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Original Article

Assessment of Immediate Effects of Different Electrotherapeutic Modality with Cobra Extension Regime in Low Back Pain: A Comparative Study

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ABSTRACT

Background: Nonspecific low back pain is a common musculoskeletal condition that can impair mobility, function, and daily activity in young adults. Transcutaneous electrical nerve stimulation and superficial heat therapy are frequently used physiotherapy modalities for pain relief, while cobra extension exercise may support lumbar mobility and movement tolerance. Objective: To compare the immediate effects of transcutaneous electrical nerve stimulation combined with cobra extension exercise versus hot pack therapy combined with cobra extension exercise on pain intensity and lumbar range of motion among young adults with nonspecific low back pain. Methods: This comparative pretest–posttest experimental study included 30 male participants aged 18–28 years with nonspecific low back pain. Participants were divided into two equal groups: Group 1 received transcutaneous electrical nerve stimulation for 15 minutes followed by cobra extension exercise, while Group 2 received hot pack therapy for 15 minutes followed by the same cobra extension regimen. Pain intensity was assessed using the Visual Analogue Scale, and lumbar flexion and extension were measured using a universal goniometer before and immediately after intervention. Data were analyzed using SPSS version 23. Results: Pain decreased in both groups, from 1.80 ± 0.775 to 1.47 ± 0.743 in the TENS group and from 2.20 ± 0.414 to 1.53 ± 0.640 in the hot pack group. Lumbar flexion increased from 58.27 ± 2.434 to 61.73 ± 3.058 in the TENS group and from 51.67 ± 8.958 to 53.80 ± 8.866 in the hot pack group. Lumbar extension increased from 27.33 ± 3.539 to 30.93 ± 9.430 in the TENS group and from 19.13 ± 3.159 to 21.47 ± 3.226 in the hot pack group. Overall pre–post improvements were significant for pain, flexion, and extension, while group-by-time interactions were not significant. Conclusion: Both TENS and hot pack therapy combined with cobra extension exercise produced immediate improvements in pain and lumbar range of motion, but neither intervention demonstrated statistically superior immediate effects.
Keywords: Nonspecific Low Back Pain, Transcutaneous Electrical Nerve Stimulation, Hot Pack Therapy, Cobra Extension Exercise, Visual Analogue Scale, Lumbar Range of Motion.

INTRODUCTION

Low back pain is a common musculoskeletal condition characterized by pain, stiffness, or discomfort localized between the lower costal margin and the inferior gluteal folds, with or without referred symptoms. Although many cases are nonspecific and not attributable to a single identifiable pathology, low back pain can interfere with mobility, posture, daily activities, academic performance, occupational productivity, and quality of life. The transition from acute or episodic symptoms to persistent pain is

clinically important because higher pain intensity, increased body weight, physically demanding work, awkward working postures, and psychological factors such as depression have been identified as contributors to pain chronicity (1). Therefore, early and effective management of nonspecific low back pain is essential, particularly in young adults, in whom persistent symptoms may disturb routine activity and increase the risk of recurrent disability.

Current approaches to low back pain increasingly emphasize conservative, noninvasive, and function-oriented care rather than excessive reliance on pharmacological therapy, spinal injections, imaging, or surgical procedures. Health systems and clinicians are encouraged to prioritize physical and psychological therapies that improve pain control, movement tolerance, self-management, and functional recovery (2). This direction is especially relevant for nonspecific low back pain, where symptoms often arise from multiple interacting biomechanical, neuromuscular, behavioral, and psychosocial factors rather than a single structural lesion. Epidemiological evidence also indicates that low back pain is highly prevalent and may differ according to demographic and clinical factors, supporting the need for accessible interventions that are safe, low-cost, and applicable in routine physiotherapy practice (3).

