

Comparison of Therapeutic Effectiveness between Kinesio Taping Technique and Static Resting Splint in Carpal Tunnel Syndrome

Havva Talay Çalış¹ , Hümeýra Aslaner² , Saliha Dođan Sunkak³ , Nurdan Sedefođlu¹ , Serap Tomruk Sütbeyaz¹ , Emel Güler¹ 

¹Department of Physical Medicine and Rehabilitation, Kayseri City Hospital, Kayseri, Turkey

²Department of Family Medicine, Kayseri City Hospital, Kayseri, Turkey

³Department of Physical Medicine and Rehabilitation, Erciyes University School of Medicine, Kayseri, Turkey

ABSTRACT

Objective: We aimed to compare the kinesio taping (KT) technique and static wrist resting splint therapy in terms of clinical symptoms, hand grip strength and daily living activities in patients with carpal tunnel syndrome.

Methods: In this study, 25 of 42 patients with mild/moderate carpal tunnel syndrome received KT for 4 weeks, while the remaining 17 patients used a static wrist resting splint for the same period. For all the patients, details on age, sex, occupation, and degree of carpal tunnel syndrome were recorded. Tinel's test, Phalen's test, hand grip strength, and visual analogue scale (VAS) score for pain during the day and night were assessed before the treatment and in the first and third months after the treatment. The patients also completed a QuickDASH questionnaire.

Results: No significant differences were found between the groups in terms of age, sex, and degree of carpal tunnel syndrome. In both groups, the VAS-day, VAS-night, and QuickDASH scores significantly decreased, while hand grip strength significantly improved after the treatment as compared with their pretreatment values. These effects were maintained for 3 months ($p < 0.005$). The decrease in VAS-night score in month 1 and the improvement in hand grip strength in months 1 and 3 were statistically significant in the group who received KT, while the decrease in QuickDASH score was statistically significant in the group who received static wrist resting splint therapy ($p < 0.005$).

Conclusion: This study shows that treatment with KT and static wrist resting splint therapy improved the symptoms, daily living activities, and hand grip strength of the patients with mild/moderate carpal tunnel syndrome. In conclusion, we think that KT should be kept in mind as an alternative to conservative therapies in the treatment of carpal tunnel syndrome.

Keywords: Carpal tunnel syndrome, kinesio taping, splint

INTRODUCTION

Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy and occurs when the median nerve is compressed in the wrist (1). The entrapment neuropathy may cause a decrease in hand grip strength and loss of hand function in addition to complaints such as paresthesia, pain, and stiffness that are more frequent especially at night (2).

The disease is diagnosed on the basis of present symptoms, provocative test results (Tinel's sign and Phalen's test), and nerve conduction studies, and treated either conservatively or surgically. A literature review revealed that single or combined conservative treatment methods are used in the treatment of mild/moderate CTS. Statistic wrist resting splint, corticosteroid injection, nonsteroidal anti-inflammatory drugs, physiotherapy

agents, activity modification, and tendon/nerve glide exercises are among the treatment methods (3, 4).

Recently, a limited number of studies have used the kinesio taping (KT) technique for various musculoskeletal system diseases in CTS. The use of the KT technique has increased in the treatment of several diseases such as shoulder pain (5), patellofemoral pain syndrome (6), subacromial impingement syndrome (7), plantar fasciitis (8), and spasticity (9). This prominent effectiveness of KT can be explained by the fact that it has some advantages different from other conventional techniques (10). Regulating the weak muscle function, subcutaneous edema, and impaired circulation by stimulating the lymphatic and blood circulation systems; facilitating the movement of the fascia and tendons; and reducing pain by alleviating the abnormal muscle

How to cite: Talay Çalış H, Aslaner H, Dođan Sunkak S, Sedefođlu N, Tomruk Sütbeyaz S, Güler E. Comparison of Therapeutic Effectiveness between Kinesio Taping Technique and Static Resting Splint in Carpal Tunnel Syndrome. Eur J Ther 2021; 27(1): 14–9.

