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The effectiveness of tepurak manipulation for chronic pelvic injury

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Abstract
Complaints of chronic pelvic injury are one of the most common injuries suffered. The results of Riskesdas DIY in 2018 the percentage of pelvic injuries classified as members of the lower limbs reached 64.52%. Tepurak (Tekan, Pukul, Gerak) is one of manipulation therapy. This study aims to: 1) Assess the effectiveness of Tepurak manipulation to reduce the level of pelvic pain in patients with chronic pelvic injuries; 2) Assess the effectiveness of Tepurak manipulation to improve pelvic ROM (Range of Motion) in patients with chronic pelvic injuries.

This study uses a Pre-experimental design with One Group Pretest-Posttest Design. The populations in this study were patients who suffered pelvic chronic injuries in the DIY region. The sampling technique uses quota sampling which is calculated by Slovin formula obtained quota of 20 people. Data collected was pain scale and ROM both before and after treatment. Paired Samples T-Test is used to analyze ROM data on flexion, adduction, external rotation and Wilcoxon signed rank test for function scale and ROM extension, abduction, and internal rotation.

Based on the research data, the significance level for the pain scale is 0.00 (p<0.05) and the significance level of each ROM movement (flexion, extension, adduction, abduction, external rotation, pelvic internal rotation) after Tepurak manipulation is 0.00 (p<0.05). This shows that there is a decrease in pain scale and an increase in ROM. Based on these results, it can be concluded that the manipulation of Tepurak is effective for healing chronic pelvic injuries characterized by decreased pain and increased pelvic ROM.

Keywords: Tepurak, chronic pelvic injury

Introduction

In this modern era, job demands are increasing and economic needs are increasing. This results in people carrying out work activities without seeing the effects they will have. The work you do every day will cause physical fatigue, causing your physical condition to decline and you will experience problems with your activities. These disorders can take the form of complaints of bones, muscles and joints in the body or are also called musculoskeletal disorders.

Musculoskeletal disorders are characterized by prolonged pain and cause limitations in movement. The musculoskeletal condition that many workers and athletes complain about is the pelvis. The pelvis is the connecting part of the upper and lower limbs which functions to support the body's weight and maintain balance, so the pelvis is vulnerable to injury and musculoskeletal disorders.

The prevalence of musculoskeletal pain according to WHO reaches a percentage of 33%. In Asia, the risk of hip joint injury over the age of 50 years is 5.6% in men and 20% in women. In Indonesia, percentage. Complaints of low back pain at home. Sick in Surabaya amounting to. 45.5% of the 46 people studied. Various factors have been linked to causing low back pain, namely heavy physical workload and poor working position. Results of the 2018 DIY Riskesdas, the percentage of pelvic injuries classified as lower limbs reached 64.52%.

Disorders of the hip joint must be treated immediately as a healing effort so as not to cause increasingly severe negative effects. Healing is based on the type of injury and the time the injury occurred, namely acute or chronic. The acute stage of injury lasts 4-6 days from the time the injury is experienced, the chronic stage can last 3 weeks - 12 months depending on the tissue involved and the level of damage. Healing efforts made for pelvic pain disorders can take the form of pharmacological and non-pharmacological treatments.

Pharmacological treatment is treatment using drugs to cure muscle pain and joint pain, while non-pharmacological treatment is treatment carried out using various types of therapy, such as: acupuncture, *shiatsu*, heat therapy, cold therapy, *chiropractic*, massage and others. People tend to choose non-pharmacological treatment to treat musculoskeletal disorders, especially in the hip joint, because it avoids other effects that can be caused by drugs. One form of non-pharmacological treatment carried out by the community is therapeutic massage, one of which is Tepurak Massage (Press, Pat, Move).

