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# Short-Term Effects of Cervical Kinesio Taping on Pain and Cervical Range of Motion in Patients With Acute Whiplash Injury: A Randomized Clinical Trial



• **DESIGN:** Randomized clinical trial.

• **OBJECTIVES:** To determine the short-term effects of Kinesio Taping, applied to the cervical spine, on neck pain and cervical range of motion in individuals with acute whiplash-associated disorders (WADs).

• **BACKGROUND:** Researchers have begun to investigate the effects of Kinesio Taping on different musculoskeletal conditions (eg, shoulder and trunk pain). Considering the demonstrated short-term effectiveness of Kinesio Tape for the management of shoulder pain, it is suggested that Kinesio Tape may also be beneficial in reducing pain associated with WAD.

• **METHODS AND MEASURES:** Forty-one patients (21 females) were randomly assigned to 1 of 2 groups: the experimental group received Kinesio Taping to the cervical spine (applied with tension) and the placebo group received a sham Kinesio Taping application (applied without tension). Both neck pain (11-point numerical pain rating scale) and cervical range-of-motion data were collected at baseline, immediately after the Kinesio Tape application, and at a 24-hour follow-up by an assessor blinded to the treatment allocation of the patients. Mixed-model analyses of variance (ANOVAs) were used to examine the effects of the treatment on each outcome variable, with group as the between-subjects variable and time as the within-subjects variable. The primary analysis was the group-by-time interaction.

• **RESULTS:** The group-by-time interaction for the 2-by-3 mixed-model ANOVA was statistically significant for pain as the dependent variable ($F = 64.8$; $P<.001$), indicating that patients receiving Kinesio Taping experienced a greater decrease in pain immediately postapplication and at the 24-hour follow-up (both, $P<.001$). The group-by-time interaction was also significant for all directions of cervical range of motion: flexion ($F = 50.8$; $P<.001$), extension ($F = 50.7$; $P<.001$), right ($F = 39.5$; $P<.001$) and left ($F = 3.8$, $P<.05$) lateral flexion, and right ($F = 33.9$, $P<.001$) and left ($F = 39.5$, $P<.001$) rotation. Patients in the experimental group obtained a greater improvement in range of motion than those in the control group (all, $P<.001$).

• **CONCLUSIONS:** Patients with acute WAD receiving an application of Kinesio Taping, applied with proper tension, exhibited statistically significant improvements immediately following application of the Kinesio Tape and at a 24-hour follow-up. However, the improvements in pain and cervical range of motion were small and may not be clinically meaningful. Future studies should investigate if Kinesio Taping provides enhanced outcomes when added to physical therapy interventions with proven efficacy or when applied over a longer period.

• **LEVEL OF EVIDENCE:** Therapy, level 1b.
*J Orthop Sports Phys Ther 2009;39(7):515-521. doi:10.2519/jospt.2009.3072*

• **KEY WORDS:** *cervical spine, neck, taping, WAD*

Whiplash injuries or whiplash-associated disorders (WADs) often occur with motor vehicle accidents.[3] The Quebec Task Force adopted the following definition of whiplash: "Whiplash is an acceleration-deceleration mechanism of energy transfer to the neck. It may result from rear-end or side-impact motor vehicle collisions, but can also occur during diving or other mishaps. The impact may result in bony or soft tissue injuries (whiplash), which in turn may lead to a variety of clinical manifestations (whiplash-associated disorders)."[19] The incidence rate varies across different studies and countries, but it may be as high as 677 per 100 000 habitants.[4] While it has

SUPPLEMENTAL VIDEO ONLINE

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been reported that the majority of patients with a whiplash injury return to activities within 1 week of their injury, nearly 30% of patients continue to experience symptoms beyond 3 months, resulting in a considerable financial burden. Persistent pain and disability occur in up to 40% of those patients who experience WAD, and it is this group that incurs substantial costs.[1]

Physical therapists often treat individuals with WAD, who most often report symptoms including neck pain and cervicogenic headaches.[6,7,27] The Cochrane Review Group found that active interventions are more effective than passive interventions in the management of patients who had WAD.[25] Despite the conclusions made by the Cochrane Group that active approaches lead to an improved prognosis, many clinicians continue to utilize passive interventions in clinical practice to manage this patient population.[25] Limiting clinician treatment choices, some patients with WAD may not tolerate the application of some interventions, such as spinal manipulation or exercises.