Corresponding Author: Hümeýra Aslaner **E-mail:** drhumeýra@hotmail.com

Received: 28.04.2020 • **Accepted:** 09.09.2020

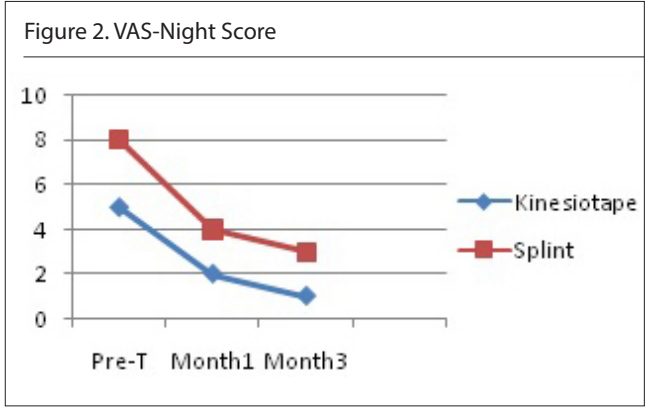
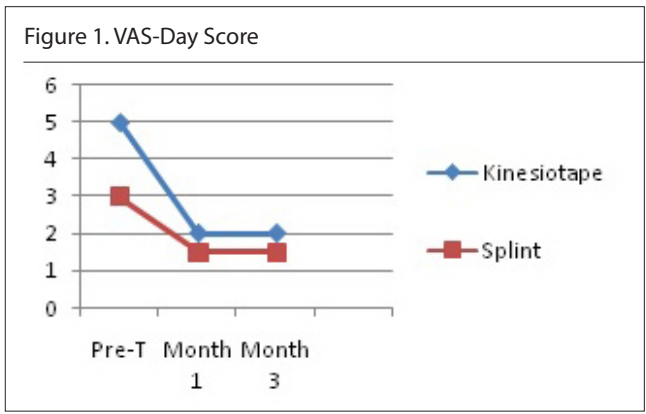
tension, repositioning the subluxated joints, and increasing proprioception through cutaneous mechanoreceptors are among these effects (11-14).

The use of a static wrist resting splint in a neutral position is the first step in CTS therapy in clinical practice. The aim of splinting the wrist in a neutral position is to increase the volume of the carpal tunnel and reduce the pressure on the median nerve. Studies revealed that the use of a wrist resting splint in CTS improved symptoms and functions (15, 16). However, only few studies have reported the effect of KT on CTS (17).

This study was aimed at comparing the KT technique and static wrist resting splint therapy in mild/moderate idiopathic CTS in terms of their effectiveness for improving symptoms, hand function, and grip strength.

METHODS

A total of 42 patients (50 hands) who were admitted to the physiotherapy outpatient clinic of the Kayseri Training and Research Hospital, who underwent electroneuromyography, who were diagnosed with mild/moderate CTS, and whose informed written and verbal consents for participation in the study were obtained, were retrospectively included in the study. While patients aged >18 years, who did not receive any treatment; and who were diagnosed as having mild/moderate CTS were included in the study; those who had a metabolic disease (diabetes mellitus or thyroid diseases), systemic or malign diseases, trauma history in the etiology (fracture), and CTS therapy before (corticosteroid injection, splint, and taping therapies); pregnant and breastfeeding women; patients aged <18 years; and patients with thenar atrophy (to exclude severe CTS) were excluded from the study. The first group consisted of 25 patients (25 hands) who received KT, and the second group consisted of 17 patients (25 hands) who used a static wrist resting splint. Eight of the 42 patients were diagnosed as having bilateral CTS, and these patients received the same treatment for both hands. KT was applied four times and renewed each week, and the tape was applied using a neural technique and ligament/space correction technique recommended for CTS (18). First, the skin was cleaned with alcohol-soaked cotton to remove oil and moisture. A Y tape was applied along the line of the nerve for the neural technique, and an I tape was applied around the wrist for the ligament/space correction technique. The Y tape was applied starting from the first and fifth metacarpal joints up to the area 5 cm below the medial epicondyle along the line of the nerve, with 50% stretching, as the wrist was the transition area when the forearm was in supination and the elbow and wrist were in extension. The I



tape was applied to the volar side of the wrist with maximum stretching when the wrist was in the neutral position (Fig. 1). The patient was informed to avoid activities that may cause excessive sweating and exposure to water during the process. The splint given to the patients in the splint group had a neutral position and volar support, as it did not allow flexion, extension, and deviation of the wrist but allowed pronation and supination. The patients were recommended to use it for 4 weeks (19) (Fig. 2). All the patients were given a home program consisting of tendon and nerve-shifting exercises.

