

ORIGINAL RESEARCH

Electroacupuncture combined with salt stone bed heat therapy for lumbar degenerative back pain: A clinical study

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ABSTRACT

Objects: To evaluate the effectiveness of combining electroacupuncture with hot compresses using a salt stone bed in the treatment of back pain due to lumbar degenerative disease, and to assess any associated adverse effects. **Subject and methods:** Patients over 18 years old regardless of gender or occupation, diagnosed with back pain due to lumbar degenerative disease according to the 2014 Guidelines for Diagnosis and Treatment of Musculoskeletal Diseases by the Vietnam Ministry of Health, were recruited from November 2023 to May 2024, at HaiPhong Traditional Medicine Hospital. It's a pre – post study, comparing the study group to the control group before and after the treatment. Convenient sampling was chosen, each group has at least 30 patients; in fact, there are total of 68 patients divided equally in two groups (34 patients each). **Results:** Most patients were over 60 years old (67.6% in the study group, 61.8% in the control group) and predominantly female (71% in the study group, 68% in the control group). The study group showed significant improvements in pain levels (VAS score decreased from 6.4 ± 1.1 to 3.1 ± 1.0), lumbar spine extension (increased from 2.3 ± 0.6 cm to 3.4 ± 0.7 cm), and disability level (Owestry Disability Index - ODI score decreased from 23.0 ± 5.3 to 8.5 ± 5.6). These improvements were statistically greater than those observed the control group. No adverse effects were reported during electroacupuncture. However, three patients in the study group experienced skin irritation, which resolved after adjusting the bed temperature, and one patient discontinued treatment due to itching from the hot compresses. **Conclusion:** Combining electroacupuncture with hot compresses therapy using salt stone bed is more effective in reducing pain, improving lumbar flexibility, and enhancing daily functions than electroacupuncture alone. It is important to monitor patients for skin irritation, adjust bed temperatures as needed, consider patient allergy histories before treatment and regularly clean the salt stone bed.

Keywords: *electroacupuncture, salt stone bed, back pain, lumbar degenerative disease.*

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INTRODUCTION

Lumbar degenerative disease is a chronic, progressive condition that causes pain,

reduced mobility, and spine deformity, typically without signs of inflammation [1]. According to a 2012 report by Yoshihito Sakai, approximately 80% of the population experiences back pain at least once in their lifetime [2]. Other global studies estimate that up to 65 million people suffer from low back pain each year, significantly impairing daily function and reducing quality of life [3]. Therefore, effective treatment is essential to restore mobility, functional independence, and work capacity. In traditional medicine, back pain—historically referred to as Yao Tong—has been treated using methods such as acupuncture, moxibustion, and herbal remedies. Among these, electroacupuncture, which involves applying electrical stimulation to acupuncture points via inserted needles, has demonstrated pain-relieving effects in multiple scientific studies [4], [5]. Additionally, the salt stone bed, which delivers localized heat therapy, has been introduced at Hai Phong Traditional Medicine Hospital and is used clinically to relieve back pain. Despite its promising application, this heat-based therapy is not yet widely adopted in some local medical facilities which currently do not utilize salt stone beds. Given the limited research on the combined use of electroacupuncture and salt stone bed heat therapy, this study aims to evaluate their effectiveness in treating back pain caused by lumbar degenerative disease and to assess any associated adverse effects. The findings are intended to contribute to the evidence base for integrated traditional treatments and support their broader clinical application.

SUBJECT AND METHOD

Selection criteria: Patients over 18 years old regardless of gender or occupation, were diagnosed with back pain due to lumbar

degenerative disease according to the 2014 Guidelines for Diagnosis and Treatment of Musculoskeletal Diseases of the Vietnam Ministry of Health [6], according to which the patient has lumbar spine syndrome and degenerative lumbar spine images on X-ray. Patients voluntarily participated in the study and complied with treatment.

