

## Physiotherapy Management in Patient with Knee Osteoarthritis through Three Tract Reasoning: A Case Report

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### Abstract

**Background:** Knee Osteoarthritis is the most common joint disorder and one of the leading causes of disability. The main symptoms associated with osteoarthritis are pain, discomfort, limitation of activity and reduced participation. Physiotherapy management is evidence-based treatment approach that have short-term and long-term effect on reducing pain, improve muscle strength and function.

**Aim:** The aim of this study was to find out evidence-based physiotherapy in patient with knee osteoarthritis through three tract reasoning on reducing pain, improve muscle strength and function.

**Method:** A case-based study was conducted. The three tract reasoning: procedural, interactive and conditional were used during diagnosis and in management of knee osteoarthritis.

**Results:** The patient respond well in physiotherapy treatment. The swelling was 100% reduced, reduced pain in VAS from 8/10 to 1/10, improved muscle strength by oxford muscle grading scale by grade V, weight bearing is more (90%) and only 25% remain limitation in functionally from 69%.

**Conclusion:** Knee osteoarthritis is frequent musculoskeletal condition that affect person's activities and restricted the participation. Using clinical reasoning physiotherapist diagnosed and managed the symptoms. After receiving physiotherapy treatment improved the patient's status of health.

**Keywords:** *Knee osteoarthritis; Physiotherapy; Clinical reasoning*

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### Introduction

Osteoarthritis (OA) is the most common joint disorder seen in the older adult population. Knee OA occurs in 10% men and 13% in women aged 60-year or older. Osteoarthritis of the knee is expected to be the fourth leading cause of disability by the year of 2020 [1]. Knee osteoarthritis affects millions of Americans. In India, the prevalence of knee OA is 22% to 39% [2].

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Osteoarthritis (OA) is a degenerative joint disease involving the cartilage and many of its surrounding tissues. Disease progression is usually slow but can ultimately lead to joint failure with pain and disability. Symptoms and radiographic changes are poorly correlated in OA. Established risk factors include obesity, local trauma and occupation. The burden of OA is physical, psychological and socioeconomic [3].

OA has a multi-factorial etiology. Old age, female gender, overweight and obesity, knee injury, repetitive use of joints, bone density, muscle weakness, and joint laxity all play roles in the development of joint osteoarthritis, particularly in the weight-bearing joints. Modifying these factors may reduce the risk of osteoarthritis and prevent subsequent pain and disability [4].

OA can be defined pathologically, radiographically, or clinically. In radiographic OA, the overall joint scoring system grades five levels of OA, from 0 to 4, defining OA by the presence of a definite osteophyte, and more severe grades by the presumed successive appearance of joint-space narrowing, sclerosis, cysts, and deformity. In pathologic OA, pathologic changes in the knee detected by MRI (bone marrow lesions, synovitis, effusion or periarticular lesions were associated with knee pain, but others have failed to confirm the association between bone marrow lesions and knee pain [5].

OA accounts for more trouble with climbing stairs and walking than any other disease. Common OA symptoms include pain, stiffness, some loss of joint motion, and changes in the shape of affected joints [6]. In diagnosis, the clinical criteria for classification of osteoarthritis of the knee. The criteria are knee pain, and at least one of the following three criteria: age >50 years, stiffness < 30 minutes, crepitus and osteophytes. Physical therapists are highly qualified to evaluate and treat patients suffering from this debilitating disease. Physical therapists are known to be disease modifiers through the use of various interventions like manual therapy and medical exercise training. These interventions aim to provide pain relief, improve joint range of motion, and improve muscle strength and aerobic fitness [7]. According to the World Confederation for Physical Therapy describes physical therapy as providing ‘services that develop, maintain and restore people’s maximum movement and functional ability. They can help people at any stage of life, when movement and function are threatened by ageing, injury, diseases, disorders, conditions or environmental factors. Physical therapists help people maximize their quality of life, looking at physical, psychological, emotional and social wellbeing. They work in the health spheres of promotion, prevention, treatment/intervention, habilitation and rehabilitation [8]. A systematic review concluded that greater muscle strength, better mental health and self-efficacy, social support and more aerobic exercise were significant predictors for better outcomes in knee osteoarthritis [9].

