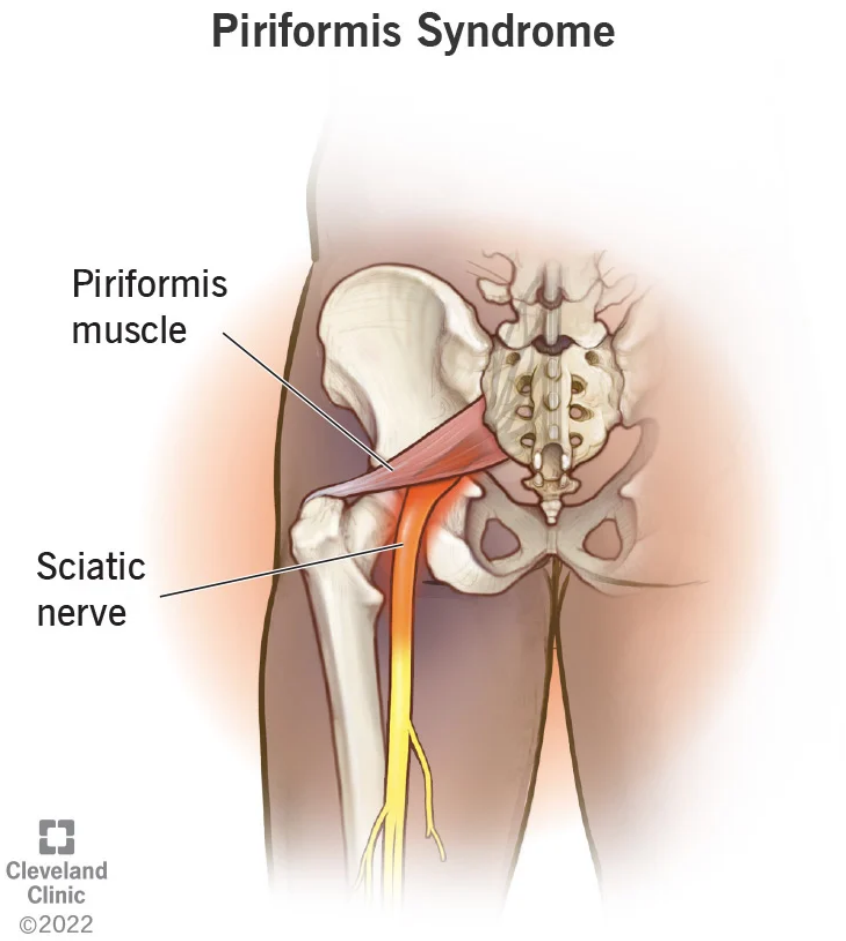

Figure 1. Anatomical structure of Piriformis muscle and Sciatica nerve

1.2 Risk factor of Piriformis Syndrome

There are various risk factors that may make individuals more likely to develop piriformis syndrome.

- Some studies suggest that piriformis syndrome is more common in females by a 6:1 ratio, thought to be due to anatomical differences.
- Anatomical variation in the positioning of the sciatic nerve in relationship to the piriformis muscle may lead to piriformis syndrome. In some people, the sciatic nerve traverses through the piriformis muscle, for example, perhaps increasing the likelihood of sciatic nerve compression.
- Direct trauma or injury to the buttock area can lead to swelling, hematoma formation, or scarring, which may lead to compression or entrapment of the sciatic nerve.
- Prolonged sitting may lead to direct compression against the sciatic nerve. Piriformis syndrome has, therefore, sometimes been referred to as "fat wallet syndrome" or "wallet sciatica," as it has been found to occur in people continually sitting against their wallet on a hard surface.
- Overuse or repetitive movements, such as occur with long-distance walking, running, cycling, or rowing can lead to inflammation, spasm, and hypertrophy (enlargement) of the piriformis muscle. This can increase the likelihood of sciatic nerve irritation or entrapment.

- **1.3 History and Physical**

Patients frequently exhibit symptoms resembling sciatica, making it challenging to discern the source of radicular pain, whether it stems from spinal stenosis or piriformis syndrome. The pain may manifest as radiating discomfort into the posterior thigh, but on occasion, it can extend down to the lower leg, affecting dermatomes L5 or S1. Patients may also report discomfort in the buttock region, with palpation often uncovering mild to moderate tenderness around the sciatic notch. Utilizing the FAIR (flexion, adduction, and internal rotation) test, healthcare providers may potentially reproduce the patient's symptoms for further assessment.The FAIR test is conducted with the patient lying supine. Instruct the patient to flex the hip and guide it towards the midline. Concurrently, the examiner should rotate the lower leg, creating tension in the piriformis muscle. During this maneuver, palpation will often reveal tenderness over the muscle region, which extends from the sacrum to the greater trochanter of the femur.

1.4 Piriformis Syndrome in Western Medicine

1.4.1 Etiology

Entrapment of the sciatic nerve can occur either anterior to the piriformis muscle or posterior to the gemellus-obturator internus complex, typically at the level of the ischial tuberosity. The piriformis muscle may undergo stress due to factors like poor body mechanics in chronic conditions or acute injuries involving forceful internal hip rotation. Furthermore, various anatomical anomalies can contribute to nerve compression, such as a bipartite piriformis, direct tumor invasion, alterations in the course of the sciatic nerve, or the presence of an inferior gluteal artery aneurysm that may exert pressure on the nerve.

Causes of piriformis syndrome include the following:

- Trauma to the hip or buttock area
- Piriformis muscle hypertrophy (often seen in athletes during periods of increased weightlifting requirements or pre-season conditioning)
- Sitting for prolonged periods (taxi drivers, office workers, bicycle riders)
- Anatomic anomalies:
    - Bipartite piriformis muscle
    - Sciatic nerve course/branching variations with respect to the piriformis muscle
        - In >80% of the population, the sciatic nerve courses deep to and exits inferiorly to the piriformis muscle belly/tendon.

- Early (proximal) divisions of the sciatic nerve into its tibial and common peroneal components can predispose patients to piriformis syndrome, with these branches passing through and below the piriformis muscle or above and below the muscle.

1.4.2 Pathophysiology

The piriformis muscle exhibits a flat, oblique, and pyramidal shape, with its origins spanning from the anterior aspect of vertebrae (S2 to S4), the superior margin of the greater sciatic foramen, and the sacrotuberous ligament. It proceeds to traverse the greater sciatic notch before attaching to the greater trochanter of the hip bone. Its functional role varies with hip movement: during hip extension, it primarily functions as an external rotator, while in hip flexion, it behaves as a hip adductor. Innervation of the piriformis muscle is provided by nerve branches stemming from L5, S1, and S2. Overuse, irritation, or inflammation of the piriformis muscle can lead to the irritation of the nearby sciatic nerve, which courses in close proximity to the center of the muscle. Sciatic nerve entrapment occurs anterior to the piriformis muscle or posterior to the gemellus-obturator internus complex, which is in line with the anatomical location of the ischial tuberosity. Piriformis can be stressed due to poor body posture chronically or some acute injury that results in a sudden and strong internal rotation of the hip.

1.4.3 Evaluation

The diagnosis relies mainly on clinical assessment and involves a process of exclusion. During the physical examination, the healthcare provider should incorporate stretching maneuvers aimed at provoking the piriformis muscle.

These stretches include:

- Freiberg (forceful internal rotation of the extended thigh) - You'll lie on your back with your legs straight. The tester will take your femur and roll it inwardly. They'll then ask you if you feel pain in your deep gluteal region.

- Pace (resisted abduction and external rotation of the thigh) - You'll sit with a 90-degree angle at your hips and knees. The tester will put their hands on the outer side of your lower legs, and you'll be told to push into their hands.

- Beatty (deep buttock pain produced by the side-lying patient holding a flexed knee several inches off the table) - You'll lie on your side with your affected leg on top and your knees bent. You'll be told to raise your top thigh to see if the movement causes pain in your buttocks.

- FAIR (flexion, adduction, internal rotation) maneuvers - FAIR is an acronym that stands for flexion, adduction, and internal rotation. During the test, you'll lie on your side with your injured leg on top. The tester will stabilize your hip with one hand and bring your knee toward your chest while moving it toward the midline

of your body. At the same time, they'll rotate your lower leg away from the midline of your body to put your piriformis muscle under tension.

- Differences between piriformis syndrome and lumbar disc bulge testing - The most common cause of sciatica is a bulging disc Pain is often worse when you flex, twist, or bend your lumbar spine, and your healthcare provider will likely perform tests that move your spine in these ways. The straight leg test is commonly used to test for sciatica. If you have low back and/or leg pain when your leg is flexed to between 30 and 70 degrees, you may have sciatica caused by a bulging disc. Imaging techniques are unlikely to be used in the early stages of sciatica diagnosis. However, MRI may be used if the pain isn't resolved from conservative treatment after 6 to 8 weeks.

1.4.4 Western Treatment

Treatment includes short-term rest (not more than 48 hours), use of muscle relaxants, NSAIDs, and physical therapy (which entails stretching the piriformis muscle, range of motion exercises, and deep-tissue massages). In some patients, injection of steroids around the piriformis muscle may help decrease the inflammation and pain. Anecdotal reports suggest that botulinum toxin may help relieve symptoms. However, the duration of pain relief is short-lived, and repeat injections are required. Surgery represents the final option for individuals dealing with piriformis syndrome. It should be contemplated solely when conservative treatments, such as physical therapy, have proven ineffective. Surgical intervention may involve

nerve decompression if there is any impingement, as well as the potential release of adhesions or scar tissue from the nerve. Nevertheless, post-surgery outcomes can be uncertain, and some patients may persist in experiencing pain.

2.1 Piriformis in Eastern Medicine

2.1.1 Etiology

Within the realm of Chinese Medicine, piriformis syndrome is often correlated with what are known as "patterns of disharmony." In this holistic approach, the body is perceived as a system in which all elements are interconnected, rather than an assembly of isolated components. A "pattern" emerges when there is a disruption in the system's overall harmony. Unlike the Western concept of "disease," the perspective in Chinese Medicine suggests that piriformis syndrome can arise from four distinct patterns of disharmony. To understand whether someone's piriformis syndrome might be caused by a given pattern, one needs to look for signs and symptoms associated with the pattern beyond what one might typically experience from piriformis syndrome alone. For instance when piriformis syndrome is caused by the pattern Spleen or Kidney Yang Deficiency, patients also experience symptoms such as abdominal pain that worsens with cold, urinary difficulty, deep aching and heaviness in the extremities and dizziness. Similarly, patients with Spleen or Kidney Yang Deficiency typically exhibit deep (Chen) or fine (Xi) pulses as well as a pale tongue.

1. Spleen or Kidney Yang Deficiency

   Pulse type : Deep, Fine

   Tongue Color : Pale

   Tongue Shape : Swollen, Tooth-marked

Piriformis syndrome in the context of Traditional Chinese Medicine might be attributed to Spleen or Kidney Yang Deficiency, particularly when the condition is accompanied by symptoms such as abdominal pain worsening in the cold, urinary difficulty, deep aching in the extremities, and dizziness. Additionally, patients with Spleen or Kidney Yang Deficiency tend to exhibit deep (Chen) or fine (Xi) pulses and have a pale tongue. These diagnostic elements aid in understanding and addressing the underlying patterns associated with piriformis syndrome in the context of Chinese Medicine.

- Pathology of Spleen or Kidney yang deficiency

Spleen or Kidney Yang Deficiency represents a pattern of disharmony in the framework of Chinese Medicine, where the body is viewed as a complex system inherently inclined toward harmony. Patterns of disharmony denote disruptions that hinder the achievement of this natural equilibrium. These patterns manifest as a spectrum of symptoms that may appear disparate from a Western medical perspective but align coherently with the principles of Chinese Medicine. For instance, Spleen or Kidney Yang Deficiency can manifest in diverse symptoms, including abdominal pain exacerbated by cold, urinary difficulties, deep aching and heaviness in the extremities, and dizziness, among others. Diagnosis of such patterns often involves pulse and tongue analysis. In the context of Spleen or Kidney Yang Deficiency, patients frequently present with deep (Chen) or fine (Xi) pulses and a pale tongue. It's essential to understand that patterns in Chinese Medicine don't directly correspond to Western diseases; instead, they underlie and provide insights into the origins of various health conditions. In this context, Spleen or

Kidney Yang Deficiency may contribute to conditions like intermenstrual bleeding, hypertension, or pelvic inflammatory disease, among others.

- Recommended Herbal Formula

    1. Zhen Wu Tang - comprises five key ingredients and is characterized by its actions in warming and tonifying the Yang and Qi of the Spleen and Kidneys while eliminating Dampness. This formula may offer potential benefits for individuals dealing with piriformis syndrome, primarily because it is often recommended to address patterns such as Spleen or Kidney Yang Deficiency, Exterior Cold invading the Interior, and Spleen Yang Deficiency, which are at times associated with the syndrome.

    2. Gu Ben Zhi Beng Tang - comprises six herbal ingredients and primarily focuses on tonifying Qi and Yang. Falling into the category of formulas designed to boost Qi and Blood, this formula is utilized not only for addressing conditions related to Spleen or Kidney Yang Deficiency but also for the treatment of Qi Deficiency. Its origin in traditional Chinese medicine highlights its potential efficacy in bolstering vital energy and Qi, making it a valuable resource for those seeking to alleviate patterns of deficiency in their health.

2. Exterior Cold invading the Interior

   Pulse Type: Deep, Fine

   Tongue Coating : Thick White Coating

Piriformis syndrome, when presenting with symptoms such as sweating that doesn't reduce fever, palpitations in the epigastrium, dizziness, and generalized twitching, may be attributed to Exterior Cold invading the Interior according to the principles of Traditional Chinese Medicine. Patients displaying this pattern of disharmony often exhibit deep (Chen) or fine (Xi) pulses and a tongue with a thin white coating. These diagnostic elements assist in comprehending and addressing the underlying patterns associated with piriformis syndrome in the context of Chinese Medicine.