Tepurak manipulation is carried out by pressing on the Trigger point to relax the muscles so as to reduce muscle stiffness or tension. Beating or tapotement to relax the muscles, so that the range of motion of the joints increases and pain will decrease. The movements carried out can return the joints to the correct position, and stretch stiff muscles so that they become more relaxed. The advantage of Tepurak manipulation is that it can relax muscles thereby reducing pain and increasing ROM (*Range of Motion*), as well as actively involving patients so that it is safer because patients act according to the stiffness and pain they feel (Ambardini *et al.*, 2016:74) [1].

Tepurak manipulation for repositioning shoulder subluxation by Rachmah Laksmi Ambardini and B.M. Wara Kusharanti in 2016 which is known to be effective for repositioning the shoulder joint, which is characterized by increasing ROM and reducing pain due to shoulder subluxation. Then Tepurak manipulation for healing pain and neck muscle tension was researched by Ela Yuliana in 2018, and was found to be effective in healing pain and neck muscle tension which was characterized by increasing ROM, decreasing pain scale and increasing body function. The effectiveness of Tepurak manipulation for healing chronic pelvic injuries has never been done so this study was designed to determine its effectiveness.

Research Methods

Types of research

The research design used in this research is *pre-experimental design* with a plan *One Groups Pretest-Posttest Design*, namely the existing research design *pretest* before being treated and *posttest* after treatment and without control. This research was designed to determine the effect of massage treatment on the pain variable, ROM. This design can compare conditions before and after treatment.

$$O_1 \text{ — } x \text{ — } O_2$$

Information

O1 = value *pretest* (before being given Tepurak manipulation)
X = treatment (Tepurak manipulation)
O2 = value *posttest* (after being given Tepurak manipulation)

Place and time of research

Research was carried out from January to April, at the Laboratory *Exercise Therapy* GOT University.

Research Population and Sample

The population in this study were sufferers of chronic pelvic injuries who lived in the DIY area. Samples were taken non-randomly, namely by incidental sampling. Technically, this is done by finding people with pelvic injuries who are then screened using inclusion and exclusion criteria. The inclusion criteria include pelvic injury sufferers who have had more than 3 weeks, willing to take part in research as proven by *Informed Consent.* Exclusion criteria include broken bones, severe pain so that you cannot walk, fever, and urination problems.

The sampling technique uses quota sampling and determines the number of samples using the Slovin formula with a critical value of 20%. So we got a sample of 20 people.

Instruments and Data Collection Techniques

The instrument used in this research is the VAS (Visual Analogue Scale) and Goniometer. This research data collection technique procedure is divided into three waves, namely pretest by measuring pain and ROM, then given treatment (treatment) in the form of Tepurak manipulation and *post-test* by measuring pain and ROM.

Data analysis technique

Descriptive analysis of research subjects is used to describe and describe research subjects which include data on gender, age, employment, duration of illness, pain, ROM obtained using tables, pie chart nor bar chart.

Descriptive statistical analysis of research variables is used to describe the statistics of research variables pretest and posttest which consists of the average and standard deviation of the pain and ROM variables. The prerequisite tests in this research include normality tests with tests Shapiro Wilk. Parametric statistical analysis tests are used if the normality test shows that the data is normally distributed, then a difference test will be carried out paired t-test. Non-parametric statistical analysis tests are used if the normality test shows that the data is not normally distributed, then a different test is carried out using Wilcoxon signed rank test to compare variables pretest and posttest.

Effectiveness is calculated by finding the difference in value pretest with posttest and divided by value pretest, then multiplied by 100%.

Results Study and Discussion

Descriptive Analysis of Research Subjects

Gender

The number of subjects in this research was

20 people, with details of 14 women and 6 men, so that the percentage of female patients is 70% and male patients are 30%.