Exclusion criteria: Patients with concomitant infections, systemic poisoning; open wounds in the back area; skin diseases in the back area; ankylosing spondylitis; cancer; spinal tuberculosis; spinal trauma; indications for surgical treatment (severe compression, muscle atrophy, sphincter disorder, failed medical treatment); serious diseases (heart failure, liver failure, kidney failure, mental illness, dementia, HIV/AIDS; high fever, generalized convulsions, delirium; treated with NSAIDs within 10 days or injected with corticosteroids in the last 3 months; stopped treatment in the middle of ≥ 2 days; sensory disturbances.

Research location and time: Hai Phong Traditional Medicine Hospital, from November 2023 to May 2024.

Research method and sample size: It's pre – post study, comparing the study group to the control group before and after the treatment. Convenient sampling was chosen, each group has at least 30 patients; in fact, there are total of 68 patients divided equally in two groups (34 patients each).

Information collection method: Patients who meet the selection criteria and consent to participate in the study will have their information collected using a standardized research medical record form. Patients were divided into two groups, each consisting of at least 30 individuals. Both groups were matched for age, pain level according to the VAS scale, and the duration from the onset of pain to the time of examination. Patients

in both groups received electroacupuncture treatment once daily for 25 minutes per session, following the acupuncture protocol outlined in the "Guidelines for Diagnosis and Treatment of Diseases According to Traditional Medicine Combined with Modern Medicine, 2020." [7]: A shi point, Shang Liao, Yao Yang Guan, Ci Liao, Jia ji in the lumbar region, Shen Shu, Da Chang Shu, Yao Shu. Combined with additional Tai Xi, Tai Chong, San Yin Jiao (for liver and kidney deficiency); Tai Chong, Qi Hai, Guan Yuan, Ming men (for kidney yang deficiency); Ge Shu on both sides (for blood stasis). Patients in the study group receive electroacupuncture treatment and are also instructed to lie on a salt stone bed once daily for 30 minutes. They lie in two positions: on their back with legs straight so the entire back is in contact with the bed surface, and with legs propped up so the soles of their feet are in contact with the bed surface. This salt stone bed has met the technical requirements and testing methods announced by the Hai Phong Technical Center for Standards, Metrology and Quality - Department of Standards, Metrology and Quality on May 5, 2023. The data was analyzed after 10 days of treatment.



Picture 1. Lying on the back with legs straight



Picture 2: Warming the soles of your feet with a salt bed

Data processing method: The collected data will be processed using the medical statistics method with SPSS 20.0 software, the Independent Sample T-test and Pair Sample T-test will be used to compare mean values. Research results will be considered statistically significant if $p < 0.05$.

The research criteria included documenting patients' age and gender, comparing pain levels using the Visual Analog Scale (VAS), assessing lumbar extension with the Schober test, and evaluating disability levels via the Oswestry Disability Index (ODI) score, before and after 10 days of treatment and comparing results of treatment between 2 groups. Additionally, any adverse effects experienced during the treatment were monitored and recorded. How to score the ODI [8]: Patients answer the Oswestry Low Back disability questionnaire which include 10 section (pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, travelling, employment/homemaking). For each question, there are possible 5 points, 0 for the first answer, 1 for the second answer and etc. Add up the total for the 10 questions and rate them on the scale at right. **Disability level:** No disability (0 – 4 score), Mild disability (5 – 14 score), Moderate disability (15 – 24 score), Severe disability (25 – 24 score), Complete disabled (35 – 50 score).

Research ethics: This research has been approved by the Scientific Council of the Faculty of Traditional Medicine and Hai Phong University of Medicine and Pharmacy, with implementation permission from Hai Phong Traditional Medicine Hospital. The results are intended solely for scientific purposes to enhance the quality of

treatment and patient care, with no other objectives. Patients are fully informed about the research content and objectives and have the right to choose whether to participate. We are responsible for examining and

treating patients, or transferring them to a higher-level hospital, and covering any treatment costs if any incident related to the use of these two methods occurs during the study.

