Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

Criteria-Based Management Of An Osteoarthritis Knee In Nk Health Clinic: A Case Report

Catherine Hermawan Salim[1*], Yurita Mailintina[2], Astrid Komala Dewi[3]
Bachelor of Physiotherapy, Husada Hospital College of Health Sciences, Central Jakarta, Bachelor of Health Administration, Husda Hospital College of Health Sciences, Central Jakarta

Article Info
Keywords:
Osteoarthritis genu dextra,
assesment,
physiotherapist

ABSTRACT
Osteoarthritis is a degenerative joint disease which has a characteristic chronic, progressing slowly when all of the structure of the joint changes pathologically. Role of physiotherapist is appropriate to the problem in the osteoarthritis case based on the results of physiotherapis examination which includes an assessement, diagnosis, planning and evaluation for increasing mobility of movement and functional activities in patient with osteoarthritis of knee. Case description: Mr.J 60 years old complaints of knee pain that has been felt about 2 years ago. After doing a physiotherapis examination, he has a diagnosis osteoarthritis of knee. The diagnosis of knee osteoarthritis is based on the physical examination and supporting examination. According to result of x-ray showed Mr.J has grade III osteoarthritis on the right side knee where moderate osteophyte, deformity of the bone tip cracked joints narrowed. Results: After of the physioterapis treatment program is carried out for 4 weeks with 2- 3x/week. The patient has experienced a change from relaxation and in carrying out daily activities such as going up and down stairs,sitting and squatting. Conclusions: All of the goals or outcome measure can be achieved by management of physiotherapis with applying various aspects appropriately and spesific.

Corresponding Author:
Catherine Hermawan Salim
College of Health Sciences, Husada Hospital
Jembatan Lima, Jakarta Barat
cathysalim8@gmail.com

INTRODUCTION

Health development is essentially the implementation of health efforts to achieve the ability of the community to live a healthy life so that the optimal degree of health is realized. Along with the development of development in all areas of life, it causes changes in people's behavior and lifestyles. This has resulted in the emergence of various diseases and currently the most common diseases encountered by the community are degenerative diseases, especially degenerative joint disease or what is called osteoarthritis.

In Indonesia, the prevalence of osteoarthritis reaches 5% at < age 40, 30% at the age of 40-60 years, and 65% at > age 61. *Osteoarthritis* is the highest case (37%) of all rheumatic cases and of all osteoarthritis sufferers, knee osteoarthritis is obtained as much as 97% (Allen, D, K, 2015). Osteoarthritis is caused by many factors, including the degeneration process, continuous use of the knee joint (*overuse*), trauma, and excess weight (obesity) (Malgaonkar,

Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

P, P, 2014).

Osteoarthritis is a chronic, *slow-progressive*, degenerative *joint disease* in which the entire structure of the joint undergoes pathological changes. It is characterized by a gradual loss of joint cartilage and followed by thickening of the subchondral bone, osteophyte growth, thickening of the joint capsule, weakening of the muscles that connect the joints, ligament damage and synovial inflammation, so that the joint concerned forms effusion (Muraki S, Tanaka S, 2013).

In knee osteoarthritis, there is a peeling of the cartilage of the joints so that there is a thickening of the subchondral bone, with the routine of activities that continue to be carried out causing direct abrasion of the knee causing inflammation, where pain receptors will release algogen substances that can increase the sensitivity of nociceptors so that it causes pain. Pain in the knee will cause obstacles to joint movement. In arthrosis, positional faults are also found where the tibia shifts laterally in the valgus genu or shifts medial in the varus genu, causing deformity and can continue to develop into disability (Gbiri AC, 2013). The role of physiotherapy is indispensable in accordance with what is stated in PERMENKES NO. 65 article 1 paragraph 2 of 2015, which reads: "Physiotherapy is a form of health service aimed at individuals and or groups to develop, maintain and restore movement and body function throughout the life span by using manual handling, improvement of movement, equipment (physical, electrotherapeutic and mechanical), Functional and Communication Training" then physiotherapy can provide physiotherapy actions which include *assessment, diagnosis, planning, intervention* and *evaluation* in accordance with the *International Classification Of Functioning, Disability And Health (ICF).* The following is table 1 regarding the characteristics of osteoarthritis.

