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COMBINATION OF EXERCISE THERAPY AND ELECTROPHYSICS MODALITIES IN REDUCING PAIN IN CARPAL TUNNEL SYNDROME (CTS) : LITERATURE REVIEW

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Abstract:
Background: Carpal Tunnel Syndrome (CTS) is a collection of symptoms due to compression of the median nerve in the carpal tunnel at the wrist, precisely under the flexor retinaculum. Symptoms that arise in CTS include numbness, tingling, pain, and weakness in the hands and wrists. In this CTS condition, physiotherapy can play a role in reducing pain in the wrist. Therefore, from several studies that we got, giving exercise therapy combined with electrophysical modalities is effective for reducing the symptoms that arise in the condition of carpal tunnel syndrome.
Research purposes: To determine the effect of a combination of exercise therapy and electrophysical modalities to reduce pain in carpal tunnel syndrome.
Methodology: A systematic review of an article relating to the provision of exercise therapy and electrophysical modalities to reduce pain in carpal tunnel syndrome.
Results: With exercise therapy and electrophysical modalities can provide a significant effect to reduce pain in carpal tunnel syndrome.
Conclusion: Provision of exercise therapy and electrophysical modalities can reduce pain and increase daily physical activity in patients with carpal tunnel syndrome.
Keywords: Carpal Tunnel Syndrome, Exercise Therapy, Electrophysics, Physiotherapy

INTRODUCTION

According to The World Confederation for Physical Therapy (WCPT) Physiotherapy is a health worker who serves individuals and groups to develop, maintain and restore movement and function throughout the life cycle. These services cover conditions where movement and function are impaired by aging, injury, pain, disease, disorder, condition or environment.

Carpal Tunnel Syndrome is a disorder that causes numbness, tingling, pain or weakness in the hands and wrists. This case occurs when the nerves in the wrist are squeezed or compressed. The carpal tunnel is a narrow passageway inside the wrist formed by the wrist bones (carpal bones) and connective tissue between the bones (ligaments) (Sheereen et al., 2022).

Physiotherapy services have an important role for CTS patients according to the stages of the patient's condition with the aim of achieving better functional abilities than before. In the healing process of patients with CTS cases, physiotherapy provides electrotherapy modalities and exercise therapy to reduce pain, increase muscle strength, and increase the range of motion of joints, in the form of ULTT Exercise, Nerve and Tendon Gliding Exercise, TENS, and Ultrasound.

METHODE

This research method uses a systematic review journal literature review. This study was to determine the effect of a combination of exercise therapy and electrotherapy modalities in reducing pain in Carpal Tunnel Syndrome. A thorough review performed on 3 topics: (1) carpal tunnel syndrome. (2)

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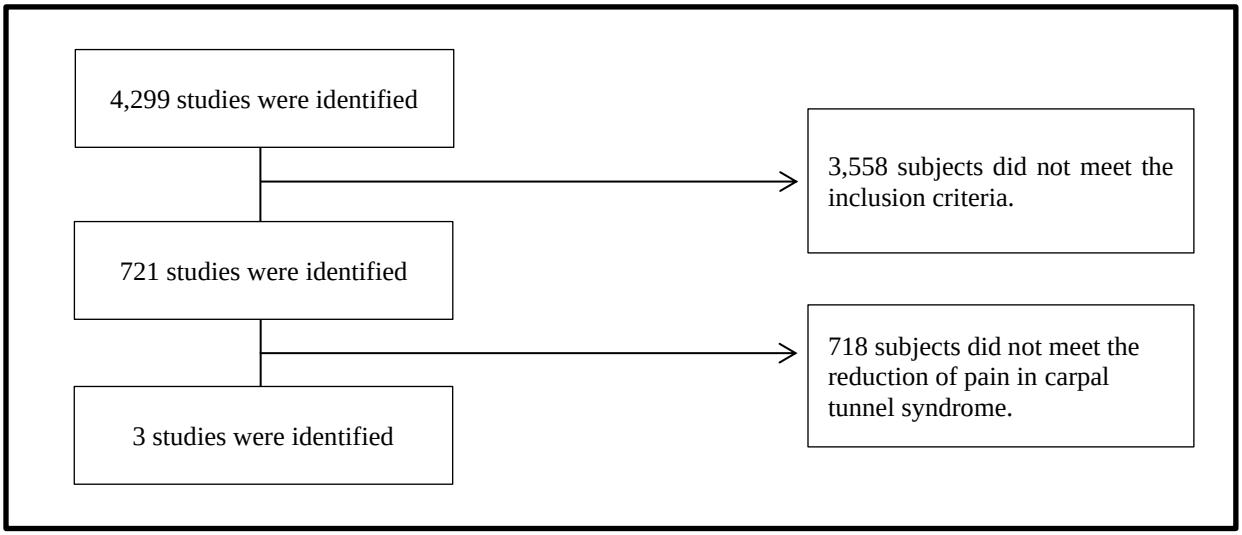
reduction painful with exercise therapy in carpal tunnel syndrome patients. (3) reduction painful with electrophysics modalities in carpal tunnel syndrome patients. The following are the inclusion criteria for research through literature review: 1) Patients have carpal tunnel syndrome, 2) aged 25-40 years, 3) do not have comorbid neuropathy, 3) Able to communicate. Furthermore, the exclusion criteria in this study are: 1) Patients have diabetic neuropathy disorders, 2) patients are unconscious, 3) patients have cognitive impairment (Zaralieva, A., Georgiev, G. P., Karabinov, V., Iliev, A., & Aleksiev, A. (2020).