RESULTS

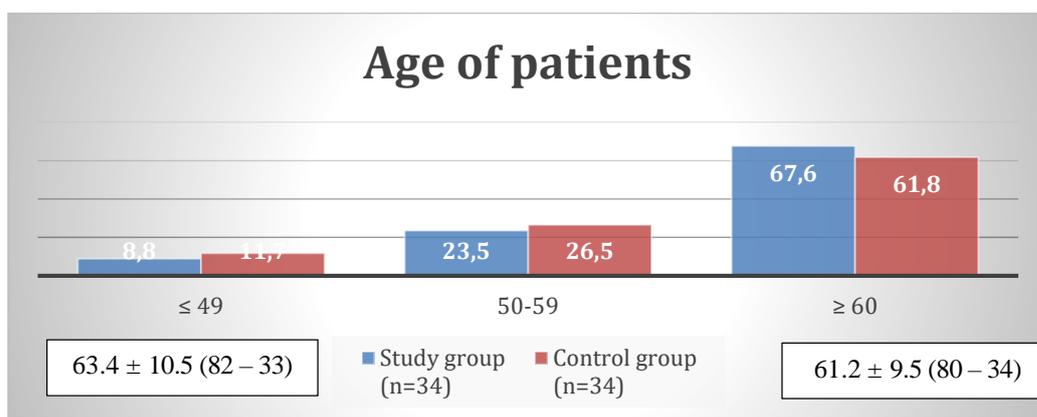


Chart 1. Age distribution of patients

It shows that both groups have similar distributions across age categories, 67.6% (study group) and 61.8% (control group) of patients are over 60 years old. In both group, patients are from over 30 years old to about 80 years old.

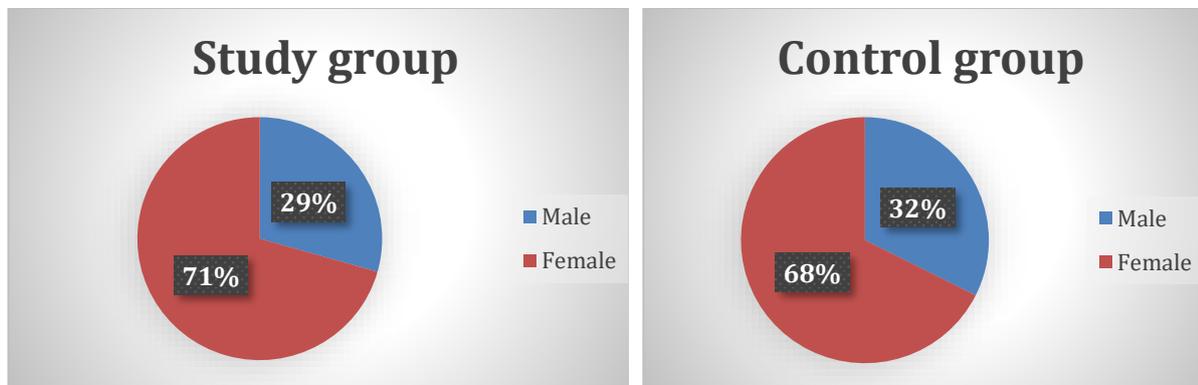


Chart 2. Gender distribution of patients

The female patients higher than male in both groups (71% female in study group, 68% female in control group).

Table 1. Results of pain relief according to the VAS before and after treatment

Pain level/ VAS score	Study group (1) (n=34)				Control group (2) (n=34)				
	D0		D10		D0		D10		
	Number	%	Number	%	Number	%	Number	%	
No pain	0	0	0	0	0	0	0	0	
Mild pain	1 - 3	0	0	23	67.6	0	0	15	44.1
Moderate pain	4 – 6	19	55.9	11	32.4	23	67.6	19	55.9
Severe Pain	7 – 10	15	44.1	0	0	11	32.4	0	0