-Pathology of Exterior cold Invading Interior

Exterior Cold invading the Interior is a recognized pattern of disharmony within Traditional Chinese Medicine, which perceives the human body as an intricate system inherently inclined toward achieving harmony. Patterns of disharmony, as seen in this context, represent disturbances that disrupt this natural balance. These patterns give rise to a wide array of symptoms that, while potentially appearing unrelated from a Western medical standpoint, align with the foundational principles of Chinese Medicine theory. For instance, Exterior Cold invading the Interior can manifest in diverse symptoms, including abdominal pain, constipation, hypochondriac pain, and chills, among others. Diagnosis of these patterns often involves analyzing a patient's pulse and tongue. In the case of Exterior Cold invading the Interior, patients often present with tight (Jin) or wiry

(Xian) pulses and a tongue displaying a thick white coating. It is essential to understand that patterns in Chinese Medicine serve as explanations for the underlying causes of diseases or health conditions, rather than direct parallels to Western diseases. In this context, Exterior Cold invading the Interior is considered as potentially contributing to conditions such as hypertension, pelvic inflammatory disease, or trigeminal neuralgia, among others.

- Recommended Herbal Formula
    1. Da Huang Fu Zi Tang - is composed of three key herbal ingredients renowned for their actions in warming the Interior, dispersing Cold, unblocking the bowels, and relieving pain. Classified within the category of formulas intended to provide warmth and purging effects, it has been historically employed for addressing conditions where these actions are necessary. With its long-established history, this formula continues to serve as a valuable resource for practitioners seeking to restore balance, alleviate discomfort, and promote overall well-being.

3. Yang Deficiency with Cold-Damp

Pulse Type: Choppy, Deep, Minute, Slow

Tongue Coating : Thin white Coating

Symptoms commonly associated with Yang Deficiency with Cold-Damp include an absence of thirst, cold extremities, generalized body pain, aching bones and joints, and a strong aversion to cold, particularly in the back. In the context of piriformis syndrome, the presence of these hallmark symptoms, such as generalized body pain, cold extremities, aching joints, and a lack of thirst, may suggest a potential connection to Yang Deficiency with Cold-Damp. Furthermore, the specific pulse and tongue characteristics serve as valuable diagnostic criteria for healthcare practitioners seeking to comprehensively address this pattern and its related symptoms.

-Pathology of Yang deficiency with Cold-damp

Yang Deficiency with Cold-Damp represents a recognized pattern of disharmony in the framework of Chinese Medicine, which perceives the human body as a complex system inherently inclined toward achieving harmony. Patterns of disharmony, as seen in this context, represent disruptions that obstruct this natural balance. These patterns can manifest as a wide array of symptoms that, while potentially appearing unrelated from a Western medical standpoint, align with the foundational principles of Chinese Medicine theory. For instance, Yang Deficiency with Cold-Damp may give rise to diverse symptoms, including generalized body pain, aching bones and joints, cold extremities,

and a lack of thirst. Diagnosis of these patterns typically involves analyzing a patient's pulse and tongue. In the case of Yang Deficiency with Cold-Damp, patients often present with choppy (Se), deep (Chen), minute (Wei), or slow (Chi) pulses and a tongue displaying a thin white coating. It's essential to understand that patterns in Chinese Medicine provide explanations for the underlying causes of diseases or health conditions rather than direct parallels to Western diseases. In this context, Yang Deficiency with Cold-Damp is considered as a potential contributor to conditions such as chronic bronchitis, uterine prolapse, or cirrhosis, among others.

-Recommended Herbal Formula

Fu Zi Tang- originating from 220 AD, consists of a carefully selected combination of five herbal ingredients, with key actions that involve warming the meridians, supporting Yang energy, dispelling cold, and transforming dampness. Its potential benefit for piriformis syndrome lies in its application as a recommended formula for addressing Yang Deficiency with Cold-Damp, a pattern often linked to the condition. If you suspect that your symptoms align with Yang Deficiency with Cold-Damp, this formula could offer relief, though it's advisable to consult a healthcare professional for confirmation before use.

2.2 Introduction of TCM (Traditional Chinese Medicine) Acupuncture

Traditional Chinese medicine (TCM), with a history spanning millennia, remains relatively unchanged over the centuries. Central to its principles is the concept of Qi, a vital life force that flows through the body, and any disruption in its equilibrium can lead to illness. This imbalance often results from shifts in the interplay of the opposing yet complementary forces known as yin and yang. Ancients in China viewed humans as microcosms of the wider natural world, intricately linked to nature and subject to its influences, emphasizing the crucial balance between health and disease. TCM treatment strategies aim to restore this equilibrium through personalized approaches. The restoration of balance involves harmonizing the internal organs with the external elements of earth, fire, water, wood, and metal.

2.2.1 Different types of Acupuncture method

a. Traditional Chinese Acupuncture -This acupuncture modality delves into both the internal and external functions of the body, taking a comprehensive approach by assessing all meridian points. Drawing from time-honored Chinese medical traditions, patients are provided with a tailored treatment plan after a thorough examination of their tongue, which plays a pivotal role in the diagnostic process.
b. Japanese Acupuncture - Unlike Chinese acupuncture that focuses on healing one health condition, the Japanese version tackles the entire body. However, it is also gentle and relatively painless, with many practitioners

importing disposable needles from Japan. The process uses fewer needles with shallow depth compared to other methods. The insertion tube controls the depth of the prick to reduce discomfort.

c. Korean Hand acupuncture - Korean Hand Therapy is an effective approach for alleviating pain experienced in both the hands and various other body areas. This technique involves the insertion of approximately twenty specialized hand needles using a needle applicator, which are left in place for a duration of 20 to 30 minutes. Additionally, silver and gold metal pellets are employed to pinpoint meridian locations. What sets Korean Hand Therapy apart is its compatibility with various other acupuncture methods, allowing for a versatile and integrated approach to addressing health concerns.

d. Auricular Acupuncture - Auricular acupuncture uses the ear as the connection point to other parts of the body. According to Ancient Oriental medicine, the ear contains acupuncture points that can heal the body. By inserting regular acupuncture needles into the ear, the acupuncturists seek to trigger chemicals that eradicate mood swings, toxins, and allergies.

e. Scalp Acupuncture - Scalp acupuncture, akin to auricular acupuncture in its procedural aspects, diverges in its focus on needling the skin of the head. This treatment is characterized by its safety and dependability, as it actively stimulates brain cells, promoting their revitalization. Specifically designed to target conditions associated with brain function, scalp

acupuncture is frequently employed in the post-stroke or post-brain surgery rehabilitation process, offering a valuable therapeutic option for patients seeking neurological recovery.

f. Cupping Therapy - Cupping therapy involves the use of rubber or glass suction cups applied to specific points on the body to enhance blood circulation. Typically conducted alongside needle acupuncture, these cups remain on the skin's surface, creating suction that effectively alleviates muscle pain and reduces inflammation while aiding in the elimination of toxins from the bloodstream. In the case of wet cupping, after removing the cups, the therapist makes small incisions on the skin to release a portion of blood. Cupping is widely favored for its efficacy in addressing conditions such as blood poisoning, anemia, and high blood pressure, achieved through the redirection of blood flow, resulting in visible skin reddening. It's important to note that any redness and scarring that may occur typically subside within approximately ten days.

g. Electroacupuncture - In electroacupuncture (EA), needles are inserted by hand but then attached to a device that generates electrical current that causes stimulation of the needles. This can be produced with use of an ordinary TENS machine attached to the needles with wires and crocodile clips or with commercially available units specifically for EA. Regardless of the unit used, practitioners should be able to alter the frequency,

intensity, and pulse duration of the electric current. Two modes of EA are used commonly: low-frequency (1 to 4 Hz), high-intensity EA and high-frequency (50 to 200 Hz), low-intensity EA.

II. MATERIALS AND METHODS

2.1 Research design

This research will proceed based on randomized controlled trials and on volunteers who have symptoms or are diagnosed with Piriformis Syndrome. The research participants will be divided into two groups: an experimental group(without electrical stimulation) and control group (with electrical stimulation).

Experimental group will be received acupuncture points as treatment (Li4, Lv3, St36, Ub40, Ub57, Gb30, Ub24, Ub25, Trigger point for Piriformis muscle, Gluteus Medialis), while control group will receive same acupuncture points with electro stimulation.

Progression of the treatment evaluated with subjective Pain scale and measuring Range of Motion of hip movement with goniometer.

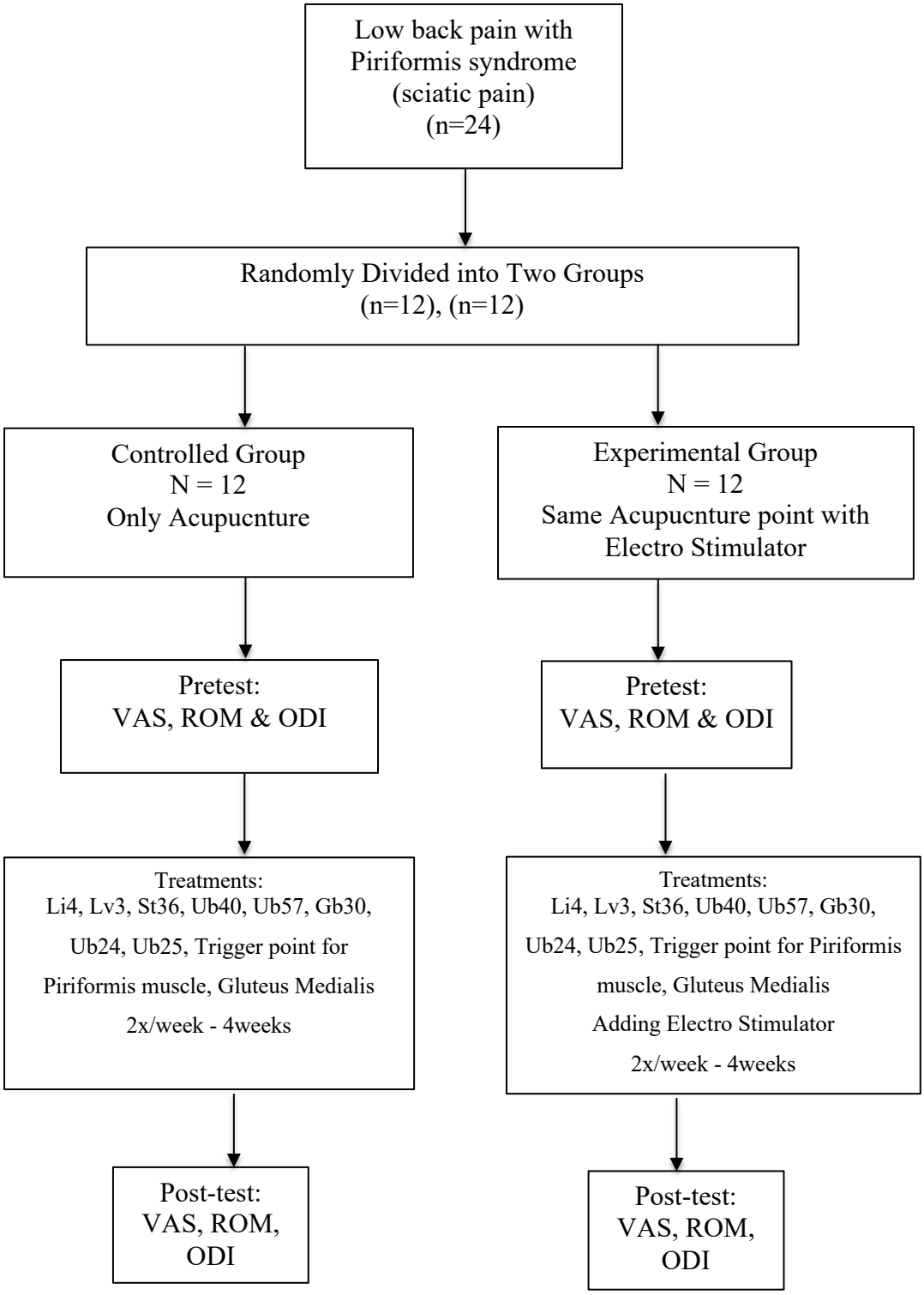

Figure 2. Schematic Diagram of Research Design

2.2 Participants

a. Registration Process

Researchers will gather voluntary participants through clinic advertisements. All participants are based on those already diagnosed with Piriformis Syndrome.

b. Criteria

Followings are the criteria to be a participant:

- Buttock pain - The feeling may be described as an aching, burning throbbing or shooting paint
- Numbness and tingling in the buttock and down the leg.
- Difficulty sitting for extended periods of time
- Low back pain associated with buttock pain
- Weakness or difficulty moving the leg

c. Inclusion Criteria

- All participants should be 19 years old and older, either male or female, with a signed consent form that verifies participation is voluntary.
- Diagnosed with Piriformis Syndrome

d. Exclusion Criteria

- Pregnant or those who are planning for pregnancy.
- Lumbar radicular compression, coxopathy, inflammatory or mechanical sacroiliac problems, or any inflammatory, infectious or tumor-related pelvic disease.
- Extreme chronic pain for more than 1 year.
- Mental Illness (i.e. delusion)
- Any medical device inserted in their body (i.e. Pacemaker)

2.3 Groups

1) Control Group will receive acupuncture points
    - Li4, Lv3, St36, Ub40, Ub57, Gb30, Ub24, Ub25, Trigger point for Piriformis muscle, Gluteus Medialis
    - 2x/week for 4 weeks
2) The Experimental Group will receive the same acupuncture points with electro stimulation.
    - Li4, Lv3, St36, Ub40, Ub57, Gb30, Ub24, Ub25, Trigger point for Piriformis muscle, Gluteus Medialis + Electro Stimulator
    - 2x/week for 4 weeks

Table 1. Acupuncture points location and indications

Acupuncture point	Location	Indication
Li4	On the dorsum of the hand, between the 1st and 2nd metacarpal bones, in the middle of the 2nd metacarpal bone on the radial side	• Every type of pain and psychogenic tense. • Use in conjunction with LIV 3 (the Four Gates) to strongly move the qi and blood in the body in order to remove stagnation and alleviate pain.
Lv3	On the dorsum of the foot, in the depression proximal to the 1st metatarsal space.	• Weakness, numbness and pain of the lower extremities, difficulty in walking
St36	On the anterior aspect of the lower leg, 3 cun below ST 35, one finger-breadth (middle finger) from the anterior crest of the tibia.	• On the anterior aspect of the lower leg, 3 cun below ST 35, one finger-breadth (middle finger) from the anterior crest of the tibia.
Ub40	Midpoint of the transverse crease of the popliteal fossa, between the tendons m. biceps femoris and m. semitendinosus.	• Lumbar pain, spasm and weakness of the lower extremities
Ub57	On the posterior midline of the lower leg between UB 40 and UB 60, when extending the toes straight or lifting the heel, the point is below of m. gastrocnemius in the apex of the depression.	• Spasm and pain of the lumbar and leg
Gb30	On the lateral side of the buttocks, when the patient is in the lateral recumbent position and the thigh is flexed, this point is at the junction of the lateral 1/3 and medial 1/3 of the line connecting the greater trochanter and the hiatus of the sacrum.	• Weakness, numbness and pain of the lower extremities • Pain of the lumbar and leg, hemiplegia • Activates the meridian and removes obstructions, benefits the hips and legs, resolves Wind-Damp, relieves pain.

