Effectiveness of Kinesiotaping on Carpal Tunnel Syndrome: A Systematic Review

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Introduction

Carpal Tunnel Syndrome (CTS) is one of the most widely-known and most common UE diagnosis that is caused by compression to the median nerve. This disease has a significant impact on the work force as it heavily affects those who perform repetitive wrist motion within their line of work (e.g. hairdresser). In recent years, the common approach in treating CTS involved splinting, injections, and/or other various conservative therapy treatments. Over the past few years there has been an apparent increase in the use of Kinesiotaping, and few RCT's have been conducted to investigate Kinesiotape's effects towards treating CTS. While some research has been conducted, there is no evidence of a SR. Therefore, the purpose of this review is to determine Kinesio tape's effect on improving CTS pain levels, symptom severity, and patient function measured by the Visual Analog Scale (VAS) and the Boston Carpal Tunnel Questionnaire's (BCTQ) symptom severity and function sub-sections.

Methods

Databases searched:

- Cochrane (Database of SR & Central Register of Controlled Trials), CINAHL, MEDLINE, PEDRO, PubMed, and TRIP
- Keywords: 1. Kinesiotape or KT or Kinesio Tape. 2. CTS or carpal tunnel syndrome. 3. Treatment or intervention or evaluation.
- Dates searched: 2010 to 2020

Inclusion and Exclusion criteria KT systematic review

Inclusion Criteria	Exclusion Criteria
RCT	Non-RCT
N = ≥ 30	Non-CTS related
CTS related	Unable to access
date: ≤ 10 years	On-going trial
English	Foreign
	date: > 10 years

Table 1.

Excluded article description and reason for exclusion

Study	Reason
Güner et al.	PEDro score of 4
Mindy L, Pou Y.	N = 4
J. Öncü et al.	Foreign
Chang HY et al.	Non-RCT
D'Angelo et al.	Systematic Review
Krause et al.	Qualitative Study
Kaplan et al.	Unable to access
Soheir et al.	N = 15

Table 2.

Methodological rating of the RCT's were completed using the PEDro criterion score. At least 2 raters read each of the 5 articles and were blinded to individual PEDro scores. No disagreements between raters were evident. Articles meeting the cutoff PEDro criterion score (>7) were then identified with the weighted average standardized effect size (SES) calculated for control and intervention groups. Sensitivity analysis was completed by removing the study with the largest sample size and re-calculating weighted average SES.

PRISMA flow diagram of studies.

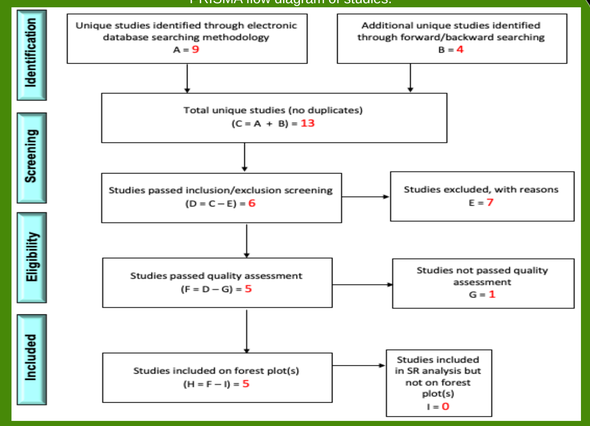

Table 3.

Methodological rating of RCT's based on the PEDRO scores

Quality Assessment											
	PEDro Score										
Study	1	2	3	4	5	6	7	8	9	10	Total
Akturk et. Al.	Y	N	Y	Y	Y	N	Y	Y	Y	Y	8
Külcü et. Al.	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	9
Kruase et al.	Y	Y	Y	Y	N	N	Y	Y	Y	Y	8
Rania et. Al.	Y	N	Y	Y	N	N	Y	Y	Y	Y	7
Yildirim et. Al.	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	9

Table 4. Disagreement between raters indicated by *. Percent agreement between raters was 100% (50/50).

Description of included articles.