Clinical reasoning is a term describing the thinking and decision-making processes associated with clinical practice. It is the thinking process that escorts clinical practice, it is a multifaceted skill. Clinical reasoning as a cognitive process aiming to understand the implications of patient data. It also aims to recognize and diagnose present concrete or latent patient problems, to make clinical well-judged choices to help in problem solving, and to result in encouraging patient outcomes. Clinical reasoning is one of the methods of applying evidence-based practice in physiotherapy [10].

Therapists have been using a three tracks reasoning in their mind. These tracks are procedural, interactive, and conditional. These are the three main tracks that guide a therapist’s thought processes. Procedural reasoning involves treatment decision making that guided things like problem identification, goal setting, and intervention planning. By using interactive reasoning therapist can begin to understand the person better, and can appreciate the disability or illness experience for the client [11]. Conditional reasoning involves not only prognosis, as such, but working through the implications of prognosis. The therapist

helps the patient envisage various scenarios for the future and this informs the choices and options for management in the present. Conditional reasoning is a predictive approach that incorporates the present context and future scenario and formulates the intervention that focuses on the long-term outcomes [10].

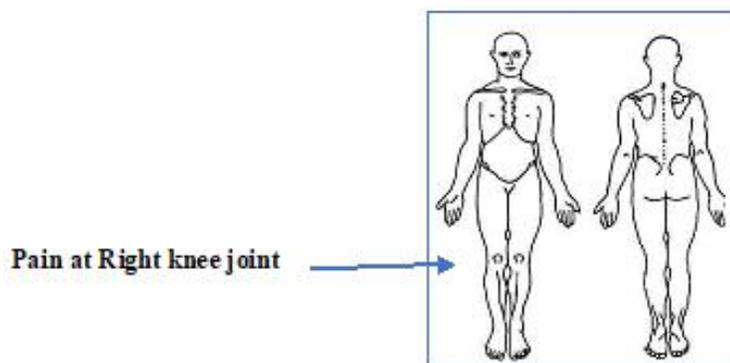
Osteoarthritis (OA) is a common type of arthritis that affect middle age groups. Osteoarthritis affects women more than men. Knee osteoarthritis affects the Functional Ability and Quality of Life negatively. Pain and functional impairment are the key domains of the burden of OA patients [12]. Knee OA has a significant impact on personal suffering and the economic cost of providing health care [13]. Given that the knee plays an important role in the power and gait cycle. The pathophysiological mechanisms associated with knee OA can significantly compromise the gait pattern. The pain is the common symptoms that limit the ADLs. Knee OA impact on activities limitation and restricted the participation. The purpose of this study is to describe a case of knee osteoarthritis with the evidence-based physiotherapy treatment through clinical reasoning.

### Case Description

The subject of the case was 54-year-old female, housewife. Initial examination is done by using an assessment which is used in Centre for the Rehabilitation of the Paralysed (CRP), Department of Physiotherapy. A written or verbal consent has taken from her before starting assessment. Patient is an integral part of decision making. Patients consent is top most priority to start any examination or treatment process. Informed consent is a process by which patient get informed about the facts and figures about this examination process.

In subjective part of assessment, present complain of patient was pain on knee joint (right) from 2 months. Severity was severe and in Visual Analogue Scale it was 8/10. Patient was feeling knee pain at the medial border of the knee joint and also feeling stiffness in the morning. The aggravating factors were long time walking, staring up and down, during praying and easing factors was rest. At night and morning, the pain was increasing. Day by day her pain was exacerbating. There was no other past medical history like diabetes, high pressure etc.

**Body chart or map-**The body chart indicate the exact area of patient's problem.



**Figure 1:** Body chart of Mrs. 'X'

**In objective part of assessment-**This part was started with general and local observation, inspection and palpation, range of motion (ROM) and manual muscle testing. In inspection and palpation, on her knee joint tenderness at medial border of knee joint line was found. Mild temperature was evident. Prepatellar crepitus was also found in palpation.