All the patients’ demographic characteristics, occupations, injured hand, and dominant hand were recorded at the beginning of the study. Tinel’s and Phalen’s test scores, hand grip strength, and visual analogue scale (VAS) scores of the patients were evaluated during the day and night before the treatment (pretreatment) and in the first and third months after treatment. The QuickDASH questionnaire was also administered to the patients. The VAS was scored between 0 (no pain) and 10 (worst possible pain) to determine the degree of pain. Hand grip strength was evaluated in kilograms by using the Jamar-type hydraulic hand dynamometer (Saehan Corp. Masan, Korea). All the measurements of the patients were performed in a sitting position, with the shoulder in adduction and neutral position at 90° elbow flexion, the forearm in neutral position, and the wrist at 0–10° of extension and 15° of ulnar deviation. The patients were asked to perform a maximal voluntary grip. The measurements were performed three times, and the mean value was calculated (20).

Main Points:

- We have found statistically significant difference between KT and splint groups.
- KT significantly increase hand grip strength was observed in the first and third months as compared splint group.
- KT significantly decrease QuickDASH score was found in the first and third months as compared with before the treatment.

The QuickDASH (The Quick Disabilities of Arm, Shoulder and Hand Questionnaire) questionnaire consists of 15 questions in total and was validated in Turkish and found to be reliable for evaluating the severity of symptoms and functional capacity of patients (21). The patients in this study completed the questionnaire by themselves. The QuickDASH has 11 titles (each title includes five answer options), and at least 10 of the 11 titles must be answered to calculate the QuickDASH score (0=no disability and 100=the most severe disability). Approval of this issue was obtained from the ethics committee of the Ministry of Health Kayseri City Hospital on March 12, 2020 (Document No. 14).

Statistical Analysis

The data obtained were evaluated with the Statistical Package for Social Sciences 22.0 (IBM SPSS Corp.; Armonk, NY, USA) statistical package software. Descriptive statistics were presented as mean±standard deviation, median (range), frequency distribution, and percentile. For the statistical methods, the chi-square test was used for nominal values, and the Wilcoxon rank-sum test, Kruskal–Wallis analysis of variance, and Mann–Whitney U test were used for non-parametric values. Variables with p values of <0.05 were considered statistically significant.

RESULTS

The mean age of the patients who participated in the study was 47.48±8.13 years in the first group and 45.56±6.55 years in the second group, indicating similar ages between the groups (p=0.354). No statistically significant differences were found between the groups in terms of sex, treated extremity, and degree of CTS. The demographic characteristics of the patients are given in Table 1.

The mean VAS-night score in the first group was 5.0 before the treatment and 2.0 after the treatment. A statistically significant decline in VAS-night score was recorded after the treatment, and this effect was observed to continue for 3 months. While the mean VAS-night score in the second group was 8 before the treatment, it decreased to 4 after the treatment, and this effect was observed to continue for 3 months. The decrease in VAS-night score within 1 month was statistically more significant in the first group. A statistically significant decrease in VAS-day score was recorded in both groups in the first and third months as compared with before the treatment, and no significant difference was found between the groups (Figs. 1 and 2).

A statistically significant increase in hand grip strength was observed in the first and third months as compared with before the treatment in both the groups. A statistically significant greater increase in hand grip strength was recorded in evaluations for the first group as compared with the second group during the first and third months (p<0.05; Table 2).

A statistically significant decrease in QuickDASH score was found in the first and third months as compared with before the treatment in both groups, and the decrease in the third month was statistically more significant in the second group than in the first group (p<0.05; Table 3).

Table 1. Distribution according to the Demographic Characteristics

	Kinesiotape Group (n=25)	Splint Group (n=17)	p*
Age (Mean.±SD)	47.4 ± 8.1	45.6 ± 6.7	0.354
	Number(%)	Number(%)	
Gender			
Female	23 (92)	16 (94.11)	0.853
Male	2 (8)	1 (5.8)	
Occupation			
Housewife	21 (84)	14 (82.3)	0.518
Employee	3(12)	3 (17.7)	
Retired	1(4)	0 (0.0)	
Degree			
Mild	15(60)	14(56)	0.554
Moderate	10(40)	11(44)	

