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Soultana Daroglou
Department of Physiotherapy,
Faculty of Health Sciences
International Hellenic
University Alexander Campus
Sindos, Thessaloniki, Greece

Dimitrios Lytras
Ph.D., Department of
Physiotherapy, Faculty of
Health Sciences International
Hellenic University Alexander
Campus Sindos, Thessaloniki,
Greece

Anastasios Kottaras
Department of Physiotherapy,
Faculty of Health Sciences
International Hellenic
University Alexander Campus
Sindos, Thessaloniki, Greece

Paris Iakovidis
Ph.D., Department of
Physiotherapy, Faculty of
Health Sciences International
Hellenic University Alexander
Campus Sindos, Thessaloniki,
Greece

Ioannis Kottaras
M.Sc., Department of
Physiotherapy, Faculty of
Health Sciences International
Hellenic University Alexander
Campus Sindos, Thessaloniki,
Greece

Georgios Chasapis
Department of Physiotherapy,
Faculty of Health Sciences
International Hellenic
University Alexander Campus
Sindos, Thessaloniki, Greece

Corresponding Author:
Dimitrios Lytras
Ph.D., Department of
Physiotherapy, Faculty of
Health Sciences International
Hellenic University Alexander
Campus Sindos, Thessaloniki,
Greece

A review of the efficacy of Kinesio taping in carpal tunnel syndrome

Soultana Daroglou, Dimitrios Lytras, Anastasios Kottaras, Paris Iakovidis, Ioannis Kottaras and Georgios Chasapis

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Abstract

Carpal tunnel syndrome (CTS) is one of the most common peripheral neuropathy syndromes. Early intervention through physiotherapy with as many means as possible helps reduce symptoms, speeds recovery and prevents surgery as a last resort to manage CTS. The aim of this review is to investigate the efficacy of the use of Kinesio Tape (KT) in patients with CTS as the sole treatment or in combination with other physiotherapy techniques. Method: The Google Scholar, PubMed, Scopus and PEDro databases were searched with the following keywords: Carpal tunnel syndrome, kinesio tape, physiotherapy, rehabilitation. Both clinical studies and systematic reviews were included in the review. Results: Eventually, 10 articles were included, of which nine were clinical studies and one was a systematic review. Discussion-Conclusions: The majority of the articles included in this review report that the use of KT provides positive results regarding the reduction of pain, the increase of the space inside the carpal tunnel and the functioning of the upper limb. Some research comes to this conclusion using only KT and others in combination with different physiotherapy interventions. In general, the use of KT is encouraged by these studies, but the need for further research study to establish a treatment protocol on application manner and frequency and its combination with other interventions is emphasized.

Keywords: Carpal tunnel syndrome, Kinesio tape, physiotherapy, rehabilitation

Introduction

Carpal tunnel syndrome (CTS) is the most common peripheral neuropathy [1]. The carpal tunnel is a limited space that is also characterized as a “closed compartment” [2]. CTS is caused by pressure on the median nerve inside the carpal tunnel [3, 4, 5]. Symptoms include pain, paresthesia and loss of sensation in the innervation area of the median nerve [6]. Daily activities such as typing aggravate the pain. The epidemiological data of CTS show that 1% of the general population is affected. Women are affected twice as often as men. Vulnerable groups include pregnant women and people who undergo dialysis as the distribution of fluids in their body is affected [6].

Nowadays, due to incorrect ergonomic positioning of the wrist and its overuse during work in front of the computer, the probability of developing the syndrome increases (working for long periods of time with intensive use of the mouse may lead to increased risk of mononeuropathy) [7]. Teleworking has also contributed to this, which, due to COVID-19, has increased considerably [8].

Physiotherapy intervention is critical to prevent the increase of symptoms as proper and early physiotherapy treatment eliminates the need for surgery [3]. The use of Kinesio Tape (KT) is widespread in the field of sports [9]. It is applied to the body, it is waterproof and the literature shows that it helps movement, improves the intra-articular space, reduces pain and has several advantages [9, 10]. CTS is the leading cause of absence from work compared to any other injury, which has a major financial impact on the health system [11]. The action of KT is continuous supporting the application area during the movement while at the same time it allows people to continue working. Furthermore, it keeps the hand in the correct position in contrast to splints that immobilize the hand in a specific position [12].

The aim of this study is to demonstrate with research evidence whether the use of KT is effective in relieving or reducing symptoms in people with CTS.

Method

The Google Scholar, PubMed, Scopus and PEDro databases

were searched in English and Greek with the following keywords: carpal tunnel syndrome, kinesio tape physiotherapy, rehabilitation. Both clinical studies and systematic reviews were included in the review. Below are the main points and conclusions of all the articles included in this review (Table 1).