Table 1. Characteristics of Osteoarthritis

No.	Parts of the joint involved	Characteristic
1	Cartilago Article	Fibrillation-softening, breaking and fragmentation Breakdown of collagen fibers. Proteo-glycan disorganization. Carthilago absorbs water. Fragments rupture causing blockages in the joints.
2	Bone	Eburnation of the bone tip – smooth and smooth Cyst below the surface of the bone tip Osteophyte at the edge of the joint Change in the shape of the bone tip – flat
3	Synovial membrane	Hypertrophy. Decreased production of synovial fluid Decreased nutrients for cartilage
4	Kapsul	Fibrous degeneration. Chronic inflammation
5	Ligaments	Contracted or stretched
6	Otot	Atrophy due to unused

Functional Pathology

Knee dysfunction based on the *International Classification Of Functioning, Disability And Health (ICF)* which causes impaired pain, joint mobility and disability due to knee osteoarthritis, is as follows:

Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

a. Body Functional, Structures & Impairment

In *osteoarthritis,* there will be progressive damage to the joint cartilage, as a result of which the cartilage will thin, crack, crack and eventually peel off. The occurrence of division and peeling of the cartilage layer of the joint called corpus libera which can cause the joint gap to narrow. If there is pressure or friction on the surface of the joint, it will cause pain because there is a collision between the bones which will eventually form osteophytes that will irritate the nerve endings and activate pain receptors in the surrounding tissues, where pain receptors will release *algogen* substances that can increase the sensitivity of the nociceptors so that they cause pain. The accumulation *of algogen substances* can accelerate the process of destruction of cartilage joints, in the advanced stages there is an increase in pressure from the joint fluid on the joint surface. This fluid will also be pushed into the fissures *of the subchondral* bone which will give rise to the crista. Then the crista is exfoliated so that *the subchondral* bone receives a direct load that causes *inflammation* and thickening of the *subchondral*. As a result of the narrowing of the joint gap, the capsuloligamenteric system in the knee is shortened and contractuturized, resulting in limited movement with *capsular patterns* and pain. Pain in the knee will interfere or inhibit the occurrence of a movement so that sufferers tend to immobilize. At the immobilization stage, it will cause circulation disorders, where microcirculation decreases, in addition, it will also cause a decrease in the level of liquid *glycoaminoglycan* (GAG) and a decrease in the number of motor units. Due to a decrease in the level of liquid *glycoaminoglycan*, the elasticity or flexibility of the tissue decreases and *fibrosis* arises due to the formation and accumulation of excessive collagen. The collagen fibers will then form a random pattern or *abnormal cross link* which will cause *contracture of the* ligament capsule so that hypomobility occurs. Decreased number of motor units and activity of *neurotransmitters*, impaired circulation in the muscles and reduced muscle quality that leads to weakness of the muscles in the knee. In addition, in knee osteoarthritis, instability is also found in *the capsuloligament* so that the distribution of load on the surface of the knee joint between the medial compartment and the lateral compartment becomes unbalanced and this can trigger the deformity of the genu valgus or genu varus. Due to the deformity of the valgus genu/lateral compartment and the deformity of the varus genu/medial compartment, the work on the muscles of the lower leg becomes unbalanced so that hypomobility occurs and can continue to develop into disability so that it affects functional activities in the patient (Kisner, Carolyn and Colby, Allen, 2012).

b. Activity Limitation

Based on *the body functions & structures and impairments* discussed earlier, there has been damage to specific tissues that can cause decreased joint mobility and disability resulting in limitations in performing daily activities (*activity daily of living*). The following are activities that experience limitations based on *the International Classification Of Functioning, Disability, and Health* (ICF) in Mr. J's patients, namely knee discomfort when lying down, sitting, squatting, worshipping, maintaining a squatting position, kneeling, maintaining a kneeling position, picking up objects below and going up and down stairs

Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

(Kisner, Carolyn and Colby, Allen, 2012).

c. Participation Restriction

Participation restriction is a problem that may be experienced that involves quality of life. Activities that are disrupted are sports activities such as running, jumping and when traveling such as walking on uneven surfaces, using private vehicles and using public transportation (Kisner, Carolyn and Colby, Allen, 2012).

