



Article

**Electroacupuncture Therapy for Knee Pain Syndrome of Qi and Blood Stagnation in the ST Meridian**

*Erlina Cindi Anjaly<sup>1\*</sup>, Sholichan Badri<sup>2</sup>, Nurtama Aditya Nugraha<sup>3</sup>*

*<sup>1-3</sup> Acupuncture Department, Health Polytechnic Ministry of Health Surakarta, Indonesia*

**SUBMISSION TRACK**

Received: February 21, 2024  
Final Revision: March 13, 2024  
Available Online: April 18, 2024

**KEYWORDS**

Knee pain, electroacupuncture, stagnation, pain scale

**CORRESPONDENCE**

Phone: 085879362618  
E-mail: erlinacindianjaly@gmail.com

**ABSTRACT**

Knee pain is a joint disease characterized by pain, crepitus, and stiffness in the knee joint. The inflammatory process in knee pain affects the cartilage, synovial fluid, and subchondral bone. Objective: To determine the effectiveness of electroacupuncture therapy with points ST 35 Dubi, EX-LE 4 Neixiyan, GB 33 Xiyangguan, BL 40 Weizhong, LR 8 Ququan, GB 34 Yanglingquan, SP 9 Yinlingquan, BL 55 Heyang, EX-LE 2 Hedong, ST 36 Zusanli, SP 10 Xuehai, ST 40 Fenglong, and ST 34 Liangqiu in patients with knee pain. Management of knee pain with electroacupuncture method at points ST 35 Dubi, EX-LE 4 Neixiyan, GB 33 Xiyangguan, BL 40 Weizhong, LR 8 Ququan, GB 34 Yanglingquan, SP 9 Yinlingquan, BL 55 Heyang, EX-LE 2 Hedong, ST 36 Zusanli, SP 10 Xuehai, ST 40 Fenglong, and ST 34 Liangqiu. The therapy principle in this case is to smooth the Qi and Xue in the ST meridian. Therapy was performed for 6 sessions. The outcome measurement indicator used the Numeric Rating Scale (NRS). Electroacupuncture therapy for 6 sessions effectively reduced knee pain from a scale of 6 to a scale of 0. Electroacupuncture is effective in reducing pain in patients with knee pain.

**I. INTRODUCTION**

Knee pain is a joint disorder that can hinder a person's motor ability, causing movement disorders and hindering daily activities and work. This can result in psychosocial disturbances for those affected. Knee pain sufferers experience pain and limited mobility that can lead to poor sleep quality<sup>(1)</sup>.

The prevalence of knee pain continues to increase with the aging population. Although knee pain is often associated

with aging or known as degenerative diseases, it also occurs in the community with age ranges between 15 and 24 (1.3%), increasing in the age range of 24 to 35 (3.1%) and then at ages 35 to 44 (6.3%)<sup>(2)</sup>.

In addition to the aging process, research conducted in the past shows that various factors such as gender, body mass index (BMI), education, psychological factors, genetic factors, and local structural pathology are associated with knee

pain. Knee pain is categorized as osteoarthritis in Western Medicine. This disease causes progressive disruption of joint tissues, including cartilage, synovium, and subchondral bone, resulting in degeneration of articular cartilage, cracking, ulceration, and thinning of the articular surface<sup>(3,4)</sup>.

In Eastern medicine, knee pain is classified as Bi syndrome, which is defined as obstruction in the Chinese language. Bi syndrome is characterized by stagnation of Qi and Xue in the meridians caused by external pathogen invasion, such as wind, cold, and dampness. Symptoms of Bi syndrome include pain, heaviness, numbness, joint swelling, and limited movement. According to Traditional Chinese Medicine (TCM), knee pain is caused by cartilage damage in one or more joints<sup>(5)</sup>.

Acupuncture therapy is widely used to treat knee pain. Acupuncture can transfer heat from deep tissues, provide anti-inflammatory and analgesic effects, increase blood supply, and relieve muscle stiffness in its role in addressing knee pain complaints<sup>(6)</sup>. Acupuncture has significant effects and is considered an effective treatment for reducing pain and regenerating cells in knee pain, considering the patient's weight and duration of pain<sup>(7)</sup>.

