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Effectivenes Of Gliding Exercise Therapy In Carpal Tunnel Syndrome (CTS) Patients : Literature Review

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Abstract
Carpal Tunnel Syndrome (CTS) is a condition characterized by pain, numbness, and tingling in the hand, particularly in the thumb, index finger, middle finger, and part of the ring finger. This condition occurs due to compression of the median nerve passing through the carpal tunnel in the wrist. This study aims to evaluate the effectiveness of gliding exercises in improving CTS symptoms and the functional status of patients. The method used is a literature review, with inclusion criteria for research articles from 2013 to 2023. The results from the five selected studies indicate that gliding exercises can significantly reduce pressure on the median nerve, thereby alleviating symptoms and enhancing the functional capacity of the hand in CTS patients. These exercises were performed once a week for 30 minutes over a period of 3 to 8 weeks, depending on the patient's condition. Gliding exercises have been proven effective as a non-medical intervention in the management of CTS, though some controversy regarding the potential risk of shifting the involved anatomical structures should be considered.

Keywords: carpal tunnel syndrome, gliding exercises, literature review, pain

INTRODUCTION

Carpal tunnel syndrome is a disease characterized by pain, numbness, and tingling in the hands. This sensation can be felt on the thumb, index finger, middle finger, and 1/2 ring finger on the radial side. This occurs when the median nerve that passes through the carpal tunnel in the wrist is pinched or pinched (Genova et al., 2020). The wrist and fingers are made up of muscles, tendons, joints, and nerves. The wrist and fingers have a more complex function than other parts of the body. Its most common function is carpal tunnel syndrome (CTS) (Zaki et al., 2022).

CTS pathophysiology has evaluated symptoms related to local compression of the central nerve of the wrist causing ischemia or injury of a mechanism that interferes with the speed of nerve conduction (Malakootian et al., 2023). This condition can be caused by damage to the space occupied in the tunnel, such as cysts, tumors, osteophytes, callus fractures or hypertrophic synovial tissue (Horvai & Link, 2012). It is also associated with metabolic or systemic conditions such as thyroid disease, diabetes, rheumatoid arthritis, arthritis, arthritis, alcoholism, and pregnancy (Bilecik[1] et al., 2014).

In addition, packaging and systematic CTS are also associated with a decrease in the morbidity of central nerve longitudinal travel is as follows through the carpal tunnel (Atya & Mansour, 2011). Although the majority of CTS cases are idiopathic in nature, with a higher incidence for certain daily tasks of speed and robustness, repetitive crafts work in the fields of construction, packing and assembly of meat lines and those dealing in long-term correct hand movements. Patients with CTS symptoms usually include numbness, tingling, paresthesia and burning pain at night (Ballestero-Pérez et al., 2017).

The median nerve innervates the fingers. The worst symptoms are at night and often wake the patient up. These Clinical signs may include damage to both the lamp and the different and developing sense of touch Loss of grip and compression in some cases (Abdolrazaghi et al., 2023). In the early stages of CTS, no morphological changes can be observed in the central nervous system, neurological findings are reversible and intermittent symptoms Long or repeated periods of increased pressure in the carpal tunnel can lead to segmental and more sustained demyelination and The symptoms are severe, sometimes accompanied by weakness (Ghasemi et al., 2023). When there is long-term ischemia, the damage to the axon and nerve failure may be irreversible. CTS management is based on reducing pressure on the median nerve. Multiple treatments used (Wulandari & Ariyanto, 2024). There is quite a lot of discussion of the optimal control category Although there are advantages of controlled cross wrist strap removal in patients with advanced CTS.

Carpal tunnel syndrome is a condition characterized by pain, death Research on the effectiveness of gliding exercises in improving carpal tunnel syndrome symptoms and functional status in patients with carpal tunnel syndrome is still limited and produces conflicting results (Sheereen et al., 2022). Gliding exercises are expected to accelerate the improvement of carpal tunnel syndrome symptoms so as to improve functional status (Sekaringtyas et al., 2021).

