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Meta-Analysis

Effect of Kinesio Taping on Pain Reduction in Carpal Tunnel Syndrome Patients: Meta-Analysis

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ABSTRACT

Background: Carpal Tunel Syndrome (CTS) is the most common nerve compression. Some cases of CTS have chronic symptoms. The most common complaint is "Nocturnal Acroparesthesia", which is tingling pain at night. Physiotherapy interventions can be done 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 from several previous studies.
Subjects and Method: This article is a systematic and meta-analytical study. The study used the PICO model as follows. Population= Patients with Carpal Tunel Syndrome, Intervention= Kinesio taping, Comparison= No Kinesiotaping, and Outcome= 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, USA, Poland, Egypt, and the Republic of Korea showed a significant reduction in Carpal Tunnel Sundrom pain (SMD= -1.122; 95% CI= -1.93 to -0.32; p <0.001).
Conclusion: The use of kinesio taping can reduce pain in patients with Carpal Tunnel Syndrome.

Keywords: kinesio taping, reduction of pain, carpal tunnel syndrome.

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BACKGROUND

Carpal tunnel syndrome (CTS) commonly occurs with nerve compression. CTS belongs to the group of trap neuropathy or compression neuropathy that is commonly found 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 12% and epicondylitis 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 people with CTS that 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 of edema remove 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 in an effort to obtain comprehensive results, by synthesizing the results of the main study involving kinesiotaping to reduce pain in patients with CTS.

SUBJECTS AND METHOD

1. Study Design

This study was conducted using 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".

2. Inclusion Criteria

The articles included in this study 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 discuss the effect of kinesiotaping on pain reduction in patients with CTS.

3. Exclusion Criteria

Articles excluded from this study were articles with non-RCT study designs, non-full-text articles, articles published before 2005, and non-English articles.

4. Operational Definition of Variables

The search for articles was carried out by considering the eligibility criteria determined using the PICO model.

Kinesio taping is plasters of various sizes are designed to support weakened muscle and joint tissue without compromising mobility.

Carpal Tunnel Syndrome is a common condition that causes numbness, tingling, and pain in the hand and forearm.

5. Instruments

The instrument used in this research is to use a quality assessment using the Critical Appraisal checklist For Randomized Controlled Trial study from the Center for Evidence Based Management (2014).

6. Data Analysis

The data in this study were analyzed using the Review Manager application (RevMan 5.3). Forest plots and funnel plots were used to determine the size of the relationship and the heterogeneity of the data.

RESULTS

Process of searching article wascarried out by searching several journal databases PubMed, Google Schoolar, Science Direct, and Semantics it can be seen using the PRISMA FLOW flowchart shown in Figure 1.

The initial search process resulted in a total of 813 articles, after deleting the duplicated articles, 784 articles were found, of which 25 articles were eligible for a full text review. A total of 8 articles that meet the criteria according to the quantitative synthesis meta-analysis. It can be seen in figure 2 that the research articles come from fourth continents such as Asia, America, Africa, and Europe (Figure 1).

