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Implementation Of Ischemic Compression Technique And Myofascial Release Technique In Reducing Disability In Myofascial Pain Syndrome Upper Trapezius Muscle

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ABSTRACT

Patients with myofascial pain syndrome of the upper trapezius muscle are a population that is widely found by various groups, one of which is in stone crusher workers. Myofascial pain syndrome of the upper trapezius muscle is an implication of the presence of trigger points in the taut band caused by adhesion to the myofascial structure. This study is an experimental study using pre and post test control group design which aims to compare the better intervention between the provision of myofascial release technique and ischemic compression technique on improving functional ability in cases of myofascial pain syndrome of the upper trapezius muscle. The sample in this study amounted to 22 people and was divided into two application groups with each group totaling 11 people. The results of the related t-test showed that both applications could reduce significant disability ($p < 0.05$), and the results of the independent t-test showed that each group could reduce disability in cases of myofascial pain syndrome of the upper trapezius muscle but did not show a significant difference, p value = 0.41 ($p > 0.05$). Conclusion: the application of myofascial release technique is as good as ischemic compression technique and can be used as a physiotherapy technique in reducing disability in myofascial pain syndrome of the upper trapezius muscle.

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INTRODUCTION

Awang Bangkal Barat Village, Karang Intan Sub-district, Banjar Regency, South Kalimantan Province is one of the centers of stone breaking. Because the need for construction goods, especially stone, continues to increase, some people in the village of Awang Bangkal Barat make it a medium to low-scale home industry. Stone breaking in Awang Bangkal Barat Village is done by men and they work on average more than 5 years. The workers utilize natural products because the surrounding settlements are close to the hills. The work process includes breaking the stone into several parts and then collecting the stone fragments. and

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then lifting the stone into the truck and arranging it, the amount of stone that is transported using a truck uses a cubic count. Stone crusher workers work for ± 7-8 hours every day, from Monday to Saturday, starting at 08.00 to 16.00-17.00 Wita, taking a 1-hour break to fulfill needs such as eating, and praying. When doing their work the stone breakers work by standing then bending / static and repetitive body positions for a long time and carried out in an open place so that it is very risky for musculoskeletal complaints, one of which is myofascial trigger point. In line with research conducted by (Shiri et al., 2017) and (Prayogo et al., 2022)(Prayogo et al., 2022), almost one-third of cases can be attributed to occupational risk factors and the impact of ergonomic interventions in the workplace. According to (Benynda, 2016), the causes of primary musculoskeletal complaints: excessive muscle stretching, repetitive activities, non-ergonomic work attitudes, secondary causes: pressure, vibration, microclimate. While the factors that cause musculoskeletal disorders according to individual factors such as age, gender, smoking habits, physical activity, physical strength and body size. The majority of stone-crushing workers consider complaints of aches or pains around the neck or back to be commonplace due to daily work, so the aches or pains felt are not treated. It can be seen that in between their work, workers often take breaks due to fatigue and complaints caused by pain around the neck or back. After the stones are broken into several pieces, they are arranged before being sold to form small mounds to facilitate the process of lifting into the truck.

The Indonesian Ministry of Health reported that health problems experienced from 9,483 workers in 12 districts / cities in Indonesia, 48% had musculoskeletal disorders, 10-30% mental disorders, 10% work demormality, 9% hearing loss, 3% pesticide poisoning and injuries. One of the musculoskeletal disorders that occur relatively frequently is Myofacial Trigger Point in the Upper trapezius muscle. (Ministry of Health, 2009).

Disability in myofascial pain syndrome of the upper trapezius muscle is a collection of symptoms characterized by the presence of myofascial trigger points as a result of fascial damage to muscle tissue, causing pain in the myofascial tissue structure. (Fernandez, 2007). Myofascial syndrome pain can also be defined as a syndrome that arises due to the activation of trigger points or tender points in muscle fibers. (Anggraeni, 2014).