Table 2. Hand grip value

	Kinesiotape	Splint	p*
Hand Grip Pre-Treatment	19 (18.08–23.63)	15 (12.75–18)	0.003
Month 1	23 (19.39–28.44)	16 (12–21.5)	0.001
Month 3	25 (20.4–29.09)	19 (15.5–22.5)	0.004
p*	p<0.05	p<0.05	

Table 3. QuickDASH Value

	Kinesiotape	Splint	p*
QuickDASH Pre-Treatment	50 (40.9–62.5)	45 (34.6–55)	0.256
Month 1	38 (18.2–55.6)	29.5 (17–39.3)	0.145
Month 3	34 (19.3–43.2)	17.5 (7.5–27.5)	0.008
p*	p<0.001	p<0.001	

A statistically significant increase was observed in negative results in Tinell’s and Phalen’s tests in the first and third months compared with the pretreatment results in both groups and the decrease was statistically more significant in the third month in the second group than in the first group (p<0.05; Tables 4 and 5).

Table 4. Tinel’s Test Results

		Kinesiotape	Splint	p
Tinel’s	Pre–Treatment	60%	56%	0.177
	Month 1	40%	25%	0.089
	Month 3	35%	20%	0.004
p *		p<0.001	p<0.001	

Table 5. Phalen’s Test Results

		Kinesiotape	Splint	p *
Phalen’s	Pre–Treatment	72%	80%	0.508
	Month 1	60%	56%	0.382
	Month 3	45%	28%	0.011
p *		p< 0.001	p<0.001	

DISCUSSION

CTS is an entrapment neuropathy characterized by the loss of hand function accompanied by clinical symptoms such as pain and paresthesia. Our study was aimed at determining the effects of using KT and a splint device on the severity of the symptoms and functional conditions of patients with CTS.

In the study by Kulcu et al., the 22 wrists in the 45 patients included in the study (65 wrists) received KT, 22 received placebo KT, and 21 received splint therapy, and the effectiveness of the therapies were compared. The Boston Carpal Tunnel Questionnaire (BCTQ) was used to evaluate the functional condition in their study. While functional improvement was observed in the KT group, no significant improvement was found in the other two groups (17). In the study by Yildirim et al. (22), an improvement in the BCTQ-S score was observed in the KT group during the third follow-up. In our study, we used the QuickDASH questionnaire, which was developed to evaluate the functional condition. As a result of our study, while significant improvements were found in the first and third months in the KT and splint therapy groups, the improvement was more significant at the end of the third month in the splint group. In the same study, a statistically significant improvement in hand grip strength was found in the splint group; however, no significant difference was found among all the groups (22). In our study, although significant clinical improvements in symptoms, hand function, and grip strength were observed within the first 3 months after treatment in the patients who received KT and splint therapy, the improvements of the symptoms and grip strength in the KT group and hand function in the splint group were more significant.

KT helps improve blood circulation and lymphatic drainage. This effect on the blood circulation helps eliminate the tension and tenderness in the damaged area, and decreases the stimulation of the subcutaneous pain receptors. With these features, KT showed positive effects in the treatment of CTS (23). In our study, an increase in both VAS-day and VAS-night scores were found in

the KT group. The study by Kaplan et al. (24) showed a decrease in VAS score in the KT treatment group.

Epidemiological studies on CTS showed that it was more common in the middle-aged female population. In our study, 92% of the patients were female, and their mean age was approximately 47 years; these results were compliant with the epidemiological data (25). Several studies have reported that CTS is an occupational disease that is more common in occupations that require intensive use of the hands (26). In our study, 98.1% of the patients had occupations (housewife, employee, etc.) that require intensive use of the hands and frequent repeated movements.

CTS is diagnosed by performing medical history taking and clinical examination, and its severity is determined with electrophysiological testing. Whereas physical examination has reduced sensitivity and abnormal responses to provocative tests and/or symptoms due to reduced muscle power are detected in patients with CTS, provocative test results are not always positive but are useful in the diagnosis. The sensitivity and specificity of these tests in the diagnosis of CTS are still disputed (27). According to Brüske et al. (28), the sensitivity of Phalen’s test was between 42% and 91%, and the sensitivity of Tinel’s test was between 38% and 100%. In our study, we used Tinel’s and Phalen’s provocative tests in physical examinations for patients with symptoms of CTS. In a meta-analysis in which MacDermid et al. evaluated 60 studies, the sensitivity was 68% for Phalen’s test and 50% for Tinel’s test. In our study, the Phalen’s test result was positive in 76% of the patients, and the Tinel’s test result was positive in 58%, which is similar to the results of MacDermid et al. (29). In the study by Akturk et al. (30), a decrease in the sensitivity of provocative tests was observed, which is similar to the results of our study.