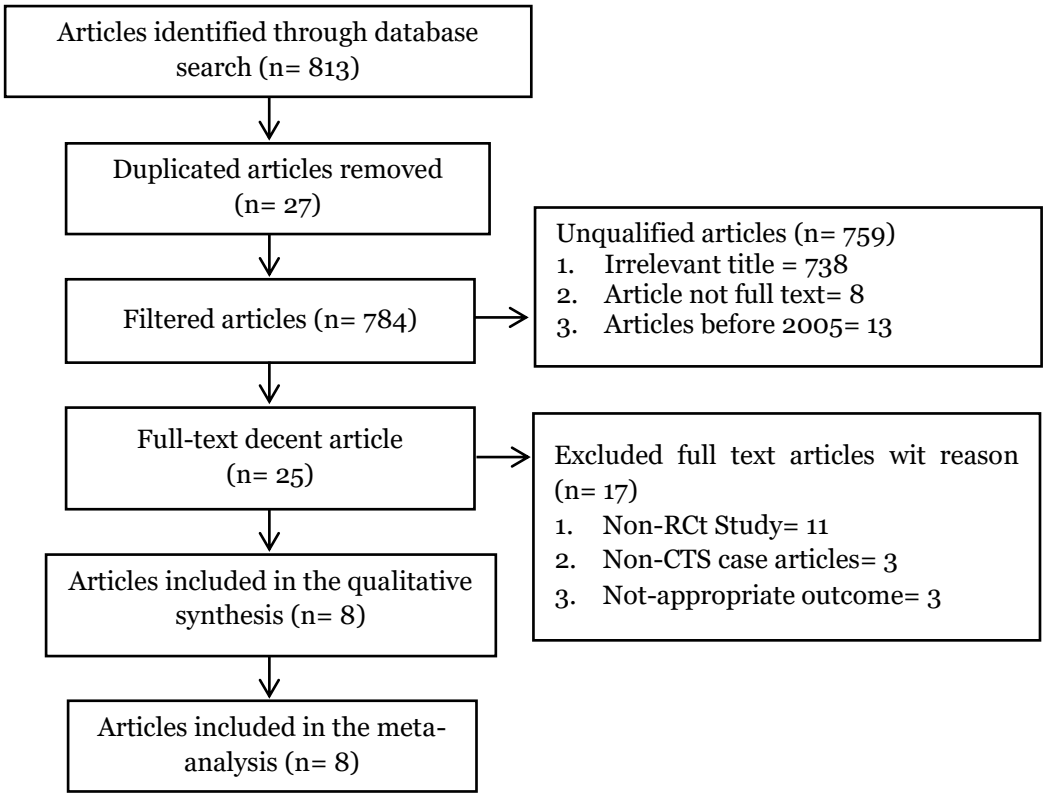

Figure 1. Results of Prisma Flow Diagrams

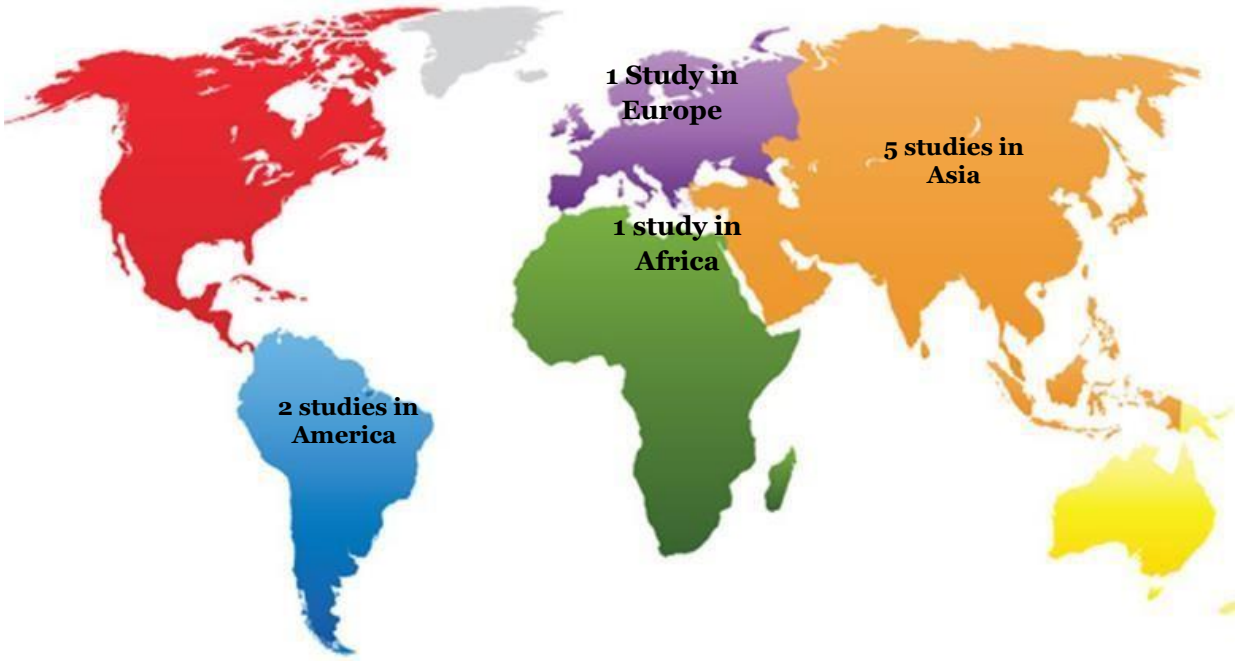

Figure 2. Resarch Distribution Map

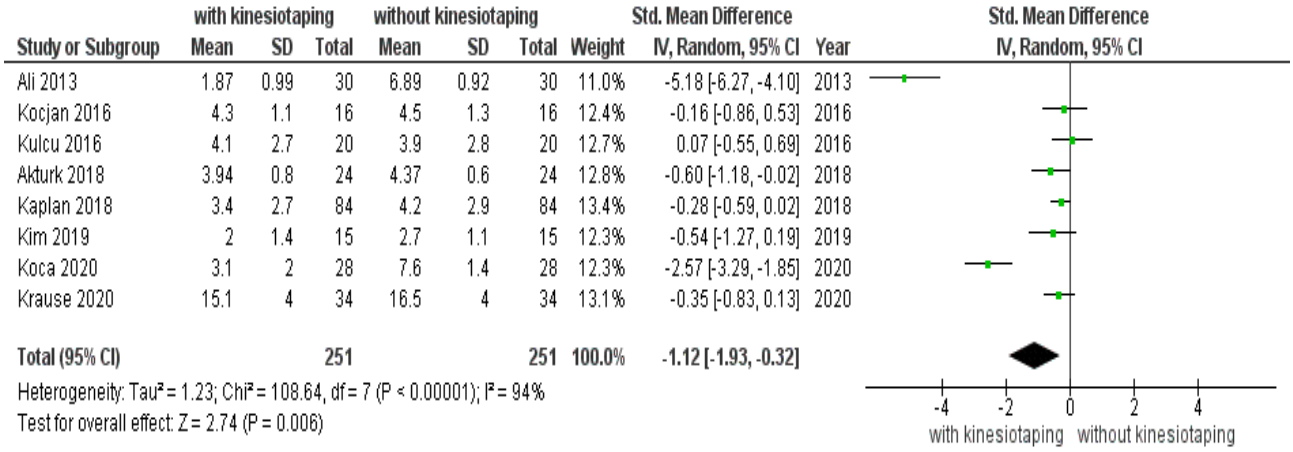

Figure 3. Forest plot of the Effect of Using Kinesio taping to Reduce CTS Complaints

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 (I^2= 94%; p <0.001) so the Random Effect Model (REM) was used.

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Table 1. Critical Appraisal Checklist for Cross-Sectional study (CEBM)

No	Indicator	Publication (Author and Year)							
		Aji (2013)	Kocjan (2016)	Kulcu (2016)	Akturk (2018)	Kaplan (2018)	Kim (2018)	Koca (2020)	Krause (2020)
1	Does this study address a clear research focus?	1	1	1	1	1	1	1	1
2	Is the Randomized Controlled Trial research method appropriate to answer the research question?	1	1	1	1	1	1	1	1
3	Are there enough subjects in the study to establish that the findings were not coincidental?	1	1	1	1	1	0	1	1
4	Were the subjects randomly divided into the experimental and control groups? If not, can this be biased?	1	1	0	1	1	1	1	1
5	Does the study use inclusion/exclusion criteria?	1	1	1	1	1	1	1	1
6	Were the two groups comparable at the start of the study?	1	1	1	1	1	1	1	1
7	Were objective and unbiased outcome criteria used?	1	1	1	1	1	1	1	1
8	Is the measurement method used objective and valid to measure the results? If not, is there any blinding in the study?	1	1	1	1	1	1	1	1
9	Is effect size practically relevant?	1	1	1	1	1	1	1	1
10	Is the estimated effect correct? Is there a confidence level interval?	1	1	1	1	1	1	1	1
11	Are there any confounding factors that have not been taken into account?	1	1	1	0	0	1	1	1
12	Can the results be applied to your research?	1	1	1	1	1	1	1	1
	Total	12	12	11	11	11	11	12	12