The reported prevalence of myofascial pain syndrome ranges from 20-95% in patients with musculoskeletal pain. The distribution of myofascial pain syndrome is comparable between genders (female 24.1% and male 23.8%) (Stella et al., 2021). In various studies, it has been shown that many of the pain complaints experienced by clients are related to trigger points. An American study of 100 male and 100 female flight attendants with an average age of 19 years found that 45% of men and 54% of women experienced localized neck muscle tenderness or what is commonly referred to as latent trigger points. (Novi, 2010).

The Upper Trapezius muscle is a tonic muscle or postural muscle that functions to move the neck and shoulders. The existence of poor posture (foreward head posture), or as a result of poor work ergonomics accompanied by micro and macro trauma and degeneration of muscles and fascia, continuous contraction of the upper trapezius muscle will result in spasm, collagen contracture, adhesion, abnormal crosslink actin myosin, and decreased blood

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circulation in the area which triggers the appearance of trigger points in the taut band which will cause myofacial syndrome pain. (Anggraeni, 2014).

Myofascial pain syndrome of the upper trapezius muscle is an implication of the presence of trigger points in the taut band caused by adhesion to the myofascial structure. The adhesion will have an impact on local ischemia due to decreased blood circulation and the need for nutrients and hypoxia in the taut band area as well as the accumulation of metabolic waste which is often referred to as lactic acid accumulation (Gerwin et al., 2014). (Gerwin et al., 2014). Hypoxia and ischemia in muscle cells have an impact on reducing local pH and followed by the release of substances that stimulate pain receptors in the muscles. The activity of these pain receptors will have an impact on muscle spasm, allodynia, hyperesthesia and mechanical hyperalgesia. (Donmerholt et al., 2016)..

Myofascial pain syndrome of the upper trapezius muscle can cause functional disorders in addition to causing damage to specific tissues. Functional disorders caused by the syndrome that occurs in the upper trapezius muscle myofascial can be in the form of motion pain and limitation of cervical lateral flexion and shoulder depression. Daily activities can also be disrupted if someone experiences this syndrome. In general, this syndrome can result in disruption of student learning patterns due to pain and can result in decreased academic achievement. (Anggraeni, 2014). One of the causes of neck pain is Myofascial Triggers Point Syndrome (MTPs) in the upper trapezius muscle , which is part of the musculoskeletal disorders (MSDs) that many workers experience. (Pratama, 2013).

Preventing the development of myofascial syndrome pain from becoming more severe requires appropriate treatment. Interventions can be provided in the form of pharmacology and non-pharmacology. In terms of non-pharmacology, the intervention provided can be in the form of manual therapy. In general, there are many intervention methods or approaches that can be done by a Physiotherapist to treat cases of myofascial pain syndrome. One of the intervention techniques in handling myofascial pain syndrome cases is providing manual therapy such as myofascial release technique and ischemic compression technique.

Myofascial release technique (MRT) is a procedure that combines manual pressure on specific muscle areas and the simultaneous use of stretching. (Werenski, 2011) states that the application of MRT can be an effective therapy in cases of myofascial pain. This MRT application in the form of control and focus on pressure, acts to stretch or expose myofascial and muscle structures with the aim of releasing adhesions or adhesions, reducing pain with gate control theory, restoring the quality of lubricating fluid from fascial tissue, tissue mobility and normal joint function. (Riggs & Grant, 2018). MRT is a stretching and pressure technique performed to increase tissue flexibility and can reduce pain. (Buana et al., 2014).

Ischemic compression technique (ICT) is a form of massage technique with the aim of reducing pain with the occurrence of reactive hyperemia in the trigger points area and the spinal reflex mechanism that restores muscle spasm. The target is the substantia gelatinosa with the aim of inhibiting the transmission of pain stimulation. (Gemmell et al., 2018).. (Aguilera et al., 2019) stated that this technique is effective for reducing pain in myofacial syndrome. By pressing on the trigger point area of the myofascial tissue, it is hoped that the

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release of residual irritant substances with the overflow of blood flow on adhesions which are metabolic waste that accumulates in the myofascial tissue, so that absorption of irritant substances that cause pain occurs and will reduce allodynia and hyperalgesia in the nervous system. Meanwhile, according to (Buana et al., 2014) Ischemic compression technique is a technique of direct and repeated emphasis on trigger points to reduce spasm.