One passive intervention used clinically in the management of patients with acute WAD is Kinesio Taping. Kinesio Taping was originally developed in Japan by Kase,[14] and in recent years its use has become increasingly popular.[15] The therapeutic effects of Kinesio Taping remain to be elucidated. However, it has been hypothesized that Kinesio Taping may exerts its effects by (1) increasing local circulation, (2) reducing local edema by decreasing exudative substances, (3) improving circulation of blood by facilitating the muscle, (4) providing a positional stimulus to the skin, muscle, or fascial structures, (5) providing proper afferent input to the central nervous system, or (6) limiting range of motion of the affected tissues.[14]

Although physical therapists use Kinesio Taping in clinical practice, scientific evidence investigating its effectiveness is limited. A few published case reports provide preliminary evidence that Kinesio Taping may be beneficial in treating acute patellar dislocations,[18] as well as ankle,[17] shoulder,[10] and trunk pain.[28] But the results of a noncontrolled study conducted on healthy subjects showed that Kinesio Taping did not enhance proprioception of the ankle.[11] More recently, a randomized clinical trial was published that reported on the response of patients with shoulder pain to a real or sham Kinesio Tape application.[23] In this study, Kinesio Taping immediately improved pain-free active shoulder range of motion but not shoulder pain (visual analogue scale) or disability (Shoulder Pain and Disability Index).[23] However, to date, no studies have evaluated the effects of Kinesio Taping in patients with neck pain. The purpose of this study was to compare the short-term effects of a Kinesio Taping application to the cervical spine versus placebo tape application on both neck pain and cervical range of motion in patients with acute WAD.

## METHODS

### Participants

Consecutive patients reporting neck pain as a result of a motor vehicle accident within 40 days of the injury, referred by their primary care physician to a physical therapist between June 2007 and October 2008, were screened for eligibility criteria. Patients were eligible if they met the Quebec Task Force Classification of WAD II—neck pain symptoms and musculoskeletal signs (eg, restriction of range of motion)—but without evidence of conduction loss on clinical neurological examination.[19] Patients were excluded if they experienced a concussion during the motor vehicle accident, loss of consciousness, or head or upper quadrant injury during the accident, had sought treatment prior to their accident for neck pain, reported a previous history of whiplash, neck pain, headaches, psychiatric or psychologic condition, were affected by any neurologic or circulatory disorders, were affected by other somatic condition (eg, fibromyalgia syndrome), or had a current claim for litigation or compensation. The study protocol was approved by the Escuela de Osteopatia de Madrid local human research committee (EOM 2007/41). All subjects signed an informed consent prior to participation in the study.

### Study Protocol

Patients were informed to not take any analgesic or anti-inflammatory drugs for 72 hours prior to the study. Patients completed self-report measures and received a standardized history and physical examination by an experienced therapist. Demographic data, including age, gender, medical history, and location and nature of the symptoms, were collected. Patients also completed the Neck Disability Index (NDI) to measure self-perceived disability.[26] The NDI consists of 10 questions addressing functional activities such as personal care, lifting, reading, work, driving, sleeping, and recreational activities, as well as pain intensity, concentration, and headache.[26] There are 6 potential responses for each item, ranging from no disability (0) to total disability (5). The NDI is scored from 0 to 50, with higher scores corresponding to greater disability.[26] The NDI has been frequently used in studies investigating the disability levels in patients with WAD.[20-22]

The outcome measures for this study consisted of a numerical pain rating scale (NPRS) and cervical range-of-motion measurements. The NPRS[12] (0, no pain; 10, maximum pain) was used to record the patient's current level of neck pain. Although admittedly determined in patients with low back pain, a 2-point reduction on the 11-point NPRS has been shown to be the minimal clinically important difference.[8] Cervical range of motion was assessed with the patient sitting comfortably on a chair, with both feet flat on the floor, hips and knees at 90° of flexion, and buttocks positioned against the back of the chair. A cervical range-of-motion (CROM) device was placed on the top of the head, and the patient was asked to move the head as

far as possible without pain in a standard fashion: flexion, extension, right lateral flexion, left lateral flexion, right rotation, and left rotation. Three trials were conducted for each direction of movement, and the mean values of the 3 trials were recorded for analysis. Reliability testing of the CROM device in previous studies indicates intraclass correlation coefficients ranging from 0.66 to 0.94.[5,9] Both pain and cervical range-of-motion data were collected at baseline, immediately after the Kinesio Tape application, and at a 24-hour follow-up by an assessor blinded to the treatment allocation of the patients. Patients were blinded to the treatment allocation, as they had had no previous treatment with Kinesio Tape. This was confirmed by all patients reporting that they were unaware of their group assignment at the end of the study.

