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Providing Neurodynamic Mobilization Exercises is Better than *Myofascial Release* in Improving Complaints in Construction Workers with *Carpal Tunnel Syndrome* in Cahaya Dinar Housing

Bernad Sadu [1], Utomo Wicaksono [2], Dadan Proyogo [3]
[1,2,3] Program Studi Sarjana Fisioterapi Stikes Suaka Insan, Banjarmasin, Indonesia

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ABSTRACT

Carpal tunnel syndrome (CTS) is a collection of symptoms that appear along the median nerve innervation area, caused by compression or pressure on the (median) nerve in the wrist area or carpal tunnel. Neurodynamic mobilization exercises are *tension* (stretching) and *sliding (sliding)* techniques to move the nerve structures proximal and distal parts of the nerve, involving the spine (neck) and hands). *Myofascial release* is a therapeutic method using the hands to release adhesions or bonds in myofascial tissue. This research aims to prove application of mobilization neurodynamics in repair complaints. This study Uses an experimental *pretest-posttest control group design.* Amount subject study 16 people divided into two groups, group treatment 1 was given intervention practice mobilization neurodynamics, and group treatment 2 was given *myofascial release.* Intervention gave 3 per week for 4 weeks. The instrument study uses *Boston Carpal Tunnel Questionnaire* (BCTQ). Measurement result complaint *pretest* and *posttest* on groups treatment 1 and treatment 2 equally showing repair with *p-value* 0.000. Comparison test results effectiveness showing a meaningful difference where practice mobilization neurodynamics better in repair CTS complaints with *p-value* 0.000. Mobilization exercise neurodynamics and *myofascial release* both can provide repair, however, practice mobilization neurodynamics has proven better inside repair complaints against workers buildings experiencing CTS.

Email :
bernadussadu@gmail.com
tomwicaksono@gmail.com
Dadanprayogo@gmail.com

1. INTRODUCTION

Every day humans do so many activities or jobs to meet their needs. Each of these activities cannot be separated from the role of the limbs of the human body, whether it is only to move or move up to complete an activity or work that is complicated and heavy. One part or limb that is often used by humans when on the move is the hands. As a result of using hands excessively, repeatedly, and for a long time, various disorders or health problems appear in the hand area, and one of the diseases that is often encountered due to excessive use of hands is carpal tunnel syndrome (CTS) (Wardana et al. ., 2018). Carpal tunnel syndrome (CTS) is one of the most common peripheral nerve disorders, caused by the entrapment of the median nerve in the carpal tunnel area, causing pain, impaired mobility, and reduced productivity or quality of work. CTS sufferers for a long time can cause economic problems for someone. This happens apart from decreased productivity but also a lot of costs incurred in the treatment process, so an effective and efficient method of treating CTS sufferers is needed (Hamzeh et al., 2020). The leading cause of complaints generally cannot be found with certainty but is said to be

closely related to the use of the hands when doing work, hobbies, arts, and sports. Several studies have revealed that more than half of the causes of CTS come from factors at work (Utomo and Wahyono, 2017). The prevalence of CTS in the United Kingdom (UK) reaches 7 – 16%, which is 5% greater than in the United States (US) (Ibrahim et al., 2012). The National Health Interview Study (NIHS) estimates that the self-reported prevalence of CTS among adults is 1.55% (2.6 million). The incidence of CTS in the population is estimated to be 3% in women and 2% in men, with the highest prevalence in older women aged > 55 years, usually between 40-60 years. The incidence of CTS reaches 276:100,000 per year. The prevalence in women reaches 9.25% and in men around 6%. CTS can occur in all age ranges but usually on average 40-60 years old. The prevalence of work-related CTS in Indonesia is not known with certainty. Until 2001 there were still very few occupational disease diagnoses reported for various reasons, among others because of the difficulty of diagnosis. Research on high-risk workers who work involving the wrists and hands reports that the prevalence of CTS among workers is between 5.6% and 15% (Astrina, 2015). Symptoms of CTS appear to vary localized from the wrist to the shoulder, and other areas such as the palmar, thumb, index, and middle fingers. The initial symptoms that often appear being paresthesias and pain (Wipperman & Goerl, 2016). This syndrome or group of symptoms results from compression of the median nerve in the wrist. CTS causes discomfort and pain, limits daily activities, causes sleep disturbances, and decreases work productivity. Complaints in CTS sufferers will significantly interfere with daily activities so that CTS sufferers will experience a decrease in the functionality of their hands for activities. Complaints will also interfere with sleep quality at night, and they can also cause weakness in thenar muscles which will affect the functional abilities of the hands such as grasping, clamping and so on (Kostopoulos, 2004).

