

PHYSIOTHERAPY MANAGEMENT IN CASE OSTEOARTHRITIS GENU SINISTRA WITH MODALITIES ULTRASOUND DIATHERMY AND EXERCISE THERAPY AT DUSTIRA CIMAHU HOSPITAL

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Abstract

Osteoarthritis genu is a degenerative joint disease that is worsening and is characterized by progressive reduction of cartilage. The disorders that occur in osteoarthritis are pain in the knee, range of motion, decreased muscle strength, impaired functional activity. The therapy provided is in the form of Ultrasound Diathermy with a view to reducing pain and Exercise Therapy with a view to increasing the range of motion and increasing muscle strength. Final report of the research is to know the benefits of Ultrasound Diathermy and Exercise Therapy in Osteoarthritis condition to increase the range of motion, muscle strength, decrease pain and increase functional activity. After five times of therapeutic the result showed a decrease in tenderness from T1: 4 to T5: 3, motion pain from T1: 7 to T5: 5, range of motion from T1: S 0-0-1150 to T5: S 0-0-1200, increased muscle strength from T1: 3 to T5: 4, enhancement functional activity. Ultrasound Diathermy can help reduce pain, and Exercise Therapy can increase range of motion, increase muscle strength, and enhancement functional activity capabilities.

Keywords: Osteoarthritis Genu, Ultrasound Diathermy and Exercise Therapy.

Introduction

Health is a healthy state, both physically, mentally, spiritually and socially which allows everyone to live a socially and economically productive life (Ministry of Health, Law No. 36 of 2009).

Incident Osteoarthritis in America aged 18-24 years, 7% of men and 2% of women describe OA of the hands. At the age of 55-64 years, 28% have genu OA and 23% have hip OA. At ages 65-74 years, 39% described knee OA and 23% described hip OA. At the age of >70 years 100% of both men and women have symptoms osteoarthritis.

In Indonesia, prevalence Osteoarthritis reaching 5% at age <40 years, 30% at age 40-60 years, and 65% at age >61 years. According to the 2013 Riskeddas, the prevalence of joint disease based on diagnoses by health workers in Indonesia is 11.9% and 24.7% based on symptoms. Based on the highest diagnosis in Bali 19.3% while based on the highest symptoms in NTT 33.1%, West Java 32.1%, Bali 30%, Jakarta 21.8%. The highest prevalence was at age >75 years (54.8%). Where there are more women (27.5%) than men (21.8%).

From a physiotherapy perspective, Osteoarthritis genu can cause various levels of interference viz impairment such as decreased muscle strength, limited range of joint motion, pain, muscle spasms, and disability such as the inability to perform certain activities, for example getting up from sitting, squatting, kneeling, standing for a long time as a result of decreased ability to move. Even level functional limitation such as walking disorders, running and climbing stairs (Fukuda, 2011).

A. At issue

Seeing from the problems above, the research problems are as follows:

1. Is Ultrasound Diathermy can reduce pain in cases Osteoarthritis genu?
2. Can Exercise Therapy reduce pain in cases Osteoarthritis genu?

B. Purpose of Writing

1. Know the benefits Ultrasound Diathermy in reducing pain in cases Osteoarthritis.
2. Knowing the benefits of Exercise Therapy in reducing pain in cases Osteoarthritis.

C. The benefits of writing

Based on the purpose of writing above, the use of writing this thesis is as follows:

1. For Hospital Institutions

To increase information for the wider community about the case Osteoarthritis and introduce the public about the modality Ultrasound Diathermy and the important role of physiotherapy in treating cases Osteoarthritis.

2. Bagi Institutes Politeknik Piksi Ganesha

To add knowledge and knowledge in education, and draw conclusions on the treatment of physiotherapy in cases Osteoarthritis Genu.

