Original Article

DOI: 10.4274/haseki.galenos.2025.69885
Med Bull Haseki 2025;63(4):171-177

Effects of Kinesio Taping in Carpal Tunnel Syndrome Treatment: A Randomized Controlled Trial

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Abstract

Aim: The effectiveness of kinesio taping (KT) on carpal tunnel syndrome (CTS) remains controversial. Therefore, we aimed to investigate the clinical effectiveness of KT compared to sham taping and exercises in patients with CTS.

Methods: The study was conducted between July 2020 and February 2022. Patients were randomly divided into three groups: group 1 (KT plus tendon and nerve gliding exercises), group 2 (sham-taping plus exercises), and group 3 (exercises alone). Kinesio taping was applied three times with 5-day intervals, with the "neural technique" for median and ulnar nerves and the "area correction technique" for carpal tunnel releasing. The primary outcome was the visual analog scale (VAS), while secondary outcomes included hand grip strength, the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ), and the Short Form-12 (SF-12).

Results: The study was completed with 44 patients. Significant improvement was observed in all parameters in the KT group ($p<0.05$). In both the sham taping and control groups, significant improvement was observed in all parameters except SF-12. The decrease in VAS and the improvement in the BCTQ score and hand grip strength were the highest in the KT group and were found to be significantly greater compared to the other groups ($p<0.001$, $p=0.046$, and $p=0.004$, respectively).

Conclusion: Kinesio taping in addition to exercises is more effective in improving pain, symptom severity, and hand grip strength in patients with CTS.

Keywords: Carpal tunnel syndrome, kinesio tape, pain

Introduction

Carpal tunnel syndrome (CTS) represents the most frequently encountered peripheral nerve entrapment, arising from median nerve compression as it traverses the carpal tunnel in the wrist (1). Depending on the diagnostic criteria used, its prevalence ranges between 5% and 16%, with middle-aged individuals and women being more commonly affected (2). Patients with CTS report pain, numbness, and tingling in the first three radial fingers and the radial side of the fourth finger. Diagnosis is primarily established through clinical evaluation, with electrodiagnostic studies providing additional confirmation when necessary (3). Furthermore, ultrasonography is utilized in evaluating peripheral nerve entrapments, with the most reliable ultrasonographic indicator being the nerve cross-sectional area (4).

For mild and moderate CTS, several conservative treatment methods are available, including corrective splints, local steroid injections, oral medications, physical therapy agents (ultrasound, paraffin, laser), and tendon and nerve gliding exercises (5-7). Kinesio taping (KT) is a relatively new technique for managing upper arm and hand pain. Studies suggest that its use in CTS improves symptoms (8-12). Application of KT with specific methods and tension facilitates decompression of the median nerve through extension of the transverse carpal ligament. It also regulates subcutaneous edema, enhances lymphatic and blood circulation, reduces muscle spasms, facilitates

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Received: 07.04.2025 **Accepted:** 16.09.2025 **Publication Date:** 02.10.2025

Cite this article as: Baykal Sahin H, Kara F, Cakir E, Saglam Akkaya G. Effects of Kinesio taping in carpal tunnel syndrome treatment: a randomized controlled trial. Med Bull Haseki. 2025;63(4):171-177

tendon and fascia movement, and reduces pain through neurological suppression (13). We hypothesized that KT combined with exercises would result in greater improvements in pain, symptom severity, hand grip strength, and quality of life compared to sham taping or exercises alone.

Materials and Methods

Compliance with Ethical Standards

This study was conducted in accordance with the Declaration of Helsinki. Approval was obtained from the Karadeniz Technical University Scientific Research Ethics Committee (approval no.: 9, date: 24.02.2020). The clinical trial registration number is NCT06710041.

Study Design

A priori sample size calculation was performed using G*Power software (version 3.1.9.7, Universität Düsseldorf, Germany). Assuming a large effect size (f=0.50) based on prior research on pain reduction with KT in musculoskeletal conditions, an alpha level of 0.05, and a power of 80%, the minimum sample requirement was 42 participants (14 per group) for a One-Way Analysis of Variance (ANOVA) across three groups.