Handling complaints on CTS can be made with several methods, both manually and with training. Among them are neurodynamic mobilization exercises and myofascial release. Neurodynamic mobilization exercises use a combination of specific movements of the spine and limbs that aim to reduce nerve mechanosensitivity, restore limb movement and function, and reduce perceived symptoms. Recent research supports the use of neurodynamic mobilization exercises to treat nerve mechanosensitivity disorders in patients with neck and arm pain and lower leg pain (Boyd et al., 2017). The myofascial release therapy method refers to massage techniques, to cause a stretching effect on the fascia and release the bonds between the fascia and integuments, muscles, and bones, to relieve pain, increasing range of motion and body functions (Utomo and Wahyono, 2017).

2. METHOD

This research is a type of experimental Research, with the research design is *Pre - test-Post - test Control Group Design*. In this study, samples selected from the population using a *simple random sampling* (SRS) technique were then divided into two groups, namely treatment group 1 and treatment group 2, with the same characteristics. Then both groups underwent a *pre-test* . Then treatment group 1 was given an intervention in the form of neurodynamic mobilization exercises, while treatment group 2 was given a *myofascial release intervention*. After that, the two groups again carried out *post - t-test* with the same instruments, and the results were compared to see which intervention was better.

Instruments or measuring devices used for data collection in this study use the BCTQ questionnaire *(Boston Carpal Tunnel Questionnaire)* part severity symptoms or SSS with 11 questions related to CTS, with five categories used to measure level complaint CTS sufferers. This research is located in the Cahaya Dinar housing complex, Handel Gumpung Village, Gambut District, Banjar Regency, South Kalimantan Province.

Data was analyzed with the help computer program *statistical package for the social sciences* (SPSS), Analysis descriptive covers mean, intersection raw, minimum and maximum values in the variable age, years of service, and BMI. Test the normality of the data using *Shapiro Wilk* on the level significance of $\alpha = 0.05$ and *p-value > 0.05,* statistical test parametric *Paired-sample t test* for normally distributed and nonparametric data *Wilcoxon sign rank test for non-normally* distributed data with levels 5% significance ($\alpha = 0.05$) and *p-value <0.05, and* statistical test parametric *independent sample t-test for* normally distributed data and used statistical tests nonparametric *Mann Whitney test for non-normally* distributed data with levels significance of 5% ($\alpha = 0.05$) and *p-value* <0.05.

3. RESULTS AND DISCUSSION

Based on the results of research that has been carried out and data analysis obtained results and discussion like the following :

Characteristics of Research Subjects

Table 1. Characteristics of Research Subjects

Variable	n	Average	SD	Minimum-Maximum Value
Age (Year)	16	41.87	5.58	34-50
Years of service (Year)	16	2.93	0.92	2-4
BMI (BB_{kg}/TB_{m^2})	16	22,37	2,33	18-27

The number of subjects who took part in this study was 16 people, and all of them were male, with an age range of 34 years (1 person) to 50 years (3 people); most were 38 years old as many as 4 people with an average age of research subjects 41.87±5.54. The age range of the workers in this study shows that workers are included in the age category at risk of experiencing CTS.

In accordance with the research by Basuki *et al.* , (2015) , said that workers who are at risk of developing CTS are in the age range of 29–62 years. It is further said that CTS can cause health problems in the long term, usually experienced in middle age and old age.

The working period of the research subjects ranged from 2 years (7 people) and the longest with 4 years of service (6 people). Working for more than 1 year, increases the risk of construction workers at Cahaya Dinar Housing experiencing CTS. Long work periods play a significant role in the emergence of musculoskeletal disorders, as revealed in the results of, that long work periods ranging from > 1 year have been able to contribute emergence of musculoskeletal disorders.

BMI characteristic data from 16 research subjects obtained a range of BMI values from 18 to 27, with an average value of 22.37 ± 2.33. From the results of this study, there was one research subject included in the *underweight category* with a BMI score of 18, 11 research subjects included in the normal category with a BMI value of 20-24, three participants were in the *overweight category* with a BMI 25, and one participant is included in the obese category with a BMI value of 27.

The results of this study are following, which said that 70% of CTS sufferers were overweight, and any increase in BMI value of 8% would increase the risk of developing CTS. Another study by Salawati & Syahrul, (2014) , said that workers who have a BMI value of 25 or more are at risk of developing CTS than workers who have lower BMI values, because obesity is an intrinsic risk factor for sufferers of CTS .

Differences in CTS Complaints Between *pre* and *post* In Treatment Group 1 (Neurodynamic Mobilization Exercise) and Treatment Group 2 *(Myofascial Release)*.