## II. METHODS

This case study was conducted to determine the effectiveness of electroacupuncture therapy management in Mrs. S, a 50-year-old woman with a weight of 67kg and a height of 148cm. Mrs. S appears enthusiastic, with bright eyes and a radiant complexion. However, when walking, there is an abnormality compared to someone without knee pain. Mrs. S's tongue is fat, with tooth imprints and a thin white coating on the tongue. A fat tongue indicates phlegm accumulation in the body, while tooth imprints on the tongue indicate spleen deficiency<sup>(8)</sup>.

Mrs. S's voice is loud, and no breathing sounds are heard. She is not coughing or hiccupping. No abnormalities are found

in Mrs. S's mouth odor or sweat. Mrs. S complains of right knee pain after being used as a support while searching for grass in the field for a long time. She has been feeling pain for 3 months, and the pain is continuous with a persistent and heavy sensation. When she first felt the pain, the pain scale reached 8. Mrs. S consulted a doctor and was advised not to use her right knee as support. She recommended swimming or walking in the water. Pain scale measurement was done using the Numeric Rating Scale (NRS), and Mrs. S stated that the pain was at level 6 during the assessment. Considering the duration of Mrs. S's pain being only 3 months, this pain is still classified as acute, and persistent and heavy pain indicates dampness, which is a manifestation of stagnation Qi and Xue<sup>(9,10)</sup>. The pain worsens when used to stand up from a sitting position and when bent for too long, which can be relieved by straightening.

Mrs. S's bowel movements (BM) and urination (UR) are standard, with a frequency of 1 BM/day and 5 to 6 times/day. Anamnesis on Mrs. S's diet found that she has a good appetite, eats twice a day, tends to eat soupy foods, has a normal portion of rice with 1 to 2 spoonfuls of rice, and has no tendency for specific tastes or snacks. Mrs. S drinks frequently, with mineral water as the type of beverage, a drinking volume of 10 glasses/day, tends to be cold, and normal thirst (not excessively thirsty when doing heavy activities). Mrs. S's work and rest patterns are sufficient, but she only exercises once a week, which is gymnastics. Mrs. S's emotional pattern is fear. Emotional patterns with a tendency towards fear are closely related to the kidneys<sup>(11)</sup>.

Examination of Mrs. S's organ/meridian status revealed symptoms such as eye problems, palpitations, cold sweat, knee pain, and graying hair. These symptoms are related to the liver/gallbladder, heart/small intestine, and kidney/bladder systems.

The examination results, either by inspection or palpation, showed tenderness upon pressure and swelling in the right knee. Tenderness upon pressure and swelling are manifestations of stagnation Qi and Xue<sup>(10)</sup>. Pulse palpation on Mrs. S revealed floating depth, rapid pulse rate, average pulse size, and normal pulse strength. Differentiating the pulse locations, the pulse on the left and right sides floated, indicating that the disease was still external. In contrast, a rapid pulse rate suggests the presence of heat <sup>(12)</sup>. No abnormalities were found upon pressing the heart, liver, and kidneys's shu, mu, and yuan points. The Range of Motion (ROM) of Mrs. S's right knee was within normal limits.

The materials and tools used in this therapy process include a sphygmomanometer, stethoscope, thermometer, gloves, 70% alcohol swab, 1 cun and 1.5 cun filiform needles, electrostimulator, cupping set, bent needles, tweezers, and safety box. Acupuncture treatment was conducted from January 2, 2024, to January 18, 2024, with a frequency of 6 therapy sessions, performed twice a week at the Asri Therapy House in Boyolali.