Sum	34	100	34	100	34	100	34	100
The average VAS score	6.4 ± 1.1		3.1 ± 1.0		6.3 ± 1.0		3.8 ± 0.9	
VAS score difference	3.3 ± 0.1				2.4 ± 0.7			
p (D10-D0)	< 0.05				< 0.05			
p₁₋₂	< 0.05							

Both the study group and the control group show significant reductions in VAS score from D0 to D10 ($p < 0.05$). The study group had a higher average reduction in VAS score compared to the control group (3.3 ± 0.1 vs. 2.4 ± 0.7). There was a significant difference between the study group and the control group in terms of VAS score reduction ($p_{1-2} < 0.05$).

Table 2. Results of improvement in lumbar spine extension with Schober test

Lumbar spine extension/ Schober score		Study group (1) (n=34)				Control group (2) (n=34)			
		D0		D10		D0		D10	
		Number	%	Number	%	Number	%	Number	%
Normal movement	[4-6cm]	0	0	6	17.6	0	0	2	5.9
Mild restrictions	[3-4 cm]	3	8.8	24	70.6	3	8.8	26	76.5
Moderate restrictions	[2-3cm]	22	64.7	4	11.8	22	64.7	6	17.6
Severe restrictions	< 2 cm	9	26.5	0	0	9	26.5	0	0
Sum		34	100	34	100	34	100	34	100
The average Schober score		2.3 ± 0.6		3.4 ± 0.7		2.3 ± 0.5		3.1 ± 0.4	
Schober score difference		1.0 ± 0.4				0.8 ± 0.1			
p (D10 – D0)		p < 0.05				p < 0.05			
p₁₋₂		< 0.05							

Significant improvements were observed in both the study group (from 2.3 ± 0.6 to 3.4 ± 0.7 , $p < 0.05$) and the control group (from 2.3 ± 0.5 to 3.1 ± 0.4 , $p < 0.05$) from D0 to D10. The study group showed a greater average improvement in Schober score compared to the control group (1.0 ± 0.4 vs. 0.8 ± 0.3). There was a significant difference in Schober score improvement between the study group and the control group ($p_{1-2} < 0.05$).

Table 3. Results of Oswestry Disability Index

Disability level	Study group (1) (n=34)				Control group (2) (n=34)			
	D0		D10		D0		D10	
	Number	%	Number	%	Number	%	Number	%
Mild disability	2	5.9	21	61.8	1	2.9	12	35.3
Moderate disability	10	29.4	7	20.6	12	35.3	14	41.2
Severe disability	22	64.7	6	17.6	21	61.8	8	23.5
Sum	34	100	34	100	34	100	34	100
The average of ODI score	23.0 ± 5.3		8.5 ± 5.6		21.9 ± 4.8		13.1 ± 5.0	
ODI score difference	10.3 ± 3.7				8.9 ± 2.0			
p (D0 – D10)	p < 0.05				p < 0.05			

p₁₋₂

p < 0.05

At the start of the study, disability levels were similar between the two groups. However, after 10 days of treatment, the study group showed a significant improvement, with 61.8% of patients experiencing mild disability compared to 35.3% in the control group. The proportion of patients with severe disability decreased markedly in the study group from 64.7% at D0 to 17.6% at D10, whereas the control group showed a less pronounced reduction from 61.8% to 23.5%.

Unwanted Effects: No abnormalities were observed during electroacupuncture treatment. Three patients experienced skin irritation, which resolved after adjusting the bed temperature. Additionally, one patient developed moderate itching despite having no prior history of allergies. The hot compress treatment was discontinued, anti-allergy medication was administered, and the patient was closely monitored. The itching subsided after half a day, and the patient was subsequently removed from the study.