A sample of 60 patients (aged between 18 and 65 years) diagnosed with mild to moderate CTS and experiencing symptoms for at least 6 weeks was enrolled in the study between July 2020 and February 2022. The study was designed as a prospective, randomized, placebo-controlled trial. Study procedures were explained to patients and written informed consent was obtained. To maintain blinding, patients received separate informed consent forms.

Exclusion criteria included electrophysiological evidence of severe CTS; presence of thenar atrophy; history of local corticosteroid injection or physiotherapy for CTS within the past three months; secondary metabolic causes of CTS such as diabetes mellitus, thyroid disease, pregnancy, rheumatoid arthritis, or sarcoidosis; coexisting conditions associated with neck or arm pain (e.g., cervical disc herniation, arthritis, or epicondylitis); history of wrist fracture; and prior CTS surgery.

Demographic variables such as age, gender, body mass index, symptom duration, smoking status, occupation, and dominant hand were recorded. For patients with bilateral CTS, only the side with more prominent symptoms was analyzed. If symptoms were equal on both sides, only the dominant hand was considered. Patients were randomly assigned to three groups via the sealed envelope method: group 1 (KT combined with tendon and nerve gliding exercises), group 2 (sham taping combined with tendon and nerve gliding exercises), and group 3 (tendon and nerve gliding exercises alone, control group). Randomization was conducted by an independent researcher uninvolved in other aspects of the study. Patients and assessors were blinded to treatment allocation, with taping and evaluations conducted by separate researchers. Patient evaluations were conducted after removing kinesiotape to ensure blinded assessments.

All three groups underwent physical, musculoskeletal, and neurological examinations, including Tinel, Phalen, and carpal compression tests. Hand grip strength was assessed using a digital dynamometer with the patient seated, forearm neutral, and elbow flexed at 90°. The highest of three measurements was recorded.

The primary outcome measurement was pain level, assessed using a visual analog scale (VAS). Secondary outcome measurements were hand-grip strength, the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ), and the Short Form-12 (SF-12) Health Survey. The BCTQ is a disease-specific questionnaire to evaluate symptom severity and functional capacity (14). A validity and reliability study of the Turkish version of the scale was conducted (15). Higher scores indicate increased symptom severity and reduced functional capacity. Short form-12 assesses health-related quality of life, with lower scores indicating poorer physical and mental health (16).

Kinesio taping was applied three times at five-day intervals. The KT application was performed three times at five-day intervals. The "neural technique" was applied along the median and ulnar nerves, while the "area correction technique" was used for carpal tunnel release. The skin was cleaned with alcohol before taping. The patient was positioned with the wrist at 30° extension and the elbow fully extended and supinated. One of the two I-bands, prepared for the neural technique, was applied along the median nerve from the second and third metacarpophalangeal joints to 5 cm below the medial epicondyle, with medium stretching. For the ulnar nerve, the same procedure was applied from the fourth and fifth metacarpophalangeal joints to 5 cm below the medial epicondyle. For the area correction technique, a tape of half the length of the wrist circumference was prepared. It was applied to the volar face of the wrist with a 50-75% stretch at the middle third. Sham taping was performed with no stretch, without the area-correction technique, and with suboptimal joint positioning to minimize biomechanical and neurophysiological effects (e.g., on transverse carpal ligament tension, lymphatic flow, or cutaneous mechanoreceptor input). This was done to maintain blinding and procedural credibility.

Tendon and nerve gliding exercises were performed three times daily (15 repetitions per session) for 6 weeks. Instructions were given in person and supplemented with brochures. Evaluations were conducted at baseline, 3 weeks, and 6 weeks.