Table 1: Main characteristics of included studies

Author, Year	Number of participant	Intervention duration	Intervention	Conclusions
Krause <i>et al.</i> , 2020	44 participants n = 68 included hands	2 weeks	Group 1: dorsal Kinesio Tape (KT) application Group 2: typical physiotherapy (splints, stretching) Group 3: placebo KT use	Group 1 had better results than the others
Güner <i>et al.</i> , 2018	n = 68		Group 1: n = 21, low-frequency laser Group 2: n = 22, low-frequency laser and KT Group 3: n = 21, placebo laser	Combination of laser and KT (Group 2) provides long-term results.
Koca, 2020	n=56	6 days	One group: dorsal KT application	KT use reduced pain and improved functioning.
Park <i>et al.</i> , 2018	n=20	4 weeks	Group 1: no treatment Group 2: Y-shaped KT	KT use increased carpal tunnel space, as shown by the electrophysiological findings.
Aktürk <i>et al.</i> , 2018	44 participants n = 58 included hands	5 weeks	Group 1: use of splint Group 2: use of KT	Group 1 patients showed better compliance and early use of KT reduces the symptoms of CTS
Nadgarstka & Kocjan, 2016	32 participants n = 38 included hands	3 weeks	Group 1: use of KT Group 2: no treatment	There were no statistically significant differences between the two groups. Further research is suggested.
Kaplan <i>et al.</i> , 2019	n = 110	3 weeks	Group 1: night splint Group 2: night splint and KT Group 3: night splint and paraffin	Electromyographic results showed that muscle strength could be maintained for more than six months by combining tape and a splint
Kurniawati <i>et al.</i> , 2020	n = 20	No treatment time data available	Group 1: n = 10, nerve mobilization Group 2: n = 10, use of KT	Nerve mobilization (group 1) has better results in reducing pain than KT.
El Kosery <i>et al.</i> , 2012	n = 15	4 weeks	One group: use of Y-shaped KT	The statistical results showed that the use of tape is an effective, cheap and safe intervention as it does not affect the fetus and the pregnant woman
Movaghar <i>et al.</i> , 2020	Not mentioned.	-	11 articles included	Pain decreased, fist and hand grip muscle strength increased, especially when using KT long-term.

Literature Review

In the randomized clinical trial of Krause *et al.* [12], the efficacy of applying KT dorsally is compared with conservative, non-surgical treatment with splints and lumbrical muscles stretching and with placebo KT application. The study recruited 44 participants with CTS and 68 wrists were evaluated. The participants were divided into three different intervention groups: the group with dorsal application of KT (first group), the group with standard physiotherapy protocols (second group) and the group with placebo application of KT (third group). The study had a duration of two weeks. The first group received dorsal application of the tape (on the forearm, up to the interphalangeal joint of the thumb and the last interphalangeal joint of the fifth finger with 10% tension of the tape). The tape was changed every three days. The second group received a pre-set splint that they wore every night and they learned a set of exercises, which they performed 3-5 times every day. The third group received a four-inch tape on the scapula with 0% tape tension, which was changed every three days. The result showed that the group with the dorsal use of KT had a better result in the various comparison measures (questionnaires, pain tests and exercises). The researchers suggest the conduction further studies as the use of tape reduces the symptoms and at the same time allows the

activities to continue.

In the clinical study of Güner *et al.* [13], the efficacy of using KT in combination with laser in individuals with mild to moderate symptoms of CTS in terms of strength, functioning and electrophysiological parameters was assessed. The participants were divided into three groups. In the first group, which consisted of 21 hands, a low-frequency laser was used. The second group (22 hands) employed a combination of low-frequency laser and KT. Lastly, in the third group of 21 hands placebo KT was applied. The total number of participants was 64. Evaluations were performed before treatment, at the end of the study (duration of three weeks) and after three months. Evaluation included pain test, questionnaires, hand grip strength test and finger pinch strength test. In comparisons made in the third week, the first and second groups had similar results, which were better than those of the third group. In the 3-month follow-up measurements, the second group had a better result than the first. The study concluded that combining a laser treatment and KT leads to better long-term results.

Koca *et al.* [14] focused their clinical study on the efficacy of people with CTS. The sample consisted of 56 randomly selected individuals to whom KT was applied twice for three days each time. The method of taping was the use of a strip on the dorsal surface of the forearm that reached the third and

fourth metacarpal joint. The tape tension was 0% on the forearm while after the wrist it became 50%. Another strip of tape was used around the wrist for greater restraint. The results of the study based on various questionnaires showed that KT increased functioning in the daily work of individuals, while the intensity and severity of pain decreased. Furthermore, Park *et al.* [15] studied in their clinical trial the contribution of the use of KT to the expansion of space in the area of the carpal tunnel. The study included 20 participants, aged 20-40 years with mild to moderate CTS symptoms. The intervention group used KT two times per week for a total of four weeks, while the control group did not receive any treatment. The tape was Y-shaped, i.e., a piece of tape 20-25cm long and 5cm wide, applied to the palmar surface of the hand from the forearm to the periphery of the metacarpal joints of the 1st and 5th finger. The tape was removed every 48 hours and after a break of 24 hours a new one was applied. In conclusion, the electrophysiological findings showed that with the use of KT the carpal area increased and the pressure of the median nerve decreased.

