

Corticosteroid Injection versus Kinesio Taping in Patients with Tennis Elbow: A Systematic Review and Meta-analysis

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Objective: To evaluate if corticosteroid injection or Kinesio taping is more effective in patients with tennis elbow by using a systematic review.

Materials and Methods: This systematic review was conducted by searching on four databases including PubMed, Cochrane library, Scopus, and CINAHL. The inclusion criteria were studies conducted in adult patients with tennis elbow or lateral epicondylitis and treated with corticosteroid injection versus Kinesio taping by the randomized or non-randomized controlled trials. The outcomes of the study were clinical outcomes after the treatment of both Kinesio taping and corticosteroid including visual analogue scale of pain (VAS), grip strength, and Quick Disability of Arm, Shoulder and Hand.

Results: There were 38 articles related to Kinesio taping and other treatments from four databases. There were two articles included in the quantitative analysis and meta-analysis. Among three outcomes, only grip strength was significantly different between both groups and both at baseline and at post-treatment. At baseline, the corticosteroid group had higher grip strength than the Kinesio taping group by 7.26 kg-force (95% confidence interval of 3.13 to 13.45), while the corticosteroid group had higher grip strength than the Kinesio taping group by 9.28 kg-force (95% confidence interval of 4.75 to 13.81) at post-treatment.

Conclusion: Corticosteroid injection may be more effective than Kinesio taping in terms of grip strength. However, these results may need to be cautiously interpreted as there were significant differences in the grip strength at baseline. Further studies are required to confirm the results of this study.

Keywords: Grip strength; Methylprednisolone; Triamcinolone; Lateral epicondylitis

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Tennis elbow or lateral epicondylitis is a common condition in tennis players. Even though the adult population has tennis elbow in 1 to 3%, up to 50% of tennis players reported pain in the extensor origin of the elbow⁽¹⁾. Tennis elbow is also reported in other sports and several occupations such as housewives⁽²⁾. Approximately 86% of housewives reported tennis elbow pain by the questionnaire, while 39.33% of them had positive test for tennis elbow.

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A study from Japan showed that the overall prevalence of tennis elbow in healthcare workers was 5.5% with the highest prevalence in caregivers at 12.5%⁽³⁾.

There are 40 treatment options for tennis elbow in literature⁽¹⁾. A network meta-analysis found that steroid injection significantly lower patient-rated tennis elbow evaluation pain score with a mean difference of -5.44 (95% confidence interval of -9.07 to -1.82) compared to placebo at more than 6 weeks and up to 6 months⁽⁴⁾. Previous systematic reviews found that Kinesio taping is effective compared to control or physiotherapy^(5,6). Kinesio taping lowered visual analog scale of pain at movement by 1.08 compared with control; $p=0.03$ ⁽⁵⁾. Corticosteroid injection is an alternative option for tennis elbow as it may reduce local inflammation of the elbow. Even though both treatments are effective, there is limited data on a comparison between these two treatments. The present study aimed to evaluate if Kinesio taping or corticosteroid injection is more effective in patients with tennis elbow by using a systematic review.

Materials and Methods

This systematic review was conducted by searching on four databases including PubMed, Cochrane library, Scopus, and CINAHL. The inclusion criteria were studies conducted in adult patients with tennis elbow or lateral epicondylitis and treated with Kinesio taping versus corticosteroids by the randomized or non-randomized controlled trials. Those observational studies, case series, case reports, systematic reviews, studies without control group, or studies with control groups other than corticosteroids were excluded.

Search terms used in the present study included tennis elbow, lateral epicondylitis, athletics tap, Kinesio tape, randomized controlled trials, or non-randomized controlled trials. Full searching procedures were reported in the searching appendix. The last search was performed on March 12, 2024. Those eligible studies after duplication removal entered the screening process on study title and study abstract; those irrelevant studies were excluded. The remaining studies proceeded to a full-text review. Those met with the present study criteria were included in the quantitative synthesis and meta-analysis (Figure 1).