**In ROM**-Active movement was checked in lying position. Knee flexion and extension was checked in both sides (left and right). There was no abnormality was found at left knee joint. In following table shows the right knee active range of motion (AROM) (Table 1).

Movement	AROM	Pain	Willingness
Flexion (right)	125°	√	Difficult
Extension (left)	0°	√	Mild

**Table 1:** The right knee active range of motion (AROM).

Thought found limitation of active movement for this reason therapist was checked the **PROM** of knee joint. Overpressure was applied to see the end feel and found the tissue approximation (based on Cyriax). In **accessory movement** there was found that decreased patellar glide both medially and laterally.

It is known that the knee flexors that are the group of hamstrings, popliteus, gracilis and sartorius and quadriceps femoris (rectus femoris, vastus medialis, vastus lateralis and vastus intermedius) and tensor fasciae latae are responsible to knee extension. The oxford grade of right sided knee flexors and extensors were grade-IV where left sided muscles were in grade V.

**In neurological test**- The sensory in right sided were intact. The reflex was also normal (**Patellar ligament (L3,4)** and **Achilles Tendon (S1, S2)**).

**Investigation**-In X-ray narrowing joint space especially at medial side and osteophytic changes were found. At early stage of OA, minimal joint space is narrowing and medial side was more reduced than lateral side.

**Possible diagnosis:** The possible diagnosis was the right knee osteoarthritis.

**Differential diagnosis:** The differential diagnosis was a list of diagnosis including prepatellar tendonitis, Iliotibial band syndrome ligamentous instability (medial and lateral collateral ligament) and meniscal pathology.

Condition	Complain	Special test
Meniscal tear	Pain at postero medial or lateral pain	McMurray’s test
Knee instability	Pain with rotation	Lachman, Ant and post. Drawer, varus and valgus stress test
Iliotibial band syndrome	Antero-lateral knee pain	Ober test
Patellofemoral pain syndrome	Anterior knee pain	Patellar grind test

**Table 2:** Neurological Test & Diagnosis for Knee Osteoarthritis.

**Confirmatory Diagnosis:** The confirm diagnosis of this case was Osteoarthritis of right sided knee joint.

**Problem list:** The list of the problems was constant knee pain (in VAS 8/10), reduced knee ROM, poor muscular strength (4/5), presence of swelling, decreased flexibility, decreased aerobic capacity and difficulty to maintain everyday activities (ADLs). The patient’s problem also incorporated by using ICF (international classification of functioning, disability and health). ICF has the advantage of being a universal and standardized language to describe functioning and health. The classification aims to

provide a scientific basis to understand and study health states, as well as their consequences and determinants (Rat, et al., 2008).

**Outcome measures:** The outcome measures were used for outcome measure on pain, strength and function including 1) Visual analogue scale for pain measurement, 2) Goniometer to assess the range of motion (ROM), 3) Oxford Muscle Grading Scale to measure the strength of muscle 4) Measuring tape is used for the assessment of swelling and 5) Lower extremity function scale to measure the function for this patient with knee osteoarthritis.

**Plan of care:** The aim or goal of physiotherapy treatment consist of -to reduce knee pain, swelling and tenderness, maintain knee joint range of motion, strengthen knee: especially quadriceps (especially VMO) and hamstrings muscles, strengthen the muscles of lower limb: calves, hip and pelvis muscles, improve the patellofemoral (knee cap) alignment and function, maintain muscle lengths or flexibility, improve agility and balance, enhance aerobic capacity, improve function e.g: walking, squatting, stiring.

**Goal set up:** The goal set up was done based SMART approaches. The SMART format provides clarity about goals. The meaning is **S** - specific, **M** - measurable, **A** - achievable, **R** – realistic and **T** - time-based. The SMART also provides the guide in setting objectives. Setting goals early in the treatment program help to give direction on what to expect, how it will happen and how long it's going to take to get there. Not only is it an important tool for treatment but also it can be applied for setting the objectives.

