

Effect of Theraband Exercise on Knee Pain Reduction in Osteoarthritis Patients

Dela Ramona, Wahyu Tri Sudaryanto

Department of Physiotherapy, Faculty of Health Sciences,
Universitas Muhammadiyah Surakarta

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ABSTRACT

Background: Osteoarthritis (OA) is a degenerative joint disease associated with damage to joint cartilage, where a complex joint degradation process occurs, consisting of a repair process in the cartilage, bone and synovium, followed by a secondary component of the inflammatory process. The primary cause of osteoarthritis is still not known for certain, but there are several risk factors that play a role, namely: age, gender, genetics, obesity, and metabolic diseases and other factors. This study aimed to examine the effect of theraband exercise on reducing knee pain in OA patients.

Subjects and Method: This was a quasy experiment study conducted at Dr. Soedjono Hospital, in Magelang, Central Java, from May to June 2023. A sample of 33 knee osteoarthritis patients was selected using purposive sampling. Intervention group (n= 17) received Theraband exercise and control group (n= 16) received usual care. The dependent variable was knee pain. The independent variable was Theraband exercise. Knee pain was measured using a visual analogue scale (VAS). The data were tested using independent t test.

Results: After intervention, mean of VAS score in the intervention group (Mean= 5.25; SD= 1.57) was slightly higher than control group (Mean= 5.13; SD= 1.75), but it was statistically non-significant (p= 0.848).

Conclusion: Mean of VAS score in the intervention group is slightly higher than control group, but it is statistically non-significant.

Keywords: theraband exercise, pain, osteoarthritis knee.

Correspondence:

Dela Ramona. Study Program of Physiotherapy, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta. Jl. A. Yani Kartasura, Sukoharjo, Central Java, 57162 Email: delaramona26@gmail.com. Mobile: +6281347988116.

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BACKGROUND

In this more advanced era of life, it is increasingly common to find people who experience various types of movement limitations, this is closely related to the activity of basic body functions and movements to carry out daily activities. These movement limitations can include various factors, including trau-

ma, inflammation, degenerative processes and so on. Osteoarthritis is a disease caused by degenerative factors that is most often found in musculoskeletal diseases and osteoarthritis is the most common cause of limited movement and function, the location most often affected is the knee joint. Osteoarthritis of the knee is considered a

degenerative disease whose exact cause has not been found, so there is no optimal therapy to treat the problem of knee osteoarthritis (Susilawati, Indri; Tirtayasa, Ketut; Lesmana, 2015).

Osteoarthritis can attack various joints, but what often occurs is the joints that support body weight such as the knees and hips. The knee joint is where osteoarthritis occurs most often. OA is the main cause of morbidity, limited physical activity, physical disability, can reduce the quality of life of sufferers, is a source of chronic pain and is the main cause of disability in adults and elderly people over 60 years with a prevalence of 60-70%. The joint disease most often found in Indonesia is OA, which is 50-60%.

The World Health Organization (WHO) reported that around 80% of OA patients are over the age of 65. The incidence of OA patients in the United States is estimated to be approximately 40 million persons of all ages, with 70-90% of those over 75 years old showing a typical x-ray picture of the OA-affected joints. According to WHO, 27.4 million individuals in Southeast Asia are affected with OA (Ra'ida, 2022).

The primary cause of osteoarthritis is still not known for certain, but there are several risk factors that play a role, namely: age, gender, genetics, obesity, and metabolic diseases and other factors. Body weight is usually associated with the trigger of osteoarthritis genu. Obesity increases the joint load so that the resultant force will shift medially. Symptoms and signs of osteoarthritis are joint pain, restricted joint movement, morning stiffness, crepitus, deformity, asymmetric joint swelling, signs of inflammation, changes in gait (Pratama, 2019).

By treating pain problems, problems such as joint stiffness and functional disabili-

ty can be overcome or eliminated. To reduce the symptoms mentioned above, non-pharmacological measures are needed, namely physiotherapy. Physiotherapy measures that can be carried out are in the form of Theraband Exercise.

Theraband exercise is isotonic exercise using a theraband or a tool in the form of colored rubber which has quite high flexibility. Meanwhile, isotonic training itself is a form of training against constant resistance or load and there is lengthening or shortening of the muscles in the Range of Motion (ROM) of the movement. Exercises with the Theraband are carried out when the knee is extended, a concentric contraction (m. Quadriceps femoris) occurs and when the knee is flexed, an eccentric contraction (m. Quadriceps femoris) occurs. The exercise is carried out repeatedly according to the dosage, so this is where the process of reducing pain, increasing stability and reducing subchondral inflammation in the capsule will occur, thereby reducing pain (Suriani and Lesmana, 2013).