Exercise-based rehabilitation remains a central component of conservative low back pain management because it can improve spinal mobility, muscular control, functional capacity, and pain-related confidence. Comparative evidence suggests that some exercise approaches, including McKenzie therapy, Pilates, and functional restoration, may be more effective than minimal care or some other exercise types for reducing pain intensity and functional limitation in chronic low back pain (4). However, clinical decision-making in low back pain care is frequently influenced by uncertainty, including uncertainty regarding the most appropriate intervention, expected response, and patient-specific factors affecting recovery (5). This uncertainty highlights the need for focused comparative studies that examine simple, commonly used physiotherapy interventions under clearly defined clinical conditions.

Low back pain does not only produce physical discomfort; it also affects quality of life through limitations in mobility, participation, sleep, emotional well-being, and perceived physical capacity. Systematic evidence indicates that both psychosocial and physical factors contribute to quality-of-life impairment among individuals with chronic low back pain (6). For this reason, interventions that combine symptom relief with movement restoration may be clinically valuable. Psychological and educational strategies may further improve outcomes when combined with physiotherapy care, particularly structured exercise, but the immediate management of pain and movement restriction remains a common priority in everyday physiotherapy settings (7).

Transcutaneous electrical nerve stimulation is widely used in physiotherapy as a noninvasive electrotherapeutic modality for pain modulation. It is applied through surface electrodes and is intended to reduce pain perception through neurophysiological mechanisms such as segmental inhibition and endogenous analgesic responses. Hot pack therapy is another commonly used superficial thermal modality that aims to decrease pain, reduce muscle spasm, promote vasodilation, and prepare soft tissues for movement. Cobra extension exercise, an extension-based spinal movement, may contribute to lumbar mobility, postural correction, and reduction of mechanical discomfort when applied appropriately. Because TENS and hot pack are both frequently used before or alongside therapeutic exercise, comparing their immediate effects when combined with the same cobra extension regimen may help clarify which approach provides better short-term clinical benefit.

The existing literature supports conservative management for low back pain, but direct evidence comparing immediate outcomes of TENS combined with cobra extension versus hot pack combined with cobra extension remains limited. Work-related physical and psychosocial factors are recognized contributors to chronic low back pain, emphasizing the importance of timely interventions that may reduce symptoms before they interfere with daily function (8). Economic reviews also suggest that noninvasive and nonpharmacological interventions, including exercise-based and education-based

approaches, can be cost-effective options for low back pain management (9). However, the relative immediate effectiveness of commonly available modalities in young adults with nonspecific low back pain requires further investigation, especially when both treatment arms receive the same exercise component.

Therefore, using a PICO framework, the population of interest in this study is young adults with nonspecific low back pain; the intervention is transcutaneous electrical nerve stimulation combined with cobra extension exercise; the comparison is hot pack therapy combined with cobra extension exercise; and the outcomes are immediate changes in pain intensity and lumbar range of motion. The objective of this study is to compare the immediate effects of transcutaneous electrical nerve stimulation with cobra extension exercise versus hot pack therapy with cobra extension exercise on pain and lumbar range of motion among young adults with nonspecific low back pain.

MATERIALS AND METHODS

This comparative experimental pretest–posttest study was conducted to evaluate the immediate effects of two commonly used physiotherapy treatment combinations on pain intensity and lumbar range of motion among young adults with nonspecific low back pain. The study followed a two-arm parallel comparative design in which participants were assessed before and immediately after receiving the assigned intervention. The intervention group received transcutaneous electrical nerve stimulation combined with cobra extension exercise, whereas the comparison group received hot pack therapy combined with cobra extension exercise. The primary outcome was pain intensity, and the secondary outcomes were lumbar flexion and lumbar extension range of motion. The study was conducted in physiotherapy clinical settings over a period of six months after approval of the research synopsis.

