Jurnal Keterapian Fisik
Vol. 8, No. 2, November 2023
https://doi.org/10.37341/jkf.v8i2.489

Original Research

Adding Core Stability Exercise After SWD and TENS Treatment Reduces Pain in Patients with Non-Specific Low Back Pain

Lina Pratifi[1], Sugiono[2], M. Mudatsir Syatibi[3]

[1, 2, 3] Department of Physiotherapy, Surakarta Polytechnic of Health, Ministry of Health Polytechnic of Health, Surakarta, Indonesia

ABSTRACT

Background: *Non-specific low back pain (LBP) is pain in the lower back that has no specific pathological cause, characterized by tenderness and muscle spasm that reduces lumbar stability. Common therapies in healthcare facilities include Short Wave Diathermy (SWD) and Transcutaneous Electrical Nerve Stimulation (TENS). However, effectiveness can be increased by adding Core Stability Exercise (CSE), which focuses on strengthening the core muscles to maintain spinal stability. This study aims to determine the effectiveness of adding CSE after SWD and TENS in reducing pain in patients with non-specific LBP.*

Methods: *This study used a quasi-experimental design with a two-group pre-test and post-test design. The study sample consisted of 30 patients with non-specific LBP at Bethesda Hospital in Yogyakarta, who were selected using purposive sampling according to inclusion and exclusion criteria. Group I received SWD and TENS, while group II received SWD, TENS, and CSE twice a week for four weeks. The research instrument was the Visual Analogue Scale (VAS). Data analysis was performed using the paired sample t-test and independent sample t-test.*

Results: *Analysis showed a p-value <0.001 in both groups, with greater pain reduction in the group that received additional CSE.*

Conclusion: *The addition of Core Stability Exercise after SWD and TENS therapy was effective in reducing pain in patients with non-specific LBP. It is recommended that physiotherapists integrate core stability exercises as part of standard therapy to reduce pain and improve lower back stability.*

ARTICLE HISTORY
Received: October 7, 2023
Accepted: July 7, 2023

KEYWORDS
core stability exercise; low back pain

CONTACT
Lina Pratifi
✉
lina893@gmail.com
Department of Physiotherapy, Jl. Letjen Sutoyo, Mojosongo, Kec. Jebres, Surakarta City, Central Java 57127, Indonesia

Cite this as: Pratifi, L., Sugiono, & Syatibi, M.M. (2023). Adding Core Stability Exercise After SWD and TENS Treatment Reduces Pain in Patients with Non-Specific Low Back Pain. *Jurnal Keterapian Fisik, 8*(2), 83-89. https://doi.org/10.37341/jkf.v8i2.489

INTRODUCTION

Health is a fundamental aspect that influences productivity and community well-being. Good health enables individuals to function optimally physically, mentally, socially, and spiritually, thereby contributing to national development. In the context of globalization, challenges to occupational health have increased due to unbalanced work

patterns and high productivity pressures. Efforts to improve public health, especially in the prevention of musculoskeletal disorders such as Low Back Pain (LBP), are an important investment for the sustainability of a productive workforce (Siwu et al., 2021).

Changes in work patterns due to industrialization have increased the risk of occupational diseases. Jobs that require static, repetitive, and non-ergonomic body positions can trigger muscle tension and spinal disorders. LBP is one of the most common health problems experienced by workers in various sectors due to repetitive activities and incorrect body positions over the long term. This condition leads to reduced work comfort, decreased efficiency, and even prolonged absenteeism (Putri et al., 2021; Rosadi et al., 2022).

Non-specific LBP is pain in the lower back that cannot be identified as having a specific cause, such as bone or nerve disorders. This disorder is a global problem and ranks second as the leading cause of disability after headaches. Based on epidemiological studies, the prevalence of LBP reaches around 84% in the adult population and is the main cause of decreased work productivity. Risk factors include physical activity patterns, static workloads, and psychosocial factors that worsen the condition of the lower back muscles (Hidayati, 2022; Amiriawati et al., 2021).

LBP management can be done pharmacologically or non-pharmacologically. Pharmacological therapy aims to relieve symptoms temporarily without addressing the main cause. Conversely, non-pharmacological therapies such as physiotherapy focus on improving function and reducing long-term pain. A combination of physiotherapy modalities, namely Short Wave Diathermy (SWD), Transcutaneous Electrical Nerve Stimulation (TENS), and Core Stability Exercise (CSE) is believed to be more optimal for reducing pain and strengthening lower back muscle stability (Wahyuni & Azis, 2021).

