University Research Resource Journal
ISSN : 2581-3730
JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR
Volume 6, Issue 2 (April-June, 2023)

The Factors Responsible for Patellofemoral Pain Syndrome

Shalu Rani 1 Research Scholar***, Dr. Manoj Malik 2 , Dr. Varun Singh 3***, Assistant Professor
Department of Physiotherapy, GJUS&T, Hisar, India

Introduction :

The patellofemoral pain (PFP) is the commonest types of pain in knee in persons below the age of 40 years. Knee problems can lead to mild to severe levels of disability. The knee joint is frequently affected by pain in anterior knee (AKP) or patellofemoral pain (PFP), which reduces functional capacity.5 "Patellofemoral pain syndrome is usually defined as pain around the patella that occurs during or after high-loaded knee flexion and extension accompanied by impaired function". 8

Keywords : Anterior knee pain , patellofemoral pain ,patellofemoral pain syndrome ,factors

ANATOMY AND FUNCTION :

The patellofemoral joint, or PFJ, is a complicated joