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Effect of Kinesio taping therapy for pain reduction in carpal tunnel syndrome patients: Meta-analysis

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Abstract---Background: Carpal Tunnel Syndrome (CTS) is the most common nerve compression. Some cases of CTS have symptoms. The

most common complaint felt by patients is "Nocturnal Acroparesthesia", which is tingling pain at night. Physiotherapy measures can be taken to relieve CTS complaints, one of which is the use of Kinesiotaping. This study aims to analyze the effect of Kinesiotaping on pain reduction in patients with carpal tunnel syndrome by summarizing several previous studies with RevMan 5.3. Subject and Method: This article is a systematic and meta-analytical study. The study used the PICO model as follows. Population = Patients with Carpal Tunnel Syndrome, Intervention = Kinesiotaping therapy, Comparison = No Kinesiotaping therapy, and Outcome = Carpal Tunnel Pain reduction. The articles used in this study were obtained from several databases including PubMed, ScienceDirect, Semantics, and Google Scholar. Articles are collected in a month. The keywords to search for the article were as follows: kinesiotaping OR "kinesio tape" OR pain OR "carpal tunnel syndrome" AND "Randomized controlled trial". The articles included in this study. Results: There are 8 articles included in the meta-analysis research. These eight articles from several countries including Turkey, the USA, Poland, Egypt, and the Republic of Korea showed a significant reduction in pain in Carpal Tunnel Syndrome patients (Standardized Mean Difference= -1.122; 95% CI= -1.93 to -0.32; $p < 0.001$). Conclusion: Kinesiotaping therapy affects reducing pain in Carpal Tunnel Syndrome patients.

Keywords---Kinesio taping therapy, pain reduction. carpal tunnel syndrome.

Introduction

Carpal tunnel syndrome (CTS) commonly occurs with nerve compression. CTS belongs to the group trap Compression neuropathy or neuropathy is the most common and is included in Cumulative Trauma Disorders (CTD) (Karabay, 2013). As one of the three most common types of disease in the upper limb CTD class, it was found that the prevalence in CTS cases was 40%, while in Trigger Finger cases 32%, De Quervan syndrome was 12%, and epicondylitis was 20% (Ibrahim, 2012).

According to Newington et al., (2015), carpal tunnel syndrome is more common in women with an annual incidence of 1.5 per 1000 and 0.5 per 1000 in men. The peak incidence occurred in women aged 45 years. In Indonesia, the prevalence of CTS is between 5.6% to 15% (Azizah et al., 2020). There are several treatments for CTS patients which can be categorized as operative and non-operative. Non-operative methods are effective in patients with mild to moderate CTS with no indication of muscle weakness, atrophy, or nerve denervation (Kosery et al., 2012).

Furthermore, to relieve CTS complaints, physiotherapy interventions can also be carried out using Kinesiotaping, Electrical Stimulation, etc. (Ardella, 2013). A study conducted by Kosery et al., (2012) presented that Kinesiotaping is effective,

efficient, inexpensive, light, safe, and harmless in cases of CTS. The elastic property of Kinesiotaping tape is also made gentle massage with movement, changes in pressure and skin movement can open and close the lymphatic vessels early, and Kinesio sticks to the lymphatic surface can stimulate edema movement, reduction edema removes heat and chemicals in the tissue, promote circulation and point triggers are reduced (Ardella, 2013). Kinesiotaping is an intervention that functions for muscle facilitation, inhibition, increasing lymphatic flow, and reducing pain. The therapeutic effect of Kinesiotaping is due to the interaction between afferent stimulation of the skin and motor Central Nervous System and Peripheral Nervous System units that can stimulate skin mechanoreceptors (Cai et al., 2016).

Based on the high incidence of CTS and the use of kinesiotaping to reduce pain in patients with CTS, the researchers were interested in investigating the effect of kinesio recording on pain reduction in patients with CTS. The data obtained were analyzed using a systematic review and meta-analysis to obtain comprehensive results, by synthesizing the results of the main study involving kinesiotaping to reduce pain in patients with CTS.

Subject and Method

Study Design

This study uses a systematic type and meta-analysis. The articles used in this study were obtained from several databases, including: PubMed, ScienceDirect, Semantics and Google Scholar. Keywords to search for articles were as follows: "kinesio taping" OR "kinesio tape" OR "pain" OR "carpal tunnel syndrome" AND "Randomized Controlled Trials".

