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The Effect of ULLTT on Reducing Pain in Carpal Tunel Syndrome Cases

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Abstract. *Background: Carpal tunnel syndrome (CTS) is a disorder of the wrist due to narrowing of the carpal tunnel, either due to edema of the fascia in the carpal tunnel or due to abnormalities in the small bones of the hand (carpal bones) resulting in pressure on the median nerve. on the wrist. CTS is defined as weakness in the hands accompanied by pain in the distribution area of the median nerve (Sidharta, 2004). Nerve mobilization is a manipulation technique by moving and stretching nerve tissue to increase axonal transportation so that it can improve nerve conduction. Nerve mobilization can reduce the pressure in the nerves so that there is an increase in blood flow to the nerves, which can have a regenerative and healing effect on injured nerves (Butler, 1991). Nerve mobilization is often used as a form of diagnosis and treatment for musculoskeletal conditions with nerve involvement (Butler, 1991). Nerve mobilization in the Upper Limb Tension Test (ULTT) is carried out at the branches of the Brachial plexus such as the radial nerve, median nerve and ulnar nerve. But here the author only discusses ULTT on the median nerve, namely ULTT 1 which is related to CTS.*
The aim is to determine physiotherapy management and the effect of Ultrasoundtherapy therapy and nerve mobilization using the ULTT 1 method in cases of Carpal Tunnel Syndrome on reducing pain and increasing the functional ability of the hand. Two group pre test and post test method. Research Place: Physiotherapy clinic, RSU Sidoarjo. TIME: Measuring instrument: Visual Analouge Scale (VAS). Results: treatment using the Mann-Whtney test. With confidence interval (CI) (95%) The results of the study revealed that there was a significant difference in pain in group 1 (p = 0.00) and group 2 (p = 0.00). But there was no significant difference between the two groups in pain improvement (p = 0.152), so there was no better treatment between the two groups. Conclusion: It is concluded that ULTT is useful in treating CTS patients to reduce pain in two groups. The targeted outcomes are publications in national journals indexed by Sinta and HAKI. The TKT target for implementing this gamelan accompaniment exercise is level 2.

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INTRODUCTION

Carpal tunnel syndrome (CTS) is a disorder of the wrist due to narrowing of the *carpal tunnel* , either due to *edema of the fascia* in the *carpal tunnel* or due to abnormalities in the small bones of the hand (carpal bones) resulting in pressure on *the median nerve* in the wrist. CTS is defined as weakness in the hand accompanied by pain in the distribution area *of the median nerve* (Sidharta, 2004).

The hand is a very important part of the body because its function is very complex. If viewed from an anatomical perspective, the wrist is formed by bones, muscles, ligaments, nerves and blood vessels so that the hand can make coordinated and automatic movements. If the hand is disturbed, it can cause interference with activities carried out by the hand.

The prevalence of CTS varies. In Purbalingga, especially in Karangcengis village, of the 72 women who picked jasmine, 34 people or 47.2% tested positive for CTS (Kurniawan, et al, 2008). In Semarang during 2006 at the Medical Rehabilitation Installation Polyclinic at Dr. Hospital. Kariadi Semarang found 34 new CTS sufferers, namely 4% of all new patients (838 people). A total of 32 people (94.1%) were women and 2 people (5.9%) were men (Tamba, 2009). The syndrome is unilateral in 42% of cases (29% right, 13% left) and bilateral in 58% (Aroori, 2008). Predominantly occurs in women, with a male to female ratio of 1:3 to 5 and the highest age range between 40 and 60 years, peak prevalence at age 55 years, rarely occurs before the age of 20 years and above the age of 80 years (Tamba, 2009) . CTS is the most common type of entrapment neuropathy. The cause of CTS is thought to be trauma, infection, endocrine disorders and others, but the cause is unknown for some. Excessive and repetitive hand use is thought to be associated with this syndrome (Bahrudin, 2011).