Effective search for purpose limited to English, with interesting studies in patients published within the last 10 years. The literature study was conducted on the Google Scholar electronic database, Science Therapy Physique and PubMed, for the period Between January 2013 to January 2023. The following is a chart of the process of retrieving articles that meet the research requirements for the review process.



RESULTS AND DISCUSSION

Carpal Tunnel Syndrome (CTS) is a very common health problem in society. CTS is an upper extremity disorder caused by narrowing of the carpal tunnel resulting in pressure on the median nerve which is located at the wrist (Salawati, 2014). Any condition that results in narrowing of the carpal tunnel, one of which is work with repetitive tapping or flexion and extension of the wrist so that it can compress the median nerve (Prakoso & Kurniawaty, 2017). Carpal Tunnel Syndrome is characterized by numbness, paresthesia, weakness, or muscle atrophy in the hand and fingers due to compression of the median nerve in the wrist. Compression may be related to certain traumatic injuries or systemic conditions or may be due to thickening of the protective sheath that surrounds the flexor tendons that run through the carpal tunnel. There are many other physical factors in the hands that can affect this condition, some of which are repetitive movements, strength, posture, vibration, environment, and pressure. Increased risk factors for Carpal Tunnel Syndrome (CTS) can also be related to gender, especially women. obesity, and the number of associated comorbidities (Salawati, 2014).

In Indonesia, the prevalence of Carpal Tunnel Syndrome (CTS), due to work factors, is still not known with certainty. In a study of garment workers in North Jakarta using diagnostic criteria from The National Institute for Occupational Safety and Health (NIOSH), it was found that the prevalence of Carpal Tunnel Syndrome (CTS) was quite high, namely 20.3%. In 2001 in Jakarta, there were 238 patients suffering from

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Carpal Tunnel Syndrome (CTS), and had experienced a decrease in the incidence in 2002, namely to 149 patients (Prakoso & Kurniawaty, 2017).

Physiotherapy plays a very important role in reducing pain, increasing LGS and increasing muscle strength, so that it can improve the ability of functional activities of the hands in patients with Carpal Tunnel Syndrome. In several literature studies, it is stated that physiotherapy can use electrophysical modalities in the form of TENS and Ultrasound as well as exercise therapy in the form of ULTT Exercise, Nerve and Tendon Gliding Exercise, to reduce pain in CTS complaints.

Transcutaneous Electrical Nerve Stimulation (TENS) is a physiotherapy modality in the form of electrical stimulation which aims to control pain with low or high frequency, low frequency is 10 Hz or less than 10 Hz, while high frequency is 50-100 Hz (Asal et al., 2018). TENS uses a dual channel where 1 channel is placed in the insertion area of the base of the 2nd metacarpal bone, then the other channel is in the area of the origin of the medial humeral epicondyle which experiences pain by applying Interferential current, frequency 50 Hz, pulse 150 Ms, intensity according to patient tolerance, and time 15 minutes (Gräf et al., 2022). In the administration of the Transcutaneous Electrical Nerve Stimulation (TENS) modality, it will cause a blockage of pain perception in the brain, so that pain is reduced, when pain is reduced, functional ability will increase.