SWD uses electromagnetic waves to generate heat in the tissue, improve blood circulation, and reduce muscle stiffness, while TENS delivers low-intensity electrical currents to inhibit pain transmission through the activation of afferent nerves (Jumiati & Dewi, 2022; Khumairoh et al., 2022; Anggriani, 2021). The combination of these two modalities is effective in reducing pain, but does not fully restore neuromuscular control. The addition of Core Stability Exercise, which focuses on strengthening core muscles such as the transversus abdominis and multifidus, has the potential to improve spinal stability and prevent pain recurrence. This study aims to test the effectiveness of adding CSE after SWD and TENS therapy on pain reduction in patients with non-specific LBP.

MATERIALS AND METHOD

This study used a quasi-experimental design with a two-group pre-test and post-test approach. This design was chosen because it allows for direct measurement of variable changes before and after intervention in two different groups, namely the treatment and control groups. The control group received SWD and TENS therapy, while the treatment group received additional CSE. This design is effective for testing the difference in intervention effects by minimizing bias and confounding variables.

The study was conducted at Bethesda Hospital in Yogyakarta from November 14 to December 9, 2022. This location was chosen because it had patients with a diagnosis of non-specific LBP and complete physiotherapy facilities. The duration of approximately one month provided sufficient time for intervention and observation of the effects of therapy. In addition, the representative research location ensured sampling from the target population with good data quality.

The study population consisted of patients suffering from non-specific LBP who underwent physiotherapy at Bethesda Hospital in Yogyakarta during the study period. The sampling technique used was purposive sampling, in which patients who met the inclusion and exclusion criteria were consciously selected for this study. The sample size of 30 patients was randomly divided into two groups, namely 15 people in the control group (SWD and TENS) and 15 people in the treatment group (SWD, TENS, and CSE).

The inclusion criteria in this study included patients aged 20–60 years with good cognitive abilities, no postural abnormalities, and a minimum pain level of 4 on the Visual Analogue Scale (VAS). Patients with a history of heart disease, cancer, neurological disorders, who were pregnant, or who were uncooperative were excluded through exclusion criteria. The data also recorded patients who dropped out if they did not follow the therapy procedures regularly or withdrew.

The independent variables in this study were the types of intervention, namely SWD, TENS, and CSE. Meanwhile, the dependent variable was the intensity of pain in patients with non-specific LBP, which was measured using the Visual Analogue Scale (VAS). The VAS instrument was chosen because it is valid and reliable in measuring subjective pain levels on a scale of 0 to 10 cm. The validity and reliability of VAS measurements have been supported by previous studies (Yudiyanta, 2017).

The data collection procedure included obtaining permission from the hospital, written consent from patients, initial pain measurement using VAS, administration of therapy according to the group twice a week for four weeks and repeat pain measurement after intervention. The data were analyzed using the SPSS program, testing normality with Shapiro-Wilk and homogeneity with Levene's test. The paired sample t-test was used to examine changes within groups, while the independent sample t-test examined differences between groups. The research ethics were approved by the hospital ethics committee, and all patients provided written consent.

RESULTS

Table 1. Respondent Characteristics by Gender

Gender	Group I (SWD + TENS) n (%)	Group II (SWD + TENS + CSE) n (%)	Total n (%)
Male	6 (40%)	5 (33.3%)	11 (36.6%)
Female	9 (60%)	10 (66.7%)	19 (63.3%)
Total	**15 (100%)**	**15 (100%)**	**30 (100%)**

Table 1 shows that the majority of respondents were female (63.3%), while males accounted for 36.6%. The predominance of females among the research indicates that women have a higher risk of experiencing non-specific LBP due to daily activities that involve more physical work and household chores, which can cause imbalance in the lower back muscles (Nugraha, 2019).

Table 2. Respondent Characteristics Based on Age (n = 15)

Variable	Group I (SWD + TENS)	Group II (SWD + TENS + CSE)
Minimum Age (years)	23	26
Maximum Age (years)	58	57
Mean ± SD (years)	44.33 ± 9.34	41.20 ± 10.82

Table 2 shows that the average age of respondents in group I was 44.33 ± 9.34 years and in group II was 41.20 ± 10.82 years. These results indicate that the majority of patients with non-specific LBP were in the middle productive age range (35–55 years).