Table 2. Description of the Primary Study of the Effect of Kinesiotaping on Carpal Tunnel Syndrome Pain

Author (Year)	Country	Study Design	Sample		P	I	C	O	Mean		SD	
			KT	NT					KT	NT	KT	NT
Kulcu et al. (2016)	Turkey	RCT	20	20	Mild and moderate CTS patients aged >18 years	Kinesio-taping	Non Kinesio-taping	Decreased pain in CTS	4.1	2.8	2.7	2.8
Kocjan (2016)	Poland	RCT	16	16	Patients with CTS aged 35-50 years.	Kinesio-taping	Non Kinesio-taping	Decreased pain in CTS	4.3	4.5	1.1	1.3
Ali et al. (2013)	Egypt	RCT	30	30	Patients with CTS with an average age of 40 years.	Kinesio-taping	Non Kinesio-taping	Decreased pain in CTS	1.87	6.89	0.99	0.92
Kim et al. (2019)	Republic ofKorea	RCT	15	15	Patients with CTS with an average age of 23 years.	Kinesio taping	Non Kinesio-taping	Decreased pain in CTS	2	2.27	1.4	1.1
Krause et al. (2020)	USA	RCT	34	34	Patients with CTS over the age of 18 years	Kinesio taping	Non Kinesio-taping	Decreased pain in CTS	15.1	16.5	4	4
Kaplan et al. (2018)	Turkey	RCT	84	84	Female patients with CTS aged 25-65 years	Kinesio taping	Non Kinesio-taping	Decreased pain in CTS	3.4	4.2	2.7	2.9
Koca (2020)	Turkey	RCT	28	28	Patients with CTS	Kinesio taping	Non Kinesio-taping	Decreased pain in CTS	3.1	7.6	2	1.4
Arktur (2018)	Turkey	RCT	24	24	CTS sufferers	Kinesio taping	Non Kinesio-taping	Decreased pain in CTS	3.94	4.37	0.8	0.6