Acupuncture point	Location	Indication
Ub24	On the back, 1.5 cun lateral to the lower border of the spinous process of the 3rd lumbar vertebra.	Strengthens the low back, removes obstructions from the meridian.
Ub25	On the back, 1.5 cun lateral to the lower border of the spinous process of the 4th lumbar vertebra.	Regulates the large intestines, strengthens the low back, removes obstructions from the meridian.
Trigger point-Piriformis muscle	The lateral piriformis trigger point is a few inches to the inside of the greater trochanter landmark, along the piriformis line. Both of these piriformis trigger points in the buttocks are capable of transmitting pain to the sacroiliac joint, posterior hip, and general buttock.	Relieve the tightness of muscle and inflammation
Trigger points - Gluteus Medialis	three main trigger point areas in the muscle that generally refer pain to the low back, across the ilium, to the sacrum, and the lateral/posterior buttock.	low back pain, and they can also cause sacroiliac pain and lumbar pain.

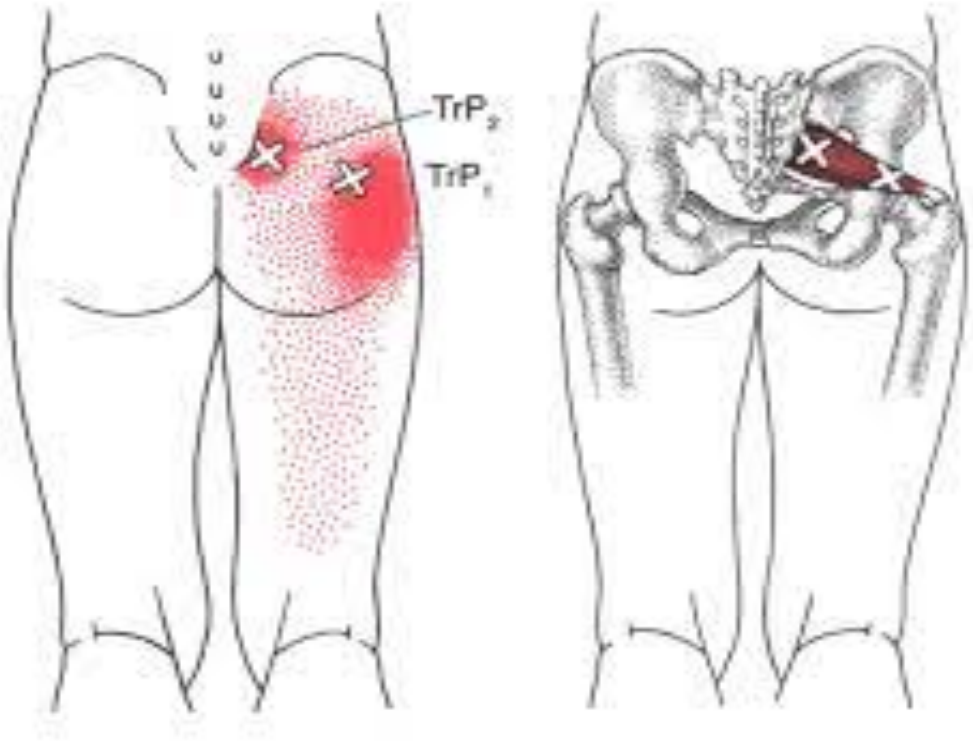

Figure 3. Trigger points for Piriformis muscle

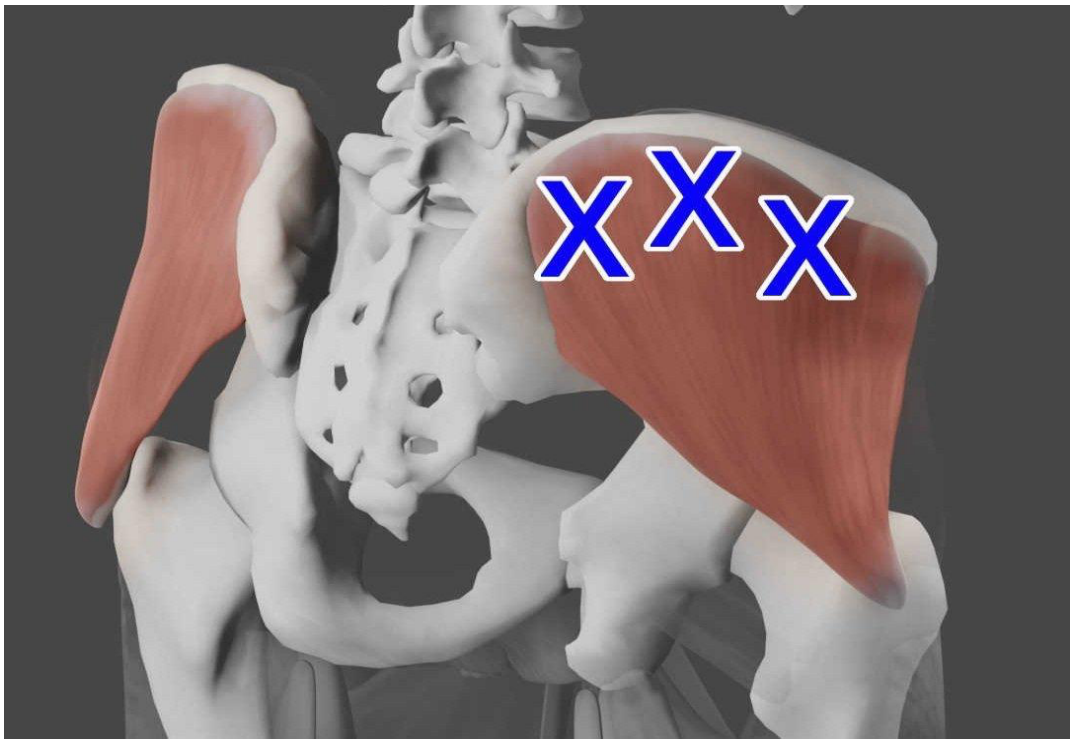

Figure 4. Trigger points of Gluteus Medialis

2.4 Treatment Protocol

Both groups will receive the same acupuncture locations with Sterilized stainless needles that are manufactured by K.M.S. All needles will be disposable after one use. Therefore every needle will be used during the study will dispose after the treatments to the biohazard sharp container immediately. Every needle will be handled as recommended and regulated by CCAOM CNT 7th Manual.

Table 2. Specification of Needles

	Specification	Manufacturer
Acupuncture Needle	0.25x50mm (1.5cun) 0.25x30mm (1 cun)	K.M.S Spring Needles

4.1 Electro-acupuncture Stimulator

The Experimental group will receive acupuncture treatment with an electro stimulator using ITO ES-130. The frequency will be Low which is equivalent to 1-20 Hz with level 5-6. Two wires will be used (each wire has 2 clips).

Figure 5. ITO ES-130

2.5 Duration of Treatment

Both groups will receive 30 minutes of treatment in total. However, the controlled group will receive electroacupuncture of two different stimulation for 15 minutes each.

Table 3. Experimental Group Electro Acupuncture protocol

First 15 minutes	Trigger points of Gluteus medius. Number 2 and 3 (Figure 3) numbered as left to right	Level 5
Last 15 minutes	Trigger points of Piriformis muscle. (Figure 2)	Level 5

2.6 Side effect Report

Common side effects include soreness and minor bleeding or bruising where the needles were inserted. Soreness from acupuncture typically dissipates within 24 hours, however, big trigger points releases can cause residual soreness that lasts a few days. If any severe reactions occur after 24 hours post acupuncture treatment, participants have to report to the researcher and call 911 in any further severe condition.

2.7 Statistical Analysis

A Statistical analysis was conducted using R program version 4.3.1 “Beagle Scouts” which is copyrighted by the R Foundation for Statistical Computing in 2023. Fisher’s exact test was performed for the homogeneity test before the experiment, paired Samples T-test was performed to compare the results before and after the experiment

within the the group, and independent samples t-Test was performed to compare the results between groups.

III. RESULTS

3.1. Homogeneity Test

3.1.1 Homogeneity Test for Patient's General Properties

Table 4. represents the results of a homogeneity test conducted to compare the general characteristics of two groups of patients: the Experimental Group (EG) and the Control Group (CG). The purpose of this test is to determine whether there are significant differences between these two groups with respect to certain variables.

-Variables: This column lists the different characteristics or attributes that are being examined to determine homogeneity between the two groups. In this case, three variables are being considered: Gender, Age, and Onset.

-EG: This column represents the data for the Experimental Group.

-CG: This column represents the data for the Control Group.

-p-value: The p-value is a statistical measure that helps determine whether any differences observed between the two groups are statistically significant. A low p-value indicates that there is strong evidence to reject the null hypothesis, suggesting that there is a significant difference between the groups. Conversely, a high p-value suggests that there is no significant difference, and the null hypothesis cannot be rejected.

Table 4. Homogeneity Test for General Characteristics of Patients

Variables		EG	CG	p-value*
Gender	Female	2	2	1.000
	Male	2	2	
Age	30s	1	1	1.000
	40s	2	2	
	50s	1	1	
Onset	≤ 3 month	2	3	1.000
	>3 month	2	1	

* Fisher's Exact Test

Gender:

- In the Experimental Group, there are 2 females and 2 males.
- In the Control Group, there are also 2 females and 2 males.
- The p-value associated with the comparison of gender between the two groups is 1.000. This p-value is quite high (close to 1), which suggests that there is no statistically significant difference in gender distribution between the two groups.
- Age:
    - In the Experimental Group, there is 1 patient in their 30s, 2 patients in their 40s, and 1 patient in their 50s.

- In the Control Group, there is 1 patient in their 30s, 2 patients in their 40s, and 1 patient in their 50s.
- The p-value associated with the comparison of age between the two groups is also 1.000. This indicates that there is no statistically significant difference in the distribution of age groups between the two groups.

- Onset:
  - In the Experimental Group, there are 2 patients with an onset of less than or equal to 3 months and 2 patients with an onset of more than 3 months.
  - In the Control Group, there are 3 patients with an onset of less than or equal to 3 months and 1 patient with an onset of more than 3 months.
  - The p-value for the comparison of onset between the two groups is once again 1.000. This suggests that there is no statistically significant difference in the distribution of onset durations between the two groups.

3.1.2. Homogeneity test for Variables (VAS, ROM, ODI)

Table 5. represents the results of a homogeneity test for three variables (VAS, ROM, ODI) before the treatment for two groups: the Experimental Group (EG) and the Control Group (CG). The purpose of this test is to determine whether there are statistically significant differences between these two groups in terms of these three variables before any treatment is administered.

Table 5. Homogeneity Test for Variables (VAS, ROM, ODI) Before Treatment

Variables	EG	CG	*p*-value*
VAS	7.5 ± 0.58	8.0 ± 0.82	0.356
ROM	53.0 ± 11.22	36.8 ± 23.21	0.781
ODI (%)	37.0 ± 5.29	39.8 ± 3.86	0.433

* Independent Samples t-Test

- VAS (Visual Analog Scale):
    - In the Experimental Group (EG), the mean VAS score before treatment is 7.5 with a standard deviation of 0.58.
    - In the Control Group (CG), the mean VAS score before treatment is 8.0 with a standard deviation of 0.82.

- The p-value for the comparison of VAS scores before treatment between the two groups is 0.356. Since this p-value is greater than 0.05, it suggests that there is no statistically significant difference in VAS scores between the two groups before treatment.

- ROM (Range of Motion):
    - In the Experimental Group (EG), the mean ROM before treatment is 53.0 with a standard deviation of 11.22.
    - In the Control Group (CG), the mean ROM before treatment is 36.8 with a standard deviation of 23.21.
    - The p-value for the comparison of ROM values before treatment between the two groups is 0.781. This p-value is quite high, indicating that there is no statistically significant difference in ROM between the two groups before treatment.
- ODI (Oswestry Disability Index):
    - In the Experimental Group (EG), the mean ODI percentage before treatment is 37.0 with a standard deviation of 5.29.
    - In the Control Group (CG), the mean ODI percentage before treatment is 39.8 with a standard deviation of 3.86.

- The p-value for the comparison of ODI scores before treatment between the two groups is 0.433. Similar to the previous variables, this p-value is greater than 0.05, suggesting that there is no statistically significant difference in ODI scores between the two groups before treatment.

3.2. VAS

3.2.1 VAS difference before and after for each treatment

Table 6. provides a detailed analysis of the Visual Analog Scale (VAS) scores before and after each treatment in two different groups: the Experimental Group (EG) and the Control Group (CG). The table also includes the differences between the VAS scores before and after treatment, as well as the p-values associated with these differences. The primary objective is to assess whether there are significant differences in VAS scores within each group after treatment.

In the EG, for the 1st treatment session, the mean VAS score decreased by 1.8 points after treatment. However, the p-value (0.133) is greater than 0.05, indicating that this decrease is not statistically significant. Similar assessments are made for subsequent treatment sessions in the EG. None of the p-values for the EG treatments are less than 0.05, suggesting that there are no statistically significant differences in VAS scores before and after any of these treatments.

The same analysis is conducted for the CG. None of the p-values for the CG treatments are less than 0.05, indicating that there are no statistically significant differences in VAS scores before and after any of these treatments in the CG either.

Figure 6. displays VAS values before and after each treatment using the bar graph, and Figure 7. displays a VAS before 1st and after each treatment using the line graph.

Table 6. VAS before and after each treatment and its difference.