The outcomes of the study were clinical outcomes after the treatment of both Kinesio taping and corticosteroid including visual analogue scale of pain (VAS), grip strength, and Quick Disability of Arm, Shoulder and Hand. These outcomes were also evaluated at the baseline to determine the difference between the Kinesio taping group and the corticosteroid group. Mean difference and its 95%

confidence interval were calculated between both groups at baseline and post-treatment. The heterogeneity or I² statistics was executed among studies; I² of 50% or over resulted in using random effect model and I² of less than 50% leading to use the fix effect calculation. Biases of randomized controlled trial were evaluated by the Cochrane criteria comprised of seven categories⁽⁷⁾. These biases were reported as low, unclear, or high risk. Statistical analyses were performed by using RevMan version 5.4.1.

Results

There were 38 articles related to Kinesio taping and other treatments from four databases (Figure 1). Of those, 23 articles were excluded from the screening by title and abstract. In total, 15 articles were remaining for the full-text review. Among those articles, 13 articles were excluded due to a comparison of non-corticosteroid: banding or brace (4 articles), shock wave (3 articles), no control group (3 articles), needle therapy (1 article), NSAIDs (1 article), and exercise (1 article). There were two articles included in the quantitative analysis and meta-analysis^(8,9).

Details of both studies were shown in Table 1 and 2. Both studies were conducted in Turkey, as a randomized controlled trial, and using Kase taping technique. There were five different factors between both studies including blinded method, type of corticosteroid, numbers of Kinesio tape, number of performers, and time point of evaluation. The Koçak study conducted as a single blinded trial, using methylprednisolone, five times of Kinesio taping by one researcher, and outcomes evaluation at three weeks, while the Erpala study conducted as open randomization by day presented to clinic, using triamcinolone, three times of Kinesio taping by two researchers, and outcomes evaluation at two weeks.

The number of elbow in the Koçak study was slightly more than the Erpala study (56 vs. 38) with an average age between 40.96 and 48.2 years (Table 2). Regarding the outcomes (Figure 2 to 7), the Erpala study reported VAS in median (IQR) resulting in inability to perform meta-analysis for VAS outcomes of both studies. The VAS was not different between the corticosteroid injection and Kinesio taping at both baseline and post-treatment (Figure 2 and 3). Among three outcomes, only grip strength was significantly different between both groups and both at baseline and at post-treatment (Figure 4, 5). At baseline, the corticosteroid group had higher grip strength than the Kinesio taping group by 7.26 kg-force (95% confidence interval of 3.13 to 13.45), while the corticosteroid group had higher grip strength than the Kinesio taping group by 9.28 kg-force (95% confidence interval of 4.75 to 13.81) at post-treatment as shown in Figure 4 and 5. Regarding study biases, the Erpala study had low risk of biases in six

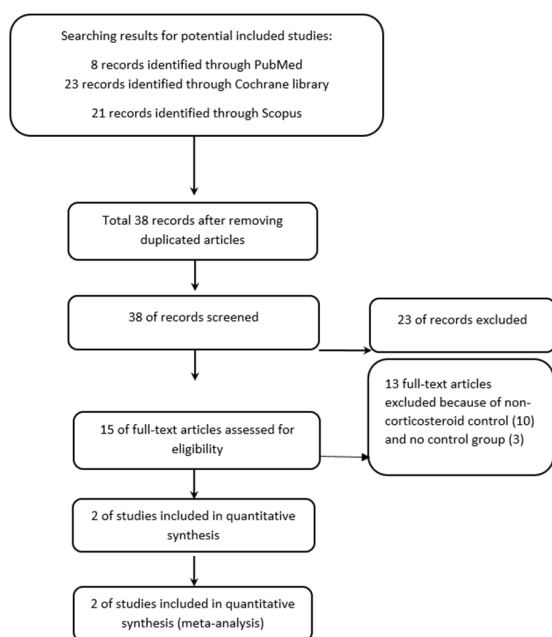


Figure 1. A Prisma flow for a comparison of corticosteroid injection versus Kinesio taping in patients with tennis elbow.