To treat CTS, Physiotherapy has a role in reducing complaints of pain, sensibility disorders in the form of tingling (*paresthesia)* and numbness , increasing joint range of motion (LGS), increasing muscle strength and functional ability of the hand (Roberts, 2009). Of the many physiotherapy modalities such as: *Short Wave Diathermy* (SWD), *Micro Wave Diathermy* (MWD), *Infra Red* (IR), *Ultrasound* (US) , and nerve mobilization. The author chose therapeutic management in *Carpal Tunnel* cases *Syndrome* with nerve mobilization or ULTT. Nerve mobilization is a manipulation technique by moving and stretching nerve tissue to increase axonal transportation so that it can improve nerve conduction. Nerve mobilization can reduce the pressure in the nerves so that there is an increase in blood flow to the nerves, which can have a regenerative and healing effect on injured nerves (Butler, 1991). Nerve mobilization is often used as a form of diagnosis and *treatment for musculoskeletal* conditions

with nerve involvement (Butler, 1991). Nerve mobilization in *the Upper Limb Tension Test* (ULTT) is carried out at the branches of *the Brachial plexus* such as *the radial nerve*, *median nerve* and *ulnar nerve* . But here the author only discusses ULTT on *the median nerve* , namely ULTT 1 which is related to CTS . Nerve mobilization is a treatment technique that can improve symptoms associated with CTS. There is evidence that the course of *the median nerve* can be influenced by nerve mobilization, as shown in cadaver *studies* (McKeon, M and Yancosek, K, 2008).

LITERATURE REVIEW

A. Definition

Carpal Tunnel Syndrome (CTS) is a collection of symptoms due to pressure on the median nerve as it passes through the carpal tunnel *in* the wrist. The manifestation of this syndrome is pain and tingling *(paresthesia)* (Sidharta, 1996). *Carpal Tunnel Syndrome* (CTS) is a condition where the hands and arms feel pain due to pinched nerves in the wrist. *Carpal Tunnel* is a narrow, thumb-sized tunnel located in the wrist of the palm, which is bound by bones and ligaments. This tunnel protects the main nerves of the hand and the nine tendons that surround the fingers (Utomo, 2008). Clinically, this syndrome consists of tingling, burning or a feeling like pins and needles along the branches of the *median nerve* of the three and a half lateral fingers and weakness of the thenar muscles and sometimes *tropic changes* in the hand . This is caused by compression of the *median nerve* in the canal (Cailliet, 1991). The carpal tunnel is located in the wrist. The skeleton is formed by eight carpal bones arranged in two rows. In the proximal part of the carpal bone, it articulates with the distal part of the radius bone. Meanwhile, the distal part articulates with the *metacarpal* bones . The proximal and distal carpal bones connect to form the midcarpal joint. These carpal bones are curved with the concave part facing the volar. On the volar part of the wrist there is a thickening of the fascia called *the flexor retinacullum* which consists of two layers of fascia, namely the palmar carpi ligament (volaris) and the transversum carpi ligament. The carpi transversum ligament covers the palmar surface, forming the carpal tunnel (Sitorus, 2005). *The median nerve* passes beneath the flexor retinaculum in the narrowed space between the flexor digitorum superficialis muscle and the flexor carpi radialis muscle (Snell, 2006).

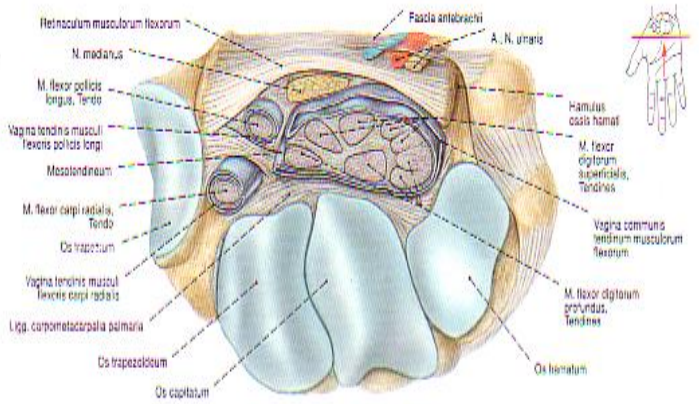

Figure 1. Carpal Tunnel seen transversely (Sobotta, 2002).