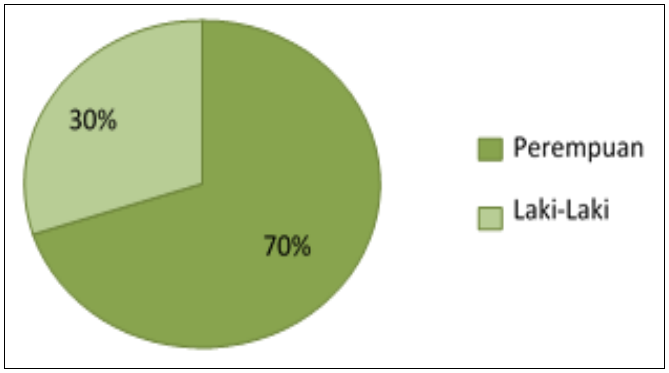


Fig 1: Gender Pie Chart.

Women have twice the risk of injury than men, because the anatomical structure of the female pelvis is greater and has a more hyperextended ROM than men (Murphy, 2003: 17). Women tend to have a gynecoid type of pelvis, a pelvic cavity that is oval in shape, shallower and wider than the male pelvis.

Age

The age range of the subjects in this study ranged from 17-46 years, with an average age of 25.55 years and a standard deviation of 8.46448. The age of the research data subjects is presented in the diagram below.

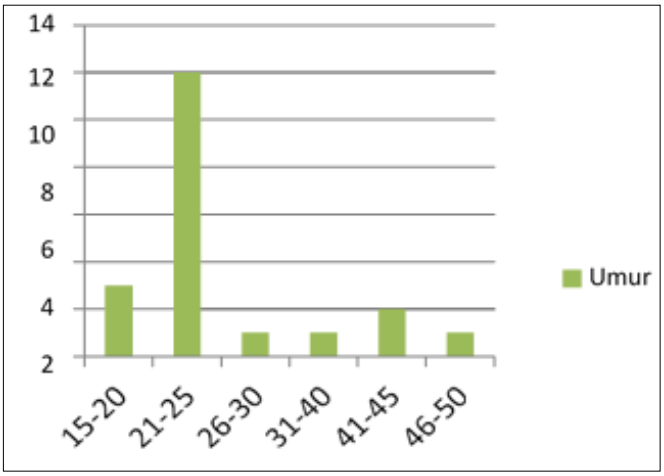


Fig 2: Subject Age Histogram

From the data above, most injuries were experienced at the age of 21-25 years because the research sample were active athletes who exercised every day. Active athletes do exercise regularly. Therefore, excessive use can cause ischemia and inflammation.

Work

The average occupation of the subjects of this research is 15 students with a percentage of 75%.

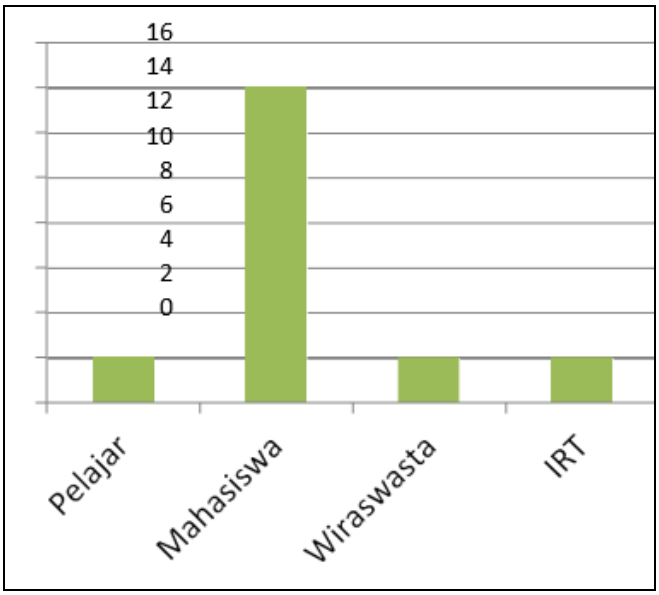
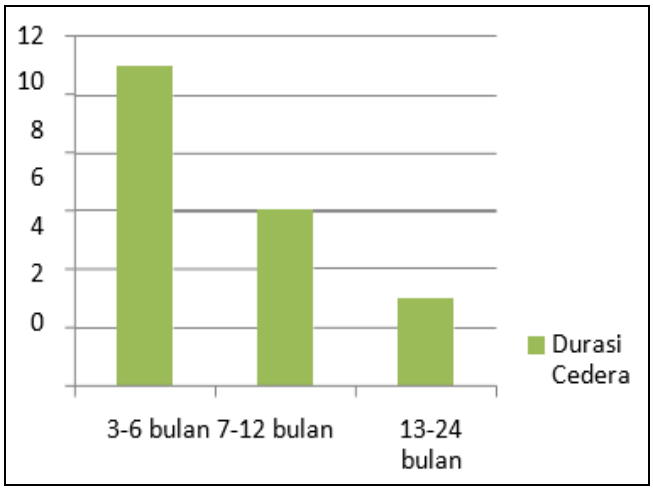