One of the most common musculoskeletal conditions in workers is carpal Tunnel syndrome (CTS), which is a collection of symptoms such as pain, tingling, and numbness in the wrist. caused by continuous compression of the central nervous system The prevalence of CTS is 1-5% of the general adult population, with an incidence of 329 cases per 100,000 people per year, and 5-21% of the working population. CTS incidence is most common in men between the ages of 40 and 60 compared to Woman 1:3-5

Research on the effectiveness of Gliding Exercise therapy in improving the Nerve Medianus found in carpal tunnel syndrome and the functional status of patients with carpal tunnel syndrome is still limited and gives mixed results (Biswas et al., n.d.). Gliding exercise therapy is expected to accelerate the improvement of carpal tunnel syndrome symptoms so as to improve functional status. Therefore, the purpose of this study is to find out if gliding can lower the average pressure on the nerves to prevent pain in patients with carpal tunnel syndrome (Razali et al., 2022).

To enhance the introduction of your study, the following paragraphs can be added to address the research gap, novelty, and objectives:

Research Gap while Carpal Tunnel Syndrome (CTS) is a well-documented condition, there is still a significant gap in the literature regarding the effectiveness of non-surgical interventions, particularly gliding exercises, in alleviating the symptoms of CTS. Previous studies on gliding exercises have yielded mixed and sometimes conflicting results, especially concerning their impact on pain reduction and functional improvement in CTS patients. The lack of consensus and limited

high-quality evidence highlights the need for further investigation into the therapeutic potential of gliding exercises. Additionally, most existing research has focused on short-term outcomes, leaving the long-term efficacy and sustainability of these exercises largely unexplored.

This study seeks to fill the existing research gap by providing a comprehensive evaluation of the efficacy of gliding exercises specifically targeted at reducing median nerve compression in CTS patients. Unlike previous studies that primarily concentrated on short-term symptom relief, this research aims to investigate both immediate and sustained improvements in pain levels and functional status. Furthermore, this study will explore the optimal frequency and duration of gliding exercise therapy, contributing to a more standardized approach for clinicians managing CTS. The novelty of this research lies in its systematic analysis of the impact of gliding exercises across different age groups, and varying degrees of CTS severity, thus offering a more tailored and effective intervention strategy.

The primary objective of this study is to evaluate the effectiveness of gliding exercises in reducing pain and improving the functional status of patients with Carpal Tunnel Syndrome. Specifically, the study aims to determine the extent to which gliding exercises can lower the average pressure on the median nerve within the carpal tunnel.

METHODS

This study uses a literature review method. Literature review is a systematic method that summarizes and evaluates knowledge or practice on a specific topic. The question of this study follows the PICO format: (P=population) carpal tunnel syndrome patients, (I=intervention) gliding exercises, (C=comparison) no comparison, (O=outcome) Gliding exercises are effective in reducing pain in CTS patients – . Articles from scientific journals are limited to inclusion and exclusion criteria, and journals are from the last 10 years, namely 2013-2023.

Articles will be reviewed if they meet the inclusion criteria as follows: (i) the subject is an adult CTS patient aged 40-65 years, (ii) the article is a research, not a review, the research intervention is scale-shifting, good or not. . They are compared in scientific journals, articles are still being researched, all research methods except systematic reviews. Authors access journal databases such as PubMed, Google Scholar, ScienceDirect, and when journal articles are locked, authors upload them to the Sci-Hub database using predefined keywords i.e. "Gliding Exercises", "CTS", "Pain". Intensity", from 2013 to 2023.

Research articles are saved in pdf format and selected through several processes such as screening, eligibility and inclusion based on inclusion and exclusion criteria determined by the author. The authors did not use raw data from previous studies. Gliding Exercise is first performed by a physiotherapist, after which the patient imitates and performs it.