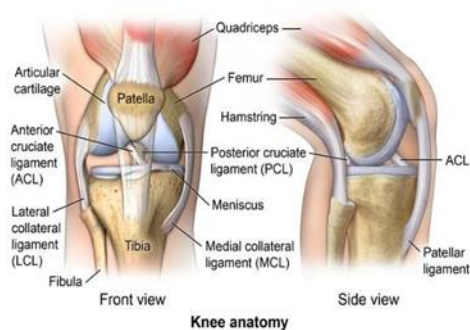
3. For Writers

Increase understanding of giving Ultrasound Diathermy and Exercise Therapy in carrying out physiotherapy processes in conditions Osteoarthritis genu.

Literature Review**A. Anatomy**

Joints are where two or more bones meet. Genu joint is the largest joint in the body, it is very complex and has muscles flexor and extensor which is strong and has ligament the strong one. The function of the genu joint is to regulate the movement of the foot. This joint is the most frequently pathological location Osteoarthritis is one of the most common conditions in the genu.

Figure 2.1 Anatomy Genu



Source: (Makris et al, 2011)

1. Shaping Bones

Bones that form joints gene, that is femur, tibia, and fibula patella.

- a) Bone Femur (Femur)

Bone Femur is the longest and largest tubular bone in the skeleton at the base that is related to dish form the so-called joint heads the head of the femur. Above and below the column afemoris there is a mentioned speed major trochanter and minor trochanter, at the ends forming the genu joints. There are two protrusions called condyles medialis and condyles lateralis.

b. You. Tibia

The tibia is smaller, attached to the base at the baseos.fibula. At the end it forms a joint with the base of the foot and there is a spur called osmedial malleolus.

c. You. Fibula

You. Fibula is the largest tubular bone after the femur which forms the genu joint with bone femur at the ends. There is a bulge called malleolus lateralis or outer ankle.

d. You. patella

On the move flex and patella extension will move on the bone femur. Function patella apart from being an adhesive for muscles or tendons, it is also a lever for the genu joints.

Figure 2.2
Genu Composition Bones



Source: (Lippert, 2011)

2. Ligaments

Bones are held together not by bones but by ligament and muscles.

a) Torn anterior ligament

Torn anterior ligament is ligament which is attached to the area intercondylar is anterior tibia and walk upwards, backwards, and lateral to attach to the part posterior surface medial condyles lateralis femoris.

b) Torn posterior ligament

Torn posterior ligament is ligament which is attached to the area inter condylar is posterior tibia and walk towards the top, front and medial to be attached to the part anterior surface lateral condyles medialis femoris.

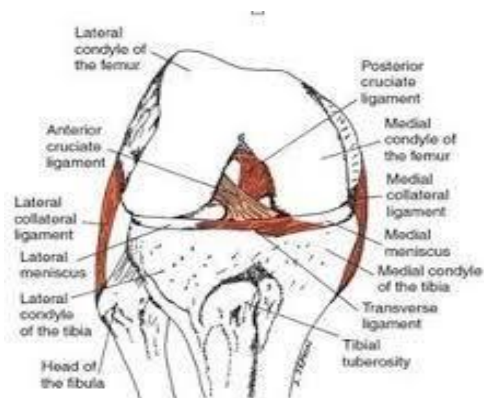
c) Ligament medial collateral

Ligament medial collateral is ligament which is attached to femur medial condyle tibia. Fiber from meniscus medial stick to ligament This contributes to frequent tearing medical medial during excessive impact.

d) Ligament lateral collateral

Ligament lateral collateral stick on lateral femoral condyle the wrist pin, this joint is very strong from impact from side pressure medial genu.

Figure 2.3 Genu Ligaments



Source: (Lippert, 2011)

3. Composing Muscles

In the genu joint there are two main movements, viz flex and extension. To be able to do this movement requires a group of muscles around the genu joint. The following are muscle groups that help in flexion and extension of the genu:

a) Gene flexor

Muscle groups genu flexor hamstring consisting of biceps femoris, semitendinosus, and semimembranosus. It also helps the muscles Racilis, sartorius, gastrocnemius, popliteus and plantar.