Fig 3: Subject Job Histogram

Eleven of the 15 students as research subjects have a profession as sportsmen, namely 11 people. Athletes tend to use high physical activity which will cause ergonomic problems which cause musculoskeletal disorders.

Injury Duration

The average duration of injury is in the range of 3-6 months. The duration of the subject's injury is presented in the diagram below.



The duration of injury experienced by most research subjects was in the range of 3-6 months, which is included in the chronic phase because the injury was relatively unnoticeable. However, there are those who have experienced injuries for up to 22-24 months which are included in the acute exacerbation phase, chronic injuries that reappear with acute symptoms. Kisner & Colby (2007: 297) [6] divides the stages of injury duration into three: the acute injury stage lasts 4-6 days after the injury is experienced, the sub-acute stage can last 10-17 days or 4-21 days from the time the injury occurs, and the chronic stage can last 3 weeks - 12 months depending on the tissue involved and the extent of damage.

Descriptive Statistics of Research Variables

Painful

Table 1: Results of descriptive analysis of pretest-posttest pain scale data

Pretest		Posttest		Decline
Mean	**Std. Dev**	**Mean**	**Std. Dev**	
5,85	8,48	2	1,09	3,45

Difference in average values *pretest* and *posttest* the pain scale during Tepurak manipulation can be seen in the following picture.

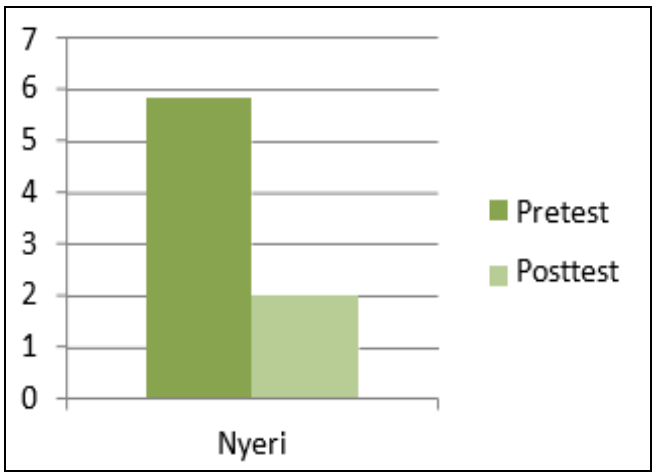


Fig 4: Histogram of Mean Pain Scale *Pretest-Posttest*

ROM

Descriptive statistical analysis of all ROM value data *pretest* and *posttest* presented in the following table.

Table 2: Results of Descriptive Analysis of ROM Data Pretest-Posttest

Variable	Pretest		Posttest		Enhancement
	Mean	Std. Dev	Mean	Std. Dev	
Flexion	92,5	19,74	109,55	22,16	17,05
Extension	25,4	7,45	37,2	11,40	11,8
Adduction	38,35	9,60	48,95	9,30	10,6
Abduction	59,2	20,16	76,05	21,30	16,85
Internal Rotation	35,85	7,10	44,15	7,58	8,3
External Rotation	31,85	10,38	39,4	11,20	7,55

Based on the data in Table 2, the average ROM data such as flexion, extension, adduction, abduction, external rotation, internal rotation increased after Tepurak manipulation. According to Ambardini *et al.* (2016:78) [1] Tepurak manipulation has a physiological effect, namely causing relaxation in the muscles, so that it can increase ROM.
The difference in the average pretest and posttest ROM scores in the Tepurak manipulation can be seen in the following picture.