Inclusion Criteria

The articles included in this research are full paper articles with a Randomized Controlled Trial approach. Randomized control experimental style design. The study subjects were patients with CTS. The articles selected by the authors discussed the effect of kinesiotaping on pain reduction in patients with CTS.

Exclusion Criteria

Articles not used in this study were articles with non-RCT study designs, non-full-text articles, articles published before 2005, and non-English articles.

Operational definition

The article search was carried out by considering the criteria determined using the PICO model. The population in this study were patients with Carpal Tunnel Syndrome, with the intervention being given kinesiotaping therapy, the comparison was not being given Kinesio Taping therapy, and the result was a reduction in pain in Carpal Tunnel Syndrome patients.

Research Instruments

The use of Kinesio Taping serves to facilitate muscle suppression, increase lymphatic flow, and relieve pain, especially in SCC patients. Instrument: VAS (Visual Analog Scale) with a rating scale.

Data analysis

Data processing was carried out by the Review Manager (RevMan 5.3) by calculating the mean differences to determine the combined research models and to form the final meta-analysis results.

Results

Sample Characteristics

The process of searching for articles in the database with journals can be seen in Figure 1. Figure 2 shows the area where articles were taken according to the inclusion criteria. Articles are taken from the continents, namely America, Europe, Africa, and Asia. Results of a meta-analysis of seven articles on the use of kinesiotaping for pain relief in carpal tunnel syndrome. Based on the results of the analysis, there is a large heterogeneity between experiments ($I^2 = 9\%$;) so the random effect (REM) model is used. Using Kinesiotaping to reduce pain in patients with carpal tunnel syndrome, high statistical significance (SMD) = 1.12; 95% CI 1.93 to 0.32; $P < 0.001$.

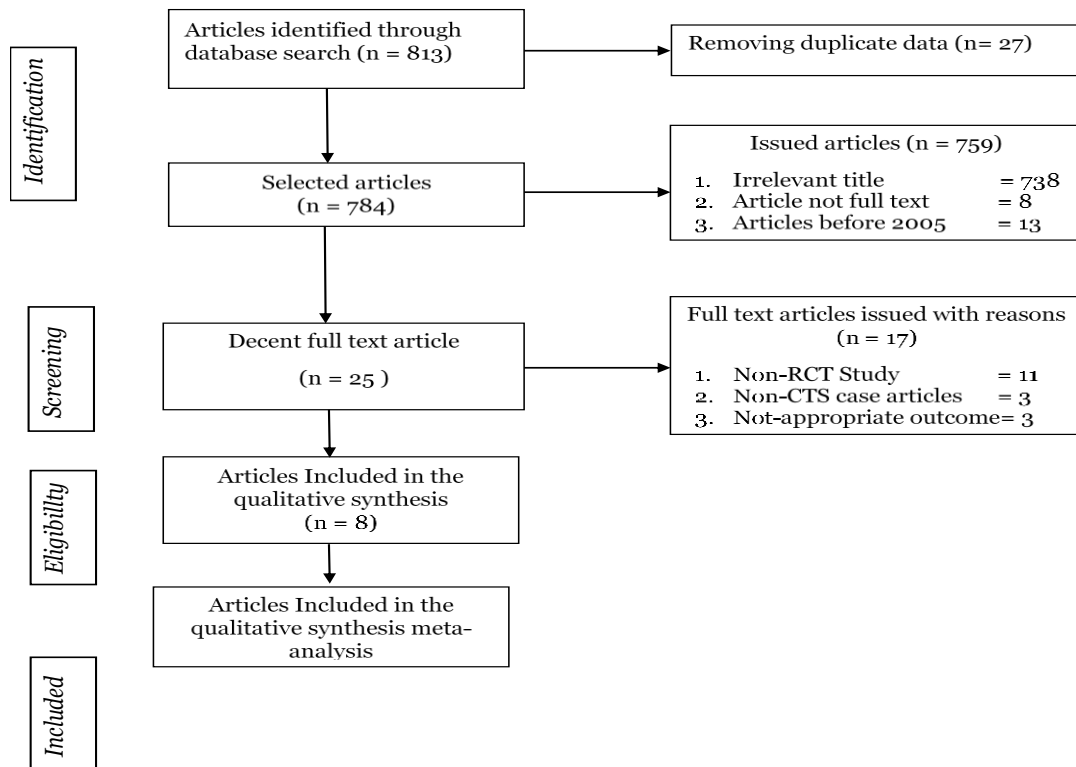


Figure 1. Prism Flow Diagram1

Table 2. A Critical Study of the Effect of Kinesiotaping to Reduce Carpal Tunnel Syndrome Pain