1. Biceps Femoris

Origin ischiatic tuberosity, divides the tendons equally by semitendinosus and semimembranosus. Insertion: side lateral head clip.

2. Semitendinosus

Origin: ischiatic tuberosity, divides the tendons equally by semitendinosus and biceps femoris.

Insertion: surface medial from the upper part of the pipe through goose foot tendon

3. Semimembranosus

Origin: ischiadic tuberosity, divides the tendons equally by semitendinosus and biceps femoris.

Insertion: surface posterior medial condylus tibia. Works forflexi knee, hip rotation towards medial (endorotas).

4. Gracilis

Origin: $\frac{1}{2}$ below symphysis pubis and $\frac{1}{2}$ above the arch of the man.

Insertion: surface medial from the upper part of the pipe through goose foot tendon

5. Sartorius

Origin: anterior superior iliac spine.

Insertion: surface Antero medial above the tibia right in goose foot

6. Gastrocnemius

Origin: caput medial and lateral from the surface posterior to the femoral condyle.

Insertion: surface posterior calcaneus form tendon Achilles.

7. Popliteus

Origin: surface lateral condylus lateral. Insertion: surface posterior proximal tibial shaft.

8. Plantaris

Origin: lateral supracondylar femu on lateral head gastrocnemius.

Insertion: tendon calcaneus.

Figure 2.4
Genus Flexor Muscles



Source: (Sobotta, 2013)

b. Estensor Genu

Muscle groups extensor knee is quadriceps consisting of rectus femoris, vastus medialis, vastus inter Medius, and lateral waste

1. Straight thigh

Origin: anterior inferior iliac spine and superior indentation dish

Insertion: tibial tuberosity.

2. Answer in Medial

Origin: intertrochanteric line and rough medial line.

Insertion: tendon patella and tibial tuberosity.

3. Intermediate waste

Origin: top $\frac{2}{3}$ anterior and surface lateral of femur.

Insertion: tibial tuberosity.

4. Lateral Waste

Origin: trochanter major and lateral line rough.

Insertion: tibial tuberosity.

Figure 2.5
Genus Extensor Muscles



Source: (Sobotta, 2013)

4. Bursa

Bursa is a closed sac of areolar tissue. The walls are flabby separated from each other by a layer of slippery fluid that resembles egg white. Partly a lubricant and to reduce friction between bones, muscles, tendons and allow free movement.

a. Previous scholarship

1. Bursa supra patellaris
Located below m. quadriceps femoris and closely related to the joint cavity.
2. Prepatellar bursa
Located on the network subcutaneous between the skin and the front of the lower hemisphere patella and the top ligamentum patella.
3. Superficial infrapatellar bursa.
Located on the network subcutaneous between the skin and the front of the lower hemisphere ligament patella.
4. Deep patellar bursa
Located between the surfaces posterior from ligamentum patella and surface anterior tibia. The bursa is separated from the joint cavity by adipose tissue, and communication between the two is rare.

b. Superior Exchange

1) Subpopliteal recession

Found in connection with tendons. popliteus and associated with the joint cavity.

2) Bursa M. Semimembranosus

Found in connection with the insertion m. Semimembranosus and often associated with the joint cavity.

Figure 2.6 Genu Joint Exchange



Source: (Sobotta, 2013)

5. Innervation of the Genu Joint

The innervation to the genu joint is through branches from the nerves that innervate the muscles around the joint and function to regulate movement in the genu joint. So that the genu joint is innervated by:

- a. N. Femoral innervatem. quadriceps andm. Sartorius
- b. No. shutter
- c. No. common fibula

Provides innervation to short headsm. biceps femoris and then flows pastfossa popliteal and wrapped aroundproximal head clasp.