In the study by Oncu et al. (31) on the effectiveness of KT for CTS, the patients were divided into four groups, and each group consisted of 15 wrists. The first group received KT and exercise therapy; the second group, splint and exercise therapy; the third group, KT, splint, and exercise therapy (KT + Splint); and the fourth group (control group), only exercise therapy. They reported that the use of KT with a night splint showed a significant clinical improvement in symptoms, hand function, grip strength, and hand skill test results within the first 3 months after treatment as compared with the other treatments. The improvement in symptoms in the group that received only KT or splint therapy was significant only in the first 2 months after treatment as compared with that in the control group. In the study by Akturk et al. (30) in which KT and splinting methods were compared in 44 patients (38 female and 6 male patients: 58 hands) with early CTS between the ages of 20 and 65 years, the KT group showed a significant improvement in motor distal latency, sensory latency, sensory conduction velocity, responses to provocative tests, sensory loss, hand function, and post-treatment symptoms, and statistically significant differences in BCTQ-functional disabilities and BCTQ-S scores. In our study, the symptoms improved in both groups, and this effect continued for 3 months in the KT group.

The use of a wrist splint in the treatment of CTS is based on the observation that symptoms increase with wrist movements and

decrease with resting. Studies have shown that the therapeutic role of the wrist resting splint is due to its decompression effect on the carpal tunnel. Pressure on the tunnel plays an important role in the pathophysiology, and as the wrist moves away from the neutral position, the pressure increases (32, 33). In our study, a significant clinical improvement was observed in the splint group in terms of symptoms, hand function, and grip strength. A meta-analysis on the effect of KT on grip strength reported that KT had positive effects on both grip strength and muscle activity (34). In a study in which the effect of KT on grip strength was evaluated in healthy athletes, KT was used for the forearm in 21 healthy athletes, and no long-term increase was observed in the maximal grip strength, while proprioception and hand grip strength improved in the early period. Oncu et al. (31) concluded in their study that KT improved grip strength only in the early period when used alone but improved grip strength over the long term when used with a splint. Guner et al. (35) found that the KT method used with a low-level laser therapy had no additional positive effect in the short term; however, they found an increase in hand grip strength and finger pinch strength in the long term. In our study, hand grip strength increased in both the splint and KT groups, and this increase was higher in the KT group.

As a result of these studies and our study, KT does not prevent daily activities as compared with the splint, and patient compliance with the KT method is high. The use of splints may limit daily activities and housework. According to the observations, KT is easier to use in clinical practice.

Limitations

The limitations of this study are its retrospective design, the fact that the long-term effectiveness of KT in the treatment of CTS was not investigated, and the limited number of patients included in the study. A further limitation is the lack of ultrasonographic images during follow-up.

CONCLUSION

We conclude that KT may be considered as an alternative method to the available conservative therapies for the treatment of CTS. The positive results that were obtained in the intervention group might have resulted from a placebo effect of KT. We think that more comprehensive retrospective placebo-controlled studies investigating the long-term effectiveness of KT are needed.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Kayseri City Hospital (12.03.2020, 2020/14).

Informed Consent: Written consent was obtained from the patients for the application.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - H.T.Ç.; Design - H.A., S.D.S.; Supervision - H.T.Ç., E.G.; Resources - N.S., S.D.S.; Materials - S.D.S., S.T.S.; Data Collection and/or Processing - E.G., S.T.S.; Analysis and/or Interpretation - H.T.Ç., H.A., E.G.; Literature Search - H.T.Ç., H.A., N.S.; Writing Manuscript - H.A., N.A., E.G.; Critical Review - H.T.Ç., S.D.S., S.T.S.; Other - H.A., N.S.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

