

# The Effect of Roll Slide Mobilization and Traction Manual on Knee Pain Scale Intensity Patients with Osteoarthritis

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**Keywords:** Roll Slide Mobilization, Traction Manual, Knee pain Scale Intensity, Osteoarthritis patients.

**Abstract:** Osteoarthritis was a chronic joint disease that is characterized by abnormalities in the cartilage of the joints and nearby bones. Cartilage (cartilage) is the part of the joint that lines the end of the bone, to facilitate the movement of the joint. The occurrence of osteoarthritis is influenced by various risk factors such as age (aging process), genetic, obesity, joint injury, anatomical anomaly, metabolic disease and inflammatory joint disease. The objectives of this research is to determine the effect of roll slide and manual traction mobilization on the intensity of the knee pain scale in patients with osteoarthritis. The method used a quasi-experimental one group pre and post test, with a sample of 22 respondents. Pain scale measurement using VAS, using paired t-test analysis. The results of the test showed that there was an influence of the provision of Slide Slide and Manual Traction Mobilization to decrease the intensity of the knee pain scale with the results of paired sample t-test results obtained p-value <a (0,000 <0.05). The Conclusion there was the effect of providing roll slide mobilization and manual traction on the intensity of the knee pain scale patients with osteoarthritis. The researcher suggests to the next researcher add the number of samples and longer time so that the results obtained are more optimal.

## 1. INTRODUCTION

Humans are living things, the characteristic of living things is moving. Humans move to needs of life in daily activities. The one that often experience disturbances are the joints, especially the knee joints, which have quite heavy movements and are mostly used by humans in carrying out activities and meeting their daily needs. Impaired motion and function in humans will result in pain or decreased functional ability, so that it can limited physical activity and sufferers depending on the help of others. Many factors or caused that can cause these disorders, one of which is Osteoarthritis where degenerative joint disease occurs in the knee joints caused by various factors (Triyono, 2018).

Osteoarthritis (OA) is the most common joint disorder and the leading cause of disability in elders. In 2015, the World Health Organization estimated that 18.0% of women and 9.6% of men 60 years of age or over suffer from symptomatic OA. Among people with symptomatic OA, 80% have some limitation in mobility and 25% are unable to perform their major daily activities (Zhang and Niu, 2016). Indonesia is sufferers of osteoarthritis are 5% at the

age of <40 years, at the age of 40-60 years reaching 30%, and 65% at the age of > 61 years. For knee osteoarthritis the prevalence in Indonesia is also quite high, reaching 15.5% men and 12.7% women of all osteoarthritis sufferers (Adhiputra, Putra 2017).

Based on data from RISKESDAS 2018, the prevalence of joint disease in Indonesia is around 7.3% and osteoarthritis (OA) or arthritis is a common joint disease. Although it often occurs with age, or known as degenerative disease, joint disease has occurred in people in the age range of 15-24 years (prevalence rate around 1.3%), the prevalence rate continues to increase in the age range of 24-35 years (3, 1%) and the age range is 35-44 years (6.3%).

Osteoarthritis is a non-inflammatory joint disorder that affects old, chronic, and slow progressive joints that eventually causes joint and disability failure. These degenerative and progressive joint diseases occur in about 250 million people worldwide, 27 million people in the United States 3, 4 Elderly (around 35% of patients over 65 years old) are women, while African-American populations are at the highest risk of developing OA.5,6, and in India there are more than 10 million cases annually and 60

million cases and will be at ranked 3rd in the world in 2025. Pain also originates from bone due to stimulation of the periosteum because osteophytes are recipients of nociceptive pain. There are 3 places that distinguish pain, namely: 1. Sinovium, occurs due to inflammatory reactions that arise due to the crest in joint fluid, 2 Damage to the soft tissue can be ligament tears, joint capsules and meniscus damage. The process of Osteoarthritis is different for each person that we can see like in Figure 1 (Kumar, & Gupta 2017, Khon 2016).



Figure 1: The Process of Osteoarthritis

The cause of osteoarthritis in every daily activity can be an emphasis on the joint area, especially the joints that become the weight of the body such as ankles, knees, and pelvis, degenerative changes that initiate primary osteoarthritis, while age, obesity, trauma, and other causes are factors that cause secondary osteoarthritis (Ganu, Merchant, 2018).

The results of research conducted by Pandya, Sheth, 2017 found that manual traction is effective for reducing pain and can increase functional activity and a decrease in pain in osteoarthritis of the Knee Joint That the roll-slide is used to mobilize the joints if there is limited space for joint motion due to the shortening of capsuleligamentair and can reduce Pain and can maintain joint ROM, (Pandya, Sheth, 2017).