Acupuncture therapy to be used in cases of knee pain with Qi and Xue stagnation syndrome on the ST meridian involves needling the following points while lying face down GB 33 Xiyangguan, BL 40 Weizhong, LR 8 Ququan, GB 34 Yanglingquan, BL 55 Heyang. Additionally, points ST 35 Dubi, EX-LE 4 Neixiyan, SP 9 Yinlingquan, EX-LE 2 Heding, ST 36 Zusanli, SP 10 Xuehai, ST 34 Liangqiu, and ST 40 Fenglong are needled while lying on the back. The therapeutic principle in this case is to alleviate knee pain by promoting the flow of Qi and Xue in the ST meridian. The therapy modality involves using an electrostimulator set at an initial duration of 15 minutes in the prone position and 15 minutes in the supine position, with a frequency of 60 Hz, continuous wave

mode, and intensity adjusted according to the patient's comfort level.

The therapy's outcome is measured using the Numeric Rating Scale (NRS), considered the easiest and most time-effective method. In the NRS, patients are asked to circle or state a number between 0 and 10 that best represents their pain intensity<sup>(13)</sup>.

### III. RESULT

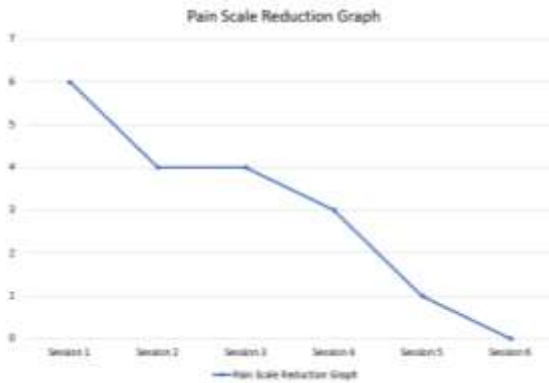
Therapy evaluation is conducted at every session to determine whether there is any difference after the therapy compared to the previous session. Evaluation is done subjectively and objectively.

The first therapy session was conducted on January 2, 2024. The swelling was observed in the right knee. Ny. S reported persistent pain with a heavy sensation, pain when standing up from a sitting position, and tenderness.

The second therapy session was conducted on January 5, 2024. The swelling was still present in the right knee after the first therapy. Mrs. S mentioned feeling less heaviness but still experiencing pain when bending or sitting for too long before standing up and tenderness when pressed.

The third therapy session was conducted on January 8, 2024. The swelling was still present in the right knee after the previous therapy. Mrs. S still felt pain when pressed and standing up after sitting for a long time. Ny. S admitted that after feeling improvement in the 2nd and 3rd therapies, she used her right leg as support again while looking for grass, even though she had previously been advised to use a small chair to avoid prolonged weight-bearing on her leg.

The fourth therapy session was conducted on January 11, 2024. The swelling was still present in the right knee after the previous therapy; Mrs. S mentioned no longer tenderness when pressed, but she still felt pain when bending and sitting for too long before standing up.



**Figure 1. Knee Pain Scale Reduction**

The reduction in knee pain scale in Mrs. S can be observed in Figure 1. In the first therapy session, the pain scale was at 6. After 6 therapy sessions, the pain scale was reduced to 0, indicating no more pain.

**Table 1. Observation of Ny. S's Tongue Before and After Therapy**

Stage	Image	Description
Before Therapy		The tongue appears swollen, tooth marks are present, and a thin white coating is on the tongue.
After Therapy		The tongue appears swollen, tooth marks are present, and a thin white coating is on the tongue.

The fifth therapy session was conducted on January 15, 2024. The swelling was no longer present in the right knee. Ny. S reported that after the fourth therapy, there was no more prolonged pain when standing up after sitting for a long time, as long as she frequently straightened her legs while sitting.

The sixth therapy session was conducted on January 18, 2024. Ny. S stated that she no longer felt any discomfort. There was no extended tenderness when pressed or standing up after sitting for a long time, and the heaviness was gone.