Table 2. Differences in Complaints between *pre* and *post*-in Treatment Group 1 and Treatment Group 2

Variable	Group	Period	Average	SB	*p-values*
SSS *	Group Treatment 1	*Pre*	2.58	0.12	0.000
		Post	1.88	0.09	
	Group Treatment 2	*Pre*	2.59	0.14	0.000
		Post	2,23	0.13	

*SSS: *Severity Status Scale*

Pre and *post*-1 treatment groups showed a significant difference with a *p-value* = 0.000. This shows that the neurodynamic mobilization exercises given to the treatment group 1 have proven to have an effect on improving CTS sufferers' complaints, there is a difference in *pre* and *post values* of 0.70. Before being given neurodynamic mobilization exercises, the category of complaints experienced by all research subjects in treatment group 1 was included in the moderate category, and after neurodynamic mobilization exercises were carried out with a frequency of 3 times per week for 4 consecutive weeks, then a *posttest was carried out* with the results of complaints on all subjects research treatment group 1 included in the mild category. Research by Goyal *et al.*, (2016) said that exercise mobilization neurodynamics 2-3 times per week for 3 weeks in people with CTS can influence repair to conductivity nerve motor, level of pain, and level severity complaint. Other research says that practice mobilization neurodynamics will reduce pressure on the nerves so that it can improve and improve blood flow to cells affected nerves glitches, and this mechanism will enhance axonal transport, conduction nerve as well as produce mprovement in pain, condition functional organs or tissues, and fatigue felt by sufferers.

In treatment group 2, there exists a meaningful difference from results measurement complaints with a *p-value* = 0.000, and the difference between the *pretest and posttest values is* 0.36. These results indicate that *myofascial release therapy* given 3 times per week for 4 consecutive weeks is proven to improve complaints in patients with CTS. *M myofascial release* has immediate effect is felt body, like pain reduction because effect of changing in blood flow and temperature; metabolism, and system autonomic; and effect to activity of fibroblastic or synthetic collagen during the healing process in CTS sufferers, this can happen because *myofascial release* gives effect fascia stretches and loosens the bonds between fascia and integuments, muscles, bones, intending to relieve pain, increasing joint range of motion and balancing the body.

Comparison of Effectiveness Between Treatment 1 (Neurodynamic Mobilization Exercise) and Treatment 2 (*Myofascial Release*).

Table 3. Comparison of Effectiveness Between Treatment 1 (Neurodynamic Mobilization) and Treatment 2 (*Myofascial Release*)

Variable	Group	Period	Average	SB	*p-values*
SSS *	Treatment 1	*Post*	1.88	0.09	0.000
	Treatment 2		2,23	0.13	

*SSS: *Severity Status Scale*

Analysis of the results of the *posttest* for measuring complaints found that the average treatment group 1 was 1.88 ± 0.09 and the treatment group 2 had an average of 2.23 ± 0.13 with a *p-value* = 0.000. These results indicate a significant difference between the two types interventions where neurodynamic mobilization exercise interventions proved to be more effective in reducing complaints. It can be seen from the mean *posttest value* in treatment 1, which is smaller and indicates lighter complaints compared to the posttest average after treatment 2. It can also be seen from the difference in *pre* and *post-values* in treatment group 1, which is more significant, namely 0.70, meaning that there is a more significant decrease in complaints good, while the difference in *pre* and *post*-improvement values in treatment group 2 was only 0.36.

Recent research further supports the use of neurodynamic mobilization exercises to treat nerve mechanosensitivity disorders in patients with neck and arm disorders and lower leg pain. Handling peripheral nerve disorders using neurodynamic mobilization exercises shows maximum results because it provides intervention to the entire part of the peripheral nerve (median) that is impaired, compared to other methods that only treat localized parts that are disturbed (wrist), neurodynamic mobilization exercises have a direct effect on nerve conduction as measured using electrophysiology, proving that the intervention this improves nerve conductivity peripheral.

Mobilization exercises neurodynamics can positively influence the regeneration of nerve peripheral through the mechanism following: a) Reduction of edema; b) Normalization Genre axoplasm; c) Decrease of mechanosensitivity abnormal nerves, with reduction of hyperalgesia and inflammation neurogenic ; d) Promotion or improvement mobility of right nerve, reduce vulnerability against trauma; e) Upgrade neuronal and glial (Schwann cell) activity through stimulation membrane dependent receptors cell . Another mechanism is the repair or regeneration nerve because the impact of the enhancement reactivity of vascular . Mobilization exercises neurodynamics will reduce pressure on the nerves so that it can improve and improve blood flow to cells affected nerves glitches, and this mechanism will enhance axonal transport, conduction nerve as well as produce improvement in pain, condition functional organs or tissues, and fatigue felt by sufferers (Coppieters and DS Butler, 2008)

4. CONCLUSION

Based on the results of the research analysis and discussion, it can be concluded as follows ., Provision practice mobilization neurodynamics and *myofascial release* are equally proven can fix complaint CTS sufferers; however, practice mobilization neurodynamics proven better inside repair CTS complaints on workers building in Cahaya Dinar Housing.

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