DISCUSSION

Our research results show that patients with back pain can occur at any age. The most common age group is over 60 years old, (67.6% in the study group, 61.8% in the control group). Our results are similar to those of To Van Dut, Le Thi Ngoan (2022) “Evaluation of the effect of treatment of low back pain by degenerative spine by Doc hoat ky sinh thang” remedy combined with electrical acupuncture and duong sinh exercises” with 54.3% of patients over 60 years old in research group and 58.7% of patients over 60 years old in control group [9]. Patients over 60 years old often suffer from lumbar degenerative disease due to the natural aging process. As people age, the spinal discs lose hydration and elasticity, making them less able to absorb shocks. This can lead to disc degeneration, where the discs become thinner and less flexible, causing pain and reduced mobility. Additionally, the wear and tear on the spinal joints and ligaments over time can result in the development of osteoarthritis and the formation of bone spurs, which further contribute to lumbar degenerative disease. Regarding the gender of the patients, our research results are similar to the research of Nguyen Duc Minh “Evaluation of low back

pain due to lumbar spine degeneration in patients treated at the Geriatric Department of the Central Acupuncture Hospital” on 60 patients diagnosed with low back pain due to spinal degeneration, with 65% female and 35% male [10]. The cause may be due to the influence of changes in female hormones and lifestyle habits as well as the impact of genetic factors, body structure and genetic factors. Specifically, the structure of the disc system, ligaments, muscles, and vertebrae of the lumbar spine of women is often weaker than that of men; the nervous system - humoral, hormones in women often decline more than men with increasing age, as well as pregnancy and childbirth have a significant impact on the spine, so women are more susceptible to degenerative diseases of the spine and discs.

The results in table 1 indicate that both groups experienced significant improvements in pain levels after treatment, with the study group showing a statistically significant greater reduction compared to the control group. The results in table 2 suggest that the combined treatment provides greater overall improvement in lumbar spine extension. Nguyen Duy Phuc (2022) “Low back pain due to spinal degeneration using the medicine Du huo ji sheng tang combined with electroacupuncture and ultrasound

therapy” improved the Schober index by 11.7 ± 0.6 , after 7 days it was 12.6 ± 0.6 and after 14 days it increased to 13.2 ± 0.6 [11]. Our study duration is 10 days (less than the 2 authors above); based on the actual situation of the hospital, the results are different from longer studies. To assess the impact of low back pain on the daily activities and work of patients, we used the Oswestry Disability Questionnaire (ODI) of the World Back Pain Prevention Committee. The comparison of ODI score differences between the study group and the control group also shows a statistically significant difference ($p < 0.05$), suggesting that the treatment in the study group led to greater improvements in disability levels and ODI scores compared to the control group. When a patient has back pain due to lumbar spine degeneration, there will be images of bone spurs and narrowed joint spaces, stimulating the sensory nerves during movement, and causing pain. When the pain causes muscle contraction and when the muscle contracts, the pain increases, which is a pathological spiral. When the pain and muscle contraction are like this, it will limit the range of motion of the joints in the lumbar spine area, especially affecting the elasticity of the lumbar spine. Acupuncture is increasingly recognized for its effectiveness in reducing pain through multiple mechanisms. Acupuncture stimulates the release of endorphins, which are natural pain-relieving chemicals in the body. These endorphins can help reduce the perception of pain and induce a feeling of well-being. The insertion of acupuncture needles can stimulate nerve fibers, which send signals to the spinal cord and brain, modulating pain pathways and potentially inhibiting the transmission of pain signals. Acupuncture can enhance local blood flow to the areas where needles are

inserted. This increased circulation can help reduce inflammation and promote healing, thereby reducing pain. Recent studies have highlighted several key pathways through which acupuncture exerts its analgesic effects. Acupuncture influences synaptic plasticity in the spinal cord, modifying the transmission of pain signals. This modulation helps reduce the sensitivity of the nervous system to pain stimuli, providing relief from chronic pain conditions [12]. In this research we use a group of acupoints in the lumbar region such as Jia ji, Shen Shu, and Da Chang Shu to act on the spine according to the principle of nerve segments, muscle relaxation, and root compression release. In the research acupoint formula, the acupoints are mainly localized in the lumbar region, so they have a direct effect on the muscles next to the spine, increasing blood circulation to nourish the muscles, relaxing the muscles and reducing pain.