The study population consisted of young adult male participants with nonspecific low back pain. Participants were eligible for inclusion if they were between 18 and 28 years of age, had nonspecific low back pain, and were willing to participate in the study. Participants were excluded if they had chronic back pain, lumbar radiculopathy, disc bulge, disc herniation, spinal stenosis, metabolic disorder, recent injury, spinal injury, or unwillingness to participate. A purposive sampling technique was used to recruit eligible participants from physiotherapy clinics. A total of 30 participants were enrolled and divided into two equal groups of 15 participants each. Group 1 received transcutaneous electrical nerve stimulation with cobra extension exercise, and Group 2 received hot pack therapy with cobra extension exercise.

Before data collection, the purpose and procedure of the study were explained to all participants, and written informed consent was obtained. Participant confidentiality was maintained by coding the collected data and avoiding disclosure of personal identifiers. Ethical approval was obtained from the Institutional Ethical Review Committee of Isra University, Karachi campus. Demographic and baseline clinical information was recorded before intervention, including age, occupation, duration of low back pain, baseline pain intensity, and baseline lumbar range of motion.

Pain intensity was measured using the Visual Analogue Scale, scored from 0 to 10, where 0 represented no pain, 5 represented moderate pain, and 10 represented the worst possible pain. Lumbar range of motion was assessed using a universal goniometer. Lumbar flexion and lumbar extension were recorded before and immediately after the intervention. The same outcome domains were assessed in both groups using identical pre-assessment and post-assessment procedures to maintain consistency across treatment arms.

Participants in the transcutaneous electrical nerve stimulation group received TENS for 15 minutes as the electrotherapeutic modality for pain management, followed by cobra extension exercise. Participants in the hot pack group received superficial heat therapy through hot pack application for 15 minutes, followed by cobra extension exercise. Cobra extension exercise was administered for 3 minutes in 3 sets, with a 30-second rest interval between each set. Both groups received the same cobra extension regimen

so that the comparative effect could be attributed to the difference between the electrotherapeutic modality and superficial heat modality.

The main independent variable was treatment group, categorized as TENS with cobra extension exercise or hot pack with cobra extension exercise. The dependent variables were pain intensity, lumbar flexion range of motion, and lumbar extension range of motion. Pain intensity was operationally defined as the participant's self-reported pain score on the Visual Analogue Scale. Lumbar flexion and extension were operationally defined as goniometric measurements of lumbar movement recorded before and immediately after intervention. The immediate treatment effect was defined as the difference between pre-intervention and post-intervention scores within the same treatment session.

To reduce measurement variation, the same outcome measures were used at both assessment points, and both groups were assessed using the same timing structure. Eligibility criteria were applied before enrollment to reduce clinical heterogeneity related to radiculopathy, spinal pathology, recent injury, and metabolic conditions. The use of the same cobra extension exercise protocol in both groups helped control the exercise component of treatment and allowed the comparison to focus on the immediate added effect of TENS versus hot pack therapy. Data were coded before analysis to support confidentiality and data integrity.

Data were analyzed using SPSS version 23. Descriptive statistics were calculated for demographic and clinical variables. Frequencies and percentages were used for categorical variables, while means and standard deviations were used for continuous variables. Pre-intervention and post-intervention values were compared within each group for pain intensity, lumbar flexion, and lumbar extension. Between-group comparisons were performed to evaluate whether the magnitude of immediate change differed between the TENS and hot pack groups. Statistical significance was assessed at a conventional alpha level of 0.05. Missing or incomplete observations were handled by analyzing available paired pre-assessment and post-assessment data for each outcome.

RESULTS

A total of 30 male participants with nonspecific low back pain were included and analyzed. Participants were divided equally into two treatment groups, with 15 participants receiving transcutaneous electrical nerve stimulation combined with cobra extension exercise and 15 receiving hot pack therapy combined with cobra extension exercise. The largest age subgroup was 21–23 years, representing 11 participants, followed by 24–26 years with 9 participants, 18–20 years with 6 participants, and 27 years or above with 4 participants. Overall, 56.7% of participants were aged 23 years or younger, indicating that the sample was predominantly composed of younger adults.

