IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Effectiveness Of Functional Strength Training On Reducing Pain And Improving Functions In Patient With Patellofemoral Pain Syndrome

-A SINGLE CASE STUDY

1**Dr.S Devi, MPT ORTHO, ASSISTANT PROFESSOR**, 2**Prof DR B SENTHIL KUMAR, MPT, MIAP, PH.D, SRP (UK), UCA College of Paramedical Sciences, Chennai**

Abstract: A 25 years old male runner walked in with a complaint of pain over the right knee joint and pain gets extended down to the leg for past 2 weeks. The severity of the pain started increasing during mid half of running. he dint complaint of sleep disturbance due to this pain. He did find some relief in cold packs and application of analgesic, but it was just a short duration of relief. He has been diagnosed to have patellofemoral joint syndrome by performing Clark test and squatting and patient is asked to fill Kujala patellofemoral scale (Anterior knee pain scale). since patient had investigations report it was easy to rule out other pathologies like meniscus tear, arthritis or knee instability conditions. As a treatment protocol patient underwent 6 weeks of functional strength training to get a complete recovery from patellofemoral pain syndrome(PFPS).

KEYWORDS: Patellofemoral pain syndrome, Knee joint, Kujala patellofemoral scale, Functional training

INTRODUCTION

Patellofemoral pain syndrome (PFPS) is a common knee problem, which particularly affects

adolescents and young adults. PFPS, which is characterized by retro patellar (behind the kneecap) or peripatellar (around the kneecap) pain, is often referred to as anterior knee pain. The pain mostly occurs when load is put on the knee extensor mechanism when climbing stairs, squatting, running, cycling or sitting with flexed knees. [13] PFPS is the most prevalent orthopedic condition seen in sports medicine and is a common presenting complaint in adolescents and young adults. PFPS is also the primary diagnosis in about 25% of all running injuries. Treatment for PFPS is especially promising for the short term, but long-term results are much less successful. The total incidence for PFPS ranges from 8.75% to 17%; however, the incidence among females is much greater at 12.7% compared to 1.1% of males. Young females who regularly participate in running and jumping activities may be particularly at risk [14] The aetiology of PFPS is multifaceted; it is present most commonly in adolescents and young adults. Its incidence varies from 10–40%, with higher rates reported in athletic populations.

Evidence does support that in active individuals, patellar mobility, quadriceps muscle activation, and quadriceps muscle tightness are common PFPS precursors. Less clear is the relationship between various lower limb bio-mechanical and neuromuscular factors and PFPS. Recent work has shown that clinical evaluation of patellar orientation has limited reliability. In addition, patellar movement during early knee flexion has also been found to vary significantly when investigated through reliable imaging techniques. [15]

The cardinal feature of PFPS is pain in or around the anterior knee that intensifies when the knee is flexed during weight-bearing activities. The pain of PFPS often worsens with prolonged sitting or descending stairs. The most sensitive physical examination finding is pain with squatting. [16]3 The quadriceps (Q) angle is formed by the Q line of pull from the middle of the patella to the anterior superior iliac spine. It is possible to calculate the degree of force between the Q muscle group and the tendon of the patella in the frontal plane in the extended knee. The average Q angle for men is 14˚ and for women is 17˚; an excess of 15-20˚ in Q angle value is typically considered to contribute to knee extensor dysfunction and patellofemoral pain.[17] the conservative treatment of PFPS, Specific vastus medialis obliques (VMO) and general quadriceps exercises represent the most commonly used intervention. Historically, clinicians have prescribed specific VMO exercises on the premise that a delay and/or reduction in VMO activity relative to the vastus lateralis (VL) contributes to excessive lateral patella tracking. Although selective VMO activation during exercise, general quadriceps strengthening does benefit many patients with PFPS and is considered the "gold" standard treatment.[18]

Excessive hip adduction and internal rotation during weight bearing could cause medial knee rotation, tibia abduction, and foot pronation, leading to dynamic knee valgus. Excessive knee valgus is related to diminished hip muscle strength and is implicated in numerous knee injuries, including anterior cruciate ligament tears and patellofemoral joint dysfunction. The valgus control exercises and conservative treatment of exercises shows improvement in pain, functional outcome in individuals with PFPS.