METHODS

Research Design

This study is an experimental study using pre and post test control group design. The aim is to compare the better intervention between the provision of myofascial release technique and ischemic compression technique on improving functional abilities in cases of myofascial pain syndrome of the upper trapezius muscle.

Measurement of functional ability improvement using the Neck Disability Index (NDI) questionnaire. The results of functional ability measurements were analyzed and compared between treatment group 1 and treatment group 2.

Population and Sample

The population in this study were stone-breaking workers in Awang Bnagkal Barat village. The target population in this study were all stone crusher workers who experienced Myofascial Syndrome in Awang Bnagkal Barat village, and the target population was Myofascial Syndrome in Awang Bangkal Barat village RT 08. This research was conducted in Awang Bangkal Barat village, Karang Intan sub-district, Banjar district, South Kalimantan province. This research was conducted from December 2023 to March 2024. The sample size required in this study was calculated based on the Pocock formula (Poccok, 2008):

$$n = \frac{2(\sigma)^2}{(\mu 2 - \mu 1)^2} \int(\alpha.\ \beta)$$

Description:
n : Number of samples
σ : Standard deviation
μ_1: Mean pain score before treatment
μ_2: Mean pain score after treatment
α : Error rate I (set at 0.05)
β : Second error rate (set at 0.2)
∫ (α β): 7.9 confidence interval (as per Pocock table)

$$n = \frac{2(7{,}55)^2}{(44{,}6 - 34.5)^2} \int(7{,}9)$$

$$n = \frac{114{,}01}{102{,}01} \int(7{,}9)$$

n = 8,82

Anticipating the occurrence of dropouts, 20% of 8.82 was added so that 10.58 was obtained, rounded up to 11 people. Based on the calculation results, the sample was determined to be a total of 22 people. The sample will be divided into two application groups with each group totaling 11 people with the following application:

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1. Treatment group 1 was given myofascial release technique 3 times within 3 weeks with a time of 30 seconds and repetition 3 times
2. Treatment group 2 was given ischemic compression technique performed 3 times within 3 weeks with a time of 30 seconds and repetition 3 times

In this study, sampling was carried out using consecutive sampling technique. This sampling technique is done by selecting samples that meet the research criteria until a certain period of time so that the number of samples is met. (A. Hidayat, 2009).

Research Instruments

The Neck Disability Index (NDI) consists of ten items that address functional activities (personal care, lifting, reading, working, driving, sleeping, and recreational activities), pain intensity, concentration, and headaches. For each item, there are six potential responses, describing greater levels of disability (no disability 0 total disability 5). An overall NDI score of 100 is calculated by summing the scores for each item. Higher scores indicate greater disability. The NDI has been shown to be valid, reliable and sensitive to change in patient populations suffering from neck pain (Hoving et al., 2003). Researchers used several statistical tests in analyzing the data, including:

1. Descriptive statistical test to analyze sample age.
2. Data normality test with Saphiro Wilk test, aims to determine the data distribution of each application group. α was used as the limit of significance, with a value of 0.05. The result $p > 0.05$ indicates that the data is normally distributed and $p < 0.05$ indicates that the data is not normally distributed.
3. Data homogeneity test with Levene's test, aims to determine data variation. Used α as the Limit of Significance, with a value of 0.05. The result is $p > 0.05$ then the data is homogeneous and $p < 0.05$ means the data is not homogeneous.
4. Hypothesis testing to determine differences in the mean of two paired data between pretest and posttest in each treatment group and control group used the paired-sample T test parametric statistical test. Hypothesis testing to determine the difference in the mean of two unpaired data between the treatment group and the control group using the independent sample T test parametric statistical test.