| Publication | RCT | With same group | thePre/intervention | Post/random assignment | Random selection of assignments | Comparable of sociodemographic between arms | Comparable baseline study outcome measures between study arms | Total |
|---------------|-----|-----------------|---------------------|------------------------|---------------------------------|---|---|-------|
| Kulcu, et al | | 1 | 1 | 1 | 1 | 1 | 1 | 7 |
| (2016) | | | | | | | | |
| Kocjan, J1 | | 1 | 1 | 1 | 1 | 1 | 1 | 7 |
| (2016) | | | | | | | | |
| Ali, et al | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 |
| (2013) | | | | | | | | |
| Su Kim et al | | 1 | 1 | 1 | 1 | 1 | 1 | 7 |
| (2019) | | | | | | | | |
| Krause, et al | | 1 | 1 | 1 | 1 | 1 | 1 | 7 |

al (2020)

Kaplan, et al (2018)

Koca, T1 (2020)

architectur e (2018)

Table 1. Description of the Primary Study of the Effect of Kinesiotaping on Carpal Tunnel Syndrome Pain

| Author (Year) | Country | Study Design | Sample | | P (Population) | I (Intervention) | C (Comparison) | O (Outcome) | mean | | SD | |
|----------------------|-------------------|--------------|--------|----|---|---|--|-----------------------|------|------|------|------|
| | | | KT | NK | | | | | KT | NK | KT | NK |
| Kulcu, et al (2016) | Turkey | RCT | 20 | 20 | CTS patients with Mild and Moderate types with age > 18 years | Seeing the effect of giving KT without being given KT on pain reduction in CTS patients, it was measured before and after in both groups. | Seeing the effect of not being given KT on reducing pain in CTS patients | Decreased pain in CTS | 4.1 | 2.8 | 2.7 | 2.8 |
| Kocjan, J (2016) | Poland | RCT | 16 | 16 | CTS patients aged 35-50 years. | Comparing the feasibility of giving KT versus not being given KT for pain reduction in CTS patients | Seeing the feasibility of not being given KT for pain reduction in CTS patients in the treatment Conservative | Decreased pain in CTS | 4.3 | 4.5 | 1.1 | 1.3 |
| Ali, et al (2013) | Egypt | RCT | 30 | 30 | CTS patients with a mean age of 40 years. | This study shows the administration of KT versus Non KT to pain reduction in CTS patients | Comparing the effect of not being given KT on pain reduction in patients CTS | Decreased pain in CTS | 1.87 | 6.89 | 0.99 | 0.92 |
| Kim, et al (2019) | Republic of Korea | RCT | 15 | 15 | CTS patients with a mean age of 23 years. | To determine the effect of giving KT with no KT on pain reduction in CTS patients | To determine the effect of not being given KT on pain reduction in CTS patients | Decreased pain in CTS | 2 | 2.27 | 1.4 | 1.1 |
| Krause, et al (2020) | USA | RCT | 34 | 34 | CTS patients over the age of 18 years | Examining the comparison of the effects after being | Comparing the effect of the program not | Decreased pain | 15.1 | 16.3 | 4 | 4 |

| Author (Year) | Country | Design | n | n | Study Description | Objective | Outcome | Effect Size 1 | Effect Size 2 | Effect Size 3 | Effect Size 4 | |
|----------------------|---------|--------|----|----|---|--|--|-----------------------|---------------|---------------|---------------|-----|
| Kaplan, et al (2018) | Turkey | RCT | 84 | 84 | Female CTS patients aged 25-65 years diagnosed with moderate CTS between March 2013 and February 2014 | To see the effect after being given KT without being given KT and usual treatment on reducing pain in CTS patients | Seeing the effect of not being given KT on reducing pain in CTS patient subjects | Decreased pain in CTS | 3.4 | 4.2 | 2.7 | 2.9 |
| Koca,T(2020) | Turkey | RCT | 28 | 28 | CTS patient diagnosed in 3 days | This study aims to see the impact of giving KT on the reduction of pain on CTS | Not to see the impact of not being given KT on pain reduction in CTS patients | Decreased pain in CTS | 3.1 | 7.6 | 2 | 1.4 |
| Aknuur(2018) | Turkey | RCT | 24 | 24 | CTS patient | To see the effect after being given KT without being given KT and usual treatment on reducing pain in CTS patients | Seeing the effect of not being given KT on reducing pain in CTS patient subjects | Decreased pain in CTS | 3.94 | 4.37 | 0.8 | 0.6 |