Physiotherapy Assessment

Physiotherapy plays a role in accordance with the problematic conditions in osteoarthritis cases based on the results of physiotherapy studies which include *assessment, diagnosis, planning, intervention* and *evaluation*. The diagnosis *of knee osteoarthritis* is made based on an anamnesa, physical examination and supporting examination. The assessment and treatment process based on *Medbridge* is explained that the assessment process is based on a *funnel shape* where the assessment starts from the general and then narrows down to the specific, which begins with *patient interview*, observation, *triage and screening* to determine whether the patient needs further referrals or not, then the examination continues to *the motion test*, palpation, *muscle testing*, *specific special test* and *physical performance measure* while the treatment process is based on a *reverse funnel shape* where the treatment starts from a specific and then expands in general (Gbiri AC, 2013).

Pain is the main complaint that brings patients to seek treatment and the first step that physiotherapy can do is to do *an anamnesis*. Anamnesa is a data collection by means of questions and answers between physiotherapists and patients, where by conducting questions and answers, it is hoped that information about diseases and complaints felt by patients will be obtained. Anamnesis is performed directly on the patient or what is often referred to as autoanamnesis was carried out on March 6, 2024 at 15.03 at the NK Health clinic. A patient named Mr. J had a complaint of knee pain 2 years ago. Pain, stiffness and discomfort are felt when walking, going up and down stairs and standing for a long time. Pain is felt during a long walk of about ± 20-30 minutes with an NRS of 6-7/10 the pain can be reduced if rested. The pain is only felt in the knee area and there is no radiant pain. Stiffness in the knees is also very felt when waking up in the morning. The pain and stiffness have become more and more uncomfortable in the last 3 months so the patient decides to consult a physiotherapist. The patient had a history of type 2 diabetes mellitus with controlled status, hypertension (-), drug consumption (-) and BMI 24 (ideal category). In the observation examination, no swelling was found on the left or right side of the knee. When walking, the legs seem to be concentrating on the healthy side and avoid concentrating on the sore side, namely the right side. In addition, both knees also appear malpositioned or malaligned outwards or what is often called genu varus. Then in the next examination, namely the range of motion examination, there is movement which when actively moved there is pain and repitation where measurements are made using a goniometer to measure the range of motion of the knee at the time of flexion and extension of the knee (AROM flexion (+) pain extension (-) pain and 0°-0°-100° for the right side while 0°-0°-125° for the left side) then the knee is moved passively there is also pain and slight stiffness in the knee flexion movement (PROM flexion (+)pain extension (-) pain and 0°-0°-105° for the right side while 0°-0°-130° for the

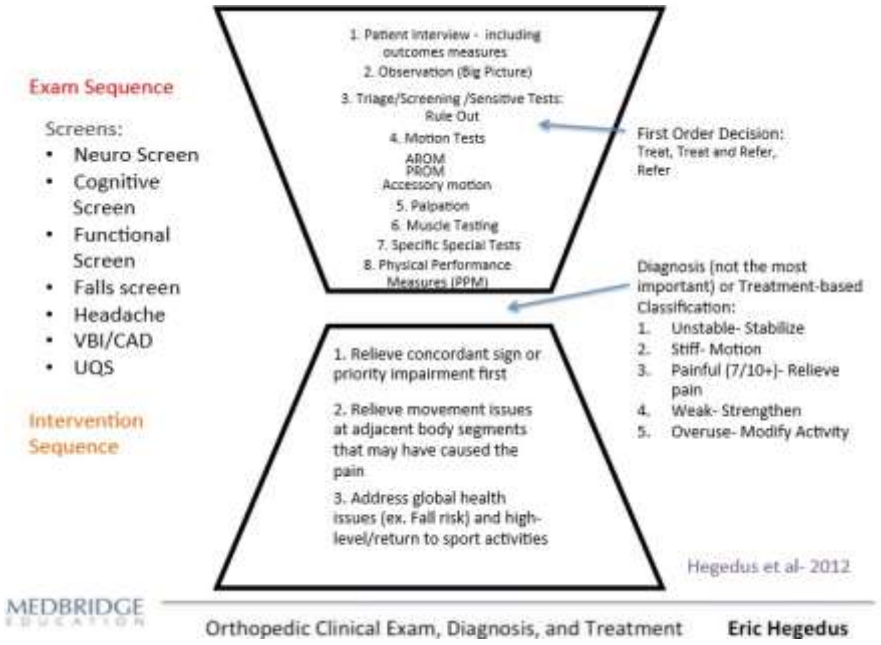
Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