**Short term goal:** The time frame of the short-term goal was 6<sup>th</sup> week in 12 physiotherapy session. The objectives were-

- ❖ To provide education to patient about diagnosis, prognosis, physiotherapeutic management and for avoiding aggravating factors
- ❖ To reduce pain in VAS from 8/10 to 2/10
- ❖ To improve muscle strength (knee flexor and extensor will be strength in oxford muscle grading scale in grade V)
- ❖ To enhance the function (there will be limited difficulties during prayer, stair up and down and in squat position)

**Long term goal:** The time frame of long-term goal is 3 months. The objectives were-

- ❖ To ensure further progression of symptoms
- ❖ To reduce pain in VAS (0/10)
- ❖ To maintain muscle strength (grade V in knee flexors and extensors)
- ❖ To enhance the function (every activity of daily living and long-term walking)

**Intervention (Evidence based):** Patients have to be careful when taking medicines. All drugs have side effects. Thus, it is very important that patients with other health issues. Cardiovascular gastrointestinal are the most common side effects. Physiotherapy is the evidence-based treatment which is safe and has no side effects. The main goal of physiotherapy for patients with knee OA in most cases is to reduce pain and improve the physical functioning. Level 1 evidence has proven that physiotherapy is effective in short term and long term. There is various treatment are available to manage the symptom in patients with osteoarthritis of knee joint. The following treatment is applied to treat the patient of this study.

The patient education was provided about condition, outcome, physiotherapeutic management and delivered advice for avoiding aggravating factors. Home program were provided with exercise therapy to patient about the condition, prognosis and physiotherapeutic treatment [14]. Warm-up and cooling down with muscle stretching (quadriceps femoris, hamstring, and calf muscle stretching) for 5-10 minutes are recommended before starting treatment. Mobilization of tibiofemoral joint, patellofemoral joint and surrounding soft tissue was provided. In a systematic review it is stated that anterior/posterior mobilizations of the tibiofemoral joint and the patella, and muscle stretching exercises is recommended in case of pain and reverse limitation of the joint mobility [15]. Tibiofemoral distraction or gapping are effective for pain control that helps to increase joint play movement and knee flexion. ROM exercise was applied to maintain normal joint ROM. Flexibility exercise was applied to preserve ROM, reduce stiffness and reduce pain. Simple stretching exercise are useful for sustain improvement of ROM as a long-term management in patient with osteoarthritis. The treatment dose was five days per week for six weeks [16]. Low intensity aerobic exercise-helps to pulse rate can reduce pain and assist to sleep better. The combination of aerobic exercise, strength training, balance exercises and educational programs were improved the balance in women with osteoarthritis [17]. Strengthening exercise was done to improve the strength of muscle that control the knee joint, helps to stabilize knee joint, helps to reduce pain and helps to stop the giving way that can help to reduce the risk of falling. Isometric strengthening or muscles setting of quadriceps are beneficial for patients with osteoarthritis of knee joint. These exercises are helpful for reducing pain and improve muscle strength of quadriceps that helps to improve function [18]. Proprioceptive exercise is statistically significant intervention to improve the proprioception of the knee joint. Weight bearing exercise, functional exercise e.g.- walking, cycling, balancing is effective component of the proprioception [19]. Thermotherapy (ice) was applied for reducing the inflammation and control of pain and swelling. Treadmill walking was provided to increase the stance phase time [20].

Day Number	Treatment	Dose	Progression
Day 1	Assessment		Motivated about PT intervention and reduce pain (6/10) and swelling
	Patient education		
	Patellar mobilization	10 repetitions in each direction	
	Application of ice	10 min	
	Quads setting exercise	10 repetitions, 3 set with rest interval	
	Home program	Use of ice 2 times a day and quads setting exercise- 10 rep, 4 times a day	
Day 2	Day 1+	Day 1+	No change in pain
	Stretching (quadriceps, hamstring, gastrocnemius and soleus)	10 repetitions, 1 set, hold 30 sec in each repetition	
Day 3 & 4	P-A, A-P glide of tibio femoral joint	10 repetitions	--Increase knee flexion 5° --Improved knee flexor strength (grade V)
	Stationary cycling	5 min	
	Strength training	8-12 repetitions, 3 set	
After day 8	Previous day +		--Improved balance
	Balance training	10 min	
	Functional exercise	10 min	
Up to day 12	Previous day +		Reduce pain, swelling, increase knee flexion 10°, improved function (stair up and down) and endurance
	Treadmill walking Agility training Home program	--With maintaining target heart rate -- 10 repetition in each component	

**Table 3:** The physiotherapy treatment protocol

**Prognosis:** The outcomes of osteoarthritis are poor quality of life, limited daily activities and disability. They found that decreased physical functions among knee osteoarthritis patients with pain shows how important this symptom is as a possible launching cause to decline of physical activities (Table 4). Even those whose pain improves are occasionally able to regain their experienced levels of physical activities [21].

**Discharge:** After 12 session patients is advised to take follow up 2 times in a month.

Variable	Day 1	4 <sup>th</sup> session	12 <sup>th</sup> session
<b>Pain</b>	8/10	5/10	1/10
<b>Swelling</b>	Mild	Reduced	Absent
<b>Knee flexion</b>	120	125	135
<b>Manual testing in flexion, extension</b>	Grade IV	Grade IV	Grade V
<b>Weight bearing ability</b>	Partial	Improved	Full
<b>Improvement in function (WOMAC)</b>	69%	45%	25%
<b>Participation in ADLs</b>	Limited	Difficulty in knee flexion activities (squat position)	No limitation but sometimes feel discomfort

**Table 4:** Progression of treatment in 12<sup>th</sup> session.

## Discussion

From the physical therapy perspective, this patient made significant improvements in only 12 session and responded well to all of the interventions. Also, from the patient’s perspective, she did progress that was most important to her that of reducing difficulties during activity of daily living. The Ottawa Panel (2005) advised the combination of manual therapy and therapeutic exercises especially muscle strengthening exercises to achieve better improvement of pain and function in patients with osteoarthritis knee.

After receiving physiotherapy session, reduced her knee pain from 8/10 to 5/10 after 4<sup>th</sup> session and more reduce pain (1/10) in VAS. The swelling was reduced and also abolished next 12<sup>th</sup> session. The active knee flexion was improved markedly as well as improved muscle strength in 12<sup>th</sup> session. After 12<sup>th</sup> physiotherapy session, improved weight bearing at knee joint. Finally, improved function that was measured by WOMAC questionnaire. Now, 25% limitation was present functionally (table 2).

Therapists were using conditional reasoning are able to translate clients’ deficits into possible adaptations that will facilitate their life roles in each environment. The physiotherapist also used interactive reasoning during treatment. This strategy is a vehicle for the interpersonal skills. Interactive reasoning occurs when the patient and the physiotherapist communicates with one another. It is essential for to use interactive reasoning in order to understand the client and find out what motivates the client. Interactive and collaborative decision making, is required because effective patient education requires assessing both the patient’s readiness for learning and their preferred style of learning.

The study finds that a number of clinical reasoning strategies, representing tasks within clinical practice. Such tasks include the formation of diagnosis; understanding the client and their context; the determination and carrying out of treatment procedures; establishing therapist - patient rapport; nurturing a collaborative approach towards deciding and implementing goals of treatment; engaging in individualized and context sensitive teaching. Activity and reasoning within these areas occupy a significant place, both philosophically and practically.

This case report may not establish causative relationships but it can add to the collective body of knowledge of clinicians. The merits of this case report provide into the clinical reasoning process adopted by an experienced clinician in a situation where at first glance a patient presents complain towards clinician. In addition to presenting the physical therapy diagnostic process and management for a patient presenting with knee pain associated with osteoarthritis. This case report also highlights the importance of ongoing reflection in the clinical decision-making process during assessment and provision of physiotherapy treatment.

### **Key Message**

- Physiotherapy with home exercise is more effective to reduce pain, improve strength and function as early.
- Based on the available evidence, it is recommended that physiotherapy for knee OA have short-term and long-term effect.

### **Conclusion**

Knee osteoarthritis is the prevalent condition. Using clinical reasoning skills and principles, the patient's history and clinical findings were analyzed, designing principles of a plane of manual therapy, measuring the outcome, and for seeing prognosis and improvement were explained.

### **Conflict of Interest**

The author stated that they have no conflict of interest.

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