RESULTS AND DISCUSSION

Sample characteristics from the results of data collection using the research instruments applied in this study, the following values were obtained:

Table 1. Sample Data Description

Variables (Age, and Tenure)	n	Average and Deviation Baku
Age (years)	11	47,75±2,63
Length of Service (years)	11	9,42±8,56

Determining the statistical test to be used, a normality test was carried out using the Saphiro Wilk Test, while the homogeneity test using Levene's Test.

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Table 2: Normality and Homogeneity Tests

Data group	Normality test Saphiro Wilk Test		Test Homogeneity
	Treatment group 1	Treatment group 2	Levene Test
NDI Before Intervention	0,59	0,94	0,53
NDI Before Intervention	0,08	0,11	0,24
Difference	0,51	0,83	0,29

Normality test using Saphiro Wilk-Test showed a decrease in upper trapezius muscle myofascial syndrome disability before the application of all normally distributed groups (p> 0.05). Likewise, after application as well as the difference between before and after application in both groups were normally distributed. (p > 0,05).

The homogeneity test using Levene-Test shows that both groups before and after application and the difference in each group p> 0.05, which means that the data on the reduction of upper trapezius muscle myofascial syndrome pain before and after training is homogeneous. A related t-test was used to determine the mean difference in disability reduction before and after the application of each group.

Table 3. Related T-Test Results

	Intervention		Beda	p
	Before	After	Average	
Group Treatment 1	4,73	1,20	3,53 1,55	0,000
Treatment Group 2	5,09	1,79	3,30 2,27	0,001

The results of the releted t-test in table 3 show the difference in the mean reduction in upper trapezius muscle myofascial syndrome disability before and after application in both groups analyzed using the related t-test shows that both applications can reduce significant disability (p < 0.05).

This t-test aims to compare the mean reduction in disability in the upper trapezius muscle before application and after application between groups in the two groups given the application of myofascial release technique and ischemic compression technique using an independent t-test.

Table 4. Independent T-Test Results

	Group	n	Average SD	p
Before treatment	Treatment group 1	11	4,73 ± 1,49	0,62
	Treatment group 2	11	5,09 ± 1,87	
After treatment	Treatment group 1	11	1,20 ± 0,80	0,21
	Treatment group 2	11	1,79 ± 1,29	
Difference	Treatment group 1	11	3,53 ± 0,69	0,41
	Treatment group 2	11	3,30 ± 0,58	

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Table 4 shows the average disability in patients with myofascial pain syndrome of the upper trapezius muscle in both groups decreased in patients with myofascial pain syndrome of the upper trapezius muscle before treatment. Analysis of meaning with an independent t-test shows that each group can reduce disability in cases of myofascial pain syndrome of the upper trapezius muscle but does not show a significant difference, p value = 0.41 (p> 0.05).

Discussion

Sample characteristics

Data on the characteristics of research subjects in table 1, the average age was 47.75 ± 2.63 with the youngest age of 42 years and the oldest age of 50 years. In line with research conducted (Santiasih, 2013)(Santiasih, 2013), states that in general skeletal muscle complaints begin to be felt at working age, namely 25-65 years. The first complaint is usually felt at the age of 35 years and the level of complaints will continue to increase with age. This research is also in line with research conducted by (Farras Hadyan & Saftarina, 2017)(Farras Hadyan & Saftarina, 2017), with increasing age there will be degeneration of bones and muscles this condition begins to occur when a person is 30 years old. Research conducted Aktifah & Saputri (2020), increasing age can also cause a decrease in the amount of elastin in muscle tissue so that it can reduce the elasticity of muscle tissue and a decrease in ATP. Lack of ATP causes myosin to be unable to release bonds with actin so that the sarcomeres cannot return to their initial length before contraction. This is a supporting factor for sarcomeric contracture and triggers myofascial pain syndrome of the upper trapezius muscle.

