e-ISSN : 2987-0836 DOI : https://doi.org/10.59585/ijhs

Publish : Association of Indonesian Teachers and Lecturers
International Journal of Health Sciences (IJHS)
Journal Homepage : https://jurnal.agdosi.com/index.php/IJHS/index
Volume 4 | Number 3 | September 2026 |

Physiotherapeutic Management Of Low Back Pain Secondary To Spondylosis Using Tens, SWD, And Mckenzie Exercise At Kartika Husada Level II Hospital, Pontianak

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Abstract

Low Back Pain (LBP) caused by spondylosis isa common musculoskeletal disorder associated with degenerative changes in the lumbar spine, often resulting in pain, restricted lumbar range of motion, and impaired functional performance. Physiotherapy plays an essential role in managing these symptoms and restoring patients' functional capacity. This study aimed to evaluate the effectiveness of a combination of Short Wave Diathermy (SWD), Transcutaneous Electrical Nerve Stimulation (TENS), and McKenzie Exercise in reducing pain, improving lumar range of motion, and enhancing functional ability in patients with Low Back Pain due to spondylosis. A descriptive quantitative case study was conducted involving a 51-year-old female patient treated at the Physiotherapy Departement of Kartika Husada Level II Hospital, Pontianak. The patient underwent six physiotherapy sessions. Clinical outcomes were assessed using the Visual Analog Scale (VAS) to measure pain intensity, a goniometer to evaluate lumbar range of motion, Manual Muscle Testin to measure muscle strength, and the Oswestry Disability Index (ODI) to determine functional disability. Following the intervention, the patient demonstrated reduced pain intensity, increased lumbar mobility, and improved functional ability, as reflected by lower ODI scores. These findings suggest that the combination of SWD, TENS, and McKenzie Exercise may be beneficial in reducing pain, restoring lumbar mobility, and improving functional performance in patients with Low Back Pain caused by spondylosis.

Keywords: Physiotherapeutic Management, Low Back Pain Secondary, Spondylosis Using Tens, SWD, Mckenzie Exercise

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Resive : 26 Agustus 2026
Revised : 31 Agustus 2026
Accept : 31Agustus 2026
Publish : 31 Agustus 2026

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1. Introduction

Health is a condition that enables every individual to carry out activities optimally from physical, mental, and social aspects. Disorders of the musculoskeletal system can impair a person's ability to perform daily activities and reduce quality of life. One of the most common musculoskeletal complaints encountered in healthcare services is *Low Back Pain* (LBP), which refers to pain in the lower back region that can be influenced by various factors, including degenerative processes in the spine. According to the *World Health Organization* (WHO), *Low Back Pain* is the leading cause of disability worldwide, with approximately 619 million cases reported in 2020 and an estimated increase to 843 million cases by 2050. In Indonesia, the prevalence of *Low Back Pain* in the adult population has been reported to range from 7.6% to 37%, making this condition one of the health problems requiring comprehensive management (*World Health Organization*, 2023; Ministry of Health of the Republic of Indonesia, 2022).

One of the causes of *Low Back Pain* is *spondylosis*, a degenerative change in the structures of the spine involving the intervertebral discs, facet joints, and surrounding tissues. These changes can cause pain, muscle spasms, limited range of motion of the lumbar joints, and decreased ability to perform daily activities. If not properly managed, this condition may potentially lead to functional limitations that affect the patient's productivity and quality of life.

Physiotherapy plays an important role in the management of *Low Back Pain et causa spondylosis* through an approach aimed at reducing pain, improving lumbar mobility, and restoring the patient's functional abilities. This study uses a combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise*. SWD provides deep tissue heating effects that help improve blood circulation and reduce muscle spasms. TENS functions as an analgesic modality through peripheral nerve stimulation, while *McKenzie Exercise* focuses on improving spinal mechanics, increasing mobility, and correcting posture. The combination of these three interventions is expected to provide complementary therapeutic effects during the patient's rehabilitation process (*World Physiotherapy*, 2023; Watson, 2020; Johnson, 2022; McKenzie & May, 2021).