### Allocation

Following the baseline examination, patients were randomly assigned to receive Kinesio Taping to the cervical spine (experimental group) or a placebo Kinesio Tape application (sham group). Concealed allocation was performed using a computer-generated randomized table of numbers, created prior to the start of data collection by a researcher not involved in the assessment or treatment of patients. Individual, sequentially numbered index cards with the random assignment were prepared. The index cards were folded and placed in sealed opaque envelopes. A second therapist, blinded to baseline examination findings, opened the envelope and proceeded with treatment according to the group assignment. All patients received the Kinesio Tape application the day after the initial examination by the primary author, a certified Kinesio Tape practitioner, who was blinded to patient information.

### Kinesio Tape Application

The tape (Kinesio Tex Tape; Kinesio Holding Corporation, Albuquerque, NM) used in this study was waterproof, porous, and adhesive. Tape with a width of 5 cm and a thickness of 0.5 mm was used in both groups. The experimental group received a standardized therapeutic Kinesio Tape application (**FIGURE 1A, ONLINE VIDEO**). The first layer was a blue Y-strip placed over the posterior cervical extensor muscles and applied from the insertion to origin with paper-off tension. The paper-off tension tape is manufactured and applied to its paper backing with approximately 15% to 25% stretch.[14,15] Patients were sitting for the application of the Kinesio Tape. Each tail of the first (blue) strip (Y-strip, 2-tailed) was applied with the patients' neck in a position of cervical contralateral side-bending and rotation. The tape was first placed from the dorsal region (T1-T2) to the upper-cervical region (C1-C2). The overlying strip (black) was a space-tape (opening) placed perpendicular to the Y-strip over the midcervical region (C3-C6), with the patients' cervical spine in flexion to apply tension to the posterior neck structures.

The sham group received a placebo Kinesio Tape application (**FIGURE 1B, ONLINE VIDEO**). The placebo taping consisted of 2 I-strips (same material as the real application), applied with no tension. For the placebo taping, the cervical spine of the participants was placed in a neutral position. The first/blue strip was placed over the spinous processes of the cervical and thoracic spine, and the second/black strip was placed perpendicular over the midcervical region. Both tape applications looked very similar, but the placebo group had no tension applied to the cervical structures.

### Statistical Analysis

Data were analyzed with SPSS, Version 14.0. Key baseline demographic variables and scores on the self-report measures were compared between groups using independent *t* tests for continuous data and chi-square tests of independence for categorical data. Separate 2-by-3 mixed-model analyses of variance (ANOVAs) were used to examine the effects of treatment pain and cervical range of motion (flexion, extension, rotation, or lateral-flexion), the dependent variables, with group (experimental or sham) as the between-subject variable and time (baseline, immediate post-treatment, and 24-hour follow-up) as the within-subject variable. The hypothesis of interest was the group-by-time interaction at an a priori alpha level equal to .05. If a significant interaction was identified on a variable, planned pairwise comparisons were performed to examine differences from baseline to each follow-up point between groups, to investigate if any between-group differences in change scores were statistically significant.

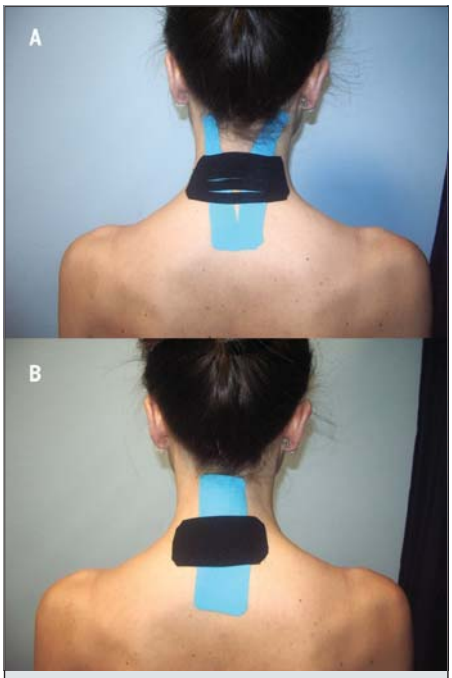


**FIGURE 1.** The placement of the Kinesio Taping for both conditions. Kinesio Taping placed with tension (A) and Kinesio Taping placed without tension (placebo) (B).