FUNCTIONAL STRENGTH TRAINING:

Functional strength training is a type of exercise training that focuses on improving strength, coordination,balance, and stability in movements that closely mimic real-life activities or sportspecific tasks. It trains muscles to work together in natural movement patterns rather than in isolation(5)

KUJALA PATELLOFEMORAL PAIN SCALE:

It is a questionnaire that consists of 13 questions where patients were asked to mark according to

the appropriate statement. (14)

CRYOTHERAPY:

cryotherapy is the treatment of pathological lesions by the use of low temperature agents

such as ice, frozen gels packs and vapo coolant sprays.(5)

AIM

To find out the effectiveness of functional strength training on reducing pain and improving function in patients with patellofemoral pain syndrome.

NEED FOR STUDY

 Patellofemoral Pain Syndrome (PFPS) is one of the most prevalent causes of anterior knee pain, particularly among young adults and physically active populations.

 PFPS is characterized by diffuse pain in the front of the knee that typically occurs when the individual ascends and descends stairs, squats, or sits for prolonged periods of time.

 It is often associated with reduced muscle strength, and impaired functional movement, which can lead to persistent symptoms and reduced quality of life if not appropriately managed.

 Growing evidence suggests that addressing functional movement patterns and incorporating multi-joint, task-specific exercises may provide superior outcomes.

 Functional strength training (FST), which emphasizes movement quality, neuromuscular control, and coordination across multiple joints, holds promise in reducing pain and improving function in PFPS patients.

 This study aims to evaluates the effects of a structured functional strength training program on pain and function in individuals with PFPS, providing evidence to inform more effective, movement-based rehabilitation strategies(12)

CASE DESCRIPTION

A 25 years old male runner walked in with a complaint of pain over the right knee joint and pain gets extended down to the leg for past 2 weeks. The severity of the pain started increasing during mid half of running he dint complaint of sleep disturbance due to this pain. No comorbidities. On observation the patients is mesomorphic and presented with the swelling over the anterior aspect of the right knee joint. On palpation Grade 3 tenderness present over the right patellar region. On examination patient complained of end range pain during both flexion and extension of the right knee joint, the patient was asked to perform squatting the pain reproduced which is highly suggestive for PFPS. He has been diagnosed to have patellofemoral joint syndrome by performing Clark test and patient is asked to fill Kujala patellofemoral scale (Anterior knee pain scale). since patient had investigations report it was easy to rule out other pathologies like meniscus tear, arthritis or knee instability conditions. As a treatment protocol patient underwent 6 weeks of functional strength training to get a complete recovery from patellofemoral pain syndrome(PFPS).

OUTCOME MEASURES

 Visual Analog Scale (VAS):

Visual Analog Scale (VAS) is a simple but valuable instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured. It usually is a horizontal line, 100 mm in length, anchored by word descriptors at each end, for example, that represent the severity of symptoms from 0 “no symptoms” to 10 “very severe symptoms.”

 Kujala Patellofemoral Scale:

The Kujala Patellofemoral Pain Scale, also known as the Anterior Knee Pain Scale (AKPS), is a standardized patient-reported questionnaire designed to evaluate symptoms and functional limitations related to patellofemoral disorders. It consists of 13 items covering pain, limp, walking, running, stair climbing, squatting, prolonged sitting, swelling, and muscle atrophy, with a total score of 0–100. higher scores indicate better knee function and less pain, making it useful for clinical evaluation, treatment planning, and pr e/post-rehabilitation comparison.(19)

PROCEDURE

PRE TREATMENT ASSESSMENT:

The subjects were assessed using

OUTCOME MEASURES	SCORES
VAS SCALE (PAIN)	8
KUJALA PATELLOFEMORAL SCALE (FUNCTION)	60

TREATMENT PROTOCOL:

Total Duration : 40minutes

Warm up – 5 minutes

General body mobility exercises

Treatment – 30 minutes

TREATMENT: WEEK 1 AND 2

EXERCISES	SETS AND REPETITIONS
Bridge	□ 3 sets of 15 sec holds □ Exercise progression: increasing 5-second hold
Side lying clamshell	□ 3 sets of 15 repetitions □ Resistance: Medium T-Band □ Exercise progression: increasing 5 counts.
Lateral band walks	□ 3 sets of 15 steps □ Resistance: Medium T-Band □ Exercise progression: increasing 3 step
Monster walks	□ 3 sets of 15 steps □ Resistance: Medium T-Band □ Exercise progression: increasing 3 step
Terminal knee extension	□ 3 sets of 15 repetition □ Resistance: Medium T-Band □ Exercise progression: increasing 5 counts.
Squats	□ 3 sets of 15 repetitions □ Resistance: Medium T-Band over knees □ Exercise progression: increasing 5 counts.

TREATMENT: WEEK 3 AND 4

EXERCISES	SETS AND REPETITIONS
Bridge	□ 4 sets of 15 sec holds □ Exercise progression: increasing 5-second hold
Side lying clamshell	□ 4 sets of 15 repetitions □ Resistance: Medium T-Band □ Exercise progression: increasing 5 counts.
Lateral band walks	□ 4 sets of 15 steps □ Resistance: Medium T-Band □ Exercise progression: increasing 3 step
Monster walks	□ 4 sets of 15 steps □ Resistance: Medium T-Band □ Exercise progression: increasing 3 step
Terminal knee extension	□ 4 sets of 15 repetition □ Resistance: Medium T-Band □ Exercise progression: increasing 5 counts.
Squats	□ 4 sets of 15 repetitions □ Resistance: Medium T-Band over knees □ Exercise progression: increasing 5 counts.

TREATMENT: WEEK 5 AND 6

EXERCISES	SETS AND REPETITIONS
Bridge	□ 3 sets of 20 sec holds □ Exercise progression: increasing 5-second hold
Side lying clamshell	□ 3 sets of 15 repetitions □ Resistance: Heavy T-Band □ Exercise progression: increasing 5 counts.
Lateral band walks	□ 3 sets of 15 steps □ Resistance: Heavy T-Band □ Exercise progression: increasing 3 step
Monster walks	□ 3 sets of 15 steps □ Resistance: Heavy T-Band □ Exercise progression: increasing 3 step
Terminal knee extension	□ 3 sets of 15 repetition □ Resistance: Heavy T-Band □ Exercise progression: increasing 5 counts.
Squats	□ 3 sets of 15 repetitions □ Resistance: Heavy T-Band over knees □ Exercise progression: increasing 5 counts.

Cool down – 5 minutes -Cryotherapy is given

POST TREATMENT ASSESSMENT:

The pain and function is reassessed using the VAS scale and Kujala patellofemoral scale.

OUTCOME MEASURES	SCORES
VAS SCALE (PAIN)	3
KUJALA PATELLOFEMORAL SCALE (FUNCTION)	80

CASE PRESENTATION

Mr. A 25 years male runner diagnosed of PFPS,before the treatment his VAS score was 8, KPFS was 60, after the treatment of valgus control exercises program his VAS score dropped to 4, KPFS increased to 80

DATA PRESENTATION

OUTCOME MEASURES	PRE TEST	POST TEST	DIFFERENCE
VAS	8	3	5
KUJALA PATELLOFEMORAL SCALE	60	80	20

RESULT

On Comparing the VAS SCALE Values before and after treatment,Patient showed a value difference of **'5',** which shows that he has **GOOD** improvement in reduction of pain.

On Comparing the KUJALA SCALE Values before and after treatment,Patient showed a value difference of **'20',** which shows that she has **GOOD** improvement in functional dynamic movements.

CONCLUSION

We conclude that functional strength training has greater impact in **reducing pain** and **improving function** in patients with PFPS. Functional strength training was effective in reducing pain in patients with patellofemoral pain syndrome.. Enhanced hip, core, and knee strength improved movement control and patellar tracking.