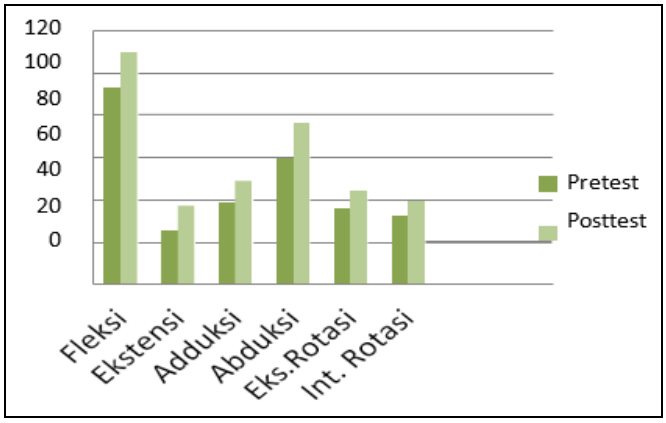


Fig 3: Average histogram pretest- posttest ROM

Normality
Based on the results of data processing using software SPSS 25.0.

Table 3: Normality Test Results with Sapphire Wilk

Variable	P value	Distribution
Flexion Pretest	0,739(>0,05)	Normal
Flexion Posttest	0,544(>0,05)	Normal
Extension Pretest	0,031(<0,05)	Abnormal
Extension Posttest	0,063(>0,05)	Normal
Adduction Pretest	0,151(>0,05)	Normal
Adduction Posttest	0,242(>0,05)	Normal
Abduction Pretest	0,019(<0,05)	Abnormal
Abduction Posttest	0,813(>0,05)	Normal
Ex. Rot Pretest	0,793(>0,05)	Normal
Ex. Rot Posttest	0,126(>0,05)	Normal
In. Rotation Pretest	0,009(<0,05)	Abnormal
In. Rotation Posttest	0,232(>0,05)	Normal
Painful Pretest	0,019(<0,05)	Abnormal
Painful Posttest	0,056(>0,05)	Normal

It is known that all test results using the Shapiro Wilk test, with variables with normal distribution, namely ROM flexion, adduction, external rotation will be analyzed using parametric statistics, paired sample t-test. Non-normally distributed variables, namely extension ROM, abduction and pain, will be analyzed using non-parametric statistics, the Wilcoxon signed rank test. Based on Table 3, it is known that all test results using the Shapiro Wilk test, with variables with normal distribution, namely ROM flexion, adduction, external rotation will be analyzed using parametric statistics, paired sample t-test. Non-normally distributed variables, namely ROM extension, abduction, and pain will be analyzed using non-parametric statistics, the Wilcoxon signed rank test

Parametric Statistical Analysis
ROM Flexion, Adduction, External Rotation

Table 3: Results Paired Samples T-Test

ROM	Variable	Mean	St. Dev	Mea n Differ up	Asym p Sig. (2 tail ed)
Fleksi	Pretest	92,50	20,2601	-17,05	0,000
	Posttest	109,55	22,7422		
Ab duksi	Pretest	38,35	9,85834	-10,60	0,000
	Posttest	48,95	9,54477		
External rotation	Pretest	35,85	7,286	-8,30	0,000
	Posttest	44,15	7,782		