Table 1. Details of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow

Factors	Koçak et al	Erpala et al
Year published	2019	2021
Country	Turkey	Turkey
Design	Single blinded randomized controlled trial	Prospective, randomization by day presented to clinic
Diagnosis of tennis elbow	Clinical	Mills, Maudsley or Cozen's tests
Inclusion criteria	Age 18 to 70 years	Age 18 to 70 years
	Pain 2 to 12 weeks	Pain 6 weeks or more
	Pain score >5/10	
Corticosteroid injection	20 mg methylprednisolone	10 mg triamcinolone
	1 cm lateral to lateral epicondyle, fan shape	Most painful point in the origin of extensor carpi radialis brevis on the lateral epicondyle
Kinesio taping	Tex gold	Kase technique
	Kase technique	5 days x 3 times
	2 weeks x 5 times	2 tapes: 2 legs & lateral epicondyle
	2 tapes: Donut hole tape & muscle inhibition tape	
Performer	1 researcher	2 researchers
Outcome evaluation	3 weeks	2 weeks

Table 2. Patient characteristics at baseline of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow

A. Koçak et al 2019		
Factors	Corticosteroid injection	Kinesio taping
Number of elbow	28	28
Age, years	43.54 (12.08)	40.96 (11.60)
Male, n (%)	14 (50.00%)	10 (35.90%)
Pain duration, weeks	4.50 (3.09)	5.07 (3.77)
Dominant side, n (%)	22 (78.57%)	19 (67.85%)
VAS pre-treatment	2.79 (2.45)	1.93 (1.56)
VAS post-treatment	0.96 (1.85)	0.28 (1.01)
Hand grip strength pre-treatment	29.96 (12.19)	21.89 (7.88)
Hand grip strength post-treatment	33.14 (13.72)	24.96 (8.43)
qDASH pre-treatment	57.39 (17.09)	55.11 (18.63)
qDASH post-treatment	48.82 (16.91)	40.21 (20.61)
B. Erpala et al 2021		
Factors	Corticosteroid injection	Kinesio taping
Number of elbow	17	21
Age, years	47.0 (8.5)	48.2 (9.1)
Male, n (%)	10 (66.7%)	17 (85.0%)
Right side, n (%)	9 (52.9%)	16 (77.2%)
VAS pre-treatment	8 (6.5-9.5)*	8 (7-8)*
VAS post-treatment	3 (2-4)*	4 (2-7)*
Hand grip strength pre-treatment	25.5 (11.3)	19.4 (8.3)
Hand grip strength post-treatment	32.1 (11.1)	22.0 (10.6)
qDASH pre-treatment	58.3 (13.6)	58.8 (12.7)
qDASH post-treatment	22.5 (15.4)	30.9 (15.4)

VAS=visual analogue scale; qDASH=Quick Disability of Arm, Shoulder and Hand
data presented as mean (SD) unless indicated otherwise.

* median (IQR).

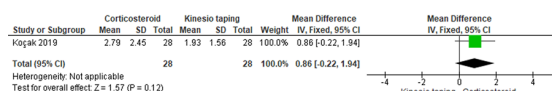


Figure 2. Forest plot of visual analogue scale at baseline of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

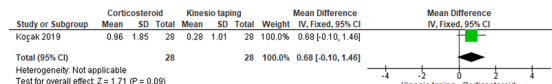


Figure 3. Forest plot of visual analogue scale at post-treatment of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

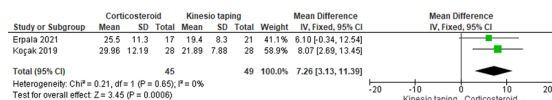


Figure 4. Forest plot of grip strength at baseline of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

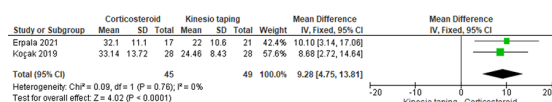


Figure 5. Forest plot of grip strength at post-treatment of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

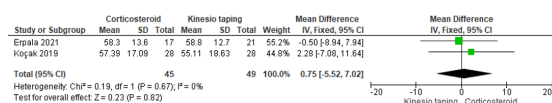


Figure 6. Forest plot of Quick Disability of Arm, Shoulder and Hand at baseline of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

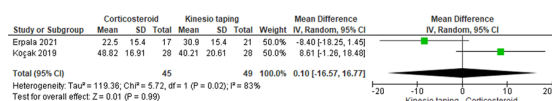


Figure 7. Forest plot of Quick Disability of Arm, Shoulder and Hand at post-treatment of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

categories, while the Koçak study had high risk of biases in four categories as shown in Figure 8.