Ultrasound (US) is also the recommended physiotherapy management for carpal tunnel syndrome. Ultrasound can be used at different frequencies, usually at 1MHz and 3MHz. Sound waves at 1MHz penetrate deeper than 3 MHz waves (2.5 to 5 cm). Ultrasound (US) for Carpal Tunnel Syndrome (CTS) is applied to areas that are inflamed. Sound waves are converted into heat, so increases the temperature in the wrist tissue, dilates blood vessels, increases the amount of oxygen delivered to the injured tissue, and speeds up the tissue healing process (Prakoso & Kurniawaty, 2017). This ultrasound therapy is effectively given to CTS patients,

The Upper Limb Tension Test (ULTT) is a joint mobilization exercise that functions to reduce pain and stiffness due to clamping of the median nerve, increase LGS, and improve the ability to move the wrist joint (Talebi et al., 2020). In the case of CTS, the technique is carried out by placing the patient in a supine lying position, then the shoulder is fixed by the therapist. The therapist asks the patient to move the depression of the shoulder, abduction of the shoulder, flexion of the elbow, external rotation of the shoulder, extension of the fingers and hands, then moves the hands down together with the position of the patient's head tilted to the left. Therapy 4 weeks with 2x a week for 10 minutes (Yani et al., 2022). ULTT is a method that has a macro-therapeutic effect in which the stretched nerve will stimulate the mechanical component so that the nerve adapts to normal mobility.

Nerve and Tendon Gliding Exercise is a hand and wrist movement exercise that can be given to increase tendon flow in sensory-motor disorders around the course of the median nerve, especially in cases of CTS. The likelihood of complaints will decrease when the area is stable and flexible with practice. According to the American Academy of Orthopedic Surgeons, this exercise is divided into 4 major parts, namely: wrist extension stretch, wrist flexion stretch, median nerve glides, and tendon glides. Each of these sections consists of several movements.

First author/year	Study type	Sample	Assessment and intervention	Clinical results	Meaning
Bartkowiak, et al, 2019	Case study research	70 patients	Assessment: Interview, VAS (Visual Analog Scale), Tinel's sign, Phalen's sign, The	The results of this study may suggest the clinical efficacy of LLLT or ultrasound combined with	P<0.05

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			Boston CTS Questionnaire. Intervention: Low-Level Laser Therapy, Nerve Gliding Exercises, Tendon Gliding Exercises, Ultrasound Treatment	gliding exercises in patients with mild to moderate CTS.	
Sembiring & Legsyanto, 2022	The case study	14 patients	Assessment: VAS (Analog Visual Scale), ROM, Wrist Hand Disability Index (WHDI) Intervention: Ultrasound (US), passive exercise, free active exercise and resisted active exercise	Studies show that there is a decrease in wrist pain, improvement muscle strength, increased range of motion in the wrist and thumb joints, increased ability functional activity, increased muscle strength.	P<0.01
Nadadap, 2014	this the study uses a quasi experimental, double blind, the approach pre-test and post-test two groups design.	15 patients	Assessment: Post Test and Pre Test Muscle Pain and Strength, Wilcoxon Test Intervention: Neuro Gliding Exercise and TENS	In this study it was found that there was an effect of Neuro Gliding Exercise and TENS on pain and an increase in hand muscle strength	P<0.05

CONCLUSION

From all these results it can be concluded that the administration of a combination of ULTT exercise therapy, Nerve and Tendon Gliding Exercise with electrophysical modalities in the form of TENS or Ultrasound is very effective in reducing pain in patients with Carpal Tunnel Syndrome, because the combination given can accelerate the healing process of Carpal Tunnel Syndrome. By providing a combination of these exercises can increase the range of motion of the joints, reduce muscle stiffness, increase muscle strength, and muscle flexibility. The provision of this therapy shows a significant increase if it is carried out according to the patient's condition on a regular basis.

THE AUTHOR'S CONTRIBUTION

Mianti Nurrizky Sutejo is the principal researcher who selects topics, writes papers and collects data. Ragil Aidil Fitriasari A searches, reviews study documents, and collects data. Samuel Frandito Pramaditya and Elsa Kurnia Sari T reviewed the study documents.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this paper.

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CONFESSION

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REFERENCE

AAOS. (2018). Introduction 1 Therapeutic Exercise Program for Carpal Tunnel Syndrome Purpose of Program. *American Academy of Orthopaedic Surgeons*, 1–4.