Data ROM Pretest-Posttest by subjects has an average of 92.50 and a standard deviation of 20.26015. Flexion ROM posttest has an average of 109.55 and a standard deviation of 22.74221. The mean difference value shows the difference pretest posttest which has a value of -17.05, meaning there is a change to the ROM after manipulation. The significant value of flexion ROM was 0.000 (p<0.05).
Abduction ROM pretest experienced by the subject has an average of 38.35 and a standard deviation of 9.85834. Abduction ROM posttest has an average of 48.95 and a standard deviation of 9.54477. The mean difference value shows the difference pretest posttest which has a value of –10.60, meaning there is a change to the ROM after manipulation. The significant value of abduction ROM was 0.000 (p<0.05).
ROM external rotation pretest experienced by the subject has an average of 35.85 and a standard deviation of 7.286. ROM external rotation posttest has an average of 44.15 and a standard deviation of 7.782. The mean difference value shows the difference pretest the posttest value is -8.300, meaning there is a change in the ROM after manipulation. The significant value of ROM external rotation was 0.000 (p<0.05).
Based on Table 3, the results of statistical analysis using Paired Samples t-Test, the significant value of ROM such as: flexion, adduction, external rotation is 0.000 (p<0.05), so the hypothesis is accepted or it can be concluded that there is a significant difference between pretest and posttest. This shows that Tepurak manipulation is effective in significantly increasing ROM of flexion, adduction, external rotation in chronic hip injuries.

Non-Parametric statistical analysis
Pain Scale

Table 4: Test Results Wilcoxon signed rank Pain Scale Data Pretest-Posttest

Here it is	Standard Deviation	Min Value	Nilai Max	Z Value	Asym p Sig. (2tail ed)
Pretest	1,49649	4,00	8,00	-3,941	0,000
Posttest	1,12390	0,00	4,00		

The pretest movement pain scale range experienced by the subjects was 4-8% with an average pain of 5.85 and a standard deviation of 1.49649. The posttest movement pain

scale range experienced by the subjects was 0-4% with an average movement pain of 2.00 and a standard deviation of 1.12390. The difference in the standardized Z value of the posttest and pretest movement pain data is -3.941, if the significance level used is 0.05 then the cumulative probability value of -3.941 is 0.000 (Asymp. Sig 2-tailed) and (0.000 < 0.05) then H0 is rejected and H1 is accepted. Based on the data, all subjects experienced a decrease in the level of movement pain scale and through a significant test the hypothesis was accepted, it can be stated that there was a significant change between the subjects' data scales. *Pretest* and *posttest* or it can be concluded that Tepurak manipulation is effective in reducing pain significantly in chronic pelvic injuries.

ROM Extension, Abduction, Internal Rotation

Table 5: Wilcoxon signed rank test results for ROM data Pretest-Posttest

ROM	Variable	Standard Deviation	Z value	Asym P Sig. (2tailed)
Extension	Pretest	7,64612	3,731	0,000
	Posttest	11,70065		
Abduction	Pretest	20,68714	3,751	0,000
	Posttest	21,86195		
Internal Rotation	Pretest	10,65376	3,509	0,000
	Posttest	11,49554		

Based on Table 5, the results of statistical analysis using the Wilcoxon signed rank test, the pretest ROM extension value experienced by the subjects was 15-45% with an average of 25.40 and a standard deviation of 7.64612. Meanwhile, the posttest extension ROM value experienced by the subject was 23-45% with an average of 37.20 and a standard deviation of 11.70065. The standardized Z value of the difference between posttest-pretest movement pain data is -3.731, if the significance level used is 0.05 then the cumulative probability value of -3.731 is 0.000 (Asymp. Sig 2-tailed) and (0.000 < 0.05) then H0 is rejected and H1 is accepted. The pretest abduction ROM experienced by the subjects was 35-92% with an average of 59.20 and a standard deviation of 20.68714. Meanwhile, the posttest abduction ROM experienced by the subject was 37-115% with an average of 76.05% and a standard deviation of 21.86195. The standardized Z value of the difference in posttest-pretest movement pain is -3.751, if the significant level used is 0.05 then the cumulative probability value of -3.751 is 0.000 (Asymp. Sig 2-tailed) and (0.000 < 0.05) then H0 is rejected and H1 accepted. The pretest internal rotation ROM experienced by the subject was 19-60% with an average of 31.85% and a standard deviation of 10.65376. Meanwhile, the posttest internal rotation ROM experienced by the subject was 60-65% with an average of 39.40% and a standard deviation of 11.49554. The standardized Z value of the difference in posttest-pretest movement pain data is -3.509, if the significance level used is 0.05 then the cumulative probability value of -3.509 is 0.000 (Asymp. Sig 2-tailed) and (0.000 < 0.05) then H0 is rejected and H1 is accepted. Based on the data that the subject experienced an increase in ROM and through a significant test the hypothesis was accepted, it can be stated that there was a significant change between the pretest and posttest subject data scales or it can be concluded that Tepurak manipulation was effective in increasing the ROM of extension, abduction and internal rotation significantly in chronic pelvic injuries.