Statistical Analysis

Data analysis was performed using SPSS version 20. Normality was assessed using the Kolmogorov-Smirnov test. Continuous variables were presented as mean ± standard deviation (SD) or median (range), while categorical data were expressed as frequencies and percentages. One-Way Analysis of Variance, Kruskal-Wallis, Mann-Whitney U, and chi-squared tests were used as appropriate. Comparisons across three time points were evaluated using the Friedman test, followed by post-hoc tests when significant differences were found. Statistical significance was set at $p<0.05$. In addition to conventional significance testing, effect sizes were calculated to quantify the magnitude of between-group differences. Cohen's d was computed for change scores (baseline to 6 weeks) using pooled SD. Cohen's thresholds were adopted for interpretation, with 0.2, 0.5, and 0.8 corresponding to small, moderate, and large effects. Reporting effect sizes provides a clinically meaningful interpretation of the results beyond p-values.

Results

Forty-four patients completed the study, which still exceeded the calculated minimum sample size, ensuring sufficient statistical power for the primary outcome. No adverse effects related to KT or exercises were reported. The study flowchart is shown in Figure 1.

Baseline demographic and clinical characteristics were found comparable among groups (Table 1). The mean age of the patients was 50.02±9.07 years, and 86.4% were women. Only Boston-Functional Status Scale (FSS) and SF-12-M scores were better in group 3 compared to other groups. At three and six weeks, significant improvement was observed in all measured parameters for the KT group ($p<0.05$). The sham taping group showed improvement in all parameters except SF-12 mental health. The control group improved in all parameters except SF-12 physical and mental health. Detailed results and p-values are shown in Table 2.

The amount of change between baseline and 6 weeks was compared between the groups. Hand grip strength

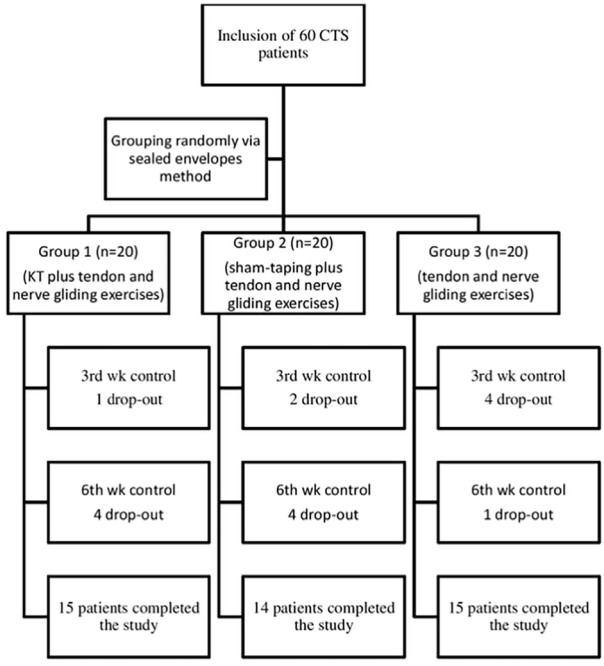

Figure 1. Flowchart
CTS: Carpal tunnel syndrome, KT: Kinesio taping

Table 1. Baseline characteristics of the patients

	Group 1	Group 2	Group 3	p-value
Age (mean ± SD)	53.20±9.78	50±7.72	46.87±8.90	0.16
Sex (female) n (%)	12 (80)	13 (92)	13 (86)	0.60
BMI (mean ± SD)	31.50±4.26	30.47±7.21	29.86±5.30	0.72
Disease duration, wk	14.13 (6-48)	33.8(6-100)	32.93 (6-100)	0.18
Median (min-max)				
Former or current smoker, n (%)	14 (93)	11 (78)	14 (93)	0.35
Number of hands affected (mean ± SD)	1.93±0.25	1.93±0.26	1.87±0.35	0.79
Hand grip strength, right, kg	25.40±6.95	23.16±8.74	22.72±10.62	0.68
Hand grip strength, left, kg	23.30±7.34	21.11±9.30	19.80±9.78	0.55
VAS at rest, cm	7.67±2.40	7.29±2	5.80±2.40	0.08
Boston-SSS	35.67±11.6	33.07±11.90	29±10.6	0.34
Boston-FSS	26.33±11.08	23.86±9.66	14.93±10	**0.011'**
SF-12-physical health	34.93±10.58	36.09±11.3	44.05±10.2	0.07
SF-12-mental health	36.63±11.04	44.55±15.2	51.73±10.1	**0.011"**

