Case Report

DOI: 10.7860/JCDR/2023/58732.18115

Physiotherapy Section

Assessment and Physiotherapeutic Intervention for Patellofemoral Pain and Muscle Performance Deficits- A Case Report

UMRA JAFRI[1], ASHFAQUE KHAN[2], MOHD JAVED IQBAL[3], NEERAJ KUMAR MAURYA[4], ABDUR RAHEEM KHAN[5]

ABSTRACT

Patellofemoral pain can lead to knee pain, mobility issues, and deficits in muscle performance. It is caused by mechanical and chemical imbalances within the patellofemoral joint. Physiotherapeutic intervention plays an important role in managing these deficits. In this case, a physiotherapeutic intervention was prescribed based on the International Classification of Functioning, Disability, and Health (ICF) model. The assessment was conducted using the ICF model to describe and organise information on functioning and disability. A 55-year-old female with right peripatellar pain was examined using the ICF model for patellofemoral pain and muscle performance deficits. The components observed were correlated with the ICF model. Based on the ICF-based assessment results, there was a decrease in muscle strength and knee Range of Motion (ROM) along with the presence of pain. Functional activity limitations are present in the form of squatting and stair climbing. Other associated findings are mild patellofemoral swelling and quadriceps wasting. This case study found that muscle performance deficits caused by patellofemoral pain can be managed with an eight-week ICF-based physiotherapeutic intervention that follows the prescribed elements of physiotherapy.

Keywords: Activity of daily living, Body function, Functional activity, Quality of life

CASE REPORT

A 55-year-old female patient was referred to the Physiotherapy Department with the chief complaint of gradual onset of right peripatellar pain, described as a dull ache in nature. The pain increased during stair climbing, cross-leg sitting, and walking, but was relieved by rest and medication. She had a history of the same complaint one month back, which was relieved by medication for a short duration. The patient had no relevant medical or family history.

On examination, the patient was cooperative with stable mental functions. During a pain analysis on the Visual Analogue Scale (VAS), from 0 to 10, where 0 means no pain and 10 means excruciating pain, the patient was asked to rate her pain. She said that at best, her pain was 2-4/10, and at worst, it was 6/10 during Activity of Daily Living (ADL), stair climbing, or walking for long distances. The patient had an antalgic gait pattern with shorter steps and strides on the left (unilateral waddling). Lordotic posture associated with other global body postural deviations was present.

Mild swelling was present over the anterior knee; patellar maltracking and quadriceps wasting were present. On palpation, mild tenderness was present during medial patellar facet and peripatellar palpation; mild palpable swelling was present over the anterior knee without effusion. Decreased muscle tone and palpable quadriceps wasting were present when compared with the right side. The patellar mobility was compared on both knees to rule out any soft tissue tightness around the knee joint. The left patella was tilted to the side. The patellar apprehension test and the patellar grind test were used to look for problems around the patellofemoral joint [1]. The patellar apprehension test was negative but the patellar grind test was positive for pain and crepitus [2].

KOOS-12 provides domain-specific scores for pain, function, and knee-specific Quality Of Life (QOL) while representing content across domains sufficiently to support construction of a summary measure of overall knee impact [3]. The score recorded was 45%.

[Table/Fig-1-3] show the details of the ICF-based assessment. The investigative findings in the form of bilateral knee X-rays with AP and lateral views were advised by the orthopaedic surgeon. The X-ray of the left knee in AP view showed patellar maltracking and normal tibiofemoral joint space, with no osteophytes or sclerotic changes. The right lateral view shows superior tilting and spiking of the patella. Thus, the patient was diagnosed to have impaired knee joint function with muscle performance deficits associated with localised inflammation [Table/Fig-4,5].

Category	Measurement used	Pre-treatment	Post treatment (after 8 weeks)
Strength	Manual muscle testing	Knee extensors;4/5 (l) knee extensors;5/5(r) hip abductors; 4/5 (l) hip abductors; 5/5 (r)	Knee extensors; 5/5 (l) knee extensors; 5/5 (r) hip abductors; 5/5 (l) hip abductors; 5/5 (r)
Pain	VAS	Left knee 6/10	Left knee 0/10
AROM*	Goniometer	Knee flexion; 0°-100°	Knee flexion 0°-130°
PROM*	Goniometer	Knee flexion; 0°-120° Kneeextension;125°-0	Knee flexion; 0°-130° Knee extension; 135°-0°

[Table/Fig-1]: Body function.
AROM: Active range of motion; PROM: Passive range of motion

Category	Measurement used	Pre-treatment	Post treatment
Double leg Squat	VAS; observation	Left knee; 8/10 Right knee; 0/10	Left knee; 2/10 Right knee; 0/10
Ascending Stairs	VAS; observation	Left knee; 7/10 Right knee; 0/10	Left knee; 2/10 Right knee; 0/10
Descending Stairs	VAS; observation	Left knee; 6/10 Right knee; 0/10	Left knee; 2/10 Right knee; 0/10
	KOOS score	45%	77%

[Table/Fig-2]: Functional activity.

Category	Pre-treatment	Post treatment
12 cm superior to joint line for rectus femoris wasting	Right; 45 cm left; 41 cm	Right; 45 cm left; 44 cm
7 cm superior to joint line for VMO wasting	Right; 41 cm Left; 38 cm	Right; 41 cm Left; 40 cm
5 cm superior and inferior for swelling and effusion	Right; 38 cm Left; 39 cm	Right; 38 cm Left; 37 cm
At mid patella for swelling	Right; 35 cm Left; 34 cm	Right; 35 cm Left; 33 cm

[Table/Fig-3]: Circumferential measurement using an inch tape.
VMO: Vastus medialis obliquus

[Table/Fig-4]: X-ray of the left knee AP view showed patellar maltracking and normal tibiofemoral joint space, with no osteophytes or sclerotic changes.
[Table/Fig-5]: X-ray right knee lateral view shows superior tilting and spiking of the patella. (Images from left to right)

After receiving informed consent from the subject, she participated in the ICF-based physiotherapeutic intervention (which follows elements of physiotherapeutic intervention) for eight weeks, as shown in [Table/Fig-6].

The outcomes of ICF-based physiotherapeutic interventions were targeted to improve the patient's pain score, muscle performance, ROM, and functional activity. After four weeks, the patient had made significant improvements in these areas, which are detailed in [Tables/Fig-1-3], respectively.

DISCUSSION

This case study aimed to describe the ICF-based assessment and physiotherapeutic intervention for patellofemoral pain and muscle performance deficits. Patellofemoral pain has an immediate effect on the person in terms of mobility, functional problems, and not being able to maintain a healthy QOL [3,4].

Rathleff MS et al., concluded that patellofemoral pain is caused by patellofemoral maltracking, which puts more compressive stress on the patellofemoral joint [5]. Many other possible causes of patellar shadowing have also been suggested, such as weakness of muscles or problems with the lower branch's alignment [6]. Also, it seems that how teenagers respond to exercise therapy is different from how older people respond. Chen Z et al., and Barton CJ et al., concluded that there was an improvement in outcome measures in their randomised trial [7,8].

Tazesh B et al., stated that patient education in combination with core stability exercise led to improved functional outcome and pain reduction in comparison with normal routine exercise in Patellofemoral Pain Syndrome (PFPS) [9]. However, in this study patient education only concerned how to perform the exercises. Likewise, in a systematic review by Saltychev M et al., it was concluded that structured physiotherapeutic approaches may be beneficial for PFPS subgroups [10].

Crossley KM et al., showed that manual therapy led to decreased pain severity and improved physical function in comparison with education alone in PFPS [11]. In a study by Hu H et al., neuromuscular training exercises were found to be beneficial for alleviating pain and knee function, and improved the PFPS patient's QOL [12].

This case report shows how an ICF-based assessment and physiotherapeutic intervention helped a female patient recover from her knee pain and muscle performance deficits. The patient responded well to the planned, tailored treatment protocol. In this case, her treatment focused primarily on pain control and improving her functional abilities. She received ICF based physiotherapeutic intervention that were backed up by evidence [13,14] and clinical reasoning, helping to increase her mobility; improve muscle performance, function which improved her QOL.

	0-1 week	1-3 week	3-6 week	6-8 week
Modalities	HWF- 20 minutes before exercise 2 times a day	HWF- 20 minutes before exercise 2 times a day	HWF- 20 minutes before exercise 2 times a day	HWF- 20 minutes before exercise 2 times a day
	Quadriceps/hip abductor/ gluteus maximus Isometric exercises (5 sec hold 5 sec relax 10 rep 5 set 2 sessions)	Quadriceps/hip abductor/gluteus maximus Isotonic progressive exercises (5 sec hold 5 sec relax 10 rep 5 set 2 sessions)	Quadriceps/hip abductor/gluteus maximus Isotonic progressive exercises (10 sec hold 5 sec relax 10 rep 4 set 2 sessions)	Double-leg press, single-leg press eccentric step- downs from step, eccentric step-downs from step
		Four direction slr (5 sec hold 5 Sec relax 10 rep 5 Set 2 sessions) Prone hip extension 5 sec holds (5 sec relax 10 reps 5 set 2 sessions) Mini-squat with wall support (5 rep 2 set 2 session)	Four direction slr with 2 kg weight (5 sec hold 5 sec relax 10 rep 4 set 2 sessions) Prone hip Extension with 2 kg weight (5 sec holds 5 sec relax 10 reps 4 set 2 sessions) Bridging with left isolated knee Extension with wall abduction (5 sec holds 5 sec relax 10 reps 4 set 2 sessions) Deep squat with wall support (5 rep 2 set 2 sessions)	Hip abduction side stepping with resistive band at ankles squats, lunges, clock balance and reach
Therapeutic exercises	Left hams self-stretching exercises (20-25 sec hold 5 sec relax 3 rep 2 set 2 sessions)	Left hams self-stretching exercises (20-25 sec hold 5 sec relax 3 rep 2 set 2 sessions)	Left hams self-stretching exercises (20-25 sec hold 5 sec relax 3 rep 2 set 2 sessions)	Left hams self-stretching exercises (20-25 sec hold 5 sec relax 3 rep 2 set 2 sessions)
Manual therapy	Self-patellar medial glide 4-5 rep 2 set 2 sessions	Self-patellar medial glide 4-5 rep 2 set 2 sessions	Self-patellar medial glide 4-5 rep 2 set 2 sessions	Self-patellar medial glide 4-5 rep 2 set 2 sessions
Special techniques	Patellar taping with medial glide Patellar brace	Patellar taping with medial glide Patellar brace	Patellar taping with medial glide Patellar brace	Patellar taping with medial glide Patellar brace
Instruction to patient for posture correction, ergonomics and activity modification.				

[Table/Fig-6]: Treatment plan.
HWF: Hot water fomentation; SLR: Straight leg raising; Hams: Hamstring muscle

On examination, there was a lack of patellar mobility and insufficient strength of the quadriceps and hip abductor muscles to generate enough force. There were functional problems and activities of daily living (ADLS) problems, and the left patellar grinding test was positive.

Based on the results of the evaluation and the correlation between clinical and radiological findings, people with patellofemoral pain and decreased muscle performance need effective physiotherapy to make functional and ADL activities pain-free. This study is supported by the findings of Bolga LA et al., [15]. In a systematic review, it was concluded that continued use of structured therapeutic exercise is required for the conservative management of PFPS. A care plan was created to deal with the current problems and help the person reach their goals [15]. Our findings are in agreement with those obtained by Smith BE et al., [16]. They concluded that patient achieved 80% improvement in his symptoms and return to physical activity with structured function based physiotherapeutic intervention. In their study, Smith BE et al., concluded that more research on therapeutic exercise intervention for patellofemoral pain is required [16].

ICF-based assessment and physiotherapeutic intervention allow the implementation of a patient-oriented approach instead of focusing solely on body structures and functions for therapeutic purposes. ICF promotes a focus on interventions that relate to activities and participation from a cultural perspective and assesses the impact of the environment on functioning.

CONCLUSION(S)

With PFP, the 8-week ICF-based physiotherapeutic intervention that focuses on muscle strength and power is doable and is linked to moderate-to-large improvements in pain, function, and lower extremity muscle performance. These exercises have been shown to be very effective at reducing patellofemoral pain and improving muscle strength, which makes it easier to do ADLs.

REFERENCES

[1] Manske RC, Davies GJ. Examination of the patellofemoral joint. Int J Sports Phys Ther. 2016;11(6):831-53.
[2] Ahmad CS, McCarthy M, Gomez JA, Shubin Stein BE. The moving patellar apprehension test for lateral patellar instability. Am J Sports Med. 2009;37(4):791-96.
[3] Gandek B, Roos EM, Franklin PD, Ware JE. A 12-item short form of the knee injury and Osteoarthritis Outcome Score (KOOS-12): Tests of reliability, validity, and responsiveness. Osteoarthritis Cartilage. 2019;27:762-70.
[4] Doyle E. Appraisal of clinical practice guideline: Patellofemoral pain: Clinical practice guidelines linked to the international classification of functioning, disability and health from the academy of orthopaedic physical therapy of the American Physical Therapy Association. J Physiother. 2020;66(2):134. Doi: 10.1016/j.jphys.2020.02.008. Epub 2020 Apr 11. PMID: 32291214.
[5] Rathleff MS, Rathleff CR, Olesen JL, Rasmussen S, Roos EM. Is knee pain during adolescence a self-limiting condition? Prognosis of patellofemoral pain and other types of knee pain: Prognosis of patellofemoral pain and other types of knee pain. Am J Sports Med [Internet]. 2016;44(5):1165-71.
[6] Willy RW, Hoglund LT, Barton CJ, Bolgla LA, Scalzitti DA, Logerstedt DS. Patellofemoral pain: Clinical practice guidelines linked to the international classification of functioning, disability, and health from the academy of orthopaedic physical therapy of the American physical therapy association. J Orthop Sports Phys Ther. 2019;49(9):G1-95.
[7] Chen Z, Wu J, Wang X, Ren Z. The effect of foot orthoses for patients with patellofemoral pain syndrome: A systematic review and meta-analysis. Heliyon [Internet]. 2022;8(6):e09656. Available from: http://dx.doi.org/10.1016/j.heliyon.2022.e09656.
[8] Barton CJ, Holden S, Rathleff MS. Patient education on patellofemoral pain. JAMA [Internet]. 2018;319(22):2338. Available from: http://dx.doi.org/10.1001/jama.2018.4458.
[9] Tazesh B, Mansournia MA, Halabchi F. Additional effects of core stability exercises on pain and function of patient with patellofemoral pain syndrome: A randomized controlled trial. Journal of Orthopaedics, Trauma and Rehabilitation. 2021:01-07. Available at: https://doi.org/10.1177/2210491721989075.
[10] Saltychev M, Dutton R, Laimi K, Beaupré G, Virolainen P, Fredericson M. Effectiveness of conservative treatment for patellofemoral pain syndrome: A systematic review and meta-analysis. J Rehabil Med [Internet]. 2018;50(5):393-401. Available from: http://dx.doi.org/10.2340/16501977-2295.
[11] Crossley KM, Vicenzino B, Lentzos J, Schache AG, Pandy MG, Ozturk H. Exercise, education, manual-therapy and taping compared to education for patellofemoral pain osteoarthritis: A blinded, randomised clinicaltrial. Osteoarthritis and Cartilage. 2015;23(9):1457-64.
[12] Hu H, Zheng Y, Liu X, Gong D, Chen C, Wang Y, et al. Effects of neuromuscular training on pain intensity and self-reported functionality for patellofemoral pain syndrome in runners: Study protocol for a randomized controlled clinical trial. Trials [Internet]. 2019;20(1):409. Available from: http://dx.doi.org/10.1186/s13063-019-3503-4.
[13] Briffa NK, Mi L, McEvoy D. Development and validation of a tool to evaluate physiotherapists' use of clinical reasoning in musculoskeletal physiotherapy [published correction appears in BMC Med Educ. 2016;16(1):9]. BMC Med Educ. 2015;15:211.
[14] World Health Organization. International Classification of Functioning, Disability and Health (ICF). Geneva, Switzerland: World Health Organization; 2001.
[15] Bolga LA, Boling MC. An update for the conservative management of patellofemoral pain syndrome: A systematic review of the literature from 2000 to 2010. International Journal of Sport Physical Therapy. 2000;6(2):112-15.
[16] Smith BE, Hendrick P, Logan P. Patellofemoral pain: Challenging current practice-A case report. Man Ther [Internet]. 2016;22:216-19. Available from: http://dx.doi.org/10.1016/j.math.2015.09.002.

PARTICULARS OF CONTRIBUTORS:
1. Undergraduate, Department of Physiotherapy, Integral University, Lucknow, Uttar Pradesh, India.
2. Professor, Department of Physiotherapy, Integral University, Lucknow, Uttar Pradesh, India.
3. Associate Professor, Department of Physiotherapy, Integral University, Lucknow, Uttar Pradesh, India.
4. Associate Professor, Department of Physiotherapy, Integral University, Lucknow, Uttar Pradesh, India.
5. Professor, Department of Physiotherapy, Integral University, Lucknow, Uttar Pradesh, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Abdur Raheem Khan,
Professor, Department of Physiotherapy, Integral University, Dasauli,
Lucknow-226026, Uttar Pradesh, India.
E-mail: abdurraheem@iul.ac.in

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jun 30, 2022
- Manual Googling: Feb 28, 2023
- iThenticate Software: Mar 23, 2022 (4%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jun 28, 2022**
Date of Peer Review: **Aug 31, 2022**
Date of Acceptance: **Apr 10, 2023**
Date of Publishing: **Jun 01, 2023**