Classification of CTS based on electrodiagnostic examination (Padua et al, 1997)

Degrees	Classification	Electrodiagnostic Examination Results
Grade 1	Very light (very mild CTS)	Standard tests are normal Comparative test abnormal
Grade 2	Light (mild CTS)	Abnormal sensory Normal motor skills
Grade 3	Currently (moderate CTS)	Sensory and motor abnormalities
Grade 4	Heavy (Severe CTS)	Sensory response is absent Distal abnormal motor latency
Grade 5	Very heavy (extreme CTS)	There is no sensory and motor response

B. Nerve mobilization

Nerve mobilization is a manipulation technique by moving and stretching nerve tissue to improve nerve conduction. Nerve mobilization is often used as a form of diagnosis and therapy in musculoskeletal conditions with nerve involvement. Nerve mobilization can reduce the pressure in the nerves so that there is an increase in blood flow to the nerves, which can have a regenerative and healing effect on injured nerves (Butler, 1991). Nerve mobilization using the *Upper Limb Tension Test* (ULTT1) method can provide *a median nerve* shift of 7.4 mm inferiorly *when* extending *the* wrist and fingers and a *superior shift* of 4.3 mm when *flexing* the elbow (Butler, 1991).

Nerve mobilization using the ULTT 1 method is a treatment technique that can improve symptoms associated with CTS (*T al Akabi, A.*, 2000). Nerve mobilization can be considered positive if: (1) when the movement occurs it produces CTS symptoms (pain, numbness,

tingling). (2) There is asymmetry or difference in the range of motion and symptoms that appear between the right and left (Kostopoulos, 2004).

1. ULTT application technique 1

Mobilization *of the median nerve* is carried out using 5 types of movement, namely (1) *shoulder girdle depression* which must be maintained during the test, (2) shoulder abduction with elbow *flexion* up to 90 ^{0} , (3) shoulder exortation, (4) wrist and finger *extension* with the arm. under supination, (5) and elbow *extension* . Each movement is performed until *uncomfortable* through *feedback* from the patient and then *released* only at the point where *uncomfortable pressure* is felt (Ekstrome and Holden, 2002).

Nerve mobilization is carried out gently, by holding the elbow in an *extended position* for approximately 3 seconds, just in the range where the patient feels tension and pain but still within tolerance limits, then relaxing the elbow to the point where the patient feels no tension and pain. Mobilization is carried out in 3 sets, 10 repetitions in each set (Kostopoulos, 2004).

Management of nerve mobilization is divided into *5 grades* , namely (1) *grade 1* with small amplitude movements and carried out before limited range of movement (feeling resistance) and/or pain, (2) *grade 2* with large amplitude movements but still carried out before limited range of movement (feels resistance) and/or pain, (3) *grade 3* with large amplitude movements and is carried out to a limited range of movement (feels resistance) and/or pain, (4) *grade 4* with small amplitude movements and is carried out to a limited range of movements (feeling resistance) and/or pain, and (5) *grade 5* is *the high velocity thrust* used in manipulation (Maitland, 2002).

ULTT 1 nerve mobilization is carried out passively at the beginning of mobilization starting from *grade* I, namely small amplitude and carried out before the range of movement is limited and/or painful, then continued according to *the grade* of the patient's condition. This aims to avoid surprising feelings so that the patient can adapt (T al Akabi, A., 2000).