Effectiveness

The percentage of effectiveness of increasing ROM after Tepurak manipulation is calculated based on the average value of the pretest and posttest using the formula.

$$\text{Effectiveness} = \frac{\text{Posttest-Pretest}}{\text{Pretest}} \text{x } 100$$

Through calculating effectiveness by looking for the difference in value posttest with pretest and divided by value pretest, then multiplied by 100%, the percentage value of the effectiveness of increasing pain is 65.09%, the percentage value of the effectiveness of increasing ROM in flexion movements is 19.48%, extension movements are 50.65%, adduction movements are 33.35%, abduction movements of 33.53%, external rotational motion of 27.46%, and internal rotational motion of 26.60%. If the average is taken, the percentage value for the effectiveness of increasing ROM in this study is 31.84%.

Discussions

Based on the research data, the significance level for the pain scale was 0.00 ($p<0.05$) and the significance level for each ROM movement (flexion, extension, adduction, abduction, external rotation, internal rotation of the pelvis) after Tepurak manipulation was 0.00 ($p<0.05$). This shows that there is a decrease in the pain scale and an increase in ROM. Based on these results, it can be concluded that Tepurak manipulation is effective for healing chronic pelvic injuries which are characterized by decreasing pain and increasing hip ROM.

The percentage of pain effectiveness was 65.09% and the percentage of effectiveness of flexion ROM was 19.49%, extension ROM was 50.66%, adduction ROM was 33.35%, abduction ROM was 33.53%, external rotation ROM was 27.46%, and internal rotation ROM was 26.60%, resulting in an average ROM of 31.84%. The greatest increase in joint range of motion in the sagittal axis is extension. This happens because a lot of stimulation is carried out on the frontal muscles, namely the muscles iliopsoas, comb, rectus femoris, sartorius, tensor fascia lata, when manipulated, this muscle causes the muscle to stretch very quickly so thatmuscle spindel will stretch out and transmit information in the form of changes in muscle length that occur to thespinal cordand the central nervous system causing strong and rapid muscle contractions or spasms as wellstretch reflex. Stretch reflex this causes an increase in extension movement.

The same thing was shown by Yuliana's research (2018) that there was a significant effect of Tepurak massage on reducing pain and tension in the neck muscles. And research by Susanto (2017) shows that there is a significant effect of Tepurak massage on increasing shoulder joint ROM in sufferers frozen shoulder.