Measurement of pain response felt by patients can be measured using the Visual Analog Scale (VAS) is a measure of pain intensity that is considered the most efficient that has been used in research and clinical settings. VAS is generally presented in the form of horizontal lines. In its development, the VAS method of presentation is given the numbers 0-10, "0" is no pain and "10" shows very severe pain, that we can see like in Figure 2 (Klimek, Bergmann, Biedermann, et al, 2017).



Figure 2: Visual Analog Scale (VAS)

Manual Traction is a technique used to treat joint dysfunction such as pain, stiffness, reversible joint hypomobility. Traction is a passive motion that can be done at a slow speed. This traction can stimulate biological activity by flowing synovial fluid that can carry nutrients in the avascular portion of the joint cartilage on the joint surface and fibro cartilage in the joints (Pandya, Sheth, 2017).

Roll slide mobilization in the knee joint is one form of mobilization in the form of passive motion in the knee joint that is adapted from physiological movements that occur when flexion and extension are in accordance with osteokinematics of the knee joint and intra articular elements have rotational, translational and spin motion. Roll slide mobilization is used to mobilize the joints if there are mechanical limitations or shortening of the capsuloligament and can maintain joint ROM while minimizing pain. Dosage and use: a) Degree I: Roll slides with small amplitudes are applied parallel to the surface of the joint and carried out at the beginning of the degree of movement. Used to reduce pain b) Degree II: Bone moves parallel to the surface of the joint until slack and tissue around the joint tighten. Used to reduce pain c) Degree III: Bone moves parallel to the joint surface with a large enough amplitude that we can see like in Figure 3 (K. Hanoch & P. Elavaration in 2016).



Figure 3: Roll Slide Mobilization and Manual Traction.

Pain is an unpleasant subjective and emotional sensory obtained related to actual or potential tissue damage or describes the condition of the damage. Pain stimulation received by nociceptors on the skin can be high or low intensity such as stretching and temperature as well as by tissue lesions. Necrotic cells release  $K^+$  and intracellular proteins. Increased extracellular  $K^+$  levels will cause depolarization of nociceptors, whereas proteins in some circumstances will infiltrate microorganisms, causing inflammation/inflammation. As a result, pain mediators are released such as leukotrienes, prostaglandin E2, and histamine which will stimulate nociceptors so that dangerous and harmless stimuli can cause pain (hyperalgesia or allodynia). In addition, the lesion also activates blood clotting factors so bradykinin and serotonin will be stimulated and stimulate nociceptors. If there is occlusion of blood vessels there will be ischemia which will cause accumulation of extracellular  $K^+$  and  $H^+$  which then activates nociceptors. Histamine, bradykinin, and prostaglandin E2 have a vasodilator effect and increase vascular permeability. This causes local edema, increased tissue pressure and also occurs nociceptor stimulation. When nociceptors are stimulated, they release the peptide substance P (SP) and the peptide-related calcitonin gene (CGRP), which will stimulate the inflammatory process and also produce vasodilation and increase vascular permeability. Vasoconstriction (by serotonin), followed by vasodilation, may also be responsible for migraine attacks. This nociceptive impulse causes pain that we can see like in Figure 4 (Ardinata, D, 2017, and Zhang and Niu, 2016).

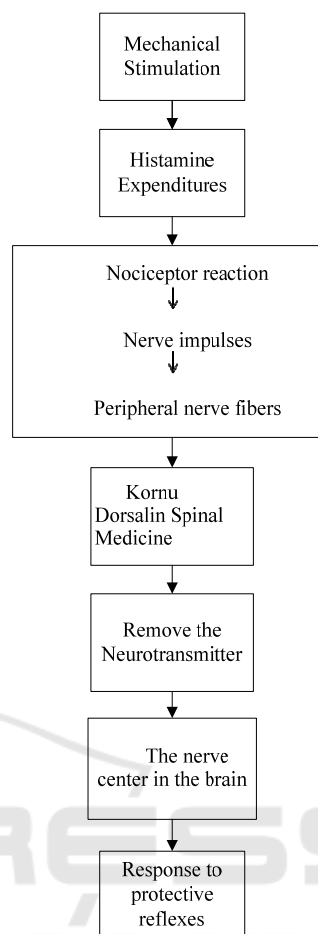


Figure 4: Physiology of Pain

Based on preliminary surveys at Grandmed Lubuk Pakam Hospital, the number of physiotherapy patients in 2018 was 7857 patients in poly physiotherapy at grandmed hospitals, whereas specifically in osteoarthritis sufferers in January to December 2018 there were 960 people. The average number of patients per month is 80 patients per month.