- d. No. Tibialis

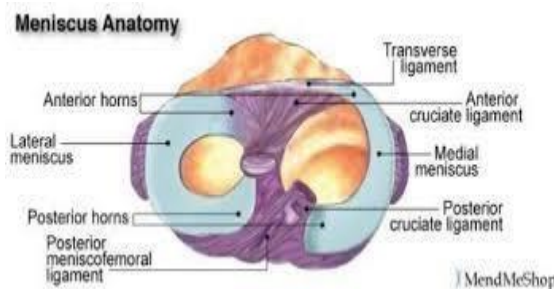
innervatem. hamstring andm. Gastrocnemius.

6. Meniscus

Meniscus are sickle-shaped plates of fibrocartilage on the surface tibial articular. The peripheral border is thick and convex. Attached to the exchange. The inner border is concave and forms free margins. Its upper surface is concave and is in direct contact with femoral condyle. The function of this meniscus is to deepen articular ligaments of the tibial condyle for accepting femoral condyle sunken.

- a. Medial meniscus
C-shaped, wider posteriorly than anterior, less mobile than medial meniscus
- b. Meniscus lateralis
Almost circular in shape, smaller, more freely movable.

Figure 2.7
Meniscus Sendi Genu



Source: (Sobotta, 2013)

7. Joint Capsule

The joint capsule is the binding of two bones that are jointed so that the bones remain in place during movement. Arranged above fibrosis and an internal synovial membrane that lines all internal surfaces of the articular cavity which is not coated with articular cartilage.

The joint capsule consists of:

a. Outer layer

Also called fibrous capsule, consists of strong connective tissue that is not regular. And will continue to be a fibrous layer of periosteum that covers the bone. And some will thicken and form ligament.

b. Inner layer

Also called synovial membrane, the inside limits the joint cavity and the outside is part of articular cartilage. This membrane produces synovial fluid, which consists of blood serum and fluid secretions from synovial cells. This synovial fluid is a complex mixture of polysaccharides, proteins, fats and other cells. This polysaccharide contains hyaluronic acid which is a determinant of the quality of synovial fluid and functions as a lubricant for the joint surface so that the joint is easy to move.

B. Definition Osteoarthritis

Osteoarthritis is a chronic joint disorder in which there is a process of weakening and disintegration of the joint cartilage accompanied by the growth of new bone and cartilage in the joint. Osteoarthritis is the most common disease that causes pain and disability in the elderly population.

Osteoarthritis found more in women than men, namely 68.67%. In menopausal women, there will be accumulation of fat, especially in the lower joints and causes an increased burden on the joints.

C. Pathology

Osteoarthritis occurs due to chondrocytes (cells that form proteoglycans and collagen in joint cartilage) fail to maintain a balance between degradation and extracellular matrix synthesis, resulting in changes in the diameter and orientation of collagen fibers that change the biomechanics of cartilage, which makes joint cartilage lose its unique compressibility properties. Apart from chondrocytes, synoviocytes also play a role in the pathogenesis of OA, especially after synovitis, which causes pain and discomfort.

D. Etiology

Reason osteoarthritis divided into 2, namely Primary OA and Secondary OA.

Primary OA is also called Idiopathic OA which means the cause is unknown but is often associated with aging or degeneration.

Secondary OA is caused by several factors, among others:

1. Obesity
Excess body weight can increase the mechanical stress on the supporting joints of the body.
2. Gender
In people older than 55 years, the prevalence of osteoarthritis is higher in women than men.
3. Trauma
Direct or indirect trauma resulting from heavy work or as a result of continuous use of the joint.
4. Over Use
Physical activity that overloads the knee joint will have a greater risk of developing osteoarthritis.

5. AND. Clinical Signs and Symptoms

Complaints felt by the patient Osteoarthritis is pain in the joints, especially joints that support the body's weight (such as the groin or hip joints). Usually feel joint pain that gets worse after exercise or putting weight on the knee, this is caused by the wearing down of joint cushions. and pain that goes away with rest, pain that increases and gets worse when starting activity after a period of inactivity, with time the pain occurs more often even at rest, crepitus often occurs during movement, joints experience swelling, swelling and warmth is one of the symptoms of any type of arthritis, joint swelling can arise due to the occurrence of effusion in the joint which is usually not much (<100 cc) or due to the presence of osteophytes, so that the shape of the joint surface changes, the range of motion of the joint is limited, as well as other symptoms that can cause the genu muscles to become weak or the structure the joint is less stable, the genu does not move as freely or as far as usual, the genu is bent, and the muscles around the joint become thin or hypotrophied.