': Statistically significant difference between groups 1 and 3 and groups 2 and 3, ": Statistically significant difference between groups 1 and 3
SD: Standard deviation, BMI: Body mass index, VAS: Visual analog scale, SSS: Symptom severity scale, FSS: Functional status scale, SF-12: Short form-12

Table 2. Baseline 3rd week, and 6th week data for all three groups and in-group comparison

	Group 1				Group 2				Group 3			
	1st visit	3rd wk	6th wk	p-value	1st visit	3rd wk	6th wk	p-value	1st visit	3rd wk	6th wk	p-value
Hand grip strength, right, kg	25.4±6.9	31.7±8.3	33.8±7.2	**<0.001**	23.1±8.7	25.0±9.0	25.4±8.8	**0.001**	22.7±10.6	24.2±11.0	24.8±10.6	**<0.001**
Hand grip strength, left, kg	23.3±7.3	29.1±7.3	30.9±8.2	**<0.001**	21.1±9.3	23.4±8.9	23.8±8.8	**0.004**	19.8±9.7	20.8±9.5	21.4±9.7	**<0.001**
VAS at rest, cm	7.6±2.4	4.5±2.3	3.8±2.0	**<0.001**	7.2±2.0	5.6±1.4	5.2±1.4	**<0.001**	5.8±2.4	4.7±2.0	4.6±2.2	**0.001**
Boston-SSS	35.6±11.6	23.0±8.3	20.4±9.3	**<0.001**	33.0±11.9	25.4±8.0	25.7±8.2	**<0.001**	29±10.6	26.6±9.9	25.1±10.1	**<0.001**
Boston-FSS	26.6±11.0	17.3±7.0	16.2±7.3	**<0.001**	23.8±9.6	18.0±5.8	17.2±5.5	**0.001**	14.9±10.2	14.2±8.9	14.0±9.2	**0.015**
SF-12-physical	34.9±10.5	42.2±12.0	42.0±12.2	**0.014**	36.0±11.3	42.1±9.8	42.7±10.6	**<0.001**	44.0±10.2	45.9±9.4	48.2±9.1	0.10
SF-12-mental	36.6±11.0	51.6±11.6	52.1±10.8	**0.001**	44.5±15.2	52.4±9.8	53.1±9.4	0.11	51.7±10.1	53.1±8.6	53.2±10.0	0.53

VAS: Visual analog scale, SSS: Symptom severity scale, FSS: Functional status scale, SF-12: Short form-12

increased most in the KT group, showing significant differences compared to the other groups (p<0.001; Cohen's d for KT vs sham =2.54; KT vs control =3.05). There was no significant difference between the second and third groups in terms of the increase in hand grip strength. Pain reduction (VAS) was also greatest in the KT group (p=0.046; d=-1.81 vs sham; d=-2.14 vs. control). There was no significant difference between the second and third groups in terms of the change in VAS (p=0.425). BCTQ symptom severity improved most in the KT group (d=-1.80 vs sham; d=-2.04 vs. control). Boston Carpal Tunnel Syndrome Questionnaire-FSS showed a moderate effect compared with sham (d=-1.47) and a very large effect compared with control (d=-1.82). Detailed results are shown in Table 3 and Figure 2.

Discussion

This randomized controlled trial demonstrated that KT combined with tendon and nerve gliding exercises was more effective than sham taping or exercises alone in reducing pain and symptom severity and improving hand grip strength in patients with mild-to-moderate CTS. While improvements were also observed in the sham taping and exercise groups, the magnitude of benefit was consistently greater in the KT group, suggesting a specific therapeutic effect beyond placebo or exercise-related mechanisms. These results support the clinical utility of KT as an adjunctive conservative treatment modality in CTS management.