Based on the aforementioned background, this study aims to evaluate the outcomes of a combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* on reducing pain, increasing the lumbar joint range of motion, and improving functional activity in patients with *Low Back Pain et causa spondylosis*. The results of this study are

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expected to serve as a scientific reference for physiotherapists in determining effective interventions for *Low Back Pain* cases resulting from degenerative processes.

2. Research Method

This study used a case study design with a quantitative descriptive approach to evaluate the outcomes of a combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* in reducing pain, improving lumbar joint range of motion (ROM), and enhancing functional ability in a 51-year-old female patient diagnosed with *Low Back Pain et causa Spondylosis*. The study was conducted at the Physiotherapy Unit of Kartika Husada Level II Hospital, Pontianak, with data collected repeatedly over six physiotherapy sessions to observe changes in the patient's condition before and after intervention. The subject experienced lower back pain, limited lumbar ROM, and limitations in functional activities and was willing to participate in the entire therapy program. Patients with a history of lumbar fracture or severe lumbar injury, severe neurological disorders affecting motor function, or concurrent therapies that could influence the study outcomes were excluded.

Pain intensity was assessed using the *Visual Analog Scale* (VAS), consisting of a 10-cm horizontal line with scores ranging from 0 to 10, where 0 indicates no pain and 10 indicates very severe or unbearable pain. Pain was assessed at rest, during tenderness, and during movement (Aras et al., 2020; Sakinah & Ismanda, 2021; Tri Nurhayati et al., 2023). Lumbar ROM was measured using a goniometer before and after physiotherapy intervention, while muscle strength was assessed using *Manual Muscle Testing* (MMT) on a 0–5 scale, with 0 indicating no muscle contraction and 5 indicating normal muscle strength (Rachmawati Rahmi & Rahman, 2021; Karima & Susanti, 2024). Functional disability was assessed using the *Oswestry Disability Index* (ODI), which evaluates limitations in activities such as personal care, lifting, walking, sitting, standing, sleeping, social activities, traveling, and daily activities, with higher scores indicating greater functional disability (Davidson & Keating, 2023; Alnahdi et al., 2021). Special examinations included the *Straight Leg Raise* (SLR), Kemp, Valsalva, and tendon reflex tests. The SLR, Kemp, and Valsalva tests produced positive results, while patellar (L3–L4) and Achilles (S1–S2) reflexes were within normal limits.

The intervention consisted of SWD, TENS, and McKenzie Exercise. Continuous SWD was applied to the lumbar region at a frequency of 27.12 MHz, power of 180 watts, and duration of 10 minutes using plate electrodes positioned bilaterally with the coplanar method and an inter-electrode distance of 5–10 cm, with dry towels used as insulators. Conventional TENS was administered at a frequency of 100 Hz, pulse duration of 100 µs, intensity of 20 mA, and duration of 15 minutes, with electrodes positioned bilaterally around the painful lumbar region. McKenzie Exercise was performed according to the

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patient's directional preference and included *prone over two pillows*, *prone over one pillow*, *prone lying*, *prone on elbows*, *prone press-up*, and *standing backward-bending exercise*. The exercises were performed for 2–5 minutes for the sustained positions and 10 repetitions for the repeated movements, with 2–3 sets, 1–2 times per day, and 30–60 seconds of rest between sets. Exercises were continued when centralization of symptoms occurred and modified or discontinued when peripheralization was observed (McKenzie & May, 2001; Mann et al., 2025).

Patient education was also provided regarding proper body mechanics, avoidance of lifting heavy objects while bending and rotating the waist, maintaining a relatively neutral spinal position when lifting objects, comfortable sleeping positions, regular performance of prescribed *William Flexion Exercise* at home, and light activities such as walking for 10–15 minutes according to the patient's tolerance.

3. Results And Discussions

a. Result

The physiotherapy procedure began with an anamnesis and initial examination, which included measuring pain intensity using the *Visual Analog Scale* (VAS), assessing the lumbar joint range of motion (ROM) using a goniometer, and evaluating functional activity using the *Oswestry Disability Index* (ODI).