Table 1. Age Distribution of Participants

Age Group	Frequency	Percentage	Valid Percentage	Cumulative Percentage
18–20 years	6	20.0%	20.0%	20.0%
21–23 years	11	36.7%	36.7%	56.7%
24–26 years	9	30.0%	30.0%	86.7%
≥27 years	4	13.3%	13.3%	100.0%
Total	30	100.0%	100.0%	—

Pain intensity decreased in both groups after intervention. In the TENS group, the mean VAS score decreased from 1.80 ± 0.775 before treatment to 1.47 ± 0.743 after treatment, giving an absolute mean reduction of 0.33 points. In the hot pack group, the mean VAS score decreased from 2.20 ± 0.414 to 1.53 ± 0.640, giving an absolute mean reduction of 0.67 points.

Lumbar flexion increased from 58.27 ± 2.434 to 61.73 ± 3.058 in the TENS group, with a mean gain of 3.46 degrees, while the hot pack group improved from 51.67 ± 8.958 to 53.80 ± 8.866, with a mean gain of 2.13 degrees. Lumbar extension increased from 27.33 ± 3.539 to 30.93 ± 9.430 in the TENS group, with a mean gain of 3.60 degrees, and from 19.13 ± 3.159 to 21.47 ± 3.226 in the hot pack group, with a mean gain of 2.34 degrees.

Table 2. Pre- and Post-Intervention Pain and Lumbar Range of Motion by Treatment Group

Outcome	Group	N	Pre-Assessment Mean ± SD	Post-Assessment Mean ± SD	Mean Change
VAS Pain Score	TENS + cobra extension	15	1.80 ± 0.775	1.47 ± 0.743	−0.33
VAS Pain Score	Hot pack + cobra extension	15	2.20 ± 0.414	1.53 ± 0.640	−0.67
Lumbar Flexion	TENS + cobra extension	15	58.27 ± 2.434	61.73 ± 3.058	+3.46
Lumbar Flexion	Hot pack + cobra extension	15	51.67 ± 8.958	53.80 ± 8.866	+2.13
Lumbar Extension	TENS + cobra extension	15	27.33 ± 3.539	30.93 ± 9.430	+3.60
Lumbar Extension	Hot pack + cobra extension	15	19.13 ± 3.159	21.47 ± 3.226	+2.34

The repeated-measures analysis showed a statistically significant overall time effect for all three outcomes. Pain improved significantly from pre-assessment to post-assessment across the full sample, $F = 14.318$, $p = 0.001$, with a partial eta-squared of 0.338. Lumbar flexion also improved significantly, $F = 19.063$, $p < 0.001$, with a partial eta-squared of 0.405. Lumbar extension showed a statistically significant improvement as well, $F = 8.567$, $p = 0.007$, with a partial eta-squared of 0.234. These findings indicate that, when both treatment groups were considered together, the interventions were associated with immediate reduction in pain and improvement in lumbar movement.

Table 3. Within-Subject Pre- to Post-Intervention Effects Across Both Groups

Outcome	Type III Sum of Squares	df	Mean Square	F-Value	p-Value	Partial Eta-Squared
VAS Pain Score	3.750	1	3.750	14.318	0.001	0.338
Lumbar Flexion	117.600	1	117.600	19.063	<0.001	0.405
Lumbar Extension	132.017	1	132.017	8.567	0.007	0.234

The group-by-time interaction was not statistically significant for any outcome. For pain, the interaction between time and treatment group was $F = 1.591$, $p = 0.218$, indicating that the magnitude of pain reduction did not differ significantly between the TENS and hot pack groups. For lumbar flexion, the interaction was $F = 1.081$, $p = 0.307$, showing no statistically significant difference in flexion improvement between groups. For lumbar extension, the interaction was $F = 0.390$, $p = 0.537$, indicating that the observed extension gains were not significantly different between the two treatment combinations. Although the TENS group showed numerically greater gains in flexion and extension, the inferential results did not demonstrate a statistically significant superior immediate treatment effect compared with hot pack therapy.