Group	Treatment	Before Tx	After Tx	Difference	p-value*
EG	1st	7.5 ± 0.58	5.8 ± 1.50	1.8 ± 1.71	0.133
	2nd	6.2 ± 1.26	5.5 ± 0.58	0.8 ± 0.96	0.215
	3rd	5.8 ± 0.96	5.2 ± 0.50	0.5 ± 1.00	1.000
	4th	5.8 ± 0.50	5.2 ± 0.96	0.5 ± 1.29	0.495
	5th	5.0 ± 0.00	4.8 ± 0.50	0.2 ± 0.50	1.000
	6th	5.0 ± 0.00	3.8 ± 0.50	1.2 ± 0.50	0.089
	7th	4.8 ± 0.50	4.2 ± 0.96	0.5 ± 0.58	0.346
	8th	4.0 ± 0.82	3.8 ± 1.26	0.2 ± 0.50	1.000
CG	1st	8.0 ± 0.82	7.8 ± 0.50	0.2 ± 0.50	1.000
	2nd	7.8 ± 0.50	7.5 ± 1.00	0.2 ± 0.50	1.000
	3rd	7.2 ± 0.50	6.8 ± 0.50	0.5 ± 0.58	0.346
	4th	7.0 ± 0.82	6.5 ± 0.58	0.5 ± 0.58	0.346
	5th	6.8 ± 0.50	6.5 ± 0.58	0.2 ± 0.50	1.000
	6th	6.8 ± 0.96	6.0 ± 0.82	0.8 ± 0.50	0.149
	7th	6.5 ± 1.00	6.1 ± 1.18	0.4 ± 0.48	0.215
	8th	6.5 ± 1.00	5.6 ± 1.11	0.9 ± 0.85	0.133

* Paired Samples t-Test / Wilcoxon Signed Rank Test

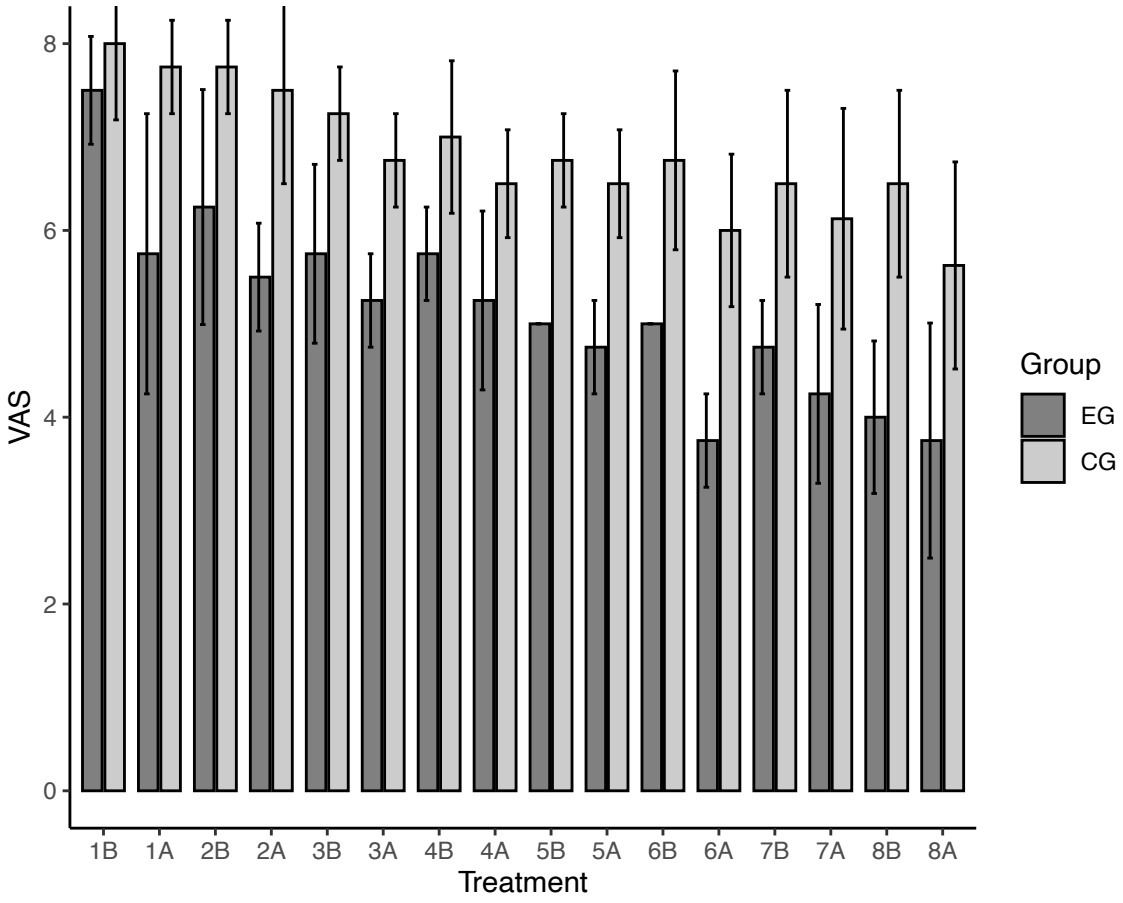

Figure 6. Bar graph of VAS before and after each treatment.

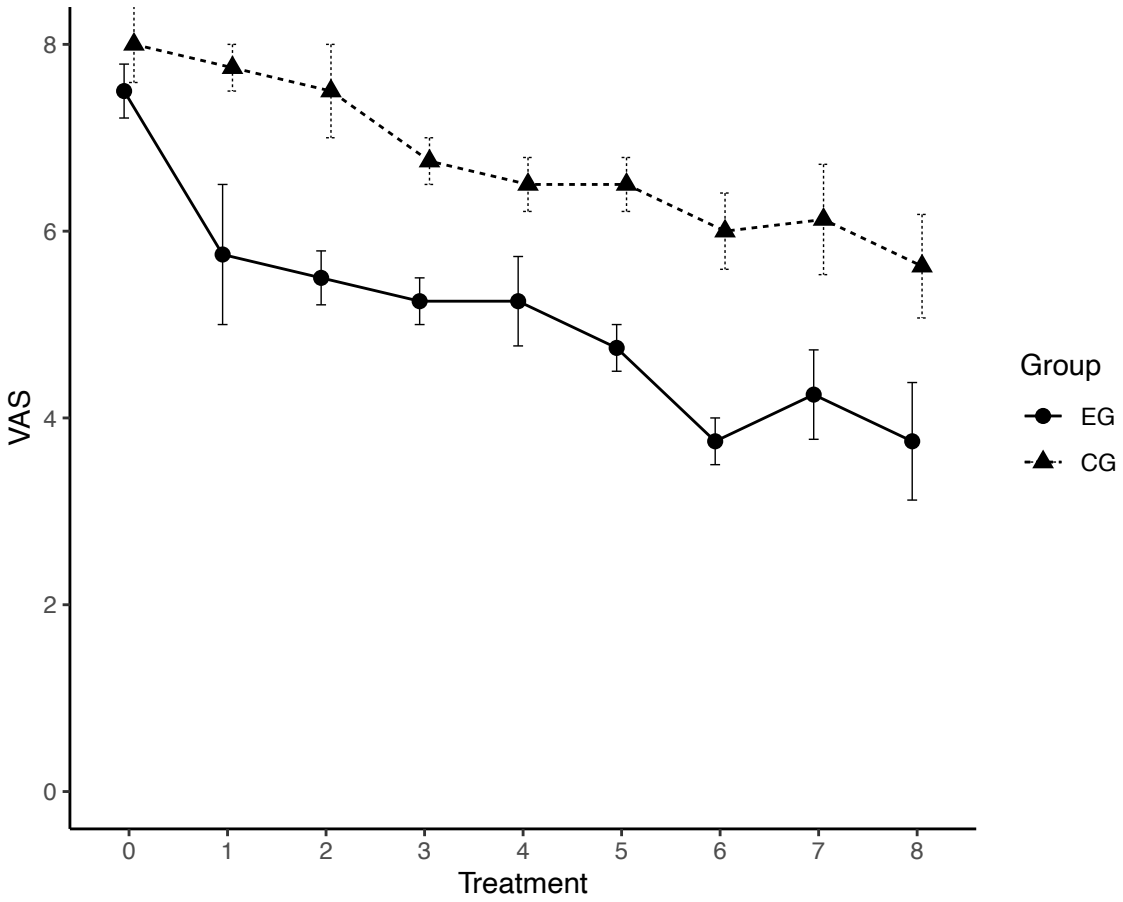

Figure 7. Line graph of VAS before 1st and after each treatment.

3.2.2 Cumulative VAS difference for treatment

Table 7. presents a comparison of the cumulative Visual Analog Scale (VAS) differences for two groups (EG and CG) after various treatment sessions. The table includes the differences between VAS scores before the 1st treatment session and after subsequent sessions, along with associated p-values and Cohen's d effect size measures. The objective here is to assess whether there are statistically significant differences in the cumulative VAS differences between the two groups for each treatment session.

In the "Before 1st - After 1st" comparison, the cumulative VAS difference for EG is 1.8, while for CG, it is 0.2. The associated p-value (0.143) is greater than 0.05, indicating that there is no statistically significant difference in cumulative VAS differences between EG and CG after the 1st treatment session. However, Cohen's d (1.270) suggests a moderate effect size. In the "Before 1st - After 2nd" comparison, the cumulative VAS difference for EG is 2.0, while for CG, it is 0.5. The p-value (0.024) is less than 0.05, indicating that there is a statistically significant difference in cumulative VAS differences between EG and CG after the 2nd treatment session. Cohen's d (2.112) suggests a large effect size. The same analysis is repeated for subsequent treatment sessions, with corresponding p-values and Cohen's d values provided. For example, for the "Before 1st - After 3rd" comparison, the p-value (0.114) is greater than 0.05, suggesting no significant difference, and Cohen's d (1.307) indicates a moderate effect size. After 2nd and 6th treatment, there were significant differences in cumulative VAS difference between two groups. ($p<0.05$)

Table 7. Comparison of Cumulative VAS difference for two groups

Treatment	EG	CG	p-value*	Cohen's d
Before 1st - After 1st	1.8 ± 1.71	0.2 ± 0.50	0.143	1.270
Before 1st - After 2nd	2.0 ± 0.82	0.5 ± 0.58	0.024	2.112
Before 1st - After 3rd	2.2 ± 0.96	1.2 ± 0.50	0.114	1.307
Before 1st - After 4th	2.2 ± 0.96	1.5 ± 0.58	0.228	0.883
Before 1st - After 5th	2.8 ± 0.96	1.5 ± 0.58	0.067	1.639
Before 1st - After 6th	3.8 ± 0.50	2.0 ± 0.00	0.018	1.129
Before 1st - After 7th	3.2 ± 1.26	1.9 ± 1.03	0.142	1.129
Before 1st - After 8th	3.8 ± 1.71	2.4 ± 0.48	0.172	1.115

* Independent Samples t-Test / Mann–Whitney U test

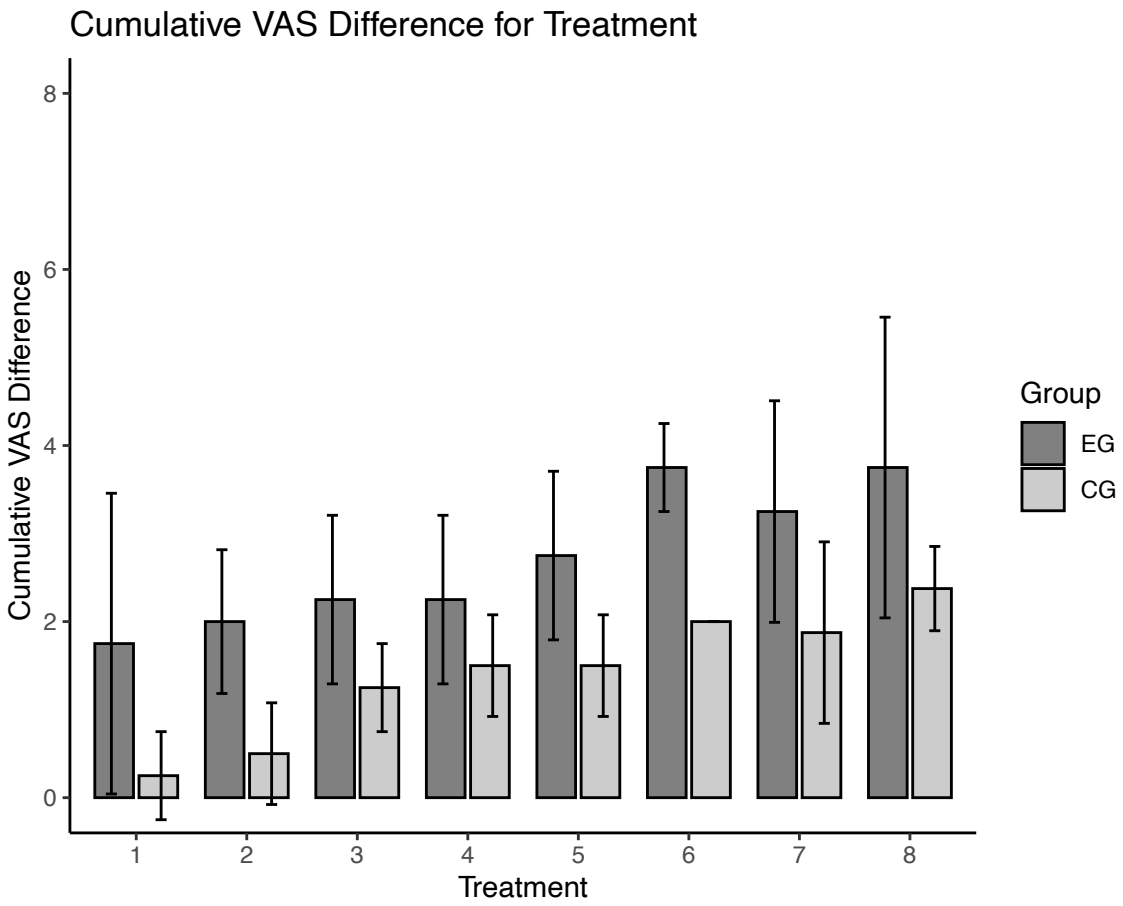

Figure 8. Bar graph of cumulative VAS difference between before and after each treatment.

3.2.3. Cohen’s d (effect size) between two groups for treatment

The equation of Cohen’s d is as follows.

Cohen's d = (M2 - M1)／SDpooled

where

$SDpooled = \sqrt{((SD1^2 + SD2^2)／2)}$

M1, M2: mean of EG and CG, respectively

SD1, SD2: standard deviation ofEG and CG, respectively

The interpretation of Cohen’s d in terms of Effect size.