In the randomized controlled trial of Aktürk *et al.* [16], the efficacy of the splint and the use of KT in patients with mild to moderate CTS symptoms was compared. The sample of the study consisted of 44 patients (58 hands), who were evaluated by physical examination and questionnaires before the study and six weeks after the end of the intervention. One group used the splint as a treatment and the other the tape. The results showed that early use of KT limited the progression of the syndrome and that patients showed greater compliance with it.

Another randomized clinical trial [17] aimed to understand the efficacy of KT use in pain levels, range of motion and patient functioning. The number of participants was 32 people (38 hands in total). The participants were divided into two groups. The intervention group was treated with KT at 40% tension applied from the medial epicondyle to the wrist, whereas the control group did not receive any treatment. The results, which were compared on the basis of various questionnaires and visual pain scales, showed very small differences of minimal statistical significance between the two groups. The study concluded that there was no difference with the use of KT and suggests further research.

In the randomized clinical trial of Kaplan *et al.* [18], the efficacy of orthotics, the use of KT and paraffin as different conservative means in the management of CTS was compared. The participants were 169 and were randomly divided into three groups, but in the end only 110 met the appropriate criteria. The first group (36 participants) received the intervention with a splint, which was applied during the night and kept the wrist in a neutral position; the second group (37 participants) had a splint intervention in combination with the use of KT and the third group (37 participants) received splint intervention along with paraffin. The splint was applied every night for three consecutive months. KT was applied twice per week and in total during the duration of the intervention six sessions were performed. The taping method involved two tapes. The first tape was applied to the palm from the second and third metacarpophalangeal joints up to 5cm before the medial epicondyle. The second tape was applied to the palm from the fifth metacarpophalangeal joint up to 5cm before the medial epicondyle with 10-15% tension. Paraffin was used three times a week for three weeks; i.e., a total of nine sessions during the study. Electromyographic results showed that muscle strength could be maintained for more than six months

in the second group by combining KT and splint application. Another comparison made was that of Kurniawati *et al.* [19], who, in their clinical trial, compared the efficacy of KT with that of joint mobilization in treating CTS symptoms. The 20 participants of the study were equally divided into two groups. Joint mobilization was performed on the first group, whereas the second one received KT application. The results showed that joint mobilization is more effective in reducing pain than KT. To be noted is that no data were provided on the treatment duration as well as the taping and joint mobilization methods.

Concerning vulnerable population groups, the clinical trial of El Kosery *et al.* [20] studied the efficacy of KT in pregnant women with CTS, due to their inability to receive analgesic medication. The total duration of the intervention was four weeks, while the KT application method was three consecutive days with a one-day break in between. The study included 15 participants. The tape had a Y-shape with an application tension of 15-20%. The study compared the electromyograms taken four weeks before and after the start of the study. The statistical results showed that the use of tape is an effective, cheap and safe intervention as it does not affect the fetus and the pregnant woman.

Lastly, in a systematic review, Movaghar *et al.* [21] investigated the efficacy of using KT on the wrist and forearm to improve the symptoms of CTS. Of the 50 articles, 11 were included in the research and the results showed that the pain was reduced, the hand grip and fist muscle strength was increased, especially when the use of tape is long-term.

Discussion and Results

The articles included in the review provide encouraging evidence that the use of KT has positive effects in reducing pain symptoms and increasing the functionality of patients with CTS, whether it is used alone or in combination with other interventions (laser, night splint). The clinical trials of (Koca, El Kosery *et al.* Nadgarstka & Kocjan and Park *et al.*) [14, 20, 17, 15] as well as the systematic review of Movaghar *et al.* [21] study the use of KT as a single intervention tool. The comparisons are made using different questionnaires and procedures in each study, with different protocols in terms of KT application time and method and conclude that it has positive effects on the symptoms of CTS. An exception is the study by Nadgarstka & Kocjan [17], who did not find significant differences between the different groups.

Other studies [16, 18, 13, 12] compare the efficacy of combined KT and splint or laser interventions with respect to a single intervention, such as a night splint, paraffin administration or laser application and conclude that combined intervention programs provide better results in patients. The only study that showed that using KT did not have a better effect than nerve mobilization was by Kurniawati *et al.* [19].

Conclusions

The majority of studies included in this review showed that the use of KT has positive results and is recommended for patients with CTS, whether used alone or in combination with other therapies. The results of this review suggest that KT application has better long-term results in patients with mild to moderate CTS symptoms. It was observed that in each clinical study the means of comparison such as questionnaires, functional tests and treatment times were different, which leads to reservations about the generalization of the conclusions. In the future, more research is needed to create a specific treatment protocol (frequency, duration, area

of application, etc.), which will show how to tape, the tension of KT, its exact application area on the body, the quality of the tape (as different tapes exhibit different behaviors) [22] and the time of its use in combination with the other means of intervention or alone as the present literature has not reached any specific conclusion regarding these parameters. The issue needs further investigation.

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