The patient subsequently underwent six physiotherapy sessions, consisting of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise*. Evaluation was conducted during each therapy session to monitor the patient's clinical progress.

1) Special Tests

The results of the special tests conducted at the initial therapy session indicated that the patient had *Low Back Pain et causa Spondylosis*. The examination findings were as follows:

a) The *Straight Leg Raise* (SLR) Test showed a positive result (+).
b) The *Kemp Test* showed a positive result (+).
c) The *Valsalva Test* showed a positive result (+).
d) The *Tendon Reflex Test* showed patellar reflexes (L3–L4) and *Achilles* reflexes (S1–S2) within normal limits.

b. Discussion

The results showed that the combination of physiotherapy interventions consisting of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* produced favorable outcomes in a patient with *Low Back Pain et causa spondylosis*. A reduction in pain intensity based on the *Visual Analog Scale* (VAS), an improvement in lumbar joint range of motion (ROM) measured using a goniometer, and a decrease in the *Oswestry Disability Index* (ODI)

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score indicated improvements in the patient's clinical condition and functional abilities after six therapy sessions.

The thermal effects produced by SWD helped improve blood circulation, reduce muscle spasms, and increase soft tissue elasticity, thereby making movement more comfortable. In addition, TENS contributed to pain reduction through the *gate control theory* mechanism and stimulation of endorphin release. Meanwhile, *McKenzie Exercise* helped improve lumbar segment mobility, correct posture, and reduce stress on affected vertebral structures.

The combination of these three interventions provided complementary therapeutic effects, resulting not only in pain reduction but also in improved joint range of motion and the patient's ability to perform daily activities. These findings are consistent with previous studies indicating that a combination of electrotherapy modalities and therapeutic exercise can be effective in improving mobility and quality of life in patients with *Low Back Pain* associated with degenerative processes (Watson, 2020; Cameron, 2023; Kisner & Colby, 2022).

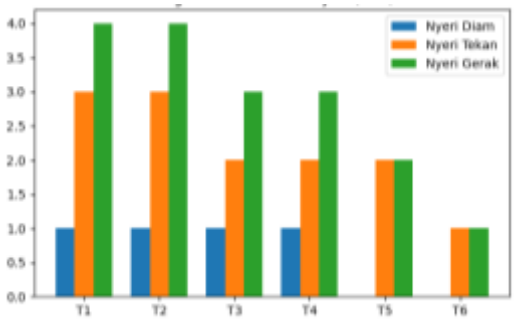

Figure 1. Evaluation of Pain Scores Using the Visual Analog Scale (VAS)

The results of pain assessment using the *Visual Analog Scale* (VAS) showed a gradual reduction in pain intensity over six physiotherapy sessions. Pain at rest decreased from 1/10 during the first therapy session (T1) to 0/10 during the sixth therapy session (T6). In addition, pain on palpation decreased from 3/10 to 1/10, while pain during movement decreased from 4/10 to 1/10.

The decrease in VAS scores across all three components indicates that the combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* was effective in reducing pain in the patient with *Low Back Pain et causa spondylosis*, thereby improving the patient's comfort both at rest and during daily activities.

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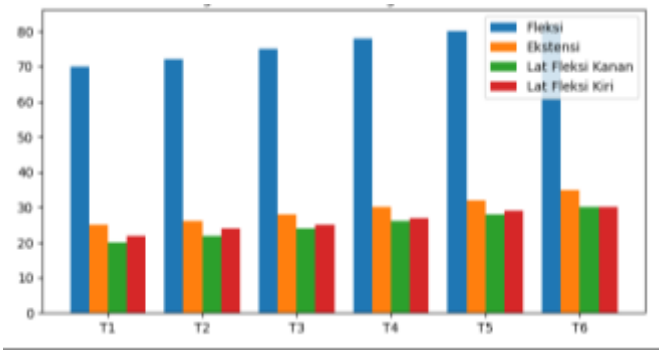

Figure 2. Evaluation of Joint Range of Motion Using a Goniometer

The results of joint range of motion (ROM) measurements using a goniometer showed an improvement in lumbar mobility over six physiotherapy sessions. Before therapy (T1), the patient experienced limited movement, with a lumbar flexion of 70°, extension of 25°, right lateral flexion of 20°, and left lateral flexion of 22°. After the sixth therapy session (T6), the range of motion increased to 82° for lumbar flexion, 35° for extension, 30° for right lateral flexion, and 30° for left lateral flexion. This improvement in ROM indicates that the combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* was effective in improving lumbar spine mobility, reducing stiffness and muscle spasms, and enhancing the patient's movement ability throughout the physiotherapy program.