**Table 2. Examination of Ny. S's pulse before and after therapy**

Stage	Right	Kiri
<b>Before therapy</b>	<i>Cun</i> floating, <i>guan</i> floating, <i>Chi</i> floating.	<i>Cun</i> floating, <i>is guan</i> floating, <i>is Chi</i> floating.
<b>After Therapy</b>	<i>Cun</i> normal, <i>guan</i> normal, <i>chi</i> normal.	<i>Cun</i> normal, <i>guan</i> normal, <i>chi</i> normal.

**IV. DISCUSSION**

The results of Mrs. S, 50 years old, complained of right knee pain with Bi syndrome due to Qi and Xue stagnation in the ST meridian. He has been suffering from knee pain for 3 months because he always uses his right knee as a support when working. Bi syndrome in TCM is defined as obstruction, namely stagnation of Qi and Xue, which causes a lack of nutrition in tendons, muscles, and bones (14). The circulation of body fluids is closely related to Bi syndrome, including blood flow in the blood vessels. Kidneys regulate the transformation and transportation of body fluids. If fluid accumulates, it will block and cause swelling in body parts, such as the knees (11).

Mrs. S's right knee S is constantly under pressure, so it can be concluded that this pain is due to trauma, which results in muscle pain, swelling, or injury to the tendons, as well as severe pain when pressed, which makes Qi not flow smoothly and causes Xue stagnation (10,15). This stagnation is still thought to be in the meridian, namely the ST meridian. The author also considered Mrs. S, namely, in

the knee joint, the duration of Mrs. S is still classified as acute; the pain worsens when pressure is applied, and the membrane of Mrs. S's tongue. The white S is thin, and the depth of Mrs. S is floating; this shows that Mrs. S is still outside (Biao) <sup>(8,11)</sup>.

This therapy uses main (symptomatic) and differential (causative) points. The main points used for knee pain cases include ST 35 Dubi, EX-LE 4 Neixiyan, GB 33 Xiyangguan, BL 40 Weizhong, LR 8 Ququan, GB 34 Yanglingquan, SP 9 Yinlingquan, BL 55 Heyang, EX-LE 2 Hedong, ST 36 Zusanli, and SP 10 Xuehai <sup>(14)</sup>. Then, two points were chosen as differential points in this case: ST 34 Liangqiu and ST 40 Fenglong. The ST 40 Fenglong point is the Luo point of the Yang Ming meridian of the foot (ST), which is used to treat weakness in the legs, including cases of knee pain <sup>(16)</sup>. Meanwhile, the ST 34 Liangqiu point was chosen as the Xi point of the Yang Ming foot meridian (ST). The Xi point treats acute diseases of Zhang Fu's meridians and organs <sup>(17)</sup>. The modality used in this therapy is an electrostimulator. The electrostimulator is set with continuous wave waves, frequency 60 Hz, with a therapy duration of 15 minutes, and the intensity of the electrostimulator is adjusted to the patient's comfort. Mrs. S's case is analgesia, suitable for using a continuous wave electrostimulator. Continuous wave

waves are used for soft tissue injuries, joint inflammation and swelling, hip pain, facial paralysis, and local frostbite. The frequency chosen is a high frequency of 50-100 Hz. This frequency provides analgesic and sedative effects, reduces muscle spasms, and treats pain with the resulting anesthetic effect <sup>(14,18)</sup>.

Acupuncture plays a role in treating knee pain because the area of high innervation for pain fibers is at the acupuncture points. The fibers referred to in acupuncture analgesia include A fibers and C fibers. Electrostimulation modalities can stimulate A $\beta$  type afferents, which also produce analgesia. Electrostimulation modulates the Nucleus Raphe Magnus (NRM) to reduce pain sensation through inhibitory pathways. Acupuncture stimulation increases adrenaline and beta-endorphins <sup>(19)</sup>.

## V. CONCLUSION

Based on the case study results, electroacupuncture effectively reduces pain in knee patients. Several aspects were evaluated by comparing the patient's condition before therapy with after undergoing therapy 6 times. This includes improving the patient's discomfort, reducing the severity of pain from a scale of 6 to 0, functional improvement, and satisfaction with the treatment.

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