## 2 RESEARCH METHODS

The location of this research was carried out at the Grandmed Lubuk Pakam Hospital, this research was conducted with a Quasi-experimental with one group pretest-posttest design model (Sugiyono, 2017). The purpose of this study was to determine the effect of roll slide mobilization and manual traction on the intensity of the knee pain scale in osteoarthritis sufferers. The samples in this study was taken 22

people with inclusion criteria: patients who experience knee osteoarthritis pain who visited poly physiotherapy at Grandmed Lubuk Pakam Hospital, Age 40 to 65 years, male and female sex, and exclusion criteria were: Patients with osteoarthritis due to other causes or not due to nerve disorders such as bone TB pain or malignancy in other cases of knee osteoarthritis, knee osteoarthritis patients who get other treatments and patients who receive pharmacological therapy in pain management. The data collection techniques were carried out using purposive sampling technique which was done by entering every patient who met the inclusion and exclusion criteria. The instrument used was an observation sheet. Measurement of pain scale is done by VAS which is divided into 3 assessments given numbers 0-10, "0" category of no pain, 1-3 categories of mild pain, 4-6 categories of moderate pain, 7-9 categories of aches and "10" Shows extreme pain. The implementation procedure can be seen in the figure 5 below:

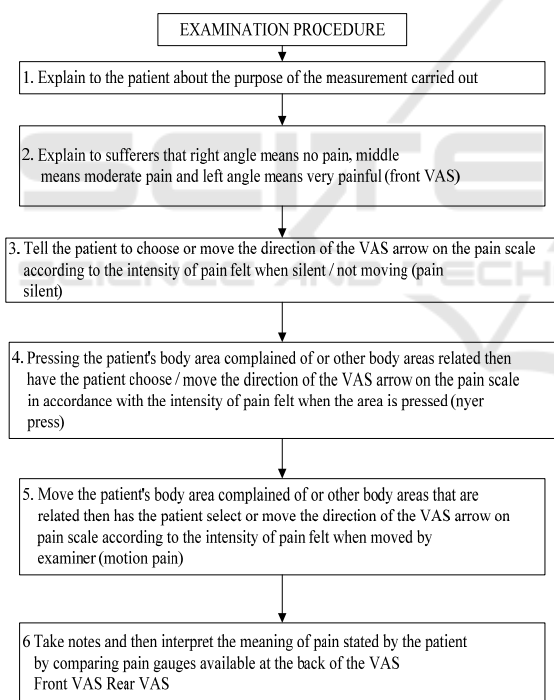


Figure 5: Examine Procedure

Before the intervention is carried out, the pain scale is measured first to ensure the pain value felt by the sample, after the pain scale is obtained from the sample, then it is continued with 3 times a week of roll slide and manual traction interventions. Measurements were taken again after the intervention was given whether there was a decrease in pain scale

or not, then data were analyzed using paired sample t-test.

### 3 THE RESULTS AND DISCUSSION

Based on Table 1, the scale of knee pain scale before Roll Slide and Manual Traction Mobilization intervention in Patients with Knee Osteoarthritis found that the dominant knee pain scale is moderate pain by 16 respondents (72.7%), mild pain by 5 respondents (22.7%), while severe pain 1 respondent (4.5%).

Table 1: Distribution of Knee Pain Scale values before Roll Slide Mobilization and Manual Traction interventions on Osteoarthritis Sufferers.

Pain Scale	n	%
Mild Pain	5	22,7%
Middle Pain	16	72,7%
Heavy Pain	1	4,5%
Total	22	100%

Based on Table 2, the Knee Pain Scale value after Roll Slide Mobilization and Manual Traction intervention in Knee Osteoarthritis Patients shows that the dominant pain scale is mild pain as much as 9 respondents (40.9%), moderate pain is 8 respondents (36.4%), whereas pain slightly 5 respondents (22.7%).

The Average of Knee Pain Scale before giving intervention in patients with Osteoarthritis, it is mean value of the knee pain scale prior to the intervention of Roll Slide Mobilization and Manual Traction in Patients with Knee Osteoarthritis found the average pain value is 2.82 with a standard deviation of 0.501

Table 2: The Distribution of Knee Pain Scale values after Roll Slide Mobilization and Manual Traction interventions on Osteoarthritis Sufferers.