left side). In palpation, pressure pain was obtained in the medial area of the knee dextra with NRS 5/10 and thigtness in the illiotibial band muscle and gastrocnemius muscle. Then the specific examination of special tests based on *evidence-based clinical practice* in the form of *joint play movement* and valgus/varus test there is a deformity of genu varus in the knee and firm endfeel with a capsular pattern of flexion<extension pattern. As for the Physical *performance measure* examination, it uses *a timed single leg stand* because it has a high enough ICC to be used as a measure of examination and evaluation, which is around 0.86 based on the journal *Clinical Practice Guideline Linked To The International Classification Of Functioning, Disability And Health From the American Physical Therapy Association* in 2017. In the radiological *examination, X-rays* are carried out to support the patient's diagnosis, namely in the form of a photo of the lateral A/P genu.gambaran osteofit pada genu dextra. Beratnya osteoarthritis pada sendi lutut secara *radiologis* dapat dibedakan menjadi beberapa kriteria menurut Kellgren dan Lawrance seperti pada tabel 2 berikut: Jika dilihat berdasarkan tingkatan osteoarthritis lutut menurut *Kellgren and Lawrence* pasien tersebut berada pada grade III dengan osteoarthritis *moderat* dengan *osteofit moderat, deformitas* ujung tulang, dan terdapat celah sendi yang sempit. Setelah didapatkan masalah dari hasil pemeriksaan, lalu menentukan *planning* jangka pendek dan jangka panjang dalam memberikan *intervensi* fisioterapi. *Intervensi* yang digunakan physiotherapy pada kasus ini adalah ultrasound, teknik MWM, *open kinetic chain* dan *close kinetic chain exercise* (Hing, W, 2019). A measuring tool that can be used to measure joint mobility in knee *osteoarthritis* patients is a goniometer. In addition, to evaluate the disability of knee *osteoarthritis* patients using *The Western Ontario and Mcmaster University Osteoarthritis Index* (WOMAC).

Table 2: Osteoarthritis grades according to Kellgren and Lawrance

Levels	Classification	Classification
Level 0	None	No narrowing of the joint space or reactive changes were found.
Level 1	Doubt	The narrowing of the joint space is doubtful with the possibility of osteophyte formations.
Level 2	Minimal	Osteophytes are obvious, the possibility of narrowing of the joint space.
Level 3	Moderate	Moderate osteophyte, obvious narrowing of the joint space, Sclerosis appears, possible deformity at the end of the bone.
Level 4	Heavy	Large osteophytes, obvious narrowing of the joint space, severe sclerosis, visible deformity of the ends of the bones.

Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt



Gambar 1. Clinical Examination and Treatment Based on Medbridge Education
Sumber: (Hegedus, E, Evidence based examination and treatment of the knee and thigh, Medbridge Education) Tanggal pengambilan: 30 Maret 2024

EVALUATION RESULTS

After the examination was carried out, physiotherapy interventions were given based on planning targets adjusted to the *International Classification Of Functioning, Disability And Health* (ICF) which were adjusted to the anatomy of impairment, functional impairment, activity limitation and participation restriction experienced by the patient with appropriate outcome measures and the period achieved. Patient Mr. J underwent physiotherapy treatment with 2-3x/week. After 4-6 weeks, patients have significant improvement with a decrease in pain, increased mobility in the knee and an increase in daily activities functionally as measured by appropriate *outcome measures*. Before treatment, the patient was measured with several measuring tools such as NRS (*Numeric Rating Scale*), goniometer and questioner or called WOMAC Score and gait analysis. The results showed significant changes subjectively and objectively, where the results showed that before the treatment the patient was measured with NRS 6-7/10 after treatment to 3-4/10 then with a goniometer 0°-0°-100° after being given physiotherapy intervention for 2 weeks with 2-3x/week to 0°-0°-110° and after treatment for 4-6 weeks to 0°-0°-125° Meanwhile, the WOMAC Score before treatment was 34 to 20. The following is table 3 of the evaluation results based on the target planning in Mr. J's patients.

Table 3 Evaluation Results

Planning Target (SMART)					
Spesifik goals	Measurement	Time	Intervention	Before	After

Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

Sensation of pain	Numeric rating scale	2-3x/minggu selama 1-2 weeks	Phonophoresis	6-7/10	3-4/10
Mobility of joint function	Goniometer	2-3x/minggu selama 4-6 weeks	Manual therapy (Joint mobilization and teknik *Mulligan Mobilization With Movement*)	0°-0°-100°	0°-0°-125°
Muscle power for functional activity walking, climbing stairs etc	WOMAC Score	4-6 weeks	Open and close kinetic chain exercise and strengthening exercise	34	20
Gait pattern	Gait analysis	4-6 weeks	Gait exercise	Genu varus	Genu varus
Physical performance measure	Stopwatch	>6 weeks	Timed single leg stand	<30s	30s

Discussion

In patients with knee osteoarthritis, there is a peeling of the cartilage of the joints so that there is a thickening of the *subchondral* bone, with the routine of activities that continue to be carried out causing direct abrasion on the knee causing inflammation, where pain receptors will release algogen substances that can increase the sensitivity of the nociceptor so that it causes pain. Pain in the knee will cause obstacles to joint movement. In arthrosis, there is also a *positional fault* where the tibia shifts to the medial in *the genu varus* so that it causes deformity and can continue to develop into disability. When this phenomenon occurs, manual therapy, increased movement (exercise), equipment (physical, electrotherapeutic and mechanical), functional training and communication can be given. The provision of physiotherapy interventions with manual therapy, one of which is the provision of *mobilization with movement* (MWM) technique, which is a simultaneous application between additional mobilization from the therapist accompanied by active physiological movements by the patient where at the end of the ROM additional pressure/strain is applied passively, this type of joint mobilization was developed by Brian Mulligan. This technique is always applied painlessly and is described as correcting the movement of the joint from a misalignment of position (Hing, W, 2019).

The MWM technique can be performed in *the non-weight bearing* position and the weight bearing *position*. The MWM *technique of the non-weight bearing position* is a simultaneous application between additional mobilization from the therapist accompanied by active physiological movements by the patient where at the end of the ROM additional pressure/strain is applied passively with the patient sleeping supine or *prone*, while in the MWM technique in the *weight bearing* positiondone in a standing position. The purpose of the MWM technique in knee osteoarthritis patients is to restore normal movement patterns through the physiological movement of the knee to carry out their daily functional activities.

Jurnal Eduhealth
Volume 15, Number 03, 2024, DOI 10.54209/eduhealth.v15i03
ESSN 2808-4608 (Online)
https://ejournal.seaninstitute.or.id/index.php/healt

The administration of MWM is based on two principles, namely *pain free movement* where the movements formed do not cause *irritation* and *precipitation of movement* where the movements formed are in accordance with *the arthrokinematic* and *osteokinematic functions of the* knee. The passive gliding mobilization motion in MWM will have a strain effect on the capsuloligamenteric system. By increasing the elasticity of the *capsuloligamenter system*, it can expand the range of motion of the joint and improve the mobility of the knee joint and reduce the emphasis on the cartilage (Mulligan's, 2024).