The aim of this research is to determine the effectiveness of ULTT in reducing pain in Carpal Tunel Syndrome patients

RESEARCH METHODS

A. Types of research

The research method used in the research is *one group pre test and post test design* . In this group, 1 group of research subjects was used. Namely 1 group of wrist pain sufferers. After receiving conventional therapy from the hospital, the research method is as follows:

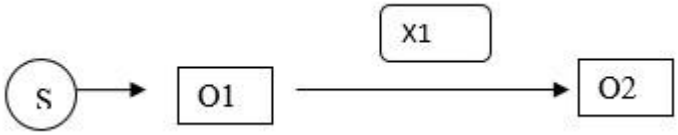

Figure 3.1 Research method

Image caption 3.1:

S : Subject

O1 : 1st observation , namely the condition before treatment was given to the group I.

In this case *a pre-test is carried out* .

X1: Treatment 1, namely giving manual oscillations

O2: 2nd observation, namely the condition after treatment in group I.

In this case *a post-test is carried out* .

B. Time and Place of Research

Data collection was carried out at the physiotherapy clinic at KRMT Wongsonegoro Regional Hospital period January 20 23 to February 2023 .

C. Research Subjects

All wrist pain patients who come to medical rehabilitation at RSUD KRMT Wongsonegoro, for the period January 2023 and February 2023. Provided that they meet the inclusion and exclusion criteria. Inclusion criteria: (1) have been diagnosed by a doctor as suffering from iskhilagia NPB , (2) aged between 30 to 60 years, (3) suffer from pain originating in the wrist (4) Prayer test + pain below the wrist (5) can communicate well, (6) cooperative and willing to take part in research programs.

Exclusion criteria: (1) patients with wrist pain accompanied by *red flags* for serious conditions (e.g. infection, tumors , osteoporosis), (2) patients who are pregnant, (3) patients who have complaints of pain originating from other than the wrist (4) patients who have a history of wrist surgery, (5) patients with wrist pain with heart disease,

Research subjects are declared to have *dropped out* if: (1) they do not undergo therapy twice in a row or not in a row, (2) the patient does not comply with the specified research procedures.

D. Research Instruments / Measuring Tools

The instrument in this study used *a visual analogue scale* (VAS) which was divided into 4 criteria, namely, (1) pain felt now, (2) average pain felt within 24 hours, (3) mild pain felt during 24 hours, (4) severe pain felt during the last 24 hours. Use of *quadruple* measuring instruments *The visual analogue scale* for filling is the same as *the visual analogue scale* ,

namely that the patient is asked to indicate the level of pain experienced on a horizontal line 100 mm long, where 0 is the point of no pain and 100 indicates severe pain. with the 4 criteria above. To calculate the average results of *quadruple calculation values visual analogue scale* , namely the total score is 1+2+ 3+ 4 =…. / 4 x 10 = …. (If < 50 then the intensity of the pain level is low, > 50 the intensity of the pain level is high) (Korff et al, 1992).

VAS assessment

Figure 3.2 QVAS scale (Korff et al, 1992).

E. Data

Data collection was carried out by providing explanations to the research subjects, providing informed consent to potential respondents, providing information about the aims and objectives of the research, asking for respondent approval with a signature. Respondents measured pain levels as pretest data. Respondents then received ULTT treatment in 4 meetings, then pain measurements were taken again as post test data.

RESEARCH RESULT

A. Research result

This research took place at KRMT Wongsonegoro Regional Hospital for the period November 2022 to July 2023. The subjects of this research were CTS (Carpal Tunel Syndrome) patients aged 30 years to 60 years who came to KRMT Wongsonegoro Regional Hospital who met the inclusion and exclusion criteria. All subjects were willing to sign an *informed consent letter* to become research subjects. It was found that the number of patients who met the research criteria was 8 people and 3 of them were declared to have failed the study because they did not take part in the training according to the predetermined program, so that 16 subjects participated in the research until completion. Group 1 consisted of 8 patients who were treated with ULTT after receiving IR and TENS therapy. Dropped subjects were not included in statistical analysis.