## RESULTS

Fifty-two consecutive patients were screened for possible eligibility criteria. Forty-one patients (mean ± SD age, 33 ± 7 years; 52% female) satisfied the eligibility criteria, agreed to participate, and were randomized into the real Kinesio Tape (n = 21) or the sham Kinesio Tape (n = 20) interven-

tion. The reasons for ineligibility can be found in **FIGURE 2**, which provides a flow diagram of patient recruitment and retention. Baseline characteristics between the groups were similar for all variables ($P>.40$) (**TABLE 1**).

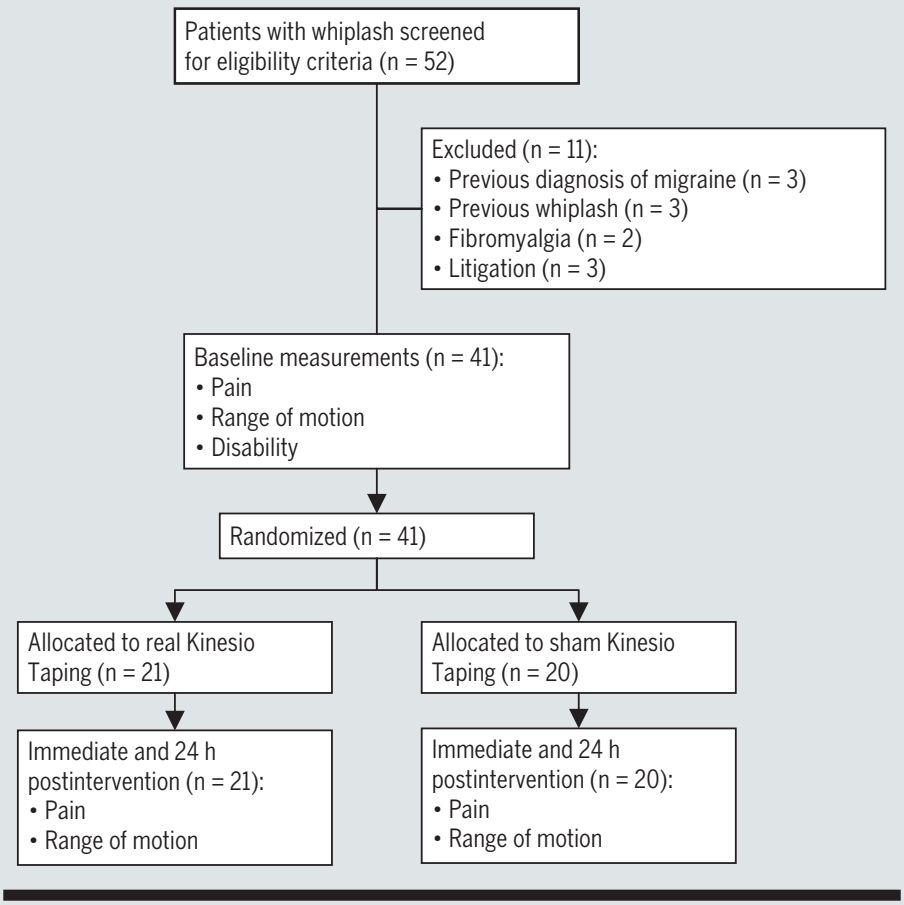


**FIGURE 2.** Flow-diagram of subjects throughout the course of the study.

**TABLE 1** Baseline Demographics for Both Groups*

| | Control Group | Experimental Group | *P* Values |
|---|---|---|---|
| Gender (male/female) | 10/10 | 10/11 | .912 |
| Age (y) | 32 ± 7 | 33 ± 6 | .474 |
| Days from accident (d) | 24 ± 8 | 22 ± 9 | .398 |
| Neck pain† | 4.2 ± 0.7 | 4.3 ± 0.9 | .780 |
| Neck Disability Index‡ | 29.0 ± 4.4 | 29.8 ± 3.5 | .881 |
| Cervical range of motion | | | |
| Flexion | 56.6° ± 4.9° | 55.8° ± 5.7° | .638 |
| Extension | 48.8° ± 4.7° | 46.7° ± 8.3° | .458 |
| Right lateral flexion | 43.3° ± 4.6° | 42.3° ± 5.1° | .574 |
| Left lateral flexion | 42.9° ± 4.1° | 41.8° ± 3.7° | .457 |
| Right rotation | 55.2° ± 5.3° | 56.1° ± 7.1° | .677 |
| Left rotation | 55.5° ± 5.9° | 55.7° ± 6.9° | .886 |

** Data are mean ± SD except for gender. No difference between groups (P>.40).*
*† Measured with an 11-point numerical pain rating scale (0, no pain; 10, worst pain imaginable).*
*‡ Range of score is 0 to 50, with higher scores indicating greater disability.*

The group-by-time interaction for the 2-by-3 mixed-model ANOVAs was statistically significant for neck pain as the dependent variable ($F = 64.8$; $P<.001$). Planned pairwise comparisons indicated that patients receiving the real Kinesio Taping intervention experienced greater reduction in neck pain immediately poststapplication and at 24-hour follow-up (both, $P<.001$). The group-by-time interaction for the 2-by-3 mixed-model ANOVA was also statistically significant for all directions of the cervical range of motion: flexion ($F = 50.8$; $P<.001$), extension ($F = 50.7$; $P<.001$), right ($F = 39.5$; $P<.001$) and left ($F = 3.8$, $P<.05$) lateral flexion, and right ($F = 33.9$, $P<.001$) and left ($F = 39.5$, $P<.001$) rotation. Planned pairwise comparisons showed that patients in the experimental group obtained a greater improvement in cervical range of motion than those in the control group (all, $P<.001$). **TABLES 2** and **3** summarize within- and between-group differences, with associated 95% confidences intervals for immediate posttreatment and 24-hour follow-up for both pain and cervical range-of-motion measurements.