- Shapiro BE. Median nerve neuropathy at the wrist. *Electromyography and Neuromuscular Disorders* 2013; 267-88. [\[Crossref\]](#)
- Alfonso C, Jann S, Massa R, Torreggiani A. Diagnosis, treatment and follow-up of the carpal tunnel syndrome: A review. *Neurol Sci* 2010; 31: 243-52. [\[Crossref\]](#)
- Kostopoulos D. Treatment of carpal tunnel syndrome: A review of the non-surgical approaches with emphasis in neural mobilization. *J Bodyw Mov Ther* 2004; 8: 2-8. [\[Crossref\]](#)
- Piazzini DB, Aprile I, Ferrara PE, Bertolini C, Tonali P, Maggi L, et al. A systematic review of conservative treatment of carpal tunnel syndrome. *Clin Rehabil* 2007; 21: 299-314. [\[Crossref\]](#)
- Thelen MD, Dauber JA, Stoneman PD. The clinical efficacy of kinesio tape for shoulder pain: A randomized, double-blinded, clinical trial. *J Orthop Sports Phys Ther* 2008; 38: 389-95. [\[Crossref\]](#)
- Aytar A, Ozunlu N, Surenkok O, Baltaci G, Oztop P, Karatas M. Initial effects of kinesio® taping in patients with patellofemoral pain syndrome: A randomized, double-blind study. *Isokinet Exerc Sci* 2011; 19: 135-42. [\[Crossref\]](#)
- Shakeri H. Therapeutic Effect of Kinesio-taping on Disability of Arm, Shoulder, and Hand in Patients with Subacromial Impingement Syndrome: A Randomized Clinical Trial. *J Nov Physiother* 2013; 3: 1-4.
- Tsai CT, Chang WD, Lee JP. Effects of short-term treatment with kinesiostaping for plantar fasciitis. *J Musculoskelet Pain* 2010; 18: 71-80. [\[Crossref\]](#)
- Karadag-Saygi E, Cubukcu-Aydoseli K, Kablan N, Ofluoglu D. The role of kinesiotaping combined with botulinum toxin to reduce plantar flexors spasticity after stroke. *Top Stroke Rehabil* 2010; 17: 318-22. [\[Crossref\]](#)
- Kim BJ, Lee JH. Efficacy of kinesiology taping for recovery from occupational wrist disorders experienced by a physical therapist. *J Phys Ther Sci* 2014; 26: 941-3. [\[Crossref\]](#)
- Host HH. Scapular taping in the treatment of anterior shoulder impingement. *Phys Ther* 1995; 75: 803-12. [\[Crossref\]](#)
- Refshauge KM, Kilbreath SL, Raymond J. The effect of recurrent ankle inversion the ankle. *Med Sci Sport Exerc* 2000; 32: 10-5. [\[Crossref\]](#)
- Bicici S, Karatas N, Baltaci G. Effect of athletic taping and kinesiotaping® on measurements of functional performance in basketball players with chronic inversion ankle sprains. *Int J Sports Phys Ther* 2012; 7: 154-66.
- Castro-Sánchez AM, Lara-Palomo IC, Matarán- Peñarrocha GA, Fernández-Sánchez M, Sánchez-Labraca N, Arroyo-Morales M. Kinesio Taping reduces disability and pain slightly in chronic non-specific low back pain: A randomised trial. *J Physiother* 2012; 58: 89-95. [\[Crossref\]](#)
- Sevim S, Dogu O, Çamdeviren H, Kaleagasi H, Aral M, Arslan E, et al. Long-term effectiveness of steroid injections and splinting in mild and moderate carpal tunnel syndrome. *Neurol Sci* 2004; 25: 48-52. [\[Crossref\]](#)
- Brininger TL, Rogers JC, Holm MB, Baker NA, Li ZM, Goitz RJ. Efficacy of a Fabricated Customized Splint and Tendon and Nerve Gliding Exercises for the Treatment of Carpal Tunnel Syndrome: A Randomized Controlled Trial. *Arch Phys Med Rehabil* 2007; 88: 1429-35. [\[Crossref\]](#)
- Geler Külcü D, Bursali C, Aktaş I, Bozkurt Alp S, Ünlü Özkan F, Akpınar P. Kinesiotaping as an alternative treatment method for carpal tunnel syndrome. *Turkish J Med Sci* 2016; 46: 1042-9. [\[Crossref\]](#)
- Bland JDP. A neurophysiological grading scale for carpal tunnel syndrome. *Muscle Nerve* 2000; 23: 1280-3. [\[Crossref\]](#)

19. Padua L, LoMonaco M, Gregori B, Valente EM, Padua R, Tonali P. Neurophysiological classification and sensitivity in 500 carpal tunnel syndrome hands. *Acta Neurol Scand* 1997; 96: 211-7. [\[Crossref\]](#)
20. Mathiowetz V, Weber K, Volland G, Kashman N. Reliability and validity of grip and pinch strength evaluations. *J Hand Surg Am* 1984; 9: 222-6. [\[Crossref\]](#)
21. Gummesson C, Ward MM, Atroshi I. The shortened disabilities of the arm, shoulder and hand questionnaire (QuickDASH): Validity and reliability based on responses within the full-length DASH. *BMC Musculoskelet Disord* 2006; 7: 1-7. [\[Crossref\]](#)
22. Yildirim P, Dilek B, Şahin E, Gülbahar S, Kizil R. Ultrasonographic and clinical evaluation of additional contribution of kinesiotaping to tendon and nerve gliding exercises in the treatment of carpal tunnel syndrome. *Turkish J Med Sci* 2018; 48: 925-32. [\[Crossref\]](#)
23. Kase K, Wallis J, Kase T. *Clinical Therapeutic Applications of the Kinesio Taping Method*. Tokyo, Japan: Ken Ikai Co. Ltd.; 2003.
24. Mansiz Kaplan B, Akyuz G, Kokar S, Yagci I. Comparison of the effectiveness of orthotic intervention, kinesiotaping, and paraffin treatments in patients with carpal tunnel syndrome: A single-blind and randomized controlled study. *J Hand Ther* 2019; 32: 297-304. [\[Crossref\]](#)
25. Burton CL, Chen Y, Chesterton LS, Van Der Windt DA. Trends in the prevalence, incidence and surgical management of carpal tunnel syndrome between 1993 and 2013: An observational analysis of UK primary care records. *BMJ Open* 2018; 8: 1-11. [\[Crossref\]](#)
26. You D, Smith AH, Rempel D. Meta-analysis: Association between wrist posture and carpal tunnel syndrome among workers. *Saf Health Work* 2014; 5: 27-31. [\[Crossref\]](#)
27. Wiperman J, Goerl K. Carpal tunnel syndrome: Diagnosis and management. *Am Fam Physician* 2016; 94: 993-9.
28. Brüske J, Bednarski M, Grzelec H, Zyluk A. The usefulness of the phalen test and the hoffmann-tinel sign in the diagnosis of carpal tunnel syndrome. *Acta Orthop Belg* 2002; 68: 141-5.
29. MacDermid JC, Wessel J. Clinical diagnosis of carpal tunnel syndrome: A systematic review. *J Hand Ther* 2004; 17: 309-19. [\[Crossref\]](#)
30. Aktürk S, Büyükcavcı R, Aslan Ö, Ersoy Y. Comparison of splinting and Kinesio taping in the treatment of carpal tunnel syndrome: a prospective randomized study. *Clin Rheumatol* 2018; 37: 2465-9. [\[Crossref\]](#)
31. Oncu J, İlişer R, Koymen Yılmaz F, Kuran B. Efficacy of Kinesiotaping on Symptoms, Hand Functions, and Hand Grip Strength in Carpal Tunnel Syndrome: A Single-Blind and Randomized Controlled Study. *Turk J Phys Med Rehab* 2014; 60: 43-51.
32. Keir PJ, Rempel DM. Pathomechanics of peripheral nerve loading: Evidence in carpal tunnel syndrome. *J Hand Ther* 2005; 18: 259-69. [\[Crossref\]](#)
33. Duncan SFM, Kakinoki R. Carpal Tunnel Syndrome and Related Median Neuropathies: Challenges and Complications. *Carpal Tunn Syndr Relat Median Neuropathies Challenges Complicat* 2017. p. 13-29. [\[Crossref\]](#)
34. Williams S, Whatman C, Hume PA, Sheerin K. Kinesio taping in treatment and prevention of sports injuries: A meta-analysis of the evidence for its effectiveness. *Sport Med* 2012; 42: 153-64. [\[Crossref\]](#)
35. Güner A, Altan L, Kasapoğlu Aksoy M. The effectiveness of the low-power laser and kinesiotaping in the treatment of carpal tunnel syndrome, a pilot study. *Rheumatol Int* 2018; 38: 895-904. [\[Crossref\]](#)