Study	Sample Size (KT/CG)	Participant Description	Tx Description	Result
Akturk et al.	58 (28/30)	-Mild to moderate CTS diagnosed via ENMG over 3 mo. Pain a/o numbness spreading to palmar face of hand. 1+ positive finding between Tinel, Phalen, or carpal compression test	KT group vs standard treatment group who received splinting. Both groups received the same exercise.	Significant improvements found in both groups but significant differences favoring KT group found in BCTQ-S and BCTQ-F.
Külcü et al.	40 (20/20)	-18+ yo w/ mild-moderate CTS symptoms <1 year. Pain in median nn distribution during activity or numbness in the median nn distribution.	KT group vs Placebo KT group and an OD group. Placebo KT group receive improper tape application and all 3 groups received the same exercises.	All 3 groups showed pain relief and decreases in symptom severity. Significant improvement only found in KT group for functional status.
Krause et al.	47 (25/22)	-18+ yo in Southern California area. English speaking. Positive findings in ether the Tinel or Phalen's test CTS signs	KT group vs Placebo KT group vs a standard CTS protocol group. All three groups received the same exercises. The placebo KT group had tape applied with 0% stretch but had the same wear pattern. The standard protocol group received a 1-size-fits-all cock-up orthosis.	Significant improvement in VAS scores only in the KT group. The KT group and placebo KT group showed significant improvement in function but not with the Orthotic group.
Rania et al.	60 (30/30)	-Recruited from local OP clinic of neurology department. Symptoms > 3 mo. Positive Tinel's & Phalen's tests. Positive electrodiagnostic findings for CTS	KT group vs Control group. Both groups received the same exercises.	Significant difference in pain levels in favor of the KT group.
Yildirim et al.	38(19/19)	-Ages 18-60 w/ mild-moderate CTS. Symptoms >3 mo.	KT tape vs control group. Both groups received the same exercises	Significant findings within each group but not between groups.

Table 5.

Results

VAS Effect Size (ES) of Both Groups; Pre-Post Intervention Difference

VAS (MCID=1.64)				
Study	KT Group (N)	KT Effect Size	Control Group (N)	CG Effect Size
Külcü et. Al.	20	2.5 cm	20	1.9 cm
Krause et al.	25	5.4 **(mm*)**	22	17.5 **(mm*)**
Rania et. Al.	30	5.2 cm	30	0.26 cm

Table 6. (Krause et al. 2020) [* = Researcher assumed the VAS used mm for measurement.]

BCTQ-Function Effect Size (ES) of Both Groups; Pre-Post Intervention Difference

BCTQ-Function (MCID=2.05)				
Study	KT Group (N)	KT Effect Size	Control Group (N)	CG Effect Size
Akturk et. Al.	28	9.06	30	0.5
Külcü et. Al.	20	6.9	20	3.5
Krause et al.	25	0.2	22	0.3
Yildirim et. Al.	19	7.31	19	6.14

Table 7. (Leite JC et al., 2006).

BCTQ-Symptom Severity Effect Size (ES) of Both Groups; Pre-Post Intervention Difference

BCTQ-Symptom Severity (MCID=1.55)				
Study	KT Group (N)	KT Effect Size	Control Group (N)	CG Effect Size
Akturk et. Al.	28	10.4	30	0.3
Külcü et. Al.	20	12.0	20	8.6
Krause et al.	25	0.2	22	0.4
Yildirim et. Al.	19	11.1	19	12.54

Table 8. (Leite JC et al., 2006).

Kinesiotape's Effect on CTS Symptom Severity Forest Plot

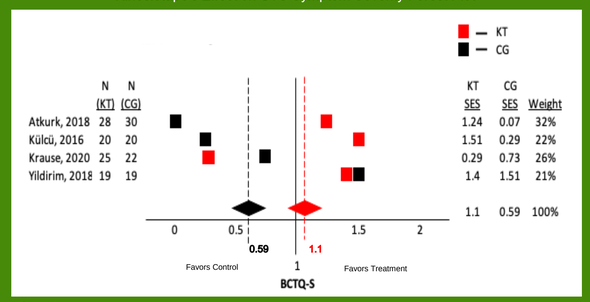

Figure 1.

Kinesiotape's Effect on CTS Function Forest Plot

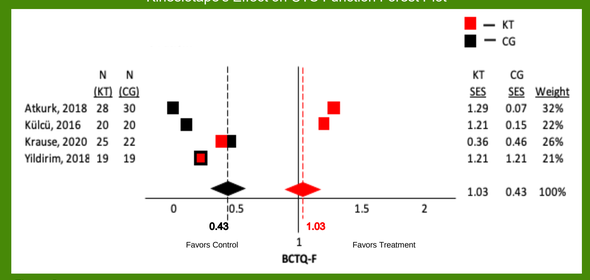

Figure 2.