Pain Scale	n	%
Little Pain	5	22,7%
Mild Pain	9	40,9%
Middle Pain	8	36,4%
Total	22	100%

The average Knee Pain Scale before giving intervention in patients with Osteoarthritis, it is mean value of the knee pain scale after Roll Slide and Manual Traction Mobilization intervention in Knee

Osteoarthritis Patients showed an average value of 2.14 with a standard deviation of 0.774.

The average Knee Pain Scale after Roll Slide Mobilization and Manual Traction Intervention in Patients with Osteoarthritis, the value of difference intensity of the knee pain scale before and after the intervention of Roll Slide Mobilization and Manual Traction in Patients with Osteoarthritis Knee obtained is 0.682 with a standard deviation of 0.568 and p-Value 0,000 which means that there is an effect of giving Roll Slide Mobilization and Manual Traction in Patients with Osteoarthritis.

Difference in Pain Scale Intensity Before and After the Intervention of Roll Slide Mobilization and Manual Traction in People with Osteoarthritis, the value of the difference in the intensity of the pain scale before and after the administration of Roll Slide Mobilization and Manual Traction in Patients with Osteoarthritis in the Knee obtained a Mean value of 0.682 with a standard deviation of 0.568 and 0,000, which means there is an effect of giving Roll Slide Mobilization and Manual Traction in Osteoarthritis Sufferers.

## 4 DISCUSSION

### 4.1 Average Pain Scale before Administration of Roll Slide Mobilization and Manual Traction in Osteoarthritis Sufferer

The results of research conducted on 22 people on the measurement of the VAS value before the administration of Roll Slide Mobilization and Manual Traction techniques that have mild pain values of 5 people (22.7%), moderate pain of 16 people (72.7%), and annoying pain 1 person (4.5%). Osteoarthritis is a chronic joint disease that is characterized by abnormalities in the cartilage of the joints and nearby bones. Cartilage will result in bones rubbing against each other, resulting in symptoms of stiffness, pain and restriction on the end movement means that osteoarthritis is a degenerative joint disease associated with joint cartilage damage. Osteoarthritis is chronic, slow progressive and is characterized by changes in susceptible joints and the formation of new bone on the joint surface. Osteoarthritis often affects joints that support weight such as vertebrae, pelvis, knees, and ankles. The occurrence of osteoarthritis is influenced by various risk factors such as age (aging process), genetic, obesity, joint injury, anatomical anomaly, metabolic disease and

joint inflammation, osteoarthritis is influenced by various risk factors such as age (aging process), genetic, obesity, injury joints, anatomical anomalies, metabolic diseases and diseases of joint inflammation (Endang, 2016, Ismaningsih, 2018 & Bove, Smith, Bise, 2018).

Other studies that are in line with this research were conducted in India in 2016 where the p value was less than 0.01 which showed that the average pain score at the level before and after the treatment was not the same, this can occur because of manual cervical traction techniques with heating pads superficial TENS was found to be the best and effective way to relieve pain and restore the active function of patients in daily life with a significant increase in symptoms that bring good patient results. (Khan, Yasmeen, Ishaque, 2016 and Pandya, Sheth, 2017, Anwer, Alghadir, Zafar, 2018).

### 4.2 Average Pain Scale after Administration of Roll Slide Mobilization and Manual Traction in Osteoarthritis Sufferers

The results of research conducted was 22 people on the measurement of VAS values after the administration of Roll Slide Mobilization and Manual Traction techniques that have a slight pain value of 5 people (22.7%), mild pain 9 people (40.9%) and moderate pain 8 people (36.4%). Roll Slide Mobilization Technique is one form of mobilization exercise in the form of passive motion in the knee joint that is adapted from physiological motion that occurs arthrokinematic motion where in the tibia there is a roll toward the dorsal and the slide towards the dorsal as well so as to obtain stretching of the ligament capsule ligament which does not occur excessive stretching on one part given the exercise.

This exercise is expected to stimulate biological activity by flowing synovial fluid that carries nutrients to the avascular part of the joint cartilage on the joint surface and fibrocartilage joints. Repeated movements in the slide roll mobilization will increase microcirculation and more liquid will come out so that the water content and matrix in the tissue increases and the tissue is more elastic. manual traction techniques that are carried out repeatedly in the movement of traction will improve the micro-circulation and fluid that is released a lot so that the water and matrix content in the tissue can increase and the tissue becomes more elastic. In addition, the traction motion elements are almost the same as the physiological movements of the knee joint in flexion movements so as to increase and maintain the

elasticity of the capsules, ligaments, and muscles, any mechanical dysfunction needs to be corrected through mechanical means. Therefore manual therapy in the form of traction tends to shift the joints at the level of the articular surface. The combination of mechanical and sports traction for patients with cervical radiculopathy improves function and reduces pain (Bukhari, Rehamn, Ahmad, Naeem 2016).