The implementation of the Gliding Exercise begins with 1) wrist and finger movements in a neutral position 2) wrists in a neutral position while holding the fingers and thumbs; finger bones 3) wrist in neutral position while fingers and thumb holding palm 4) wrist in neutral position then os. Straight fingers forward 5) Wrists in a neutral position while fingers and thumbs grasping up to the palm bone. This research tool uses pain. Pain was assessed using a visual analogue scale (cm). Already proven to be a valid, reliable, and responsive measure of clinical pain. Symptoms (SSS). The severity of symptoms is recorded using the Symptom Severity Scale (SSS). SSS asks patients to assess the severity of their CTS-related symptoms. Self-reported functions Self-

reported functions can be measured with FSS (Functional Functioning). Patients rate how difficult it is for them to perform daily tasks. FSS is valid and sensitive to use in determining the state of an operation that Detected.

Figure 1. Gliding Exercise (Rafique et al., 2020)

Active wrist exercise therapy and finger stretching exercises alternately reduce pressure on the wrist. CTS, at least in some cases in patients who use a specific set of exercises. It was concluded that adhesions were attached to the median nerve before forcing the median nerve and flexor muscles. used to minimize scar adhesion and maximize nerve ablation through carpal tunnels, and reported that this program is effective in the treatment of postoperative carpal tunnel syndrome by relieving pain and low recurrence rates.

RESULTS AND DISCUSSION

Of the 7 journals accepted, only 5 journals were examined through screening, qualification and inclusion stages. Shearing gymnastics is a program that is applied through several movements on the hands and wrists with the aim of reducing pressure on the central nerve of the wrist so that symptoms gradually improve and the functional capacity of the affected hand can be more optimal (Putri, 2019).

Table 1. Comparison of *Experimental Group* and *Control Group*

Reviewer	Participant		Intervention		Measurement	Result	Design Study
	Intervention Group	Control Group	Experimental Group	Control Group			
De-la-Llave-Rincon Et Al 2016	n=22 >44 years	n=22 >44 years	Gliding exercise	No intervention	NPRS	P<0,001	RCT Prospective
Bardak Et al,2014	n=30 60-75 years old	n=30 60-75 years old	Gliding exercise	No intervention	NCS	P<0.005	RCT
Bialosky et Al 2020	n=17 >65 years	n=17 >65 years	Gliding exercise	No intervention	CTSQ	P<0,001	RCT
Horng et al, 2013	n=36 >40 years	n=36 >40 years	Gliding exercise	No intervention	ANOVA	P<0.1	RCT

Baysal et al, 2018	n=15 >60 years	n=15 >60 years	Gliding exercise	No intervention	FFI	P<0.04	RCT

Based on a literature review study, the author found that of the 700 sample results, the dominant sample was 40-75 years old. From the results of the literature review, it was found that most of the literature used an RCT research design with a P<0.005.

Table 2. Gliding Exercise Therapy Dosage

Reviews	Type of Intervention	Therapeutic Dosage			Duration Theraphy
		F	T	T	
De-la-Llave-Rincon et al, 2016	1 session (30 min) of soft tissue mobilization and nerve slider neurodynamic exercises	1x/week	Gliding Exercise	30 minutes	4 weeks
dak et al, 2014	8 wk of paraffin, splinting, and tendon and nerve gliding Exercises	1x/week	Gliding Exercise	10 minutes	8 weeks
Bialosky et al, 2020	1 session (30 min) of soft Tissue mobilization and nerve slider neurodynamic Exercises	1x/week	Gliding Exercise	30 minutes	6 weeks
Horng et al, 2013	6 wk of SCT vs. tendon and nerve gliding exercises	Once a day	Gliding Exercise	10 minutes	6 weeks
Baysal et al, 2018	3 wk of nerve gliding exercises, stressing nerve	3x/week	Gliding Exercise	10 minutes	3 weeks
De-la-Llave-Rincon et al, 2016	Tendon and nerve gliding Exercise	1x/week	Gliding Exercise	10 minutes	4 weeks

Based on this study that has been conducted, researchers found that *Gliding Exercise* Therapy can be applied to patients *with Carpal Tunnel Syndrome* with a frequency of 1 time/week, with a duration of 30 minutes for 6 weeks and carried out 5 times/week.