F. Prognosis

Prognosis is knowledge of future events, estimates of the final state that may occur from the onset of a disease (Dorland, 2002).

Prognosis is divided into 4, as follows:

1. Qua ad vitam: Concerning the patient's life and death.
In case Osteoarthritis genu, Qua ad vitam is good because it is not life threatening to the patient.
Qua ad sanam: Concerning the patient's recovery.
2. In case Osteoarthritis genu, Qua ad sanam is good because it can be cured if immediately given regular and regular therapy.
3. Qua ad fungsionam: About the function of organs affected by disease.
In case Osteoarthritis genu, Qua ad fungsionam is good because of this disease.
4. Qua ad cosmeticam: Concerning the appearance (aesthetics) of the diseased organ.
In case Osteoarthritis genu, Qua ad cosmeticam is good because it does not change the patient's appearance.

METHOD

A. Intervention Technology Physiotherapy intervention technology used in cases Osteoarthritis Genius Ultrasound Diathermy (USD) and Hold Relax Exercise Therapy. Ultrasound Diathermy is a therapy using sound waves with a frequency between 500,000 to 3,000,000 cycles/second. Ultrasound is generated by the vibration of certain Crystals. This therapy is suitable for inflammation of the elbow joint (tennis elbow), plantar pain (plantar fasciitis), shortening of muscles and ligaments, tendon inflammation, ligament sprains, and chronic wounds. The benefit of this therapy is to relieve pain and accelerate wound healing. Things to note in this therapy is the possibility of burns and cavitation (damage to the bone) (Brukner et al 2007:256).

Hold Relax is a training method that uses isometric contraction (without movement at the joints) optimally on the agonist muscle group, which then relaxes the muscle group (the principle of reciprocal inhibition). The application of hold relax will reduce spasm due to activation of the Golgi tendon organ, then intermyofibrillar fascia which is attached to each other will experience release and pumping action occurs in the remaining lymph and venous fluid increasing tissue elasticity which affects pain reduction (Sport and Fitness Journal, 2018).

B. Description of Physiotherapy Problems. Physiotherapy problems are divided into 3 levels namely Impairment, Functional Limitation and Participation Restriction (Indriani, 2013).

1. Impairment (Characteristics of Anatomical Disorders)

In this case, physical activity disturbances have been found, namely:

- a. There is tenderness in the left knee

- b. There is movement pain
- c. There are limitations to LGS
- d. There is a decrease in muscle strength

2. Functional Limitation (Characteristics of Functional Impairment)

After examination, it was found that the patient had an inability to carry out activities such as walking long distances, running 3km and squatting for too long.

3. Participation Restriction (Limitations of Environmental Socialization)

In this examination, the results obtained that the patient did not experience interference with activities in socializing with the general public.

Results and Discussion

Problems that arise in patients with cases Osteoarthritis genu sinistra are the presence of tenderness in the left knee, decreased joint range of motion, decreased muscle strength and decreased ability of functional activities. So the role of physiotherapy is to reduce the problems that exist in patients. Therapy was carried out 5 times using therapeutic modalities Ultrasound Diathermy and Exercise Therapy (Hold Relax). The results obtained are as follows:

- A. Visual Analogue Scale (VAS) to determine the decrease in the patient's pain.

Table 3.5 Evaluation of pain with VAS

Painful	T0	T1	T2
Silent pain	0	0	0
Tenderness	3	3	3
Motion pain	7	7	6

- B. Manual Muscle Testing (MMT) to determine the patient's increase in muscle strength.

Table 3.6 Evaluation with MMT

Otot Penggerak	T0	T1	T2	T3	T4	T5
Fleksor	3	3	3	3	4	4
Ekstensor	3	3	3	3	4	4

Source: processed by the author (2020).