## DISCUSSION

The results of the current study demonstrated that patients with WAD who received Kinesio Taping exhibited statistically significantly greater improvements in neck pain and cervical range of motion both immediately following application of the tape and at a 24-hour follow-up, when compared to a group receiving a placebo nontensioned Kinesio Tape application. But these changes were small and possibly of minimal clinical significance. Our results agree with previous case series that also found a decrease in pain and improvement in range of motion after the application of Kinesio Taping.[10,17,28] Further, the improvements in cervical range of motion demonstrated in the current study are similar in magnitude to those

**TABLE 2**

**Baseline, Immediate Posttreatment, and Change Scores for Neck Pain and Cervical Range of Motion***

| Outcome/Group | Baseline | Immediate Posttreatment | Within-Group Change Scores | Between-Group Difference in Change Scores |
|---|---|---|---|---|
| Pain (0-10 points) | | | | −0.9 (−1.2, −0.7) |
| Experimental | 4.3 ± 0.9 | 3.3 ± 0.9 | −1.0 (−1.2, −0.8) | |
| Control | 4.2 ± 0.7 | 4.1 ± 0.8 | −0.1 (−0.2, 0.0) | |
| Cervical flexion (deg) | | | | 6.6 (5.3, 7.9) |
| Experimental | 55.8 ± 5.7 | 60.7 ± 5.6 | 4.9 (3.9, 5.8) | |
| Control | 56.6 ± 4.9 | 54.9 ± 4.7 | −1.7 (−2.6, −0.7) | |
| Cervical extension (deg) | | | | 8.2 (6.2, 10.2) |
| Experimental | 46.7 ± 8.3 | 54.9 ± 10.9 | 8.1 (6.2, 9.9) | |
| Control | 48.8 ± 4.7 | 48.7 ± 4.4 | −0.1 (−1.0, 1.0) | |
| Cervical right lateral flexion (deg) | | | | 5.4 (3.9, 7.0) |
| Experimental | 42.3 ± 5.1 | 47.2 ± 5.6 | 4.9 (3.6, 6.1) | |
| Control | 43.3 ± 4.6 | 42.7 ± 3.9 | −0.6 (−1.6, 1.0) | |
| Cervical left lateral flexion (deg) | | | | 3.1 (1.0, 5.5) |
| Experimental | 41.8 ± 3.7 | 44.5 ± 5.4 | 2.7 (1.0, 4.6) | |
| Control | 42.9 ± 4.1 | 42.5 ± 3.5 | −0.4 (−1.9, 1.2) | |
| Cervical right rotation (deg) | | | | 5.5 (3.7, 7.4) |
| Experimental | 56.1 ± 7.1 | 61.1 ± 8.4 | 5.0 (3.5, 6.3) | |
| Control | 55.2 ± 5.3 | 54.6 ± 3.4 | −0.6 (−1.9, 1.0) | |
| Cervical left rotation (deg) | | | | 5.2 (3.5, 6.9) |
| Experimental | 55.7 ± 6.9 | 59.9 ± 7.6 | 4.2 (2.8, 5.6) | |
| Control | 55.5 ± 5.9 | 54.5 ± 6.4 | −1.0 (−2.0, 0.0) | |