Effect size	Cohen’s d
Small	0.2
Medium	0.5
Large	0.8 or greater

Cohen's d is a measure of effect size that quantifies the standardized difference between two groups. It provides insight into the practical significance or magnitude of differences observed in a study. In Table 7. Cohen's d is used to assess the effect size of the differences in cumulative Visual Analog Scale (VAS) scores between the Experimental Group (EG) and the Control Group (CG) after various treatment sessions.

- Before 1st - After 1st: Cohen's d = 1.270

    - A Cohen's d of 1.270 is considered a relatively large effect size. It indicates that after the 1st treatment session, there is a substantial difference in cumulative VAS scores between the EG and CG.

- Before 1st - After 2nd: Cohen's d = 2.112
    - A Cohen's d of 2.112 is a very large effect size. It suggests that after the 2nd treatment session, there is a substantial and highly significant difference in cumulative VAS scores between the two groups. This difference is notably larger than the effect observed after the 1st treatment.

- Before 1st - After 3rd: Cohen's d = 1.307
    - A Cohen's d of 1.307 is considered a moderate to large effect size. It indicates that after the 3rd treatment session, there is a meaningful difference in cumulative VAS scores between the groups. While the effect size is not as large as after the 2nd treatment, it is still significant.

- Before 1st - After 4th: Cohen's d = 0.883
    - A Cohen's d of 0.883 is considered a moderate effect size. It suggests that after the 4th treatment session, there is a moderate difference in cumulative VAS scores between EG and CG. The effect size is smaller than after the 2nd and 3rd treatments.

- Before 1st - After 5th: Cohen's d = 1.639

    - A Cohen's d of 1.639 is considered a large effect size. It indicates that after the 5th treatment session, there is a substantial difference in cumulative VAS scores between the groups. This effect size is notably larger than after the 4th treatment.

- Before 1st - After 6th: Cohen's d = 1.129
    - A Cohen's d of 1.129 is considered a moderate to large effect size. It suggests that after the 6th treatment session, there is a meaningful difference in cumulative VAS scores between the groups, although it is smaller than the effect observed after the 5th treatment.

- Before 1st - After 7th: Cohen's d = 1.129
    - Similar to the 6th treatment session, the Cohen's d of 1.129 after the 7th session indicates a moderate to large effect size. It suggests that there is a meaningful difference in cumulative VAS scores between the groups after the 7th treatment.

- Before 1st - After 8th: Cohen's d = 1.115
    - A Cohen's d of 1.115 is considered a moderate to large effect size. It suggests that after the 8th treatment session, there is a meaningful difference in cumulative VAS scores between EG and CG.

In summary, the Cohen's d values in Table 7. indicate the magnitude of the differences in cumulative VAS scores between the Experimental Group (EG) and the Control Group

(CG) after each treatment session. Larger Cohen's d values represent larger effect sizes, implying more significant differences between the groups. Researchers typically consider Cohen's d values of 0.2 to 0.5 as small, 0.5 to 0.8 as moderate, and above 0.8 as large effect sizes, although the interpretation can vary depending on the context of the study.

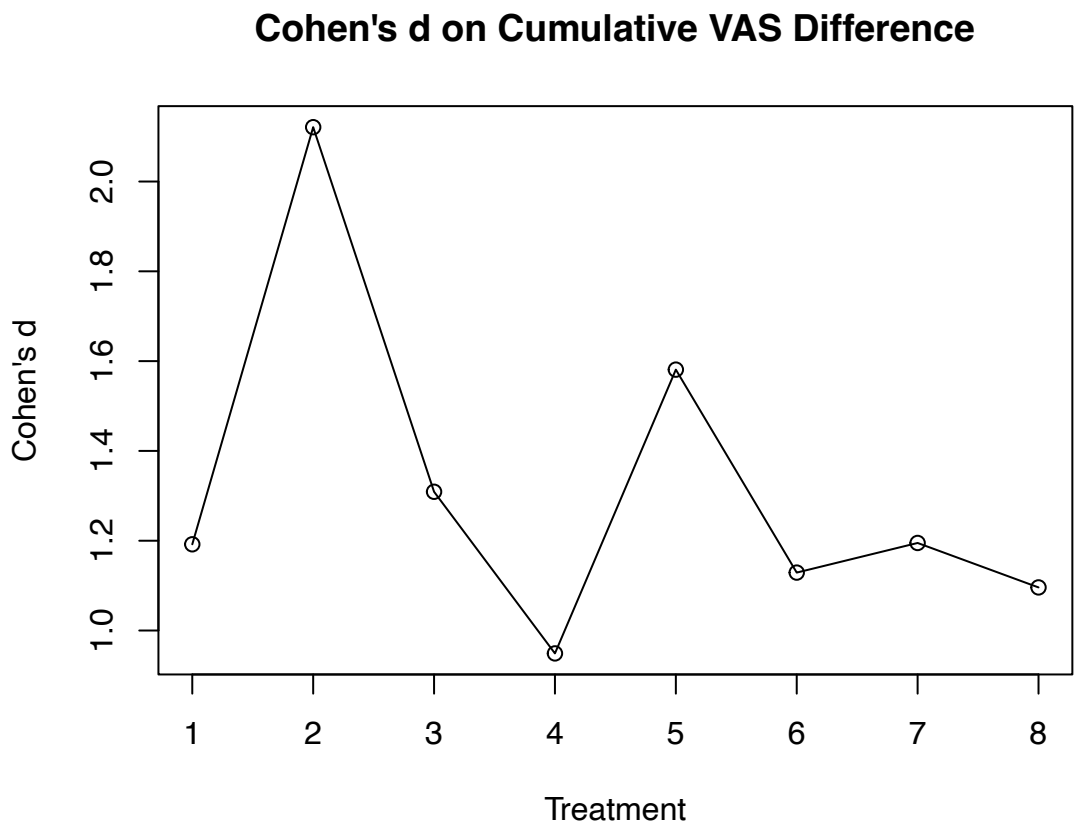

Figure 9. Cohen’s d on Cumulative VAS difference for treatment.

3.3. ROM

3.3.1 ROM difference before and after for each treatment

For the Experimental Group (EG):

- 1st Treatment (EG):
    - Before Tx (Treatment): The mean ROM (Range of Motion) before the 1st treatment was 53.0 with a standard deviation of 11.22.
    - After Tx (Treatment): The mean ROM after the 1st treatment increased to 58.8 with a standard deviation of 10.31.
    - Difference: The difference in ROM before and after the 1st treatment was calculated as 5.8 with a standard deviation of 2.99.
    - p-value: The p-value associated with this difference is 0.031, which suggests that the change in ROM after the 1st treatment is statistically significant at the 0.05 significance level.
- 4th Treatment (EG):
    - Before Tx (Treatment): The mean ROM before the 4th treatment was 68.8 with a standard deviation of 15.46.
        - After Tx (Treatment): The mean ROM after the 4th treatment increased to 72.5 with a standard deviation of 17.08.

        - Difference: The difference in ROM before and after the 4th treatment was calculated as 3.8 with a standard deviation of 2.99.
        - p-value: The p-value associated with this difference is 0.087, indicating that the change in ROM after the 4th treatment is not statistically significant at the 0.05 significance level.

- 8th Treatment (EG):
    - Before Tx (Treatment): The mean ROM before the 8th treatment was 86.2 with a standard deviation of 8.54.
    - After Tx (Treatment): The mean ROM after the 8th treatment increased to 89.8 with a standard deviation of 4.11.
    - Difference: The difference in ROM before and after the 8th treatment was calculated as 3.5 with a standard deviation of 4.73.
    - p-value: The p-value associated with this difference is 0.235, suggesting that the change in ROM after the 8th treatment is not statistically significant at the 0.05 significance level.
- For the Control Group (CG):

The results for the Control Group (CG) do not show statistically significant changes in ROM for any of the treatments (all p-values are greater than 0.05).

Table 8. ROM before and after each treatment and its difference

Group	Treatment	Before Tx	After Tx	Difference	p-value*
EG	1st	53.0 ± 11.22	58.8 ± 10.31	5.8 ± 2.99	0.031
	2nd	58.8 ± 12.12	63.8 ± 14.36	5.0 ± 4.16	0.096
	3rd	64.2 ± 15.78	65.0 ± 14.72	0.8 ± 1.50	1.000
	4th	68.8 ± 15.46	72.5 ± 17.08	3.8 ± 2.99	0.087
	5th	75.2 ± 13.05	78.8 ± 10.31	3.5 ± 4.73	0.235
	6th	81.5 ± 08.89	82.5 ± 06.45	1.0 ± 2.71	0.514
	7th	86.0 ± 07.87	88.0 ± 07.70	2.0 ± 2.16	0.161
	8th	86.2 ± 08.54	89.8 ± 04.11	3.5 ± 4.73	0.235
CG	1st	56.8 ± 23.21	57.2 ± 23.47	0.5 ± 1.00	1.000
	2nd	56.5± 19.97	58.8 ± 18.08	2.2 ± 2.22	0.135
	3rd	62.8 ± 22.59	65.0 ± 21.98	2.2 ± 3.20	0.255
	4th	65.5 ± 20.73	65.5 ± 18.91	0.0 ± 3.27	1.000
	5th	65.2 ± 24.03	68.2 ± 21.19	3.0 ± 3.56	0.190
	6th	67.5 ± 22.17	68.2 ± 20.55	0.8 ± 2.99	0.650
	7th	68.8 ± 22.87	70.8 ± 22.60	2.0 ± 2.83	0.252
	8th	70.5 ± 23.30	70.2 ± 22.37	-0.2 ± 2.78	0.854

* Paired Samples t-Test / Wilcoxon Signed Rank Test

In summary, for the Experimental Group (EG), the 1st treatment led to a statistically significant increase in ROM, the 4th treatment showed a non-significant increase, and the 8th treatment also showed a non-significant increase in ROM. The Control Group (CG)

did not exhibit statistically significant changes in ROM for any of the treatments. The p-values indicate the level of confidence in the observed differences, with lower p-values suggesting greater confidence in the results.

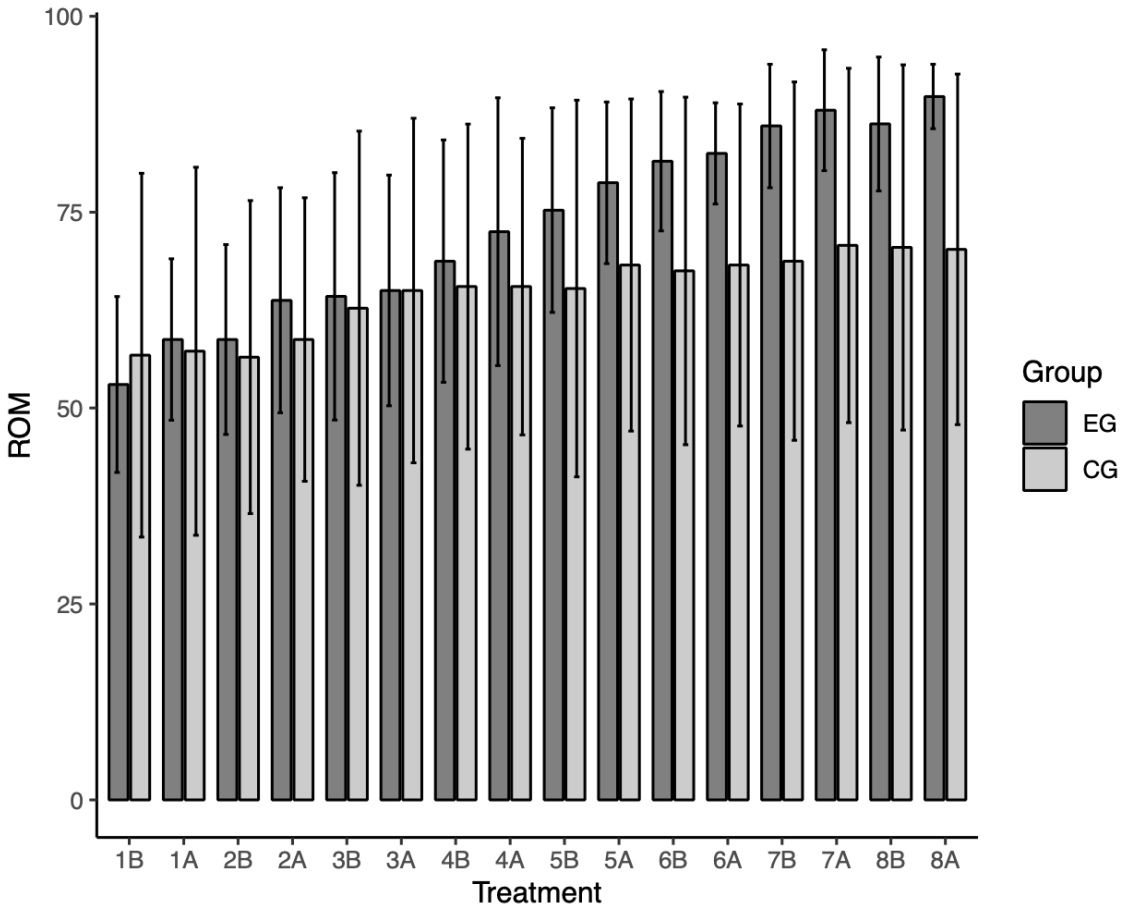

Figure 10. Bar graph of ROM before and after each treatment.