Discussion

This systematic review showed that corticosteroid injection significantly improved grip strength compared with Kinesio taping at post-treatment but not Quick Disability of Arm, Shoulder and Hand or visual analog scale.

Even though the corticosteroid injection was more

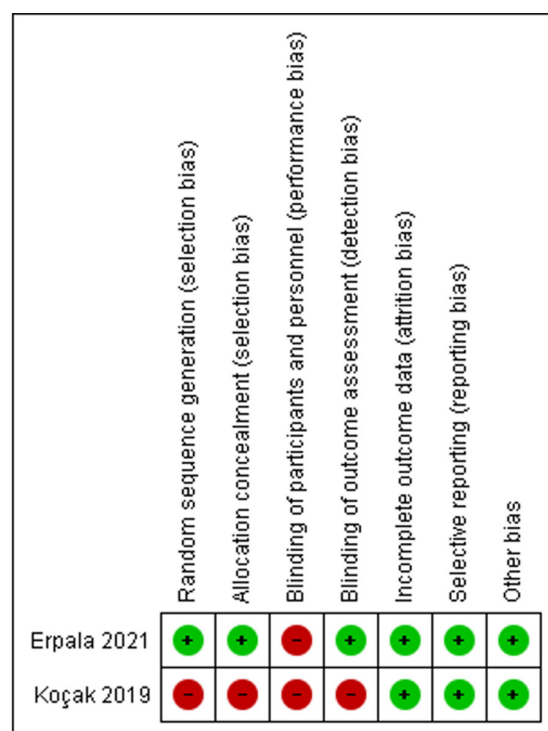


Figure 8. Risk of biases of included studies compared corticosteroid injection versus Kinesio taping in patients with tennis elbow.

-=high risk, ?=unclear risk, +=low risk

effective than Kinesio tape in grip strength at post-treatment (Figure 5), it should be interpreted these results cautiously as there was significant difference of grip strength of both treatments at baseline (Figure 4). Additionally, this grip strength measurement was performed at the post-treatment points which were one week difference between both studies; 2 weeks in the Erpala study and 3 weeks in the Koçak study^(8,9). These two factors may contribute to significant improvements in grip strength by corticosteroid injection than Kinesio taping. Two randomized controlled trials reported that corticosteroid injection showed significant improvement in grip strength than botulinum toxin injection at 4 weeks after injection but not at 8-, 12-, and 16-week after injection^(10,11).

For Quick Disability of Arm, Shoulder and Hand, both corticosteroid injection and Kinesio taping both lowered this score at post-treatment compared with baseline indicating better ability^(8,9). For example, the score was lower from 58.3 to 22.5 in the corticosteroid injection group and lower from 58.8 to 30.9 in the Kinesio taping group (Figure 6 and 7). Note that corticosteroid injection lowered the score more than the Kinesio taping in the Erpala study⁽⁸⁾. However, the summation of both studies was not statistically significant. These results may imply that both treatment modalities may be equivalent in terms of disability score improvement

or disability score improvement may take longer times to be improved. For VAS outcome, this study was unable to declare the difference between these two treatments as only one study reported mean values of both treatments and showed comparable VAS.

There are some limitations in the present study. Only two studies were included in the analysis and both studies were conducted in Turkey with quite small sample size. Second, two outcomes were calculated for the comparison of both treatments. Finally, only short term evaluation at post-treatment was computed as only Koçak study reported long term outcomes at 12 weeks but not the Erlapa study^(8,9).

In conclusion, corticosteroid injection may be more effective than Kinesio taping in terms of grip strength. However, these results may need to be cautiously interpreted as there were significant differences in the grip strength at baseline. Further studies are required to confirm the results of the present study.

What is already known on this topic?

Kinesio taping is effective in reducing pain in patients with tennis elbow compared with sham taping.

What this study adds?

This systematic review showed that corticosteroid may improve grip strength better than Kinesio taping in patients with tennis elbow. However, results should be cautiously interpreted due to significant difference of grip strength between both groups at baseline.

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Conflicts of interest

The authors declare no conflict of interest.

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