SUBJECTS AND METHOD

1. Study Design

This was a quasi-experiments study conducted at Dr. Soedjono Hospital, Magelang, Central Java, from May to June 2023.

2. Population and Sample

The study population was knee OA patients. A sample of 33 knee OA patients since the last 3 months was selected using purposive sampling. Intervention group (n= 17) received health education and theraband exercise, while the control group (n= 16) was only received health education.

3. Study Variables

The dependent variable was knee pain. The independent variable was Theraband exercise.

4. Operational definition of variables

Theraband exercise is isotonic exercise using a theraband or a tool in the form of colored rubber which has quite high flexibility. This exercise is carried out with a series of knee joint flexion-extension movements.

Knee pain was define as an unpleasant sensory and emotional experience associated with actual or potential tissue damage in knee joint.

5. Study Instruments

Knee pain was measured using a visual analogue scale (VAS).

6. Data analysis

Univariate analysis was conducted to describe the sample characteristics. Continuous data were reported in frequency (n) and percent (%). Dichotomous data were described in frequency (n), mean, standard

Table 1. Gender difference between group

Gender	Treatment Group		Control Group		p
	n	%	n	%	
Male	5	29.4	5	31.3	0.103
Female	12	70.6	11	68.8	

Table 2. Sample characteristics between group

Variables	Theraband Exercise			Control Group			p
	n	Mean	SD	n	Mean	SD	
Age (years)	17	65.76	11.74	16	63.06	10.60	0.697
BMI (kgBB/m ²)	17	25.63	3.01	16	27.25	2.82	0.805

2. Bivariate Analysis

Table 3 showed that there was a randomization distribution in baseline. Signifi-

Table 3. Baseline of mean difference of VAS score between group

Group	n	Mean	SD	p
Theraband exercise	17	6.13	1.59	0.452
Control	16	5.63	1.71	

Table 4 reported the comparison of knee pain using VAS score between groups after intervention. Mean of VAS score in the intervention group (Mean= 5.25; SD= 1.57)

deviation (SD). Comparison between knee pain using VAS score were tested using independent t- test.

7. Research Ethics

This research was supported by an ethical permission letter, including informed consent, and confidentiality signed during the research process. The ethical clearance was obtained from the Research Ethics Committee of dr. Sodjono Hospital, Magelang, Indonesia, with letter number of 360/-EC/V/2023.

RESULTS

1. Univariate Analysis

Table 1 reported that gender difference between groups were comparable (p= 0.103). Table 2 showed that there were no difference of age (p= 0.697) and body mass index (BMI) (p= 0.805) between groups.

cance level of p= 0.452 indicated that there was no difference of knee pain level (VAS score) between groups.

was slightly higher than control group (Mean= 5.13; SD= 1.75), but it was statistically non-significant (p= 0.848).

Table 4. Mean difference of VAS score between group after intervention

Group	n	Mean	SD	p
Theraband exercise	17	5.25	1.57	0.848
Control	16	5.13	1.75	

DISCUSSION

Osteoarthritis is a chronic joint disease characterized by abnormalities in the joint cartilage and nearby bones. Cartilage (cartilage) is the part of the joint that covers the ends of the bones, to facilitate movement of the joint. Abnormalities in the cartilage will result in the bones rubbing against each other, resulting in symptoms of stiffness, pain and restricted movement in the joints (Ismainingsih and Selviani, 2018).

The exact cause of osteoarthritis is unresolved although various risk factors, including age, gender, genetics, obesity, metabolic diseases, and other factors, play some role. The genesis of osteoarthritis genu is frequently related to body weight. Obesity raises joint load, causing the pressure that ensues to shift medially. Osteoarthritis symptoms and signs include joint pain, restricted joint movement, morning stiffness, crepitation, deformity, asymmetric joint swelling, inflammation, and changes in gait (Pratama, 2019).

One of the clinical signs that occurs in osteoarthritis is pain. Joint pain is the most common symptom. The pain can be localized, diffuse, or even referred pain in distant places, for example pain in OA of the hip joint can also be felt down to the knee joint. Pain usually appears slowly and gets worse over months or years. Excessive physical activity can increase the pain and will improve when resting. In advanced stages, severe pain can even be felt at rest. The source of pain can come from inflammation of the synovium, periosteum, ligaments, or muscles, or pressure on the subchondral bone due to vascular congestion due to and intraosseous hypertension. Pain does not

originate from cartilage because this structure is avascular and has very little nerve supply (Zaki, 2013).