Table 4. Group-by-Time Interaction Effects for Pain and Lumbar Range of Motion

Outcome	Type III Sum of Squares	df	Mean Square	F-Value	p-Value	Partial Eta-Squared
VAS Pain Score	0.417	1	0.417	1.591	0.218	0.054
Lumbar Flexion	6.667	1	6.667	1.081	0.307	0.037
Lumbar Extension	6.017	1	6.017	0.390	0.537	0.014

Between-group effects based on averaged pre- and post-assessment values showed no statistically significant overall difference between groups for pain, $F = 1.350$, $p = 0.255$. However, significant between-group differences were observed for lumbar flexion, $F = 9.792$, $p = 0.004$, and lumbar extension, $F = 25.718$, $p < 0.001$. These differences reflect that the TENS group had higher lumbar flexion and extension values across assessment points, including at baseline. Therefore, the primary comparative interpretation is supported more directly by the group-by-time interaction results, which showed no statistically significant difference in immediate improvement between treatment groups.

Table 5. Between-Group Effects Averaged Across Pre- and Post-Assessment Values

Outcome	Type III Sum of Squares	df	Mean Square	F-Value	p-Value	Partial Eta-Squared
VAS Pain Score	0.817	1	0.817	1.350	0.255	0.046
Lumbar Flexion	792.067	1	792.067	9.792	0.004	0.259
Lumbar Extension	1170.417	1	1170.417	25.718	<0.001	0.479

Overall, both treatment combinations produced immediate improvement in pain and lumbar range of motion. Pain decreased in both groups, with a larger numeric reduction in the hot pack group, while lumbar flexion and extension improved in both groups, with larger numeric gains in the TENS group.

The statistically significant time effects confirm immediate improvement across the sample, whereas the nonsignificant group-by-time interactions indicate that neither TENS combined with cobra extension nor hot pack combined with cobra extension demonstrated statistically superior immediate improvement over the other treatment approach.

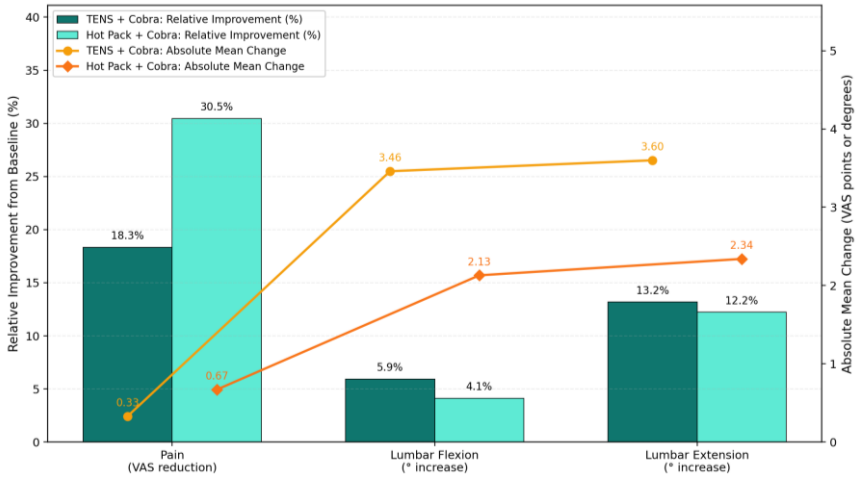

Figure 1. Immediate Improvement Profile After TENS or Hot Pack Combined With Cobra Extension