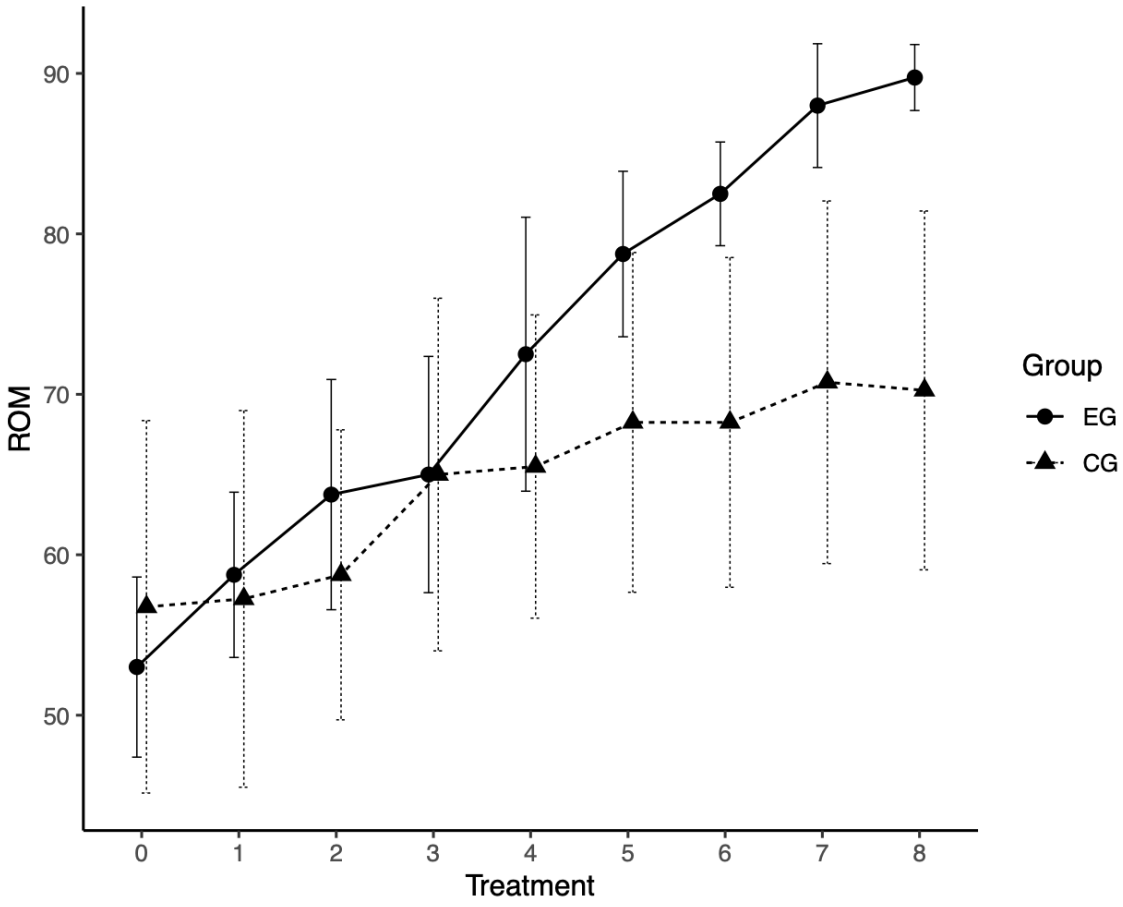

Figure 11. Line graph of ROM before 1st and after each treatment.

3.3.2 Cumulative ROM difference for treatment

The Table 9. provides a comparison of the cumulative ROM (Range of Motion) differences between two groups, the "EG" (Experimental Group) and "CG" (Control Group), after various treatments. It also includes statistical measures, including p-values and Cohen's d effect size, to assess the significance and magnitude of these differences.

Table 9. Comparison of Cumulative ROM difference for two groups

Treatment	EG	CG	p-value*	Cohen's d
Before 1st - After 1st	5.8 ± 2.99	0.5 ± 1.00	0.016	2.377
Before 1st - After 2nd	10.8 ± 4.35	2.0 ± 5.16	0.041	1.844
Before 1st - After 3rd	12.0 ± 4.00	8.2 ± 2.36	0.158	1.157
Before 1st - After 4th	19.5 ± 6.96	8.8 ± 4.79	0.039	1.791
Before 1st - After 5th	25.8 ± 5.06	11.5 ± 3.11	0.003	3.405
Before 1st - After 6th	29.5 ± 4.93	11.5 ± 3.11	0.001	4.367
Before 1st - After 7th	35.0 ± 5.10	14.0 ± 1.83	0.000	5.481
Before 1st - After 8th	36.8 ± 7.37	13.5± 1.91	0.001	4.328

* Independent Samples t-Test / Mann–Whitney U test

- Before 1st - After 1st: EG experienced a cumulative ROM difference of 5.8 with a Cohen's d of 2.377 after the 1st treatment. CG experienced a cumulative ROM difference of 0.5 with a smaller Cohen's d of 2.377 after the same treatment. The

p-value is 0.016, indicating that the difference between EG and CG after the 1st treatment is statistically significant. The effect size (Cohen's d) of 2.377 suggests a large practical difference.

- Before 1st - After 2nd: EG had a cumulative ROM difference of 10.8 with a Cohen's d of 1.844 after the 2nd treatment. CG had a cumulative ROM difference of 2.0 with a smaller Cohen's d of 1.844 after the same treatment. The p-value is 0.041, indicating that the difference between EG and CG after the 2nd treatment is statistically significant. The effect size (Cohen's d) of 1.844 suggests a large practical difference.

- Before 1st - After 3rd: EG showed a cumulative ROM difference of 12.0 with a Cohen's d of 1.157 after the 3rd treatment. CG displayed a cumulative ROM difference of 8.2 with a smaller Cohen's d of 1.157 after the same treatment. The p-value is 0.158, suggesting that the difference between EG and CG after the 3rd treatment is not statistically significant. The effect size (Cohen's d) of 1.157 indicates a moderate practical difference.

- Before 1st - After 4th: EG had a cumulative ROM difference of 19.5 with a Cohen's d of 1.791 after the 4th treatment. CG had a cumulative ROM difference of 8.8 with a smaller Cohen's d of 1.791 after the same treatment. The p-value is 0.039, indicating that the difference between EG and CG after the 4th treatment is statistically significant. The effect size (Cohen's d) of 1.791 suggests a large practical difference.

- Before 1st - After 5th: EG exhibited a cumulative ROM difference of 25.8 with a Cohen's d of 3.405 after the 5th treatment. CG showed a cumulative ROM difference of 11.5 with a smaller Cohen's d of 3.405 after the same treatment. The p-value is 0.003, indicating that the difference between EG and CG after the 5th treatment is statistically significant. The effect size (Cohen's d) of 3.405 suggests a very large practical difference.

- Before 1st - After 6th: EG displayed a cumulative ROM difference of 29.5 with a Cohen's d of 4.367 after the 6th treatment. CG had a cumulative ROM difference of 11.5 with a smaller Cohen's d of 4.367 after the same treatment. The p-value is 0.001, indicating that the difference between EG and CG after the 6th treatment is statistically significant. The effect size (Cohen's d) of 4.367 suggests a very large practical difference.

- Before 1st - After 7th: EG showed a cumulative ROM difference of 35.0 with a Cohen's d of 5.481 after the 7th treatment. CG exhibited a cumulative ROM difference of 14.0 with a smaller Cohen's d of 5.481 after the same treatment. The p-value is 0.000, indicating that the difference between EG and CG after the 7th treatment is highly statistically significant. The effect size (Cohen's d) of 5.481 suggests an extremely large practical difference.

- Before 1st - After 8th: EG had a cumulative ROM difference of 36.8 with a Cohen's d of 4.328 after the 8th treatment. CG had a cumulative ROM difference of 13.5 with a smaller Cohen's d of 4.328 after the same treatment. The p-value is

0.001, indicating that the difference between EG and CG after the 8th treatment is statistically significant. The effect size (Cohen's d) of 4.328 suggests a very large practical difference.

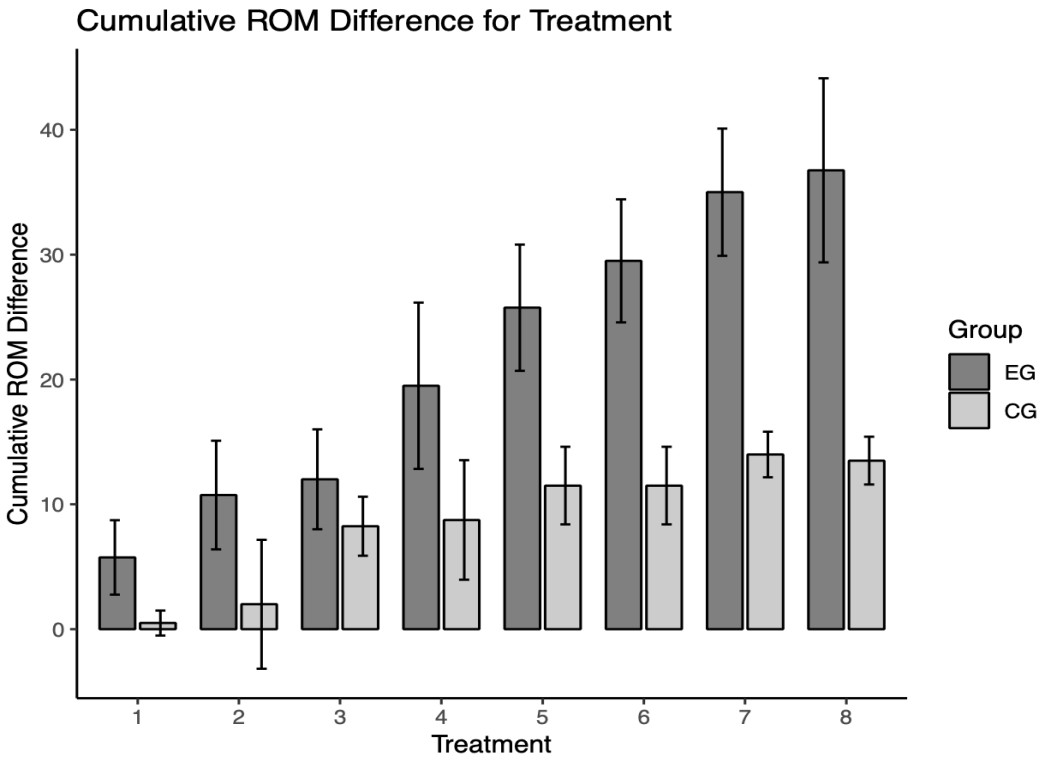

Figure 12. Bar graph of cumulative ROM difference between before and after each treatment.

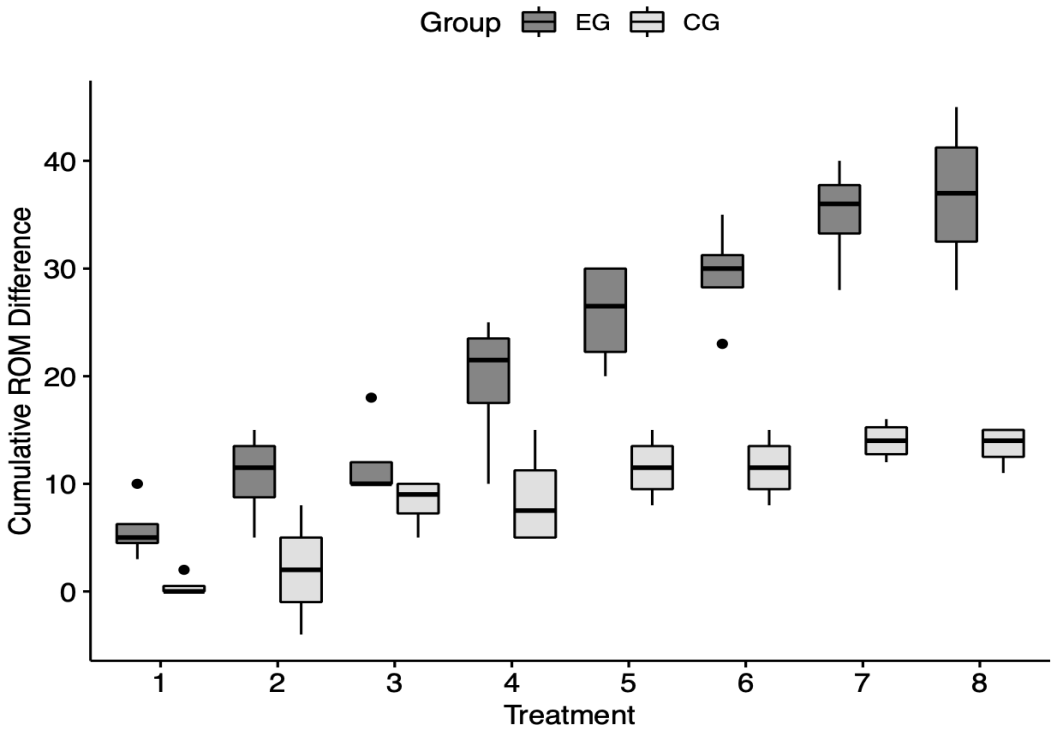

Figure 13. Boxplot of cumulative ROM difference between before and after each treatment.

3.3.3. Cohen’s d (effect size) between two groups for treatment (ROM)

The equation of Cohen’s d is as follows.

Cohen's d = (M2 - M1)／SDpooled

where

$SDpooled = \sqrt{((SD1^2 + SD2^2)／2)}$

M1, M2: ROM mean of EG and CG, respectively

SD1, SD2: ROM standard deviation of EG and CG, respectively

The interpretation of Cohen’s d in terms of Effect size.

Effect size	Cohen’s d
Small	0.2
Medium	0.5
Large	0.8 or greater

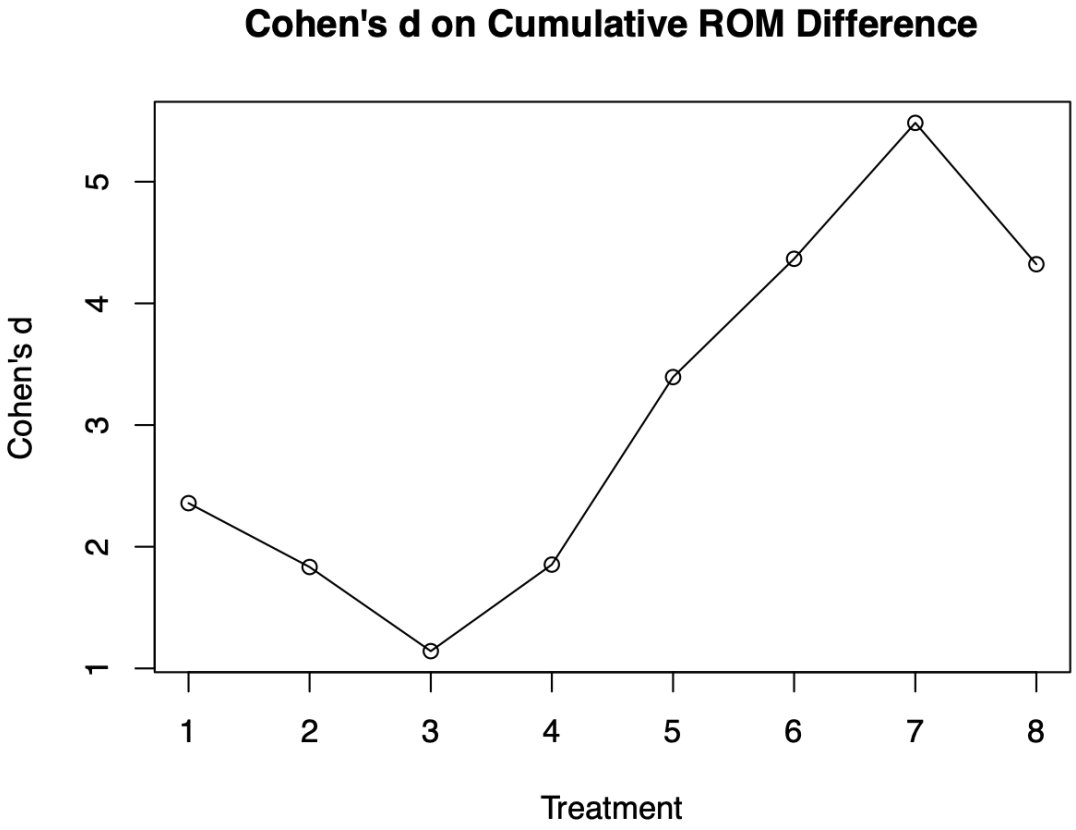

Figure 14. Cohen's d on Cumulative ROM difference for treatment.