The results of VAS measurements for each patient after being given treatment in group I, totaling 8 patients, had a mean VAS value of 38.62 after being given treatment, namely data on VAS values after being given treatment can be seen in the table

Table 4.3

VASE AFTER TREATMENT

Group	QVAS value (in mm)			
	Minimal	Maximum	Average	Standard deviation
Treatment I	22	52	38.62	10,141

B. **Statistical Analysis Results**

Data analysis used SPSS and first confirmed the QVAS data normality test. Data normality tests before and after treatment were carried out using *Shapiro-Wilk* . in group I before treatment, results were obtained with a value of p=0.42 (P>0.005), meaning the data was normally distributed. In group I after treatment, results were obtained with a value of p=0.83 (p>0.05), meaning the data was normally distributed. Meanwhile, in group II, test the hypothesis using *parametric hypothesis testing* . details can be seen in the table

Table 4.4

QVAS DATA NORMALITY TEST BEFORE AND AFTER TREATMENT

	P before treatment	P after treatment
Group I	P=0.42	P=0.83

The statistical test to compare *pre* and *post* in treatment group I used a paired sample t-test, obtained a significance value of p=0.00 (p<0.05), meaning that administering Nerve Mobilization had an influence on reducing pain in wrist pain (CTS). . data can be seen in the table

Table 4.5

VAS HYPOTHESIS TEST BEFORE AND AFTER GROUP I

		P
Pair 1	VAS *pre* - VAS *post*	0.00

DISCUSSION

The statistical test to compare *pre* and *post* in treatment group I used *a paired* sample t-test, obtained a significance value of p=0.00 (p<0.05), meaning that giving manual oscillations plus nerve mobilization after receiving standard therapy from Sidoarjo Hospital had effect on reducing pain in ischialgia NPB so that the hypothesis is accepted. This is supported by research conducted by Adel (2011), entitled *Efficacy of neural mobilization in treatment of low back dysfunctions* **,** with research subjects as much 60 chronic low back pain patients, with an age range between (30 – 60 years). Where back pain is accompanied by pain

that spreads to the distal buttocks, treatment is given for 3 weeks. Subjects were divided into two groups where both groups received standard therapy in the form of *exercises* : pelvic tilting, *wall squats*, *quadruped alternate arms/legs activities* and *bridging* . Group A received therapy in the form of: lumbar mobilization and *exercise* (standard therapy). Group B received therapy in the form of: (1) nerve mobilization, (2) lumbar mobilization, (3) *exercise* (standard). Statistical results showed significant differences in pain and functional disability. There was a significant difference between the two groups where in pain, p = 0.006 and in functional disability, p = 0.001. Nerve mobilization plus lumbar mobilization and *exercise* are useful for improving pain, reducing short-term functional disability and centralizing symptoms in patients with chronic NPB accompanied by radiating pain. With increased stability, increased LGS, decreased pain, and decreased muscle spasms in CTS sufferers.

CONCLUSIONS AND RECOMMENDATIONS _

From the research that has been carried out regarding the differences in the effect of ULTT on CTS patients after receiving standard IR and TENS therapy from KRMT Wongsonegoro Regional Hospital, it can be concluded as follows: (1) there is an effect of ULTT administration on reducing pain in ischyalgia NPB patients, p= 0.00 ($p < 0.05$). To obtain more relevant data and a more comprehensive picture in determining which form of therapy is more useful in increasing the value of functional abilities in CTS patients , it would be better to carry out research again by paying attention to the following: (1) the number of subjects used in the study. more research, (2) longer treatment time, (3) better control of other variables that can bias research results, (4) grouping CTS subjects with more specific causes, (5) better supporting examinations, for example results MRI , (6) performs *a post test* after the effects of standard hospital therapy have disappeared .

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