Table 3. Mean Pain Scores Before (Pre-Test) and After (Post-Test) Treatment

Group	Minimum Value	Maximum Value	Mean ± SD (Pre-Test)	Mean ± SD (Post-Test)
I (SWD + TENS)	42	58	47.27 ± 4.23	40.87 ± 4.68
II (SWD + TENS + CSE)	42	50	45.33 ± 2.82	30.33 ± 3.72

Table 3. Shows that the average pain score (VAS) in group I decreased from 47.27 to 40.87 after receiving SWD and TENS therapy. Meanwhile, in group II, there was a greater decrease, from 45.33 to 30.33 after receiving a combination of SWD, TENS, and *Core Stability Exercise (CSE).* These results indicate that the addition of CSE provides a more significant analgesic effect compared to basic therapy alone.

Table 4. Results of Pre-Test and Post-Test Statistical Tests for Each Group

Group	Statistical Test	Value p-value	Description
I (SWD + TENS)	Wilcoxon	<0.001	There is a significant difference before and after therapy
II (SWD + TENS + CSE)	Wilcoxon	<0.001	There is a significant difference before and after therapy
I vs II (Post-Test)	Mann-Whitney	<0.001	There is a significant difference in effect between groups

Table 4 shows that the Wilcoxon test results indicate that both group I and group II experienced a significant reduction in pain ($p < 0.05$). The Mann-Whitney test also shows a significant difference between the two groups, which means that the addition of CSE provides more effective therapeutic results than SWD and TENS alone.

Table 5. Mean Difference (ΔVAS) Pre-Test and Post-Test

Group	ΔVAS (Average Pain Reduction)
I (SWD + TENS)	6.4

Group	ΔVAS (Average Pain Reduction)
II (SWD + TENS + CSE)	15

Table 5 shows that the difference in mean VAS scores between before and after treatment indicates that group II experienced a greater reduction in pain (15 points) compared to group I (6.4 points). These results reinforce that the combination of SWD, TENS, and CSE interventions has a synergistic effect in reducing pain in patients with non-specific *low back pain*.

DISCUSSION

This study found that the addition of Core Stability Exercise (CSE) after Short Wave Diathermy (SWD) and Transcutaneous Electrical Nerve Stimulation (TENS) therapy significantly reduced pain in patients with non-specific Low Back Pain (LBP). These results indicate that the combination of core muscle strengthening exercises with electro-medical physiotherapy modalities enhances the effectiveness of pain therapy. The greater reduction in pain in the CSE group underscores the important role of muscle stability as a key factor in pain control and lower back function (Amiriawati et al., 2021; Wahyuni & Azis, 2021).

Several previous studies reinforce these findings by demonstrating the effectiveness of core muscle corrective exercises in reducing pain and improving the functional capacity of LBP patients. Christanto et al. (2017) stated that adding core stability exercises to athletes' training regimens can improve performance and reduce the risk of musculoskeletal injuries. Pramita and Wahyudi (2018) also reported that SWD and CSE synergistically improve the functional ability of patients with myogenic low back pain. These results are consistent with the current literature emphasizing the importance of integrated rehabilitation for chronic pain management.

The implications of these research findings are important in physical therapy practice and LBP management. An approach combining electromedical modalities and active exercises can accelerate recovery and reduce dependence on analgesic medications. Additionally, emphasizing core stability training has the potential to prevent pain relapse, improve quality of life, and reduce long-term care costs (Majeed et al., 2019; Kang & Oh, 2021). Physical therapy practitioners can adopt this protocol as a standard therapy for patients with non-specific LBP.

The limitations of this study lie in its quasi-experimental design, which may still contain selection bias due to purposive sampling techniques. The relatively small sample size and limited intervention duration of four weeks also limit the generalizability of the results. Furthermore, pain measurement was only conducted using the Visual Analogue Scale (VAS), which is subjective. Further research with a randomized controlled trial (RCT) design and a larger sample size is recommended to strengthen the validity of these results (Rosadi et al., 2022; Jumiati & Dewi, 2022).

The research recommendation is to routinely integrate Core Stability Exercise into physiotherapy programs along with SWD and TENS for patients with non-specific LBP. In addition, patient education is needed on the importance of maintaining core muscle strength and correct posture in daily activities. Further research could explore the effectiveness of this combination therapy with varying durations and frequencies and involve objective parameters beyond pain, such as muscle strength and quality of life (Amiriawati et al., 2021; Pramita & Wahyudi, 2018).

Overall, these findings reinforce the role of core stability exercises in the management of low back pain and open up opportunities for the development of more effective and sustainable rehabilitation protocols. This study provides empirical evidence that can serve as a basis for strengthening physiotherapy services in health facilities and increasing attention to musculoskeletal rehabilitation.