Heat therapy from the salt stone bed adds another layer of treatment. Salt stones have excellent heat retention properties. When warmed, they provide a steady, even heat source that gradually penetrates the skin and underlying tissues. The heat from the salt stone bed dilates blood vessels, improving circulation in the back area. This increased blood flow helps to deliver oxygen and nutrients to the tissues and remove metabolic waste products. The warmth from the salt stone bed can help relax stiff and tense muscles. This relaxation can reduce muscle spasms and improve flexibility. Heat can directly alleviate pain by reducing muscle tension and promoting the release of endorphins, enhancing the overall pain relief effect. Regarding positions of patients lying on the Salt Stone Bed, when patient lying on the back with legs straight, this position ensures that the heat is evenly distributed

across the entire back area, allowing comprehensive treatment of the lumbar region. When their legs propped up, this position can target specific areas of tension and discomfort in the lower back and buttocks by changing the distribution of pressure and heat. The mention of the salt stone bed meeting the technical requirements and testing methods announced by the HaiPhong Technical Center indicates that the bed adheres to specific quality and safety standards, ensuring that it provides consistent and effective heat therapy. A review research of Jürgen Freiwald, Alberto Magni (2021) of Role for Superficial Heat Therapy in the Management of Non-Specific, Mild-to-Moderate Low Back Pain demonstrates that continuous, low-level heat therapy provides pain relief, improves muscular strength, and increases flexibility [13].

When combining electroacupuncture with the use of a salt stone bed, the dual approach of stimulating endorphin release through acupuncture and providing localized heat can enhance overall pain relief and muscle relaxation. Enhanced blood circulation from both treatments can improve healing processes in the affected tissues. By addressing pain from multiple angles (neurochemical, circulatory, and muscular), the combined treatment may offer more comprehensive benefits compared to using either method alone.

There were 3 patients with skin irritation, and after adjusting the bed temperature, the phenomenon disappeared; 1 patient had itching so the treatment was stopped. The manufacturer does not specify this phenomenon in the product description. Hot compress using a salt stone bed can cause irritation or itching for several reasons. Excessive heat or prolonged exposure can

damage the skin, leading to irritation. The skin may become red, inflamed, or dry, which can cause itching. Individuals have varying sensitivities to heat. What feels comfortable for one person might be too hot for another, potentially leading to irritation or discomfort. Salt can absorb moisture from the skin, reducing its natural moisture and causing dryness and itching. Some people might have allergies or sensitivities to substances used in or present on the stone bed, resulting in skin reactions. Other hand, if the salt stone bed isn't cleaned regularly, bacteria or fungi could build up on the surface. Direct contact with such contaminants can lead to skin irritation or itching. Our research results may provide reference information for medical staff and medical facilities planning to use this type of salt stone bed.

CONCLUSION AND RECOMMENDATIONS

The study group showed significant improvements in pain levels (VAS score decreased from 6.4 ± 1.1 to 3.1 ± 1.0), lumbar spine extension (increased from 2.3 ± 0.6 cm to 3.4 ± 0.7 cm), and daily living function (Owestry Disability Index - ODI score decreased from 23.0 ± 5.3 to 8.5 ± 5.6). The study concluded that combining electroacupuncture with hot compresses on a salt stone bed is more effective for reducing pain, improving lumbar flexibility, and enhancing daily functions than electroacupuncture alone. It is a simple, easy-to-apply and effective non-drug treatment method, so it can be applied at traditional medicine clinics.

While no adverse effects were noted during electroacupuncture, 3 patients in the study group experienced skin irritation, which resolved after adjusting the bed temperature, and 1 patient discontinued due to itching

from the hot compresses. It is important to monitor patients for skin irritation or itching, adjust bed temperatures, consider patient allergy histories before treatment, clean the salt stone bed regularly. Convenience sampling and lack of randomization are limitations in methodology.

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