The MWM effect has mechanical effects and neurophysiological effects. The mechanical effect, the movement that occurs to correct for misalignment, is given a functional movement without any pain, the joint movement can stimulate movement in the synovial fluid that carries nutrients to the *avascular* cartilage in the joint surface and to the *intraarticular fibrocartilage* tissue so as to speed up the recovery process from damage. Meanwhile, the neurophysiological effect is that it can stimulate mechanoreceptors so that it inhibits the transmission of nociceptive stimuli in the spinal cord or in the brainstem. Thus, the pain can be reduced. Rhythmic movements during MWM will reduce muscle tension so that muscle contractions become balanced. In addition, the physiological effect of MWM is very important to restore the scope of motion of the active joint normally and release the locking in the knee joint, so as to increase mobility in the knee joint in addition to increasing flexibility, it will create a good movement reflex and propioceptive, so that joint movement becomes normal. This makes it easier to move the knee so that it can reduce disability and increase functional activity.

Knee osteoarthritis also occurs in the knee which causes instability in the muscles of the lower limbs and impaired correct functional position so the right intervention to be carried out is to provide close kinetic chain exercises, open kinetic chain exercises, strengthening exercises and balance exercises to improve balance in knee osteoarthritis patients and train the muscles of the limbs lower simultaneously as a weight condenser so that it can stimulate mechanoreceptors so as to increase proprioceptive reflexes, improve joint stability, and reduce muscle contraction imbalances or so-called *muscle imbalance*. The exercises given to the jasmine quadriceps muscle contract eccentric to control knee flexion and contract concentric for knee extension movements, hamstring muscles and soleus muscles contract to stabilize the tibia during translational to anterior in the knee joint, and maintain knee alignment by applying pressure to prevent knee abduction and external rotation, in addition to producing *co-contraction* and more training the coordination of anti-gravity muscles which reduces the shear force during the addition of compression force to the joint and improves the stability of the joint. To evaluate the results of the treatment that has been given, before and after the intervention is given, it is measured according to the problems that exist in the patient and the goals to be achieved, namely by using the *Numeric Rating Scale* (NRS), goniometer and *The Western Ontario and Mcmaster University Osteoarthritis Index* (WOMAC) (Kisner, Carolyn and Colby, Allen, 2012).

CONCLUSION

Physiotherapy plays a role in accordance with the problematic conditions in cases *of knee*

osteoarthritis based on *assessment, diagnosis, planning, intervention* and *evaluation* adjusted to the *Internasional Classification Of Functioning, Disability And Health* (ICF) can determine the problems that occur in patients and can also be adjusted to *clinical reasoning* in providing physiotherapy interventions by applying various aspects appropriately and specifically so that the desired outcome or goal can be achieved.

REFERENCE

Allen, D, K, et al. (2015). *Epidemiology Of Osteoarthritis: State Of The Evidence.*

Gbiri AC. (2013). *Comparative Efficacy Of Open- Chain And Close-Chain Kinematics On Proprioception Muscles's Strength And Functional Performances In Individual With Knee Osteoarthritis.*

Hing, W, et al. (2019). *Mulligan's Mobilization with Movement: A Systematic Review. The Journal of Manual & Manipulative Therapy. Volume 17.*

Kisner, Carolyn and Colby, Allen, L. (2012). *Therapeutic Exercise Foundations and Technique. Six Edition, F.A. Davis Company, Philadelphia.*

Malgaonkar, P, P, et al. (2014). *Short Term Effect Of Mulligan's Mobilization Versus Kinesiotaping On Knee Pain And Disability For Osteoarthritis Of Knee, Vol 1(4), 233-240.*

Mulligan's. (2024). *mobilization with movement on knee pain and disability associated with knee osteoarthritis–A prospective case series. Japan. rticle/537370. Diakses tanggal 24 Maret 2024.*

Muraki S, Tanaka S, Y. N. (2013). *Epidemiology of knee osteoarthritis. OA Sports Medicine 2013 Nov 26;1(3):21.*