The *Manual Muscle Testing* (MMT) examination showed changes in the muscle strength of the lower extremities during the therapy program. At T1, several muscle groups had a strength score of 4/5, which increased to 5/5 at T6. These changes indicate an improvement in the muscles' ability to generate movement and maintain positions against resistance.

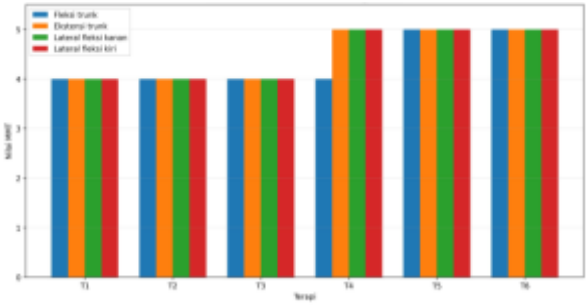

Figure 3. Evaluation of Muscle Strength Using Manual Muscle Testing (MMT)

The results of the assessment of functional activity using the *Oswestry Disability Index* (ODI) showed a gradual improvement over six physiotherapy sessions. Before therapy (T1), the patient obtained a score of 20/50, which was categorized **as** moderate disability. After completing six physiotherapy intervention sessions (T6), the ODI score decreased to 7/50, indicating mild disability.

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The reduction in the ODI score reflects an improvement in the patient's ability to perform daily activities, such as standing, walking, bending, sitting, lifting light objects, and performing household chores, with progressively reduced pain. These results indicate that the combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* had a positive impact on improving the functional ability of the patient with *Low Back Pain et causa spondylosis*.

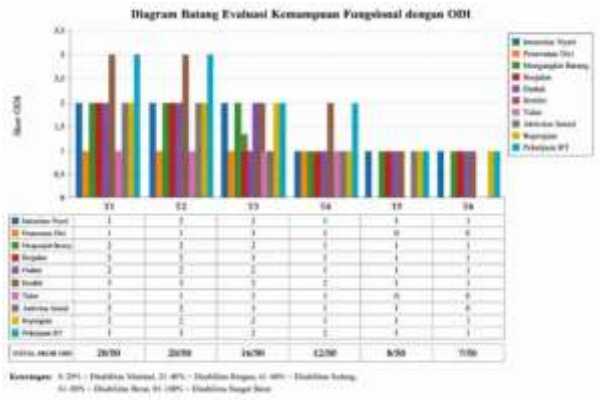

Figure 4. Evaluation of Movement Disability Using the Oswestry Disability Index (ODI)

4. Conclusion

After six physiotherapy sessions using a combination of *Short Wave Diathermy* (SWD), *Transcutaneous Electrical Nerve Stimulation* (TENS), and *McKenzie Exercise* in a patient with *Low Back Pain et causa Spondylosis*, clinical improvements were observed. Pain intensity decreased, with VAS scores changing from 1/10 to 0/10 at rest, 3/10 to 1/10 on palpation, and 4/10 to 1/10 during movement. Lumbar ROM improved, with flexion increasing from 70° to 82°, extension from 25° to 35°, right lateral flexion from 20° to 30°, and left lateral flexion from 22° to 30°. Muscle strength also improved from MMT 4/5 to 5/5 in several muscle groups. Functional ability improved, as indicated by a reduction in ODI score from 20/50 to 7/50, corresponding to a change from moderate to mild disability. Overall, the combination of SWD, TENS, and McKenzie Exercise was associated with reduced pain, improved lumbar mobility and muscle strength, and enhanced functional ability in the patient.

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