One of the pain measurement tools that can be used is the Visual Analogue Scale (VAS). The VAS scale is a linear scale measurement method that visually describes the gradation of pain levels that a patient may experience, assessing pain with a continuous scale consisting of horizontal lines, measurements are carried out by encouraging the patient to mark the straight line that has been provided and mark the point where the scale is. the patient feels pain. Then interpreted with a ruler (Merdekawati et al., 2019). One non-pharmacological treatment that can be given to knee osteoarthritis is exercise therapy using a theraband.

According to (Suriani and Lesmana, 2019) Theraband exercise is isotonic exercise using a theraband or a tool in the form of colored rubber which has quite high flexibility. Meanwhile, isotonic training itself is a form of training against constant resistance or load and there is lengthening or shortening of the muscles in the Range of Motion (ROM) of the movement. Exercises with the Theraband are carried out when the knee is extended, a concentric contraction (m. Quadricep femoris) occurs and when the knee is flexed, an eccentric contraction (m. Quadricep femoris) occurs. The exercise is done repeatedly according to the dosage, so this is where the process of reducing pain, increasing stability and reducing subchondral inflammation in the capsule will occur, thereby reducing pain.

This is also supported by the opinion of (Haryoko Imam, 2016) which states that

the effect of strengthening exercises using a theraband will increase dynamic strength in muscles so that muscle power increases. If muscle power increases, endurance and balance will also increase. Blood circulation will increase due to vasodilation of blood vessels. Apart from that, it will also improve strength, size and prevent inflammation and increase the flexibility of fat tissue which can reduce pain.

After research was carried out and there were differences in knee pain in the treatment group and the control group, it showed that there was effectiveness in using this non-pharmacological therapy, namely theraband exercise. This can be seen from respondents who were given the intervention, complaining of reduced knee pain and feeling better. If exercise is done regularly it will increase blood circulation so that metabolism will also increase and there will also be an increase in fluid diffusion through the bone matrix. Nutrition in cartilage is very dependent on the condition of the joint fluid. If the joint fluid is good, the supply of nutrients to the cartilage will be adequate and this will facilitate the mechanism for pumping back circulating fluid. In this mechanism, the alteration of metabolic and metabolic waste resulting from the inflammatory process can be slowed and pain decreased.

AUTHOR CONTRIBUTION

Dela Ramona as the principal investigator designed the research model, collected data, measured knee pain, and analyzed the data. Principal investigator collaborates with Wahyu Tri Sudaryanto interpreted the results of data analysis and wrote the manuscript.

FINANCIAL AND SPONSORSHIP

There was no external fund.

CONFLICT OF INTEREST

There is no conflict of Interest in this study.

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REFERENCE

- Aras D, Ahmad H (2014). Tes Spesifik Muskuloskeletal Disorder (Musculoskeletal Disorder Specific Tests). Makasar.
- Broto W, Busalim F, Suryaningsih N (2019). Aplikasi Transcutaneous Electrical Nerve Stimulation (TENS) sebagai Terapi Pemulihan Penderita Osteoarthritis (Application of Transcutaneous Electrical Nerve Stimulation (TENS) as a Recovery Therapy for Osteoarthritis Sufferers). 4.
- Dorland (2015). Kamus Saku Kedokteran Dorland (Dorland's Pocket Dictionary of Medicine, 29th ed) (29 ed.). Jakarta.
- Haryoko I, Juliastuti. (2016). Perbedaan Pengaruh Microwave Diathermy dan Theraband Exercise terhadap Peningkatan Kekuatan Otot Quadriceps Femoris pada Kondisi Osteoarthritis Genu Bilateral (Differences in the Effects of Microwave Diathermy and Theraband Exercise on Increasing Quadriceps Femoris Muscle Strength in Bilateral Genu Osteoarthritis Conditions). 4.
- Hasibii AW (2014). Prevelensi dan Distribusi Osteoarthritis Lutut Berdasarkan Karakteristik Sosio Demografi dan Faktor Risiko di Wilayah Kerja Puskesmas Susuti, Kecamatan Susut Kabupaten Bangle (Prevalence and Distribution of Knee Osteoarthritis Based on Sociodemographic Characteristics and Risk Factors in the Working Area of Susuti Community Health Center, Susut District, Bangle Regency).