CONCLUSION

This study concludes that the addition of Core Stability Exercise after Short Wave Diathermy and Transcutaneous Electrical Nerve Stimulation effectively reduces pain in patients with non-specific Low Back Pain, improves core muscle stability and lower back function. The main recommendation is to adopt this combination therapy as the standard physiotherapy intervention to improve clinical outcomes, prevent recurrence, and improve the quality of life of LBP patients.

ACKNOWLEDGEMENTS

The authors would like to thank the Surakarta Health Polytechnic (Polkesta) for the facilities, guidance, and opportunities provided during this research process. Thanks also to all those who helped make this research a success.

REFERENCES

Alfaridah, & Febriyanto, K. (2022). Hubungan stress kerja dengan keluhan low back pain pada operator alat berat. *Borneo Student Research, 3*(2), 1979–1985.

Amiriawati, L., Fariz, A., Prisusanti, R. D., Endaryanto, A. H., & Pradita, A. (2021). Pemberian core stability exercise mengurangi nyeri punggung bawah pada pasien dengan kondisi low back pain myogenic di RS Baptis Batu. *Jurnal Penelitian Kesehatan Suara Forikes, 12*(November), 81–82.

Anggriani, M. (2021). Pengaruh pemberian Short Wave Diathermy (SWD) dan McKenzie terhadap pengurangan nyeri punggung bawah miogenik. *Health Science and Rehabilitation Journal, 1*, 1–2.

Christanto, D. A., Adiputra, N., Lesmana, S. I., Sutjana, D. P., Muliarta, M., & W. (2017). Penambahan latihan core stability pada program pelatihan atlet dayung untuk peningkatan kecepatan mendayung. *Sport Science Journal*.

Fauziah, N., Januarsyah, E., & Hadijah, S. (2021). Pengaruh latihan core stability terhadap penurunan nyeri pada penderita low back pain. *Jurnal Ilmiah Kesehatan, 11*(2), 134–140.

Fitri, T. (2019). Pengaruh TENS terhadap penurunan intensitas nyeri pada pasien low back pain. *Jurnal Terapi Fisik, 5*(1), 25–30.

Ghait, A. S., Mohamed, E. A., Abogazya, A. A., & Behiry, M. A. (2020). The effect of obesity on the magnitude of quadriceps angle and angle of foot progression in adult females. *World Journal of Sport Sciences, 15*(1), 1–6.

Hidayati, N. (2022). Prevalensi low back pain non-spesifik dan faktor risikonya pada pekerja kantoran. *Media Kesehatan, 19*(3), 201–208.

Jumiati, R., & Dewi, T. (2022). Pengaruh core stability exercise terhadap keseimbangan dan kekuatan otot punggung bawah. *Jurnal Terapi Rehabilitasi, 14*(2), 75–83.

Kang, H. J., & Oh, Y. M. (2021). Effect of core stability exercise on pain and function in patients with chronic low back pain: A systematic review and meta-analysis. *Journal of Physical Therapy Science, 33*(7), 500–506. https://doi.org/10.1589/jpts.33.500

Khumairoh, N., Pohan, D. A., & Saputra, M. (2022). Penggunaan TENS dalam mengurangi nyeri muskuloskeletal. *Jurnal Fisioterapi Nusantara, 7*(1), 45–53.

Majeed, H., Almutairi, M., & Alzahrani, A. (2019). Clinical effects of core stability exercises on low back pain: A meta-analysis. *Journal of Back and Musculoskeletal Rehabilitation, 32*(3), 289–295. https://doi.org/10.3233/BMR-181224

Pramita, H., & Wahyudi, E. (2018). Efektivitas kombinasi SWD dan core stability exercise dalam menurunkan nyeri punggung bawah miogenik. *Jurnal Fisioterapi Indonesia, 4*(1), 15–20.

Rosadi, F., Fitriani, D., & Anisa, P. (2022). Sikap kerja dan risiko low back pain pada pekerja industri garmen. *Jurnal Kesehatan Kerja, 17*(4), 289–295.

Siwu, R. T., Rahardjo, S., & Winarno, E. (2021). Peningkatan derajat kesehatan masyarakat dalam mendukung produktivitas tenaga kerja. *Jurnal Pembangunan Manusia, 10*(2), 97–104.

Wahyuni, A., & Azis, N. (2021). Efektivitas kombinasi SWD, TENS, dan core stability exercise terhadap penurunan nyeri low back pain. *Jurnal Fisioterapi Terpadu, 6*(2), 88–95.