3.4. ODI

The Table 10. provides a comparison of data between two groups, the "EG" (Experimental Group) and "CG" (Control Group), in terms of their measurements before and after a certain treatment ("Tx"). It also includes p-values and Cohen's d effect size measurements to assess the significance and magnitude of the observed differences.

Table 10. ODI before and after treatment and its difference

Group	Before Tx	After Tx	Difference	p-value*
EG	37.0 ± 5.29	24.5 ± 9.88	12.5 ± 6.95	0.037
CG	39.8 ± 3.86	32.3 ± 5.26	7.25 ± 3.20	0.098
p-value**	0.433	0.203	0.219	
Cohen’s d	0.605	0.986	0.969	

* Paired Samples t-Test
** Independent Samples t-Test

- *p-value: The p-values in this row are associated with the differences between the "Before Tx" and "After Tx" measurements within each group. The p-values help determine whether the changes observed in each group are statistically significant. For the EG, the p-value is 0.037, and for the CG, it's 0.098. These p-values

indicate the likelihood of observing these changes due to random chance; smaller values suggest greater statistical significance.

- p-value: The second row of p-values is likely associated with a different statistical test or comparison. The labels "p-value**" suggest that these p-values may be related to a different aspect of the data or a separate analysis. However, without additional context, it's not clear what these p-values specifically represent.

- Cohen’s d: Cohen's d is a measure of effect size that quantifies the magnitude of the difference between two groups. Larger Cohen's d values indicate larger effect sizes, which suggest more substantial practical differences.

- For the Experimental Group (EG): Before treatment, the mean measurement was 37.0, and after treatment, it decreased to 24.5. The mean difference between before and after treatment was 12.5, indicating that the treatment led to a decrease in the measurement. The p-value associated with this difference is 0.037, which suggests that this change is statistically significant at a conventional significance level (e.g., $\alpha = 0.05$). The Cohen’s d value of 0.605 indicates a moderate effect size, suggesting a moderate practical difference.

- For the Control Group (CG): Before treatment, the mean measurement was 39.8, and after treatment, it decreased to 32.3. The mean difference between before and after treatment was 7.25, indicating a decrease in the measurement. The p-value associated with this difference is 0.098, suggesting that this change is not statistically significant at a conventional significance level. The Cohen’s d value

of 0.986 indicates a large effect size, suggesting a relatively large practical difference.

In summary, the table provides information about the changes in measurements before and after treatment for both the EG and CG, along with associated statistical significance (p-values) and effect size (Cohen's d). The results indicate that the treatment had a statistically significant effect on the EG but not on the CG, with varying effect sizes in each group.

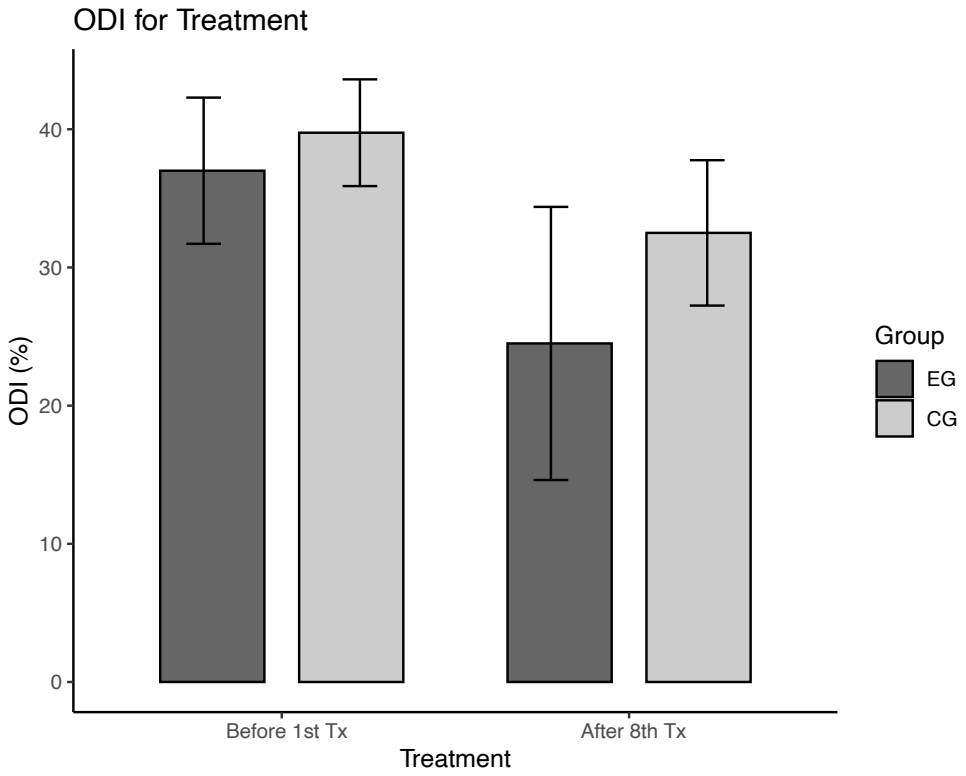

Figure 15. Bar graph of ODI before and after treatment.

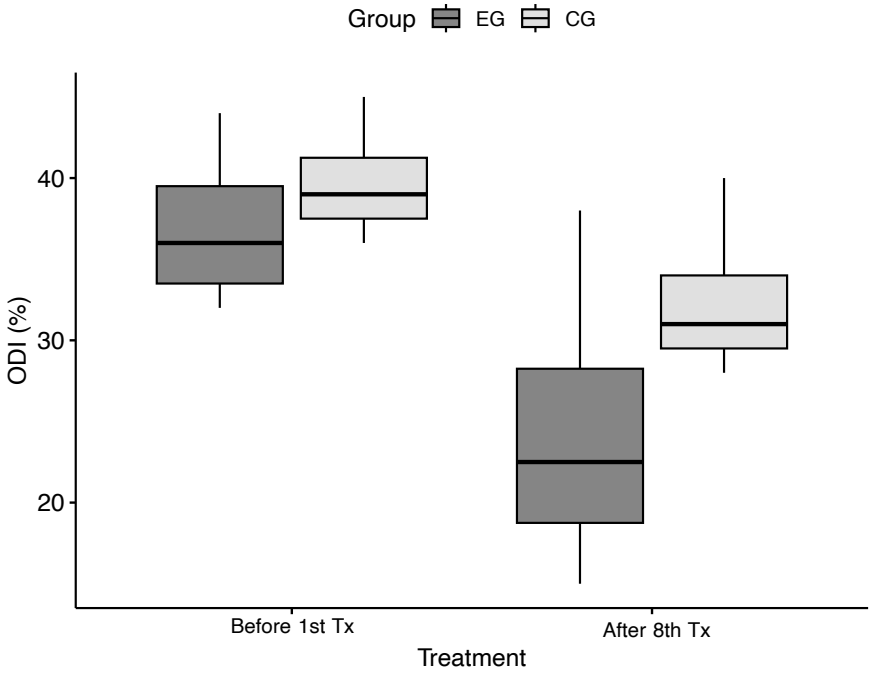

Figure 16. Boxplot of ODI before and after treatment.

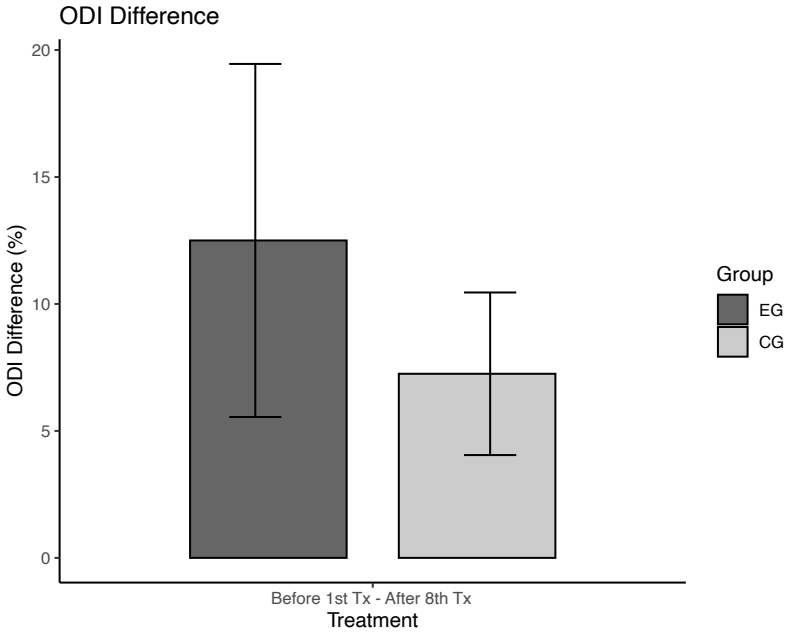

Figure 17. Bar graph of ODI difference between before and after treatment.

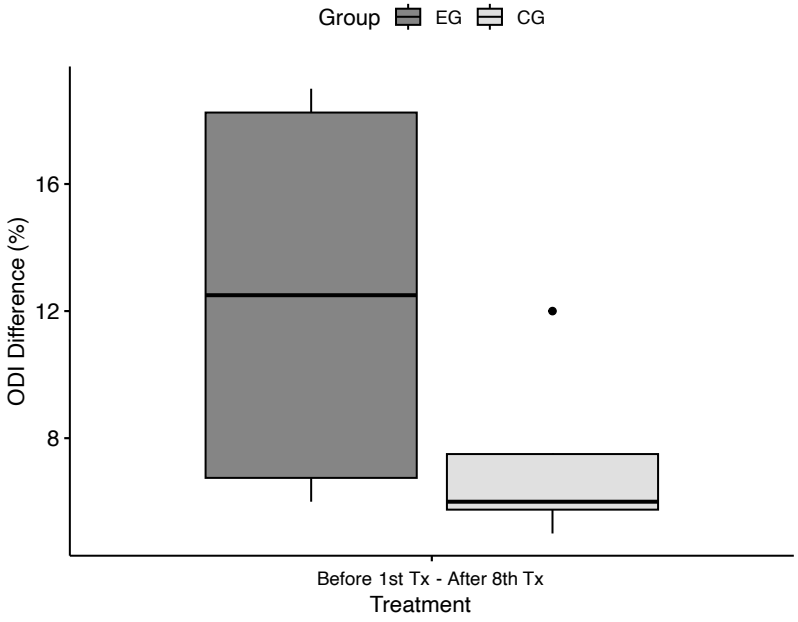

Figure 18. Boxplot of ODI difference between before and after treatment

IV. DISCUSSION

The purpose of this study is to compare the effectiveness between using an electro stimulator and without on the condition of low back pain with sciatica due to piriformis syndrome. Local acupoints were used for muscular anatomy. It was conducted in anticipation of the effect on pain relief and increase in the range of motion of the joint, and the corresponding results were obtained.

VAS was measured and collected before and after each treatment for both Group A and Group B. The result of VAS in both groups decreased when compared from pre-treatment on the 1st visit and post-treatment

The provided tables above presented data and statistics comparing two groups, the Experimental Group(EG), and the Control Group (CG), before and after receiving a given treatment. The discussion of this information involves examining the significance of the observed differences and the practical implications of following findings.

Before the treatment, the EG had a mean measurement of 37.0, while the CG had a slightly higher mean of 39.8. The EG had a slightly lower standard deviation (5.29) compared to the CG (3.86) in their initial measurements, suggesting that the EG's measurements were relatively less variable. After the treatment, both groups saw a decrease in their respective measurements. The EG's measurement decreased to a mean of 24.5, while the CG's measurement decreased to a mean of 32.3. These reductions in measurements after the treatment suggest that the treatment had an impact on both groups, resulting in a decrease in the parameter being measured.

The difference between the measurements before and after the treatment was calculated for both groups. For the EG, the mean difference was 12.5, while the CG had a mean difference of 7.25. The p-values associated with these differences were provided. The EG's p-value was 0.037, indicating that the change in measurements for the EG is statistically significant at a conventional significance level (e.g., $\alpha = 0.05$). The CG's p-value, on the other hand, was 0.098, suggesting that the change in measurements for the CG is not statistically significant at this level.

Effect sizes, represented by Cohen's d, were calculated to assess the practical significance of the observed differences. The EG had a Cohen's d of 0.605, indicating a moderate effect size, while the CG had a larger Cohen's d of 0.986, suggesting a relatively large effect size. Cohen's d values provide insight into the practical implications of the results. A larger effect size suggests a more substantial and practically meaningful difference.

The data in the table suggests that the treatment had a significant effect on the EG, as indicated by the statistically significant p-value and the moderate effect size (Cohen's d). The treatment led to a meaningful decrease in the parameter being measured.

Both Groups demonstrated significant noticeable therapeutic effect in the treatment of low back with sciatica due to piriformis syndrome. The pain is thought to arise from the blockage of Qi and Blood circulation, in accordance with the tenets of oriental medicine. Within this randomized controlled trial, acupuncture points were chosen, some with an electro-stimulator and some without, to target the enhancement of blood circulation and the activation of the trigger point in the piriformis muscle

specifically. In the comparison between the two approaches, it was observed that utilizing an electro-stimulator proved more efficacious in delivering pain relief across various dimensions.