The figure demonstrates distinct short-term response patterns across the three clinical outcomes. For pain, the hot pack plus cobra extension group showed the greater relative improvement, with a 30.5% reduction from baseline and an absolute mean decrease of 0.67 VAS points, compared with an 18.3% reduction and a 0.33-point decrease in the TENS plus cobra extension group. In contrast, lumbar mobility outcomes favored the TENS-based intervention: lumbar flexion improved by 5.9% with an absolute gain of 3.46°, compared with 4.1% and 2.13° in the hot pack group, while lumbar extension increased by 13.2% and 3.60° in the TENS group versus 12.2% and 2.34° in the hot pack group. These data indicate that both interventions produced immediate clinical benefit, with hot pack showing a stronger relative effect on pain relief and TENS showing greater absolute gains in spinal range of motion, although the overall between-group interaction effects remained statistically nonsignificant across outcomes.

DISCUSSION

The present study evaluated the immediate effects of transcutaneous electrical nerve stimulation combined with cobra extension exercise compared with hot pack therapy combined with cobra extension exercise in young adult males with nonspecific low back pain. The main finding was that both intervention combinations produced short-term improvement in pain intensity and lumbar range of motion. Pain decreased in both groups, with the hot pack group showing a numerically larger reduction in VAS score, whereas lumbar flexion and extension improved in both groups, with numerically greater absolute gains in the TENS group. Across the full sample, the time effect was statistically significant for pain, lumbar flexion, and lumbar extension, indicating that immediate post-treatment improvement occurred after intervention. However, the group-by-time interaction was not statistically significant for pain, flexion, or extension, showing that neither treatment combination demonstrated clear statistical superiority over the other in immediate clinical response. These findings support the interpretation that both TENS and hot pack may be useful adjuncts when paired with cobra extension exercise, but the comparative advantage of one modality over the other was not established in this sample.

The reduction in pain observed in both groups is clinically plausible because both superficial heat and TENS are commonly used to modulate pain before or alongside therapeutic exercise. Hot pack therapy may reduce discomfort by increasing local tissue temperature, promoting superficial vasodilation, decreasing muscle guarding, and improving tolerance to movement. This may explain why the hot pack group showed a greater relative reduction in pain from baseline. TENS, on the other hand, may influence

pain through segmental inhibitory mechanisms and stimulation-related modulation of nociceptive input, which can allow patients to move with less discomfort during exercise. Although the absolute pain reduction in both groups was modest, the immediate decrease in VAS scores suggests that both modalities may help prepare patients for active movement-based care in nonspecific low back pain.

The improvement in lumbar flexion and extension after intervention also aligns with the expected short-term effect of combining a pain-relieving modality with extension-based exercise. Cobra extension involves repeated lumbar extension and anterior trunk opening, which may reduce stiffness, improve movement confidence, and enhance spinal mobility when performed within a tolerable range. In the present study, the TENS group showed greater absolute gains in lumbar flexion and extension than the hot pack group, but the nonsignificant interaction effects indicate that these numerical differences cannot be interpreted as statistically superior treatment effects. This distinction is important because the TENS group also had higher baseline lumbar flexion and extension values, which may have influenced the apparent post-treatment differences. Therefore, the most defensible interpretation is that both interventions were associated with immediate ROM improvement, while between-group differences in improvement were not statistically confirmed (10,11).

The findings are consistent with the broader literature supporting active and conservative management for low back pain. Reviews of back pain in physically active populations have shown that low back pain is common across different activity groups and requires structured management approaches that consider both symptoms and function (12,13). Evidence also indicates that social, occupational, and behavioral factors influence low back pain burden, suggesting that treatment should not be limited only to passive symptom control (14). Physical activity and exercise-based approaches have been associated with lower prevalence or improved outcomes in low back pain, supporting the use of therapeutic movement as a key component of rehabilitation (15). In this context, cobra extension may serve as an accessible movement strategy, while TENS and hot pack may function as adjunctive modalities to reduce pain and improve short-term exercise tolerance.