In the table above it can be seen that there was an increase in muscle strength after 5 treatments.

1. Flexors T0-T1 : 3 – T5 : 4
 2. Extensors T0-T1 : 3 – T5 : 4
- C. Scope of Motion of the Joints (LGS) to determine the increase in the range of motion of the patient's joints.

Table 3.7
Evaluation of LGS with a Goniometer

Terapi	LGS Aktif	LGS Pasif
T	S ₀ 0-0-1 5°	S ₀ 0-0-125°
T	S 0-0-1 5°	S 0-0-125°
T	S 0-0-1 5°	S 0-0-125°
T	S 0-0-1 5°	S 0-0-125°
T4	S ₂ 0-0-1 0°	S ₂ 0-0-125°
T	S 0-0-1 0°	S 0-0-125°

Source: processed by the author (2020).

In the table above it can be concluded that there was a decrease in pain after 5 treatments.

1. Tenderness T0-T1 : 3 – T5 : 2
2. Movement pain T0-T1 : 7 – T5 : 5

In the table above it can be seen that there was an increase in the Scope of Motion of the Joints after 5 treatments.

1. LGS On T0-T1 : S 0-0-115° , T5: S 0-0-120°
 2. LGS Pasif T0-T1 : S 0-0-125°, T5: S 0-0-125°
- D. Functional Index Scale Jette to determine the functional ability of the patient.

Table 3.8 Evaluation with the Jette Scale

No.	Indeks Fungsional Jette	Hasil	
		T0	T5
1.	Berdiri dari posisi duduk		
	1. Derajat nyeri	3	2
	2. Tingkat kesulitan	3	3
	3. Tingkat ketergantungan	1	1
2.	Berjalan 15 meter		
	1. Derajat nyeri	3	2
	2. Tingkat kesulitan	3	3
	3. Tingkat ketergantungan	1	1
3.	Naik turun trap		
	1. Derajat nyeri	3	3
	2. Tingkat kesulitan	3	3
	3. Tingkat ketergantungan	1	1

Conclusion

Providing therapeutic measures using modalities Ultrasound Diathermy and exercise therapy for patients with cases Osteoarthritis enduring 5 times of therapy it was found that there was a decrease in pain in the knee ranging from tenderness to motion pain, increased joint range of motion, increased muscle strength, and increased patient functional activity.

The patient named Mr. M.S is 21 years old with a medical diagnosis Osteoarthritis Genu Sinistra with complaints of pain, decreased muscle strength, and decreased range of motion of the joints. After 5 times of therapy, the results show that:

1. Ultrasound Diathermy Proven to reduce pain in cases Osteoarthritis genu, Ultrasound Diathermy can repair damage to joint cartilage by stimulating chondrocyte proliferation and production of bone matrix which helps reduce the pain felt by patients.
2. Exercise therapy is proven to increase muscle strength and increase joint range of motion (LGS). Exercise therapy will reduce spasm due to activation of the Golgi tendon organs

B. Suggestion

With the above conclusions, it can be said that the success of therapy is not only influenced by the administration of therapy at the hospital but also influenced by the patient's attitude and enthusiasm for self- healing, so collaboration between the therapist, the patient and the patient's family is needed. For optimal results, it is recommended to:

1. To Physiotherapist

Physiotherapists should always try to increase knowledge to identify problems that can arise in sufferers and be able to carry out appropriate physiotherapy interventions in cases Osteoarthritis genu to achieve therapeutic success in accordance with the expected goals.

2. To Patients and Families

Patients are expected to be diligent and painstaking in doing therapy and practicing at home regularly in order to produce optimal therapy. The patient's family is expected to provide motivation for the patient to recover.

3. To the Community and Readers

Society is expected to run a healthy lifestyle. Reducing or avoiding excessive activities that involve a lot of knees. If you feel a problem with your knee, immediately contact a health worker to get the right action before the problem gets worse.

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