V. CONCLUSION

This study included eight randomly selected participants, spanning various age groups, all diagnosed with piriformis syndrome and having previously undergone multiple physical therapy treatments without experiencing any notable improvements. The efficacy of a series of four treatments was assessed by measuring outcomes using the Visual Analogue Scale (VAS), Range of Motion (ROM), and Oswestry Disability Index (ODI).

In analyzing the data from the Visual Analogue Scale (VAS) measurements before and after each treatment, it is evident that there was a notable reduction in pain scores for both the Experimental Group (EG) and Control Group (CG). While the changes in the EG showed a decreasing trend, the differences in some cases did not reach statistical significance. Conversely, the CG exhibited relatively consistent VAS scores with no statistically significant changes. These findings suggest that the experimental treatment approach may offer some potential for pain relief in individuals with piriformis syndrome, though further investigation with a larger sample size may be needed to establish its clinical significance.

To calculate the average rate of change for both the Experimental Group (EG) and Control Group (CG), you can sum the differences in the VAS scores (After treatment - Before treatment) and then divide by the total number of data points. Here's the calculation:

In the assessment of Range of Motion (ROM) changes before and after treatment, it is evident that the Experimental Group (EG) exhibited varying degrees of improvement,

with average rates of change ranging from 0.5 to 5.8 degrees. The most significant ROM improvement was observed after the first treatment, with an average rate of 5.8 degrees, and the differences in ROM for the remaining treatments, while generally positive, did not always reach statistical significance. Conversely, the Control Group (CG) displayed relatively stable ROM measurements, with average rates of change ranging from -0.2 to 3.0 degrees, and similar to the EG, these changes often did not attain statistical significance. These findings suggest that the experimental treatment may have a potential positive impact on ROM in individuals with piriformis syndrome, particularly after the initial treatment, though further investigation with a larger sample size is warranted to confirm these trends and establish their clinical significance.

In evaluating the effects of treatment on patients with piriformis syndrome, the Oswestry Disability Index (ODI) proved to be a valuable indicator of improvement. In the Experimental Group (EG), the average rate of change in ODI scores was notably pronounced, with a decrease of 12.5 points after treatment. This substantial improvement was statistically significant, as indicated by a p-value of 0.037. Similarly, the Control Group (CG) demonstrated positive changes in ODI scores, with an average rate of change of 7.25 points. Although the p-value (0.098) did not reach the conventional threshold of 0.05, it suggests a trend toward improved disability scores in the CG. The Cohen's d effect size values of 0.605 for EG and 0.986 for CG further underscore the clinical significance of these findings. Overall, these results indicate that both treatment approaches have the potential to reduce disability in patients with piriformis syndrome, with the EG showing a more substantial improvement in ODI scores.

The findings of this study suggest that the use of an electro-stimulator is more effective than not using the stimulator in the treatment of low back pain associated with piriformis syndrome.

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APPENDIX

Informed Consent Form

You are invited to participate in a research study about "**Effectiveness of Electroacupuncture Treatment for Low back Pain with Sciatica Due to Piriformis Syndrome**".

Total goal of this research study is to compare the effectiveness of electroacupuncture on low back pain with sciatica due to piriformis syndrome and without electroacupuncture.

The study design is that the patients with Low back pain with piriformis syndrome mainly, in both Control Group and Experimental Group will receive 30 minutes of acupuncture treatment on the low back and buttocks. Controlled group will receive an electro stimulator in certain locations for better stimulation. The treatment will be a total of 8 times, twice a week in 4 weeks.

This study is being conducted by Ahri J. La, L.Ac..

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, all the services you receive at this clinic will continue and nothing will change. If you choose not to participate in this research project, you will be offered the treatment that is routinely offered in this clinic. You may change your mind later and stop participating even if you agreed earlier.

Participating in this study may not benefit you directly, but it will help to enrich the knowledge on Acupuncture and Asian Medicine.

By Participating in this research it is possible that you will be at greater risk than you would otherwise be. There is, for example, a risk that your condition will not get better and

that the new medicine or treatment doesn't work even as well as the old one. If, however, the medicine or treatment is not working, we will give the medication or treatment routinely offered to make you more comfortable. While the possibility of this happening is very low, you should still be aware of the possibility.

The information you will share with us if you participate in this study will be kept completely confidential to the full extent of the law. The information that we collect from this research project will be kept confidential. Information about you that will be collected during the research will be put away and no-one but the researchers will be able to see it. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except Ahri J. La, L.Ac.

If you have any questions about this study, please contact Ahri J. La, L.Ac. At 1-213-255-1912, chikychoko@gmail.com. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Chair of the South Baylo University. Institutional Review Board (IRB) at 213-738-0712 or jungah202@southbaylo.edu.

YOU WILL BE GIVEN A COPY OF THIS FORM WHETHER OR NOT YOU AGREE TO PARTICIPATE.

Certificate of Consent:

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

_____	_____
Name of Participant (Print)	Name of Witness (Print)
_____	_____
Signature of Participant	Signature of Witness
_____	_____
Date: Day/Month/Year	Date: Day/Month/Year

Statement by the researcher/person taking consent:

I have accurately explained the information sheet to the potential participant. I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this ICF has been provided to the participant

_____

Print Name Researcher (Print)

_____

Signature of Researcher

_____

Date: Day/Month/Year

ACUPUNCTURE INFORMED CONSENT TO TREAT

I understand that I am the decision maker for my health care. Part of this office's role is to provide me with information to assist me in making informed choices. This process is often referred to as "informed consent" and involves my understanding and agreement regarding the care recommended, the benefits and risks associated with the care, alternatives, and the potential effect on my health if I choose not to receive the care. Acupuncture is not intended to substitute for diagnosis or treatment by medical doctors or to be used as an alternative to necessary medical care. It is expected that you are under the care of a primary care physician or medical specialist, that pregnant patients are being managed by an appropriate healthcare professional, and that patients seeking adjunctive cancer support are under the care of an oncologist.

I hereby request and consent to the performance of acupuncture treatments and other procedures within the scope of the practice of acupuncture on me (or on the patient named below, for whom I am legally responsible) by the acupuncturist indicated below and/or other licensed acupuncturists who now or in the future treat me while employed by, working or associated with, or serving as back-up for the acupuncturist named below, including those working at the clinic or office listed below or any other office or clinic, whether signatories to this form or not.

I understand that methods of treatment may include, but are not limited to, acupuncture, moxibustion, cupping, electrical stimulation, Tui-Na (Chinese massage), Chinese herbal medicine, and nutritional counseling. I understand that the herbs may need to be prepared and the teas consumed according to the instructions provided orally and in writing. The herbs may have an unpleasant smell or taste. I will immediately notify a member of the clinical staff of any unanticipated or unpleasant effects associated with the consumption of the herbs.

I appreciate that it is not possible to consider every possible complication to care. I have been informed that acupuncture is a generally safe method of treatment, but, as with all types of healthcare interventions, there are some risks to care, including, but not limited to: bruising; numbness or tingling near the needling sites that may last a few days; and dizziness or fainting. Burns and/or scarring are a potential risk of moxibustion and cupping, or when treatment involves the use of heat lamps. Bruising is a common side effect of cupping. Unusual risks of acupuncture include nerve damage and organ puncture, including lung puncture (pneumothorax). Infection is another possible risk, although the clinic uses sterile disposable needles and maintains a clean and safe environment.

I understand that while this document describes the major risks of treatment, other side effects and risks may occur. The herbs and nutritional supplements (which are from plant, animal, and mineral sources) that have been recommended are traditionally considered safe in the practice of Chinese Medicine, although some may be toxic in large doses. I understand that some herbs may be inappropriate during pregnancy. I will notify a clinical staff member who is caring for me if I am, or become, pregnant or if I am nursing. Should I become pregnant, I will discontinue all herbs and supplements until I have consulted and received advice from my acupuncturist and/or obstetrician. Some possible side effects of taking herbs are: nausea; gas; stomachache; vomiting; liver or kidney damage; headache; diarrhea; rashes; hives; and tingling of the tongue.

While I do not expect the clinical staff to be able to anticipate and explain all possible risks and complications of treatment, I wish to rely on the clinical staff to exercise judgment during the course of treatment which the clinical staff thinks at the time, based upon the facts then known, is in my best interest. I understand that, as with all healthcare approaches, results are not guaranteed, and there is no promise to cure.

I understand that I must inform, and continue to fully inform, this office of any medical history, family history, medications, and/or supplements being taken currently (prescription and over-the-counter). I understand the clinical and administrative staff may review my patient records and lab reports, but all my records will be kept confidential and will not be released without my written consent.

I understand that there are treatment options available for my condition other than acupuncture procedures. These options may include, but are not limited to: self-administered care, over-the-counter pain relievers, physical measures and rest, medical care with prescription drugs, physical therapy, bracing, injections, and surgery. Lastly, I understand that I have the right to a second opinion and to secure other options about my circumstances and healthcare as I see fit.

By voluntarily signing below, I confirm that I have read, or have had read to me, the above consent to treatment, have been told about the risks and benefits of acupuncture and other procedures, and have had an opportunity to ask questions. I agree with the current or future recommendations for care. I intend this consent form to cover the entire course of treatment for my present condition and for any future condition(s) for which I seek treatment.

PATIENT NAME:

ACUPUNCTURIST NAME:

(Date)

PATIENT SIGNATURE X

(Or Patient Representative) (Indicate relationship if signing for patient)

 A2015

Figure 18. Acupuncture informed consent form

DATE_____ Height: __'__" Weight: _____lbs B.P.: _____/_____ P_____ Sex: □ F □ M

NAME_____ **D.O.B.**_____ **Occupation**_____

Chief Complaints (describe location, onset, duration, severity/VAS, provocative/palliative factors for this complaint):

_____

_____

_____

_____

History of Present Illness:_____

_____

Communicable Disease: □ N/A □ If so,_____ **Eastern Diagnosis**: _____

Observation: Gait/Swelling/Color/Shen/Vitality, etc: □ N/A □_____ □ **Tenderness to palpation**: 1, 2, 3, 4

Past Medical History:_____

_____

Allergy: □ N/A □ Allergic to _____ □ If any adverse reaction/symptomto Herb_____

Family History: □ Unknown □ Mother_____ □ Father_____

Social History: □ N/A □ Smoking (Y / N) _____ □ Alcohol (Y / N) _____ □ Drug (Y / N) _____

Appetite: □ Good □ Moderate □ Poor □ Other_____ **Digestion**: □ Good □ Moderate □ Poor □ Other_____

Bowel Movement: □ Normal □ Constipation □ Loose Stool □ Incontinence □ Other:_____

Urination: □ Normal □ Frequent □ Incontinence □ Dysuria □ Other_____ **Sweat**: □ N/A □ Day □ Night

Menstruation: □ N/A □ Regular_____days □ Irregular_____days □ Clot (Yes / No) □ Pain (Yes / No) □ Other_____

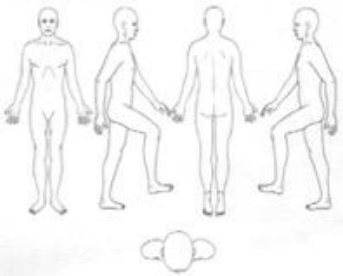
Sleep: □ Normal □ Awakes due to urination □ Insomnia ____ hours of sleep (□ Hard to sleep □ Awakes middle of night)

Tongue Signs: Body □ Pink □ Red □ Pale □ Crack (middle, tip, side R/L) □ Swelling (whole, sides) □ Other_____

Coat: □ White □ Yellow □ Thin □ Thick □ None □ Other_____

Pulse Signs: Wiry (L / R) Rolling (L / R) Weak (L / R) Moderate (L / R) Irregular (L / R) □ Other_____

Assessment:



Body Map

Medication History:

Treatment:

□ Acupuncture (15min x) □ Electro-acupuncture (15min x)

_____

_____

_____

□ Manual Therapy/Tuina(15min)_____ □ Infrared_____ □ Moxa □ Taping

□ TENS □ Other Treatment_____

□ Herbal Rx_____

□ Advised to see PCP for_____

Plan: Return to clinic _____ times a week for _____(week/month)

□ Note_____

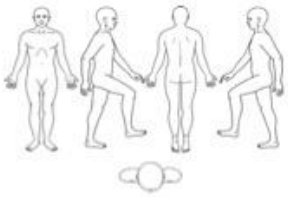
_____

_____

Figure 19. Initial Form

Name_____ **D.O.B.**_____

Date:_____ Vital Sign: □ N/A □ B.P._____/_____ P____ Temp_____ Height_____
Weight_____lbs
Treatment Prognosis: □ Improved □ Slight □ Unchanged □ Worse

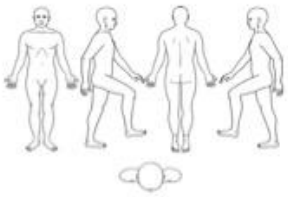


(S) Chief Complaints/ICD:

(O) Observation: Gait/Swelling/Color/Shen/Vitality_____
(P) Plan:
Treatment/CPT code:
□ 99213 □ 97810 □ 97811 x__ □ 97813 □ 97814 x__ □ 97026
□ 97140 □ 97124 □ 97139 □ 97039/unlisted □ Needle
Count_____
_____
□ Moxa □ Taping □ TENS/64550 □ Auto-Cupping □ Cupping
_____ **(A) Assessment/Exam**:
□ Herbal Rx_____ □ Picked up _____ □ ROM:
Advised to see PCP for: □ N/A □_____ □ Other:
Return to clinic _____ times a week for ___ (week/month)

_____

Date:_____ Vital Sign: □ N/A □ B.P._____/_____ P____ Temp_____ Height_____
Weight_____lbs
Treatment Prognosis: □ Improved □ Slight □ Unchanged □ Worse



(S) Chief Complaints/ICD:

(O) Observation: Gait/Swelling/Color/Shen/Vitality_____
(P) Plan:
Treatment/CPT code:
□ 99213 □ 97810 □ 97811 x__ □ 97813 □ 97814 x__ □ 97026
□ 97140 □ 97124 □ 97139 □ 97039/unlisted □ Needle
Count_____
_____
□ Moxa □ Taping □ TENS/64550 □ Auto-Cupping □ Cupping
_____ **(A) Assessment/Exam**:
□ Herbal Rx_____ □ Picked up _____ □ ROM:
Advised to see PCP for: □ N/A □_____ □ Other:
Return to clinic _____ times a week for ___ (week/month)

Figure 20. SOAP Note