** Values are expressed as mean ± SD for baseline and immediate posttreatment and as mean (95% confidence interval) for within- and between-group change scores.*

found in a recent clinical trial by Thelen et al,[23] which investigated the effectiveness of Kinesio Taping in patients with shoulder pain. In the study by Thelen et al,[23] the Kinesio Tape immediately improved the patients' pain-free shoulder range of motion but had no effect on pain or function.

It should be recognized that although the difference between groups were statistically significant, they did not surpass the minimal clinically important difference for pain, which has been reported to be 2 points on a NPRS.[8] Additionally, none of the differences between groups for improvements in cervical range of motion surpassed the minimal detectable change for the respective measurements.[5] Minimum detectable change is defined as the amount of change that must be observed before the change can be considered to exceed the measurement error.[2] Hence, despite our statistically significant between-group differences, the clinical effectiveness of Kinesio Taping for reducing pain and improving cervical range of motion may be difficult to establish on individual patients because the average expected change is less than the error attributed to repeated measurements. Nevertheless, the fact that we found a statistically significant reduction in neck pain and an increase in cervical range of motion provides impetus for future research in this area, because we only applied tape once and the follow-up was limited to 24 hours. We might expect greater effectiveness from multiple applications over a longer period.

Determining the mechanisms by which Kinesio Taping works is admittedly beyond the scope of this study. Nevertheless, a few hypotheses will be proposed to form the basis for possible future study into the mechanism of action for this intervention. In the current study, the main difference between interventions was the presence of tension in the Kinesio Tape for the experimental group compared to an absence of tension for those in the sham group. It is possible that the tension applied by the real application might have provided neural feedback to the patients during neck movement, thus facilitating their ability to move the neck with a reduced mechanical irritation of the soft tissues.[14,15] The tension in the tape may have also created tension in the soft tissue structures when the patient returned the head to a neutral position. Further, it is also possible that tension in the tape provided afferent stimuli, facilitating pain inhibitory mechanisms (gate control theory), thereby reducing the patients' pain levels.[16] Further, because increased mechanical sensitization is a feature of patients with acute WAD,[13] it is possible that the tape decreased pain by way of inhibitory mechanisms. Finally, because fear of movement is associated with pain intensity in patients with acute WAD,[24] it may possible that the application of Kinesio Tape provides a proper sensory feedback to the patients, decreasing fear of movement, thus improving neck pain and range of motion. Future studies are needed to further elucidate the clinical effects, as well as mechanisms of action, of Kinesio Taping in patients with WAD.