The results of the research related to the above study were conducted at the Meerut LLRM campus in 2018 where the assessment was conducted on day -1 of the intervention and was reassessed after 15 days of intervention. Group A VAS scores showed an overall percentage of 18%, group B experienced an overall percentage decrease of 32%. ROM scores of group A decreased by an overall percentage of 30% group B decreased by 34% overall, where the results showed that mechanical cervical traction and manual traction with nerve mobilization techniques were almost equally efficient in reducing pain and increasing range of motion, this can be occur due to neck span movements and decreased level of neck disability in two therapeutic interventions namely intermittent cervical traction combined with neck strengthening exercises in nerve mobilization combined with neck strengthening exercises that we can see like in Figure 6 (Xu, Chen, Wang, 2017 and Sarfaraj & Deepali, 2018).



Figure 6: Manual Therapy Technique for the Slide Slide Method on the Knee Joint

#### 4.3 The Effect of Difference in Pain Scale before and after Administration of Roll Slide Mobilization and Manual Traction in Osteoarthritis Sufferers

The results of the study prior to the administration of Roll Slide Mobilization and Traction Manual revealed the average value of the pain scale before 2.82 with SD = 0.501 while after the administration

of Roll Slide Mobilization and Traction Manual it was known the average value of the pain scale was 2.14 with SD = .774 while the results of the study of the difference in pain scale before and after the administration of Roll Slide Mobilization and Traction Manual amounted to 0.682 with SD = 0.568. The statistical test results obtained p-value  $< \alpha$  (0,000  $< 0.05$ ), it can be concluded there is an influence before and after the administration of roll slide and manual traction mobilization in knee osteoarthritis sufferers. The results of this study are in accordance with research conducted by Pandya, Sheth (2017) on the "Effect of Mechanical Traction on Pain And FunctionIn Subjects With Osteoarthritis Knee" given to osteoarthritis patients with a frequency of twice a week in osteoarthritis patients the healing phase can reduce pain in knee.

In line with research conducted in India in 2015 that there was a significant increase in the range of motion of subjects treated with manual therapy (P value for all cervical spine movements  $< 0.005$ ). This can occur because intermittent traction increases circulation to tissues and reduces swelling thereby helping to reduce inflammatory reactions from nerve roots. Therapy is performed with the first 2 stages, namely to form stretches that extend all vertically oriented neck soft tissue, and the second to reduce the strength of heavy bearing compression on the surface of the joints, intervertebral discs and intervertebral foramina of the cervical spine. In manual therapy, direct tensile force is applied at the level of the affected spine. When traction separates the spinous processes, the size of the intervertebral foramina increases thereby reducing compressed nerve roots to provide faster assistance in radiation and also increase intervertebral motion at these levels. Thus manual mulligan traction can be considered the treatment of choice for cervical spondylosis with or without radiculopathy. Roll Slide and Manual Traction Mobilization Measures with the determined intensity, frequency and time are very effective for osteoarthritis sufferers who experience knee pain, because this intervention can stimulate biological activity by flowing synovial fluid that carries nutrients to the avascular part of the joint cartilage on the joint surface and joint fibrocystilage so that pain is reduced (Bosmia & Kotwal, 2015, Xu, Chen, Wang, 2017).

Research conducted in Australia in 2016 showed that toe distance significantly increased with one nerve mobilization session (p  $< 0.01$ ) or static stretching (p  $< 0.01$ ). The effects of static stretching interventions on toe touch are consistent, which report similar

changes in the sit and range test, an alternative that is highly correlated with the finger touch test. The results of this study indicate that mobilization of the nerves is also an effective method for increasing toe touch distance. (Curtis, Retchford, Khalaf & Jeline 2016

## 5 CONCLUSIONS

- Knee pain scale prior to intervention Slide Slide and Manual Traction Mobilization on Patients with Knee Osteoarthritis found the average pain value is 2.82 with a standard deviation of 0.501
- The scale of knee pain after the intervention of Roll Slide Mobilization and Manual Traction on Patients with Knee Osteoarthritis found an average value of 2.14 with a standard deviation of 0.774.
- Difference intensity of the knee pain scale before and after the intervention of Roll Slide Mobilization and Manual Traction in Patients with Osteoarthritis Knee obtained is 0.682 with a standard deviation of 0.568 and p-Value 0,000 which means there is an influence on the provision of Roll Slide Mobilization and Manual Traction in Osteoarthritis Sufferers

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