The working period of the workers was more than 5 years, with a mean of 9.42 ± 8.56. In this case it can be associated between the working period and the onset of complaints of myofascial pain syndrome of the upper trapezius muscle. So the longer the working period, the more at risk of experiencing myofascial pain syndrome of the upper trapezius muscle. According to research (Umami, 2014)According to research (Umami, 2014), the most written batik workers who experience skeletal muscle complaints are those who have a working period of> 10 years. In line with research conducted by (Farras Hadyan & Saftarina, 2017)(Farras Hadyan & Saftarina, 2017), there is a relationship between tenure and the incidence of skeletal muscle complaints. Research results Aktifah & Saputri, (2020) myofascial pain syndrome of the upper trapezius muscle is most commonly found in tailors with a length of work of <10 years, the onset of myofascial pain syndrome of the upper trapezius muscle in tailors occurs at the beginning of the working period, namely in the first 2 years, with complaints of discomfort in the neck and upper shoulders. These complaints are mostly felt by tailors with a working period of less than 10 years.

The application of myofascial release technique can reduce disability in myofascial pain syndrome of the upper trapezius muscle.

Statistical tests using related-t-test in treatment group 1 using NDI and obtained the level of disability reduction in table 3. At the beginning of the treatment, the average value was 4.73, while after the application of the intervention, the average value was 1.20. Then testing with the releted t-test test with the results of P = 0.000 (P <0.05) which means Ho is

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rejected or there is an effect of applying myofascial release technique in reducing disability in myofascial pain syndrome of the upper trapezius muscle.

In line with research conducted by (Hernata Putri & Sulistyaningsih, 2020) stated that myofascial release was proven effective in reducing pain and increasing neck functional movements. Handling myofascial pain syndrome conditions with the direction of release following the direction of the upper trapezius muscle fibers to release trigger points and reduce muscle spasm so that it can reduce pain levels and restore normal muscle function. This research is also in line with research conducted by Trivedi et al., (2014) which states that Our research leads to the following conclusion that after 12 treatment sessions both active release technique and myofascial release technique are effective in the treatment of chronic lateral epicondylitis but myofascial release technique is found to be superior to active release technique. In another study conducted by Nur Hidayati & Wardana, (2023) also stated his findings that myofascial release has an effect on pain in upper trapezius muscle myofascial pain syndrome, myofascial release has an effect on pain in upper trapezius muscle myofascial pain syndrome.

The application of ischemic compression technique can reduce disability in myofascial pain syndrome of the upper trapezius muscle.

Statistical tests using the relatet t-test in treatment group 2 using NDI and obtained the level of disability reduction in table 3. At the beginning of the measurement before the application obtained an average value of 5.09, while after the intervention obtained an average value of 1.79. Then testing using the releted t-test test with the results of P = 0.001 (P <0.05) which means Ho is rejected or there is an effect of applying Ischemic compression technique in reducing disability in myofascial pain syndrome upper trapezius muscle.

This is in line with research conducted by Xu et al., (2023) stated that in neck pain conditions, ischemic compression proved effective in relieving conditions associated with neck pain, including pain intensity, pressure pain threshold, pain-related disability, and range of motion. In another systematic review of shoulder pain, ischemic compression proved effective in alleviating functional disability. In another study conducted by Hariandja et al., (2023) stated that there was an effect in providing ischemic compression intervention on myofascial pain syndrome of the upper trapezius muscle. The average pain value of myofascial pain syndrome of the upper trapezius muscle in respondents before being given ischemic compression intervention was 5.46. This shows that the average value of pain in respondents is included in the moderate pain category. The mean pain value of myofascial pain syndrome of the upper trapezius muscle after being given ischemic compression intervention is 1.38. This shows that the average value of pain in respondents after being given intervention is included in the mild pain category. This can be interpreted that on average after the ischemic compression intervention the respondents experienced a change in the pain value of myofascial pain syndrome of the upper trapezius muscle. Research conducted by Nikam & Varadharajulu, (2021) the provision of ischemic compression which is carried out for 90 seconds can provide significant results in reducing pain, ischemic compression technique provides an emphasis that results in tissue reperfusion resulting in