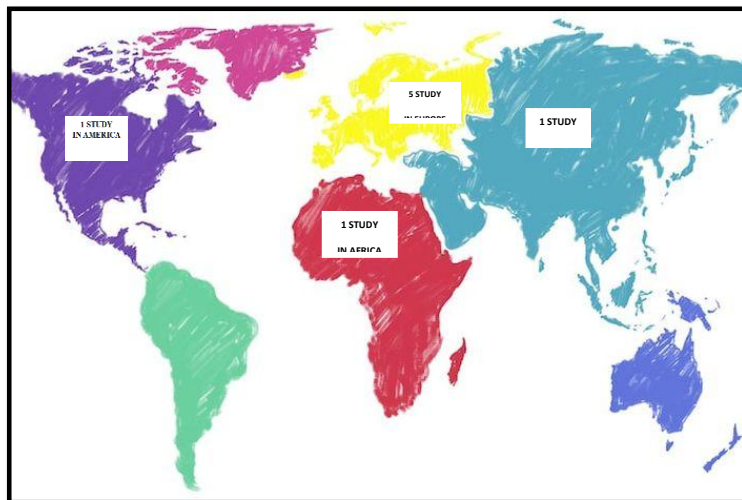


Figure 2. Map of Distribution Area

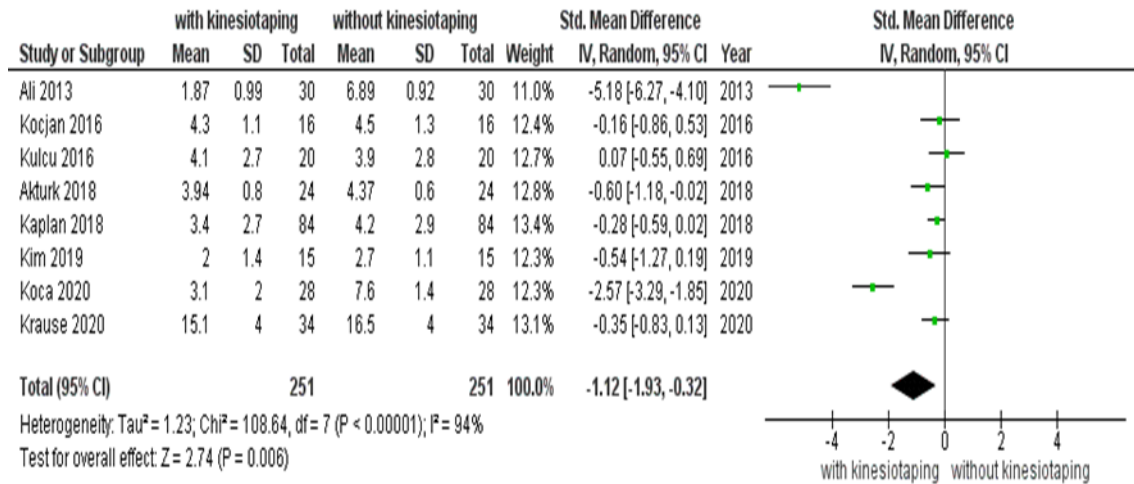


Figure 3. Forest Plot Effect of Using Kinesiotaping to Reduce CTS Complaints

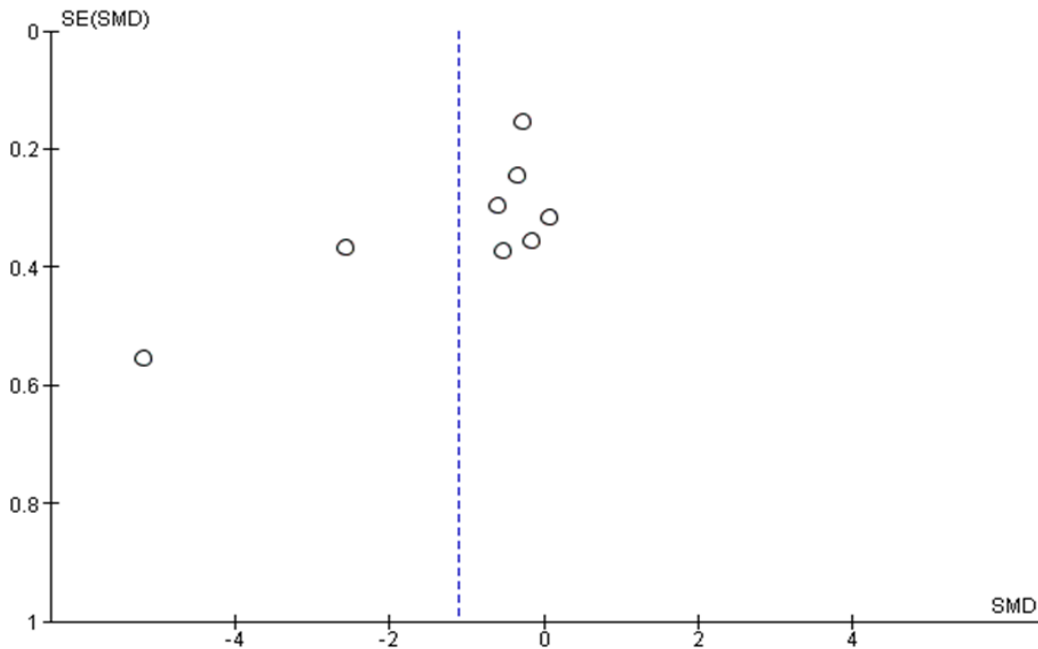


Figure 4. Funnel Plot Effect of Using Kinesiotaping to Reduce CTS Complaints

Forest plot Figure 3 shows the results of the analysis in the RCT study, the use of kinesiotaping has an effect on reducing CTS pain as much as 1.12 times statistically significant SMD = -1.12 ; 95% CI -1.93 to -0.32; P<0.001. Based on the results of the analysis, there was a high heterogeneity between trials (I²= 94%; p <0.001) so the Random Effect Model (REM) was used. Funnel Plot Figure 4) shows publication bias which is characterized by asymmetry of the right and left plots where the plot on the right side has six plots while on the left side it has two plots, so they are not symmetrical to each other and do not form an inverted funnel. The left plot has a standard error between 0.3 and 0.6, while the right plot

has a standard error of 0.1 and 0.4. The bias also occurs from the imbalance between the distances between studies on both the right and left sides of the funnel plot.

Discussion

This systematic study and meta-analysis raised the theme of the effect of kinesiotaping in reducing pain in CTS patients. This lesson discusses data on the effects of Kinesiotaping which is considered important because of its rarity. The number of relevant and accessible studies published is still limited and also experiences data access problems (data duplication) (Murthi, 2018). Pain relief with Kinesiotaping therapy is caused by decreased nerve activation and increased blood flow to muscles and soft tissues. Kinesiotaping therapy can restore muscle function by normalizing muscle tension and improving muscle function (Mohamed et al, 2016).