Our findings align with recent trials reporting significant short-term benefits of KT on CTS-related outcomes. Güvener et al. (11) showed immediate symptomatic

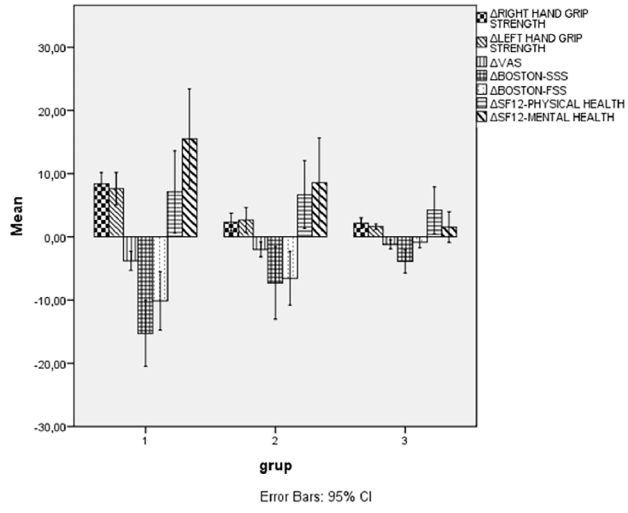

Figure 2. The amount of change in clinical parameters for all three groups

CI: Confidence interval, VAS: Visual analog scale, SSS: Symptom severity scale, FSS: Functional status scale, SF-12: Short form-12

Table 3. Comparison of the amount of change between baseline and 6th week data for all three groups				
	Group 1	**Group 2**	**Group 3**	**p-value**
Δ Hand grip strength, right, kg	8.40±3.23	2.32±2.46	2.16±1.54	**<0.001***
Mean ± SD				**<0.001****
				0.91***
Δ Hand grip strength, left, kg	7.60±4.66	2.69±3.40	1.61±0.78	**0.003***
Mean ± SD				**<0.001****
				0.81***
Δ VAS	-3.80±2.67	-2.00±2.00	-1.20±1.26	**0.046***
Mean ± SD				**0.004****
				0.42***
Δ Boston-SSS	-15.26±9.46	-7.28±9.95	-3.86±3.33	**0.004***
Mean ± SD				**0.005****
				0.18***
Δ Boston-FSS	-10.13±8.37	-6.57±7.37	-0.86±1.55	0.20*
Mean ± SD				**<0.001****
				0.033***
Δ SF-12-P	-18.15-27.50	-4.02-24.69	-3.00-18.00	**0.004***
Min-max				**0.001****
				0.66***
Δ SF-12-M	-16.70-33.17	-2.37-29.01	-5.00-13.00	0.12*
Min-max				**0.001****
				0.20***

*: Difference between group 1 and 2, **: Difference between group 1 and 3, ***: Difference between group 2 and 3
SD: Standard deviation, VAS: Visual analog scale, SSS: Symptom severity scale, FSS: Functional status scale, SF-12: Short form-12

improvements with KT, while Chen et al. (12) confirmed reductions in pain and functional limitations after KT application. Similarly, Sahin et al. (17) and Karpuz et al. (18) demonstrated that KT provided superior functional recovery compared with exercise or splinting. The present study extends these observations by confirming not only statistically significant improvements but also clinically meaningful ones, as reflected in the large effect sizes across multiple outcomes.

Interestingly, the sham taping group also showed moderate improvements in pain and symptom severity. Previous research is limited. A systematic review examining the effects of KT versus sham taping in individuals with musculoskeletal conditions found inconclusive and low-quality evidence supporting the superiority of KT over sham taping in patients with low back pain (19). Similarly, a study by Giray et al. (20) reported that KT was more effective than sham taping in alleviating pain and disability caused by lateral epicondylitis. However, studies specifically comparing KT and sham taping in CTS patients are scarce. Geler Külcü et al. (21) found no significant difference in pain reduction between KT and sham taping in CTS patients. They suggested that pain relief in the sham taping group might have been due to increased patient awareness, leading to better ergonomic practices and reduced repetitive wrist movements. Conversely, another study, similar to the present findings, showed that KT significantly improved pain and function in CTS patients compared to sham taping (22).

Although KT was superior, the sham taping group also exhibited significant pain reduction at six weeks, raising the question of whether the specific KT application technique plays a crucial role. Geler Külcü et al. (21) proposed that sham taping may provide pain relief through direct mechanical stimulation of nociceptors or mechanoreceptors. Further research is needed to explore this mechanism.