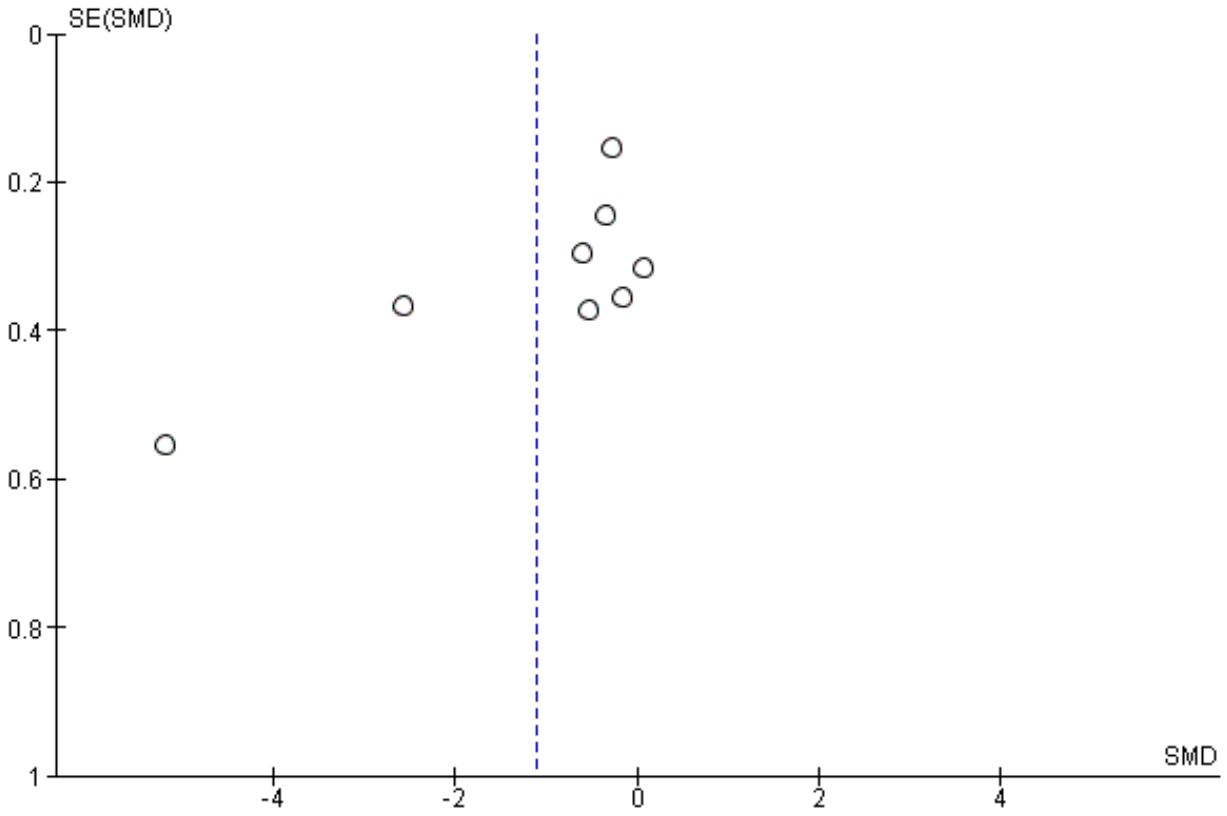

Figure 4. Funnel plot of the Effect of Using Kinesio taping to Reduce CTS Complaints

Figure 4 showed a 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 position or desired position so as to reduce pain and pressure on the tissue beneath the fascia (O'Sullivan and Bird, 2011).

DISCUSSION

This systematic study and meta-analysis raised the theme of the effect of kinesio taping in reducing pain in patients with CTS. This lesson discusses data on the effects of Kinesio taping 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) (Murti, 2018).

Reduction of pain by giving Kinesio taping due to decreased nerve activation, increased blood circulation to the fascia and soft tissues. Kinesio taping can restore fascia function by normalizing muscle tension and improving muscle function (Mohamed et al, 2016).

Based on the gate control theory, Kinesio taping can reduce pain through feedback on large-diameter afferent nerve fibers and lead to reduced stimulation of small-diameter nerve fibers that can cause pain (Tantawy and Kamel, 2015).

Pain reduction based on kinesio taping control theory can stimulate skin mechanoreceptors that can activate afferent diameter nerve fiber impulses and cause reduced stimulation of small diameter nerve fibers that are the cause of pain. Furthermore, the use of kinesio taping aims to relax the muscles. Kinesio taping given

by pulling on the skin can cause the fascia to return to its normal position. Stretching the skin layer can cause an increase in subcutaneous and lymphatic blood flow, it is believed to be able to repair and collect the fascia tissue to return to the anatomical position or desired position so as to reduce pain and pressure on the tissue beneath the fascia (O'Sullivan and Bird, 2011).

A systematic review and meta-analysis technique in this study was conducted to increase the generalizability of the findings and obtain convincing conclusions from the results of various similar studies regarding the effect of kinesio taping on pain reduction in patients with Carpal Tune Syndrome.

A study conducted by Kosery et al, (2012) showed that Kinesio taping is very effective, efficient, inexpensive, light, safe, and harmless in cases of Carpal Tunel Syndrome. The elastic nature of Kinesio taping also creates a soft massage with movement, pressure changes, and the movement of the skin can open and close the lymphatic vessels early, and kinesio taping on the lymphatic surface can stimulate edema movement, reduce edema, remove heat and chemicals in the tissue, increase circulation and trigger points. reduced (Ardella, 2013).

This study is in line with research conducted by Nagib et al. (2017) that the distribution of Kinesio taping 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.

AUTHOR CONTRIBUTION

Lely Tri Pangesti, Mehdya Vikia Murti is the main researcher who selects the topic, searches for and collects research data. Nindita Arum Veibiani as a mentor who directs and helps complete the article.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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