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increased blood flow in the area, and the muscles become more relaxed and flexibility increases as well as the decay of the taut band resulting in the release of tissue adhesions. The release of residual metabolic irritants in the myofascial tissue will then go through the stage of reabsorption by the bloodstream with this, causing allodynia and hyperalgesia in the nervous system to decrease. The effect of ischemic compression technique will reduce inflammation in the muscles, reduce tension in the muscles, destroy scar tissue and reduce the sensitivity of nerve endings. after the muscle contracts isometrically, it will automatically be followed by muscle relaxation. The mechanism that occurs is that afferents from the two receptors in the golgi tendon and gamma afferents from muscle spindle receptors provide feedback to the spinal cord. When an isometric muscle contraction is performed, it will stimulate the golgi tendon organ receptors. Afferent nerve impulses from the golgi tendon organ enter the spinal cord through the dorsal horn and meet with inhibitory motor neurons, so as to stop the release of efferent motor neuron impulses and therefore prevent further contraction, muscle tone is reduced, which will further result in relaxation and elongation of muscle fibers. (Hidayat et al., 2020).

The application of myofascial release technique is as good as ischemic compression technique in reducing disability in myofascial pain syndrome of the upper trapezius muscle.

Statistical tests in table 4, obtained the value after intervention in treatment group 1 amounted to 3.53 ± 0.69, while the value after intervention in treatment 2 amounted to 3.30 ± 0.58 with independent sample t-test, and the results showed that P = 0.41 (P>0.05), so Ho was accepted. This means that there is no significant difference in the application of myofascial release technique with ischemic compression techniquel on myofascial pain syndrome of the upper trapezius muscle.

The research is in line with research conducted by Buana et al., (2014) stated that based on the results of research and data analysis, this study can be concluded that the application of myofascial release technique is as good as ischemic compression technique in reducing pain in upper trapezius muscle myofascial syndrome. By giving ischemic compression technique to patients can have the effect of reducing muscle spasm or tightness, breaking up scar tissue, and rearranging muscle fibers and ligaments into a more biofunctional pattern. Compression movements with moderate pressure can produce thermal and sedative effects on muscle tissue. Myofascial release technique can result in increased flexibility, decreased pain and faster tissue healing duration, as well as other effects that affect postural improvement. because adhension makes fascia fibers bound together. The effect of myofascial release technique is proven to have a significant effect on the upper trapezius muscle. Judging from the results of research on the application of myofascial release techique and Ischemic Compression both have a significant effect.(Suharto & Suriani, 2020). Myofascial release technique can play a role in providing stretch or elongation in muscle and fascia structures with the aim of releasing adhesion or adhesions, reducing pain with gate control theory, restoring the quality of lubricating fluid from fascial tissue, tissue mobility and normal joint function, parasympathetic response on autonomic nerves, and serotonin release. The release of biochemicals, namely histamine and serotonin from the body will occur

vasodilation and vascular permeability which will re-establish the structure of muscle tissue. Ischemic compression technique is a massage technique that makes reactive hyperemia and spinal reflex mechanisms that target the substania gelatinosa so that there is lateral inhibition in the spinal cord is a form of effort in the effectiveness of pain relief. Myofascial release technique and ischemic pressure technique are some of the manual therapy techniques that can be used to reduce pain in this case. (Haryatno & Kuntono, 2016).

CONCLUSION

Based on the results of research and data analysis, this study can be concluded that the application of myofascial release technique is as good as ischemic compression technique and can be used as a physiotherapy technique to reduce disability in reducing disability in myofascial pain syndrome of the upper trapezius muscle.

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