There are a number of limitations of the current study that should be recognized. We used a sample of convenience from 1 clinic, which may not be representative of the entire population of patients with WAD. We only investigated the short-term results of Kinesio Tape application and, therefore, cannot make inferences relative to long-term effects. We did not include subjects currently in litigation, therefore we cannot generalize our result to a population with WAD that is seeking litigation. Further, therapists often use a multimodal approach to the management of patients with WAD and

**TABLE 3** Baseline, 24-Hour Follow-up, and Change Scores for Neck Pain and Cervical Range of Motion*

| Outcome/Group | Baseline | 24-h Follow-up | Within-Group Change Scores | Between-Group Difference in Change Scores |
|---|---|---|---|---|
| Pain (0-10 points) | | | | −1.1 (−1.5, −0.9) |
| Experimental | 4.3 ± 0.9 | 3.2 ± 1.0 | −1.1 (−1.5, −0.9) | |
| Control | 4.2 ± 0.7 | 4.2 ± 0.8 | 0.0 (−0.1, 0.1) | |
| Cervical flexion (deg) | | | | 7.4 (5.3, 9.6) |
| Experimental | 55.8 ± 5.7 | 60.6 ± 6.1 | 4.8 (3.2, 6.5) | |
| Control | 56.6 ± 4.9 | 54.0 ± 4.1 | −2.6 (−4.0, −1.1) | |
| Cervical extension (deg) | | | | 8.5 (6.1, 10.9) |
| Experimental | 46.7 ± 8.3 | 54.9 ± 8.1 | 8.1 (6.2, 9.9) | |
| Control | 48.8 ± 4.7 | 48.4 ± 4.2 | −0.4 (−2.0, 1.2) | |
| Cervical right lateral flexion (deg) | | | | 5.8 (3.9, 7.6) |
| Experimental | 42.3 ± 5.1 | 47.1 ± 5.3 | 4.8 (3.4, 6.2) | |
| Control | 43.3 ± 4.6 | 42.3 ± 3.6 | −1.0 (−2.3, 0.0) | |
| Cervical left lateral flexion (deg) | | | | 2.3 (0.2, 4.8) |
| Experimental | 41.8 ± 3.7 | 44.1 ± 5.3 | 2.3 (0.5, 4.1) | |
| Control | 42.9 ± 4.1 | 42.9 ± 2.6 | 0.0 (−1.9, 1.9) | |
| Cervical right rotation (deg) | | | | 6.1 (4.0, 8.3) |
| Experimental | 56.1 ± 7.1 | 60.9 ± 8.0 | 4.8 (3.2, 6.5) | |
| Control | 55.2 ± 5.3 | 53.9 ± 4.2 | −1.3 (−2.8, 0.0) | |
| Cervical left rotation (deg) | | | | 4.1 (2.4, 5.9) |
| Experimental | 55.7 ± 6.9 | 58.7 ± 8.8 | 3.0 (1.7, 4.5) | |
| Control | 55.5 ± 5.9 | 54.4 ± 5.5 | −1.1 (−2.2, 0.0) | |

** Values are expressed as mean ± SD for baseline and 24-hour follow-up, and as mean (95% confidence interval) for within- and between-group change scores.*

would not solely use Kinesio Taping as an isolated intervention. The effects of Kinesio Taping, when used in combination with other interventions, cannot be deduced from the current study. We suggest that future studies investigate if Kinesio Taping enhances outcomes when added to interventions with already proven efficacy, such as active exercise.[25] Additionally, the possibility of a placebo effect of the tape must also be considered. Despite the intent of the sham application, the absence of a real control group that did not receive any tape intervention precludes ruling out changes secondary to passage of time or repeated testing. Finally, we used a washout period of only 72 hours for pain medication, which may not be enough time to effectively remove the effects of nonsteroid anti-inflammatory drugs. However, we would expect that these effects would be consistent across groups.

## CONCLUSION

Patients with acute WAD receiving an application of Kinesio Taping exhibited statistically significant improvements in pain levels and cervical range of motion immediately following application of the Kinesio Tape and at a 24-hour follow-up. However, the improvements were small and may not be clinically meaningful. Future studies should investigate if Kinesio Taping provides enhanced outcomes when added to physical therapy interventions with proven efficacy. ◉

### KEY POINTS

**FINDINGS:** Patients with acute WAD receiving an application of Kinesio Taping exhibited statistically significant improvements in pain levels and cervical range of motion immediately following application of the Kinesio Tape and at a 24-hour follow-up. However, the improvements were small and may not be clinically meaningful.

**IMPLICATIONS:** The results of this study provide preliminary evidence for the application of Kinesio Taping in the management of patients with acute WAD.

**CAUTION:** We used a relatively small sample size and a single application of tape, with follow-up limited to 24 hours. Also, the generalizability of the results should be interpreted with caution as all patients were treated by the same therapist.

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