- Hayes KW, and Hall KD (2014). *Agens Modalitas untuk Praktek Fisioterapi (Modality Agents for Physiotherapy Practice)* (6 ed.).
- Putri HRA, Ilmiawan MI, Darmawan (2022). Faktor-Faktor yang Berhubungan dengan Kejadian Osteoarthritis Lutut pada Petani di Desa Bhakti Mulya Kecamatan Bengkayang (Factors Associated with the Occurrence of Knee Osteoarthritis in Farmers in Bhakti Mulya Village, Bengkayang District). *Jurnal Kedokteran dan Kesehatan*.
- Ismaningsih, Selviani I (2018). Penatalaksanaan Fisioterapi pada Kasus Osteoarthritis Genu Bilateral dengan Intervensi Neuromuskular Taping dan Strengthening Exercise untuk Meningkatkan Kapasitas Fungsional (Physiotherapy Management in Cases of Bilateral Genus Osteoarthritis with Neuromuscular Taping and Strengthening Exercise Interventions to Increase Functional Capacity). *Jurnal Ilmah Fisioterapi (JIF)*, 1, 40.
- Kisner, Carolyn, Colby LA (2016). *Terapi Latihan: Dasar dan Teknik (Exercise Therapy: Basics and Techniques)* (6 ed., Vol. 1). Jakarta.
- Knudson D. (2016). *Fundamentals Of Biomechanics*.
- Levangie PK, Norkin CC (2011). *Joint Structure And Function: A Comprehensive Analysis* (5 ed.). America.
- Marchetti. (2017). The Proximal Tibiofibular Joint: A Biomechanical Analysis of the Anterior and Posterior Ligamentous Complexes. *The American Journal of Sports Medicine*, XX.
- Merdekawati D, Melany H, Dasuki (2019). Perbandingan validitas skala ukur nyeri VAS dan NRS terhadap penilaian nyeri di IGD RSUD Raden Mattaher Jambi (Comparison of the validity of the VAS and NRS pain measurement scales for pain assessment in the emergency room at Raden Mattaher Hospital, Jambi). *Riset Informasi Kesehatan*. 7(2):114. <http://dx.doi.org/10.30644/rik.v7i2.168>.
- Milenia S, Rahman I (2021). Penatalaksanaan Fisioterapi pada Kasus Osteoarthritis Genu Bilateral dengan Menggunakan Modalitas TENS (Physiotherapy Management in Cases of Bilateral Genus Osteoarthritis Using TENS Modalities), SWD dan Quadriceps Setting di RSUD Pindad Kota Bandung.
- Pertiwi CP, and Aulia RG (2016). Penatalaksanaan Fisioterapi Pada Kondisi Osteoarthritis Genu Sinistra Dengan Modalitas Ultrasound, Transcutaneous Electrical Nerve Stimulation Dengan Metode Latihan Theraband Di RSUD Kraton Kota Pekalongan (Physiotherapy Management in Osteoarthritis Genu Sinistra Conditions Using Ultrasound Modalities, Transcutaneous Electrical Nerve Stimulation Using Theraband Exercise Methods at Kraton Regional Hospital, Pekalongan City). 17-18.
- Pratama AD (2019). Intervensi Fisioterapi Pada Kasus Osteoarthritis Genu Di RSPAD Gatot Soebroto (Physiotherapy Intervention in Cases of Osteoarthritis Genu at Gatot Soebroto Army Hospital). *Jurnal Sosial Humaniora Terapan*. 1, 22.
- Schiphof (2008). Differences In Descriptions Of Kellgren And Lawrence Grade Of Knee Osteoarthritis.
- Snell, and Richard S (2012). *Anatomi klinis berdasarkan sistem (Systems-based clinical anatomy)* (Cetakan 2012 ed.). Jakarta.
- Suriani, and Lesmana (2013). Efektifitas Latihan Isometrik Quadriceps dan Latihan Theraband terhadap Penuru-

nan Nyeri Lutut Pasien Rematik di Puskesmas Lingkar Timur Kota Bengkulu (Effectiveness of Isometric Quadriceps Exercises and Theraband Exercises in Reducing Knee Pain in Rheumatic Patients at the East Ring Health Center, Bengkulu City).

Susilawati I, Tirtayasa K, Lesmana SI (2015). Latihan Closed Kinetic Chain Lebih Baik Daripada Open Kinetic Chain Untuk Meningkatkan Kemampuan Fungsional Pada Osteoarthritis Lutut Setelah Pemberian Micro Wave Diathermy (MWD) dan Transcutaneous Electrical Nerve Stimulation (TENS) (Closed Kinetic Chain Exercise is Better Than Open Kinetic Chain for Improving Functional Ability in Knee Osteoarthritis After Microwave Diathermy (MWD) and Transcutaneous

Electrical Nerve Stimulation (TENS)). *Sport and Fitness Journal*, 3.

Utomo A (2013). Tingkat keberhasilan theraband therapy dalam meningkatkan Range Of Motion (ROM) pasca cedera pergelangan tangan pada tim UKM softball Universitas Negeri Yogyakarta (The success rate of theraband therapy in increasing Range of Motion (ROM) after wrist injury in the UKM softball team at Yogyakarta State University).

Zaki A (2013). *Buku Saku Osteoarthritis Lutut (Knee Osteoarthritis Handbook)* (1 ed., Vol. 1). Bandung, Jawa Barat: Celtics Press.