A key contribution of this study is the demonstration of substantial improvement in hand grip strength with KT. This result is consistent with prior experimental and clinical studies reporting enhanced motor performance following KT application (23,24). Notably, our findings showed large effect sizes for grip strength, suggesting that KT may not only alleviate symptoms but also improve functional capacity, which is critical for daily living and work-related activities. de Sire et al. (25) also reported improved hand

functioning with KT, although they did not observe significant changes in quality of life measures. In contrast, our study found a trend toward better physical health scores in the KT group, though no significant differences were observed in mental health outcomes, possibly due to the short follow-up or insensitivity of the SF-12 tool in this population.

Recent high-quality trials and systematic reviews further corroborate the benefits of KT in CTS. Sahin et al. (17) compared two KT techniques and confirmed significant reductions in pain and improvements in functional status. Karpuz et al. (18) showed that KT and splinting both improved functional outcomes and sleep quality, with KT demonstrating comparable or superior effects. Zainab et al. (26) found additional benefit when KT was combined with active release techniques, while Li et al. (27), in a 2025 meta-analysis, concluded that KT provides meaningful symptom relief and functional gains in mild-to-moderate CTS. These contemporary findings strengthen the external validity of our results and position KT as a relevant option within the spectrum of non-surgical CTS management.

The use of two comparators strengthens interpretation. Compared to exercises alone, KT demonstrated an incremental, clinically relevant benefit, supporting its pragmatic use as an adjunct to standard care. Compared to sham taping, KT outperformed a credible placebo that controls for attention, touch, and expectancy, indicating that the observed effects are unlikely to be explained by non-specific mechanisms. Together, these findings enhance both internal validity (specific efficacy beyond placebo) and external validity (added value over routine exercise-based management).

Study Limitations

This study has several limitations. First, the relatively small sample size and the dropout of participants may have reduced the statistical power, although the study still met the minimum sample size determined by a priori power analysis. Second, the follow-up duration was limited to six weeks, which precludes conclusions about the long-term sustainability of KT effects in chronic CTS. Third, subgroup analyses according to age, sex, symptom duration, or baseline severity were not performed, but such analyses could have provided insights into which patient groups benefit most from kinesiotaping. Fourth, although only exercise interventions were included as a control to reflect standard conservative management, the absence of an untreated control arm prevents differentiation between natural history and treatment effects. Fifth, hand dominance was not analyzed separately, which might have influenced grip strength outcomes. Finally, the use of the SF-12, although validated, may not have been sensitive enough to detect subtle changes in mental health-related quality of life in this population.

Despite these limitations, the study has notable strengths, including its randomized controlled design, blinded assessments, and use of both disease-specific and generic outcome measures, which enhance the validity and generalizability of the findings.

Conclusion

Kinesio taping plus exercises is more effective than sham taping plus exercises and exercises alone for improving pain, symptom severity, and hand grip strength in patients with CTS at the early stage. Applying KT with neural and area correction techniques at five-day intervals could enhance treatment outcomes for mild and moderate CTS. However, considering the chronic nature of CTS, further studies are needed to examine its long-term effects.

Ethics

Ethics Committee Approval: This study was conducted in accordance with the Declaration of Helsinki. Approval was obtained from the Karadeniz Technical University Scientific Research Ethics Committee (approval no.: 9, date: 24.02.2020). The clinical trial registration number is NCT06710041.

Informed Consent: Study procedures were explained to patients and written informed consent was obtained.

Footnotes

Authorship Contributions

Surgical and Medical Practices: F.K., E.C., Concept: H.B.S., G.S.A., Design: H.B.S., G.S.A., Data Collection or Processing: F.K., E.C., Analysis or Interpretation: H.B.S., G.S.A., Literature Search: H.B.S., F.K., E.C., G.S.A., Writing: H.B.S.

Conflict of interests: No conflict of interest were declared by the authors.

Financial Disclosure: This study received no financial support.

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