The results also agree with evidence suggesting that no single conservative treatment is universally superior for nonspecific low back pain. Pharmacological and invasive options have variable benefits, and evidence for many physical and behavioral therapies remains dependent on patient characteristics, intervention dose, and outcome timing (16). Exercise training has shown beneficial effects in chronic nonspecific low back pain, but the most effective mode may vary according to whether the target outcome is pain reduction, disability reduction, strength, or mobility (17). The present findings reflect this complexity: hot pack appeared numerically more favorable for immediate pain reduction, whereas TENS appeared numerically more favorable for lumbar range of motion. However, because the interaction effects were nonsignificant, the results suggest comparable short-term effectiveness rather than clear superiority of either modality.

The immediate improvement observed in this study may also be interpreted in light of evidence supporting yoga- and extension-based movement for low back pain. Yoga interventions have been reported to improve pain, function, and quality of life in patients with low back pain, partly through flexibility, movement control, and confidence in spinal motion (18,19). Cobra extension is a component of yoga-based spinal extension practice and may contribute to pain reduction by improving spinal mobility and reducing fear or guarding during extension. Nevertheless, the present study assessed only immediate post-treatment effects rather than sustained outcomes, so the findings should be understood as short-term responses to a single-session intervention rather than evidence of long-term rehabilitation effectiveness.

The clinical relevance of the findings lies in the practical use of both treatment combinations in routine physiotherapy settings. When the immediate clinical goal is pain relief before exercise, hot pack therapy combined with cobra extension may be a reasonable option because it produced the larger numerical reduction in pain. When the immediate goal is to improve spinal movement, TENS combined with cobra

extension may be considered because it produced larger numerical gains in lumbar flexion and extension. However, the nonsignificant between-group interaction indicates that treatment selection should also consider patient preference, tolerance, contraindications, availability of equipment, therapist judgment, and the broader rehabilitation plan. The findings support the use of both modalities as preparatory interventions rather than as stand-alone treatments.

Several limitations should be considered when interpreting these results. The sample size was small, with only 15 participants in each group, which limited statistical power to detect between-group differences. The study included only male participants aged 18–28 years, which restricts generalizability to females, older adults, and patients with more diverse clinical presentations. Baseline pain scores were low, suggesting mild symptoms at entry, which may have limited the magnitude of measurable pain reduction. Baseline lumbar flexion and extension values were also higher in the TENS group than in the hot pack group, making unadjusted between-group interpretation less robust. The study assessed only immediate outcomes, so it cannot determine whether the observed improvements would persist beyond the treatment session. In addition, the absence of long-term follow-up limits conclusions about recurrence, functional recovery, or sustained disability reduction.

Despite these limitations, the study contributes useful preliminary evidence for the immediate management of nonspecific low back pain in young adults. The findings indicate that both TENS and hot pack, when combined with cobra extension exercise, can produce short-term improvement in pain and lumbar mobility (20). The absence of statistically significant group-by-time differences suggests that either modality may be selected as part of an exercise-centered physiotherapy session when the objective is immediate symptom relief and movement facilitation. Future research with larger samples, balanced baseline characteristics, clearly standardized intervention parameters, and longer follow-up periods would help clarify whether one modality offers superior benefit for specific patient subgroups or specific clinical outcomes.

CONCLUSION

This study concluded that both transcutaneous electrical nerve stimulation combined with cobra extension exercise and hot pack therapy combined with cobra extension exercise produced immediate improvement in pain intensity and lumbar range of motion among young adult males with nonspecific low back pain. Pain reduction was observed in both groups, with a numerically greater decrease in the hot pack group, while lumbar flexion and extension improved in both groups, with numerically greater gains in the TENS group. However, the group-by-time interaction was not statistically significant for pain, flexion, or extension, indicating that neither intervention demonstrated clear superiority over the other for immediate clinical improvement. These findings suggest that both treatment combinations may be useful short-term physiotherapy options for reducing symptoms and improving lumbar mobility, with treatment selection guided by patient tolerance, clinical presentation, contraindications, and therapeutic goals.

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