Patient showed **better performance** in functional activities such as squatting and stair climbing. Functional strength training is a **safe** and **effective** rehabilitation approach for PFPS.

LIMITATIONS

Single case study

BIBLIOGRAPHY

1. **TEXTBOOK OF ORTHOPAEDICS AND TRAUMATOLOGY –** PATELLOFEMORAL PAIN SYNDROME

2. **ESSENTIALS OF MEDICAL PHYSIOLOGY SEMBULINGAM –** PAIN

3. **ELECTROTHERAPHY SIMPLIFIED –** CRYOTHERAPY

4. **THERAPEUTIC EXERCISES CAROLIN KISHNER –** FUNCTIONAL STRENGTH TRAINING

5. **THERAPEUTIC EXERCISES CAROLIN KISHNER –** STRENGTHNING EXERCISES

6. **PHYSIOPEDIA –** HOP TEST

7. **VALIDATION OF DIGITAL VISUAL ANALOG SCALE PAIN SCORING WITH A TRADITIONAL PAPER BASED VISUAL ANALOG SCALE IN ADULTS –** VAS SCALE

8. **B.D CHAURASIA 2ND VOLUME –** ANATOMY

9. **JOINT STRUCTURE AND FUNCTION CYNTHIA NORKINS –** BIOMECHANICS.

10. JOHN HOPKINS MEDICINE [PATELLLOFEMORAL PAIN SYNDROME]

11. MAYO CLINIC [PATELLLOFEMORAL PAIN SYNDROME]

12. Patellofemoral pain syndrome Petersen, W., Ellermann, A., Gösele-Koppenburg, A. et al. Patellofemoral pain syndrome. Knee Surg Sports Traumatol Arthrosc 22, 2264–2274 (2014).

13. Exercise for treating patellofemoral pain syndrome Rianne A van der HeijdenNienke E LankhorstRobbart van LinschotenSita MA Bierma- ZeinstraMarienke van Middelkoop.

14. Effects of functional strength training on pain, function, and lower extremity biomechanics in patients with patellofemoral pain syndrome: a randomized clinical trial

15. Patellofemoral Pain Syndrome: The Ongoing Challenges in Etiology, Diagnosis, and ManagementVolume 13, Issue23,2001,15pagesDOI:10.1615/CritRevPhysRehabilMed.v13.i2-3.20

5816. **Patellofemoral Pain Syndrome DAVID Y. GAITONDE, MD, ALEX ERICKSEN, MD, AND RACHEL C. ROBBINS, MD Am Fam Physician. 2019;99(2):88-94.**

17. A Systematic Review on Quadriceps Angle in Relation to Knee Abnormalities Rahul Sharma 1, Vikas Vaibhav 2, Raviprakash Meshram 3, Brijendra Singh 1, Gitanjali Khorwal

18. AN UPDATE FOR THE CONSERVATIVE MANAGEMENT OF PATELLOFEMORAL PAIN SYNDROME: A SYSTEMATIC REVIEW OF THE LITERATURE FROM 2000 TO 2010 Lori A Bolgla 1, Michelle C Boling

19. **ZHEYU XIONG1, WEI ZHENG1*, HAIWEN WANG2, YUAN GAO1 AND CHENGSHUO WANG**

Effects of functional strength training on pain, function, and lower extremity biomechanics in patients with patellofemoral pain syndrome: a randomized clinical trial

20. Exercise for treating patellofemoral pain syndrome Rianne A van der HeijdenNienke LankhorstRobbart van LinschotenSita MA Bierma- ZeinstraMarienke van Middelkoop. review talks about Patellofemoral pain syndrome. This review talks about patellofemoral pain syndrome.Incidence and prevalence of patellofemoral pain: A systematic review and meta-analysiS

21. Benjamin E Smith, James Selfe, Damian Thacker, Paul Hendrick, Marcus Bateman, Fiona Moffatt, Michael Skovdal Rathleff, Toby O Smith, Pip Logan PMCID:PMC 5764329 PMID:29324820. This review talks about Incidence and prevalence of patellofemoral pain