Based on the gate control theory, Kinesiotaping can relieve pain through feedback on large-diameter afferent nerve fibers and cause a decrease in the excitability of small-diameter nerve fibers that can cause pain (Tantawy and Kamel, 2015). Analgesia based on kinesiotaping control theory can stimulate skin mechanoreceptors that can activate impulses from afferent nerve fibers and reduce the excitability of small-diameter nerve fibers that are the source of pain. In addition, the use of kinesiotaping is intended to relax muscles. Kinesiotaping is done by pulling the skin which can restore balance to a normal position. Stretching the skin layer can increase subcutaneous and lymphatic blood flow, which is believed to have the ability to repair and collect tissue to return to the desired anatomical position or to relieve pain and compress the underlying tissue (O'Sullivan and Bird, 2011).

A systematic review and meta-analysis technique in this study was carried out to improve the generalizability of the findings and obtain convincing conclusions from the results of various similar studies regarding the effect of kinesiotaping on pain reduction in Carpal Tunnel Syndrome patients. A study conducted by Kosery et al, (2012) showed that Kinesiotaping is very effective, efficient, inexpensive, light, safe, and harmless in cases of Carpal Tunnel Syndrome. The elastic nature of Kinesiotaping Therapy also creates a soft massage with movement, pressure change, and skin movement that can open and close the lymphatic vessels early, and kinesiotaping on the lymphatic surface can stimulate edema movement, edema reduction removes heat and chemicals in the tissue, increase circulation and joint triggers are reduced (Ardella, 2013).

This study is in line with research conducted by Nagib et al, (2017) that the distribution of Kinesiotaping in Carpal Tunnel Syndrome cases can affect hand pain and function with BCTQ (Boston Carpal Tunnel Questionnaire). In addition, research conducted by Park et al (2017), Kaya (2015), Janusz (2016), and Ali et al (2013) stated that Kinesiotaping is effective in reducing pain in cases of Carpal Tunnel Syndrome.

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There is no

Confession

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Conflict of Interest

There are no conflicts in the creation of this article's task.

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