Asal, M. S., Elgendy, M. H., Ali, O. I., Labib, A. A., & Sabry ahmed Asal, M. (2018). Contralateral versus ipsilateral neural mobilization of median nerve in patients with unilateral carpal tunnel syndrome. *Journal of Advanced Pharmacy Education & Research, 8*(1), 17–22. www.japer.in

Bartkowiak Z, Eliks M, Zgorzalewicz-Stachowiak M, Romanowski L. The effects of nerve and tendon gliding exercises combined with low-level laser or ultrasound therapy in carpal tunnel syndrome. Indian J Orthop 2019;53:347-52.

Fernández-De-Las Peñas, C., Ortega-Santiago, R., De La Llave-Rincón, A. I., Martínez-Perez, A., Fahandezh-Saddi Díaz, H., Martínez-Martín, J., Pareja, J. A., & Cuadrado-Pérez, M. L. (2015). Manual Physical Therapy Versus Surgery for Carpal Tunnel Syndrome: A Randomized Parallel-Group Trial. *Journal of Pain*, *16*(11), 1087–1094. https://doi.org/10.1016/j.jpain.2015.07.012

Gräf, J. K., Lüdtke, K., & Wollesen, B. (2022). Physiotherapy and sports therapeutic interventions for treatment of carpal tunnel syndrome: A systematic review. In *Schmerz*. Springer Medizin. https://doi.org/10.1007/s00482-022-00637-x

Huisstede, B. M., Hoogvliet, P., Franke, T. P., Randsdorp, M. S., & Koes, B. W. (2018). Carpal Tunnel Syndrome: Effectiveness of Physical Therapy and Electrophysical Modalities. An Updated Systematic Review of Randomized Controlled Trials. *Archives of Physical Medicine and Rehabilitation*, *99*(8), 1623-1634.e23. https://doi.org/10.1016/j.apmr.2017.08.482

Nadapdap, B. (2014). *Pengaruh Neuro Gliding Exercise Dan Transcutanius Electrical Nerve Stimulation (Tens) Terhadap Penurunan Nyeri Tangan Dan Kekuatan Otot Lengan Bawah*. /citations?view_op=view_citation&continue=/scholar?hl=fr&start=90&as_sdt=0,5&scilib=1&citilm=1&citation_for_view=AvchKBQAAAAJ:zdX0sdgBH_kC&hl=fr&oi=p

Prakoso, T. D., & Kurniawaty, E. (2017). A Women Aged 65 Years With Carpal Tunnel Syndrome. *J Medula Unila, 7*, 144–149.

Region, B. A., Dias, F., Abadio, B., Vin, M., Finco, A., Graeve, L., Chemistry, B., Security, N., Economics, A., & Sciences, S. (2013). *1 2 1,2 ,. 1000*(9), 1–52. https://doi.org/10.1074/jbc.M113.461442

Salawati, L. (2014). *Carpal Tunel Syndrome. 1,* 29–37.

Sembiring, N. B., & Legsyanto, R. E. (2022). *PENATALAKSANAAN FISIOTERAPI PADA KASUS CARPAL TUNNEL SYNDROME (CTS) DENGAN MODALITAS ULTRASOUND (US) DAN TERAPI LATIHAN*. *1*(1), 1–5.

Sheereen, F. J., Sarkar, B., Sahay, P., Shaphe, M. A., Alghadir, A. H., Iqbal, A., Ali, T., & Ahmad, F. (2022). Comparison of Two Manual Therapy Programs, including Tendon Gliding Exercises as a Common Adjunct, While Managing the Participants with Chronic Carpal Tunnel Syndrome. *Pain Research and Management, 2022,* 1–11. https://doi.org/10.1155/2022/1975803

Talebi, G. A., Saadat, P., Javadian, Y., & Taghipour, M. (2020). Comparison of two manual therapy techniques in patients with carpal tunnel syndrome: A randomized clinical trial. *Caspian Journal of Internal Medicine, 11*(2), 163–170. https://doi.org/10.22088/cjim.11.2.163

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web https://ojs.stikestelogorejo.ac.id/

Wardhani. (2013). Naskah Publikasi Naskah Publikasi. *Occupational Medicine*, *53*(4), 130.

Yani, J. A., Pos, T., Kartasura, P., & Fax, T. (2022). *3 1, 2,3*. *2*(7), 2733–2742.

Zaralieva, A., Georgiev, G. P., Karabinov, V., Iliev, A., & Aleksiev, A. (2020). Physical Therapy and Rehabilitation Approaches in Patients with Carpal Tunnel Syndrome. *Cureus*, *12*(3). https://doi.org/10.7759/cureus.7171