The effects of Tepurak manipulation are the disappearance of feelings of pain, increased blood flow to the muscles, stimulating the release of endorphins, relaxing the muscles, returning the joint position to normal. There is a decrease in pain in the pelvis after Tepurak manipulation due to pressure on the pointtigger point Pelvic muscles are musclesgluteus maximus, gluteus medius, gluteus minimus, piriformis, quadratus lumboris, tensor facias latuswill block pain messages sent to the brain through the stimulation provided. Pain fibers carrying painful stimulation to the brain are smaller and travel sensation more slowly than extensive touch fibers. When touch and pain are stimulated together, the

sensation of touch travels to the brain closing the gates in the brain. It is also said in Hardjono *et al*., 2005:99 [3], stimulation travels through Aβ thick myelinated nerve fibers while pain impulses are carried by Aδ and C afferent nerve fibers. Aβ thick myelinated nerve fibers travel faster than Aδ and C afferent nerve fibers so that before the pain message is carried by the afferent nerve fibers Aδ and C are processed by the brain, the thick myelinated nerves Aβ blocks or closes the gate first, as a result the pain sensation felt is reduced. This process is Gate Control Theory. Supporting research press on trigger point can reduce pain, namely research conducted by Leonid Kalichman, in 2017 titled Effect of Self-Myofascial Release on Myofascial Pain, Muscle Flexibility, and Strength showed that the self-myofascial release (SMFR) technique significantly reduced muscle pain, muscle flexibility, and muscle strength.

Manipulating pressure and tapping on Tepurak will increase blood flow to the muscles. Manipulation is carried out by pressing until the pain reaches the maximum tolerable level so that ischemia occurs. The ischemia that occurs is one of the causes of pain. When ischemia occurs, lactic acid accumulates in the tissue as a consequence of metabolism without oxygen. Apart from that, bradykinin and proteolytic enzymes are also formed, thereby stimulating pain nerve fiber endings. Ischemia also causes a lack of blood flow in the compressed area. After the pressure is released, local blood flow increases, oxygen supply increases, making it easier to remove inflammatory chemicals in the tissue back into circulation. Clapping manipulation will complete the muscle relaxation process and reduce pain due to pressure applied to the muscles trigger point. Press and clap manipulation will stimulate the production of endorphin hormones that will reduce pain. According to Mons dragon, 2004, massage which has a distraction effect can also improve formation endorphins in the descending control system and create muscle relaxation. According to Champaneri, 2014:72 [2] massage can also increase endorphins which cause a decrease in sensitivity to pain, calm thoughts, and increase the pain threshold.

The movements carried out in Tepurak cause an increase in ROM because the muscles that are stretched and contracted will experience relaxation. With relaxation, the hip joint will return to its anatomical position and the ROM of pelvic movement will increase states that correct stretching will be useful for stretching ligaments, stretching muscles and preventing injury. Research that supports pressure on movement can increase ROM, namely research conducted by Michael P. Reiman by title Restricted Hip Mobility: Clinical suggestions for self-mobilization and muscle re-education shows an increase in ROM.

The effects of Tepurak manipulation include: inhibiting pain by pressing the point trigger point, muscle relaxation which causes pain to decrease, increased blood flow and oxygen will facilitate the removal of inflammatory chemicals so that pain and muscle tension are reduced, as well as the release of endogenous opioids which stimulate the release of endorphins causing a decrease in pain, muscle relaxation which causes ROM to increase. Thus the overall effect caused by Tepurak manipulation is to reduce pain and increase ROM. So Tepurak manipulation is effective for healing chronic pelvic injuries.

Conclusions and Suggestions

The knot

Overall in this research it can be concluded that

1. Tepurak manipulation was effective in reducing the degree of pain by 65.09%.
2. Tepurak manipulation is effective in increasing flexion ROM by 19.49%, extension ROM by 50.66%, adduction ROM by 33.35%, abduction ROM by 33.53%, external rotation ROM by 27.46%, and internal rotation ROM. amounting to 26.60%.

Based on the research results that have been obtained, it can be concluded that Tepurak manipulation is effective for healing chronic pelvic injuries as indicated by a decrease in pain levels and an increase in ROM after Tepurak manipulation.

Suggestion

1. For Patients, Patients with chronic pelvic injuries can use Tepurac Manipulation as a therapy in addition to other therapies.
2. For the Development of Sports Science.
3. The results of this study can be used as a reference for treating chronic pelvic injuries.
4. For future researchers.
5. This research can be developed with a larger sample size.

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