Table 3. *Mean of Study Characteristic*

Reviewer	Measurement	Group Experiment		Control Group		Significant
		Pre	Post	Pre	Post	
De-la-Llave-Rincon et al, 2016	NPRS	44 ± 10	46 ± 12	46.2 ± 4.3	44 ± 12.2	P<0,001
Bardak et al, 2014	NCS	51.1 ± 9.1	54.1 ± 7.1	49.4 ± 7.32	56.3 ± 7.3	P<0.005
Bialosky et al, 2020	CTSQ	44.7 ± 8.7	48.3 ± 4.7	46.3 ± 7.2	46.3 ± 4.9	P<0,001
Horng et al, 2013	ANOVA	49.8 ± 6.0	50.2 ± 4.0	48.4 ± 6.3	48. 4 ± 6.3	P<0.1
Baysal et al, 2018	FFI	0.43 ± 6.2	0.65 ± 8.2	-	-	P<0.04

Based on the table above, when compared to the control group, the intervention group showed a good and significant improvement.

Discussion

Pain is a condition in the form of unpleasant subjective feelings because everyone experiences pain on a certain scale or degree and only they can explain or evaluate the pain.

Clamp in carpal tunnel syndrome is caused by the median nerve in the carpal tunnel region, which borders the carpal bone and transverse carpal ligament. In the carpal tunnel region, the pressure increases thus causing a decrease in median nerve function at this level. Sensory symptoms such as pain that are not treated immediately cause motor dysfunction.

Several recent literature states that nerve and tendon gliding exercises are an alternative intervention in treating Conservation CTS. Nerve and tendon gliding exercise is a joint and tendon mobilization exercise program that can be implemented by doing several hand and wrist movements. This training program lasts 3-4 weeks or may change according to the results of symptom improvement. This exercise aims to reduce the pressure on the medianus nerve in the wrist causing symptoms to appear what may be happening could be better. This exercise also helps the tendon shift to its original position which can improve the range of motion of the patient's hand function According to the American Academy of Orthopaedic surgeons, this exercise is divided into 4 major parts, namely: wrist extension stretch, wrist flexion movement, median nerve slide, and tendon slide.

Based on a meta-analysis by Kim. He identified four randomized controlled trials that showed that tendon training and nerve gliding resulted in significant improvements. Symptoms associated with CTS, including symptom severity and general functional status of patients across the study group. A systematic review of neurodynamic mobilization, i.e. nerve and tendon gliding training, as an intervention for CTS reported this after training. Routinely performed as recommended by the doctor, participants reported faster symptom relief and pain relapses are less, and they also feel that the function of the hands and wrists has returned to optimal.

On the other hand, with this exercise, the anatomical structure can be restored to its original and correct position, so that the pressure on the tunnel is reduced and the symptoms gradually disappear. This effect is thought to increase venous backflow from the median nerve thereby increasing the pressure on the medianous nerve. in the duct is reduced.

Although many recent studies have yielded significant results, nerve and tendon gliding exercises remain a conservative intervention for CTS. became controversial. This exercise is thought to have the risk of shifting the anatomical structures involved beyond their actual positions, since the exact location of the compressed structures is not known before performing this exercise.

According to research conducted by Gorsche et al., the prevalence of CTS in meat packing is 5-21%, compared to 1-5% in the general population. Some of the risk factors for work-related CTS include: intensive work on the wrist, rapid work, repetitive strong movements, muscle stress, vibration, temperature, unergonomic work positions, etc. Hagberg et al. noted that exposure to physical stress, such as repetitive movements and strong handshakes, is a significant risk factor for CTS.

CONCLUSION

Nerve and tendon gliding exercise can be an effective alternative non-medical intervention for carpal tunnel syndrome. The effect of this biomechanical exercise can restore the mobility of

shear training by reducing swelling in the carpal tunnel. If the CTS is getting higher and directly proportional to the size of the CTS, then alternative treatments that can be applied to CTS patients are needed, one of which is neurogliding exercises.

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