Kinesiotape's Effect on CTS Pain Levels Forest Plot

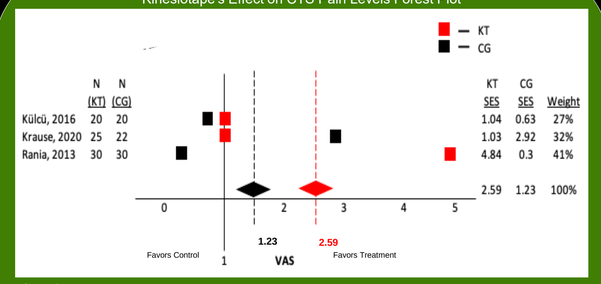

Figure 3.

- As noted by the forest plots, the combined weighted SES for KT groups were all considered large, as all 3 groups exceeded the 'large SES' cut-off score of 0.8. The combined weighted SES for control groups for CTS symptom severity and function fell below this same SES cut-off but showed a large SES for pain levels.
- Individual t-tests were conducted, and no significant differences between groups were found in any of the 3 outcome measures (α=0.05; CI=95%: Symptom Severity: p = 0.5590, Function: p = 0.7327, Pain : p = 0.3591).
- Findings show a more favorable improvement towards the KT groups noted by the MCID scores (Tables 6, 7, & 8) for BCTQ-F, BCTQ-S, and VAS.

Discussion

- All KT groups demonstrated large effect sizes (>0.8). The researchers recognize that even small effect sizes may still provide clinical meaningfulness to a clinician. Although exercise alone groups showed moderate effects sizes, the data presented in this SR suggests that KT was favorable to exercise alone. Individual t-tests were conducted and indicated no statistically significant difference between the groups, but that is not to say that the KT treatment was not more favorable.
- **Limitations**:. KT, being a broad term that encompasses many different names, can be used for various treatment strategies which may have caused the search keywords to be too specific or too broad. Limited to an initial small amount of total articles to review resulting in a lower than desired amount of studies for each data set.
- **Clinical implications:** KT may assist relief in pain, symptom severity, and/or improve function. This study recognizes that some clinicians may only be interested in 1 of the 3 dependent variables presented in our research, and the data does allow the use of KT in conjunction with empirical evidence from the clinician/researcher. Both groups in each study received the same exercises, but as the control groups showed improvement noted by MCID scores, the data suggest greater favorability towards the KT groups noted by SES.
- **Future research:** Specifically compare other interventions to KT such as: splinting, physical agent modalities, casting, and/or surgery. This study primarily focused on KT groups being compared to placebo-KT groups that received only exercise.

Conclusion

KT may be an effective intervention to improve CTS pain, symptom severity, and function, but may not be more superior than other conservative interventions as there were no significant differences between groups for all 3 outcome measures conducted in the SR.

References: **Aktürk** S, Büyükavcı 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(9):2465-2469. doi:10.1007/s10067-018-4176-1. **Geler** Külcü D, Bursali Ç, Aktaş İ, Bozkurt Alp S, Ünlü Özkan F, Akpinar P. Kinesiotaping as an alternative treatment method for carpal tunnel syndrome. *Turk J Med Sci*. 2016;46(4):1042-1049. Published 2016 Jun 23. doi:10.3906/sag-1503-4. **Krause** D, Roll SC, Javaherian-Dysinger H, Daher N. Comparative efficacy of the dorsal application of Kinesio tape and splinting for carpal tunnel syndrome: A randomized controlled trial. *Journal of Hand Therapy*. March 2020. doi:10.1016/j.jht.2020.03.010. **Leite** JC, Jerosch-Herold C, Song F. A systematic review of the psychometric properties of the Boston Carpal Tunnel Questionnaire. *BMC Musculoskelet Disord*. 2006;7:78. Published 2006 Oct 20. Doi:10.1186/1471-2474-7-78. **Rania** AR, Battecha KH, Mansour WT. Influence of Kinesio Tape in Treating Carpal Tunnel Syndrome. *Journal of Medical Science and Clinical Research*. 2013;1(1):1-9. **Yıldırım** P, Dilek B, Şahin E, Gülbahar S, Kızıl R. Ultrasonographic and clinical evaluation of additional contribution of kinesiotaping to tendon and nerve gliding exercises in the treatment of carpal tunnel syndrome. *Turk J Med Sci*. 2018;48(5):925-932. Published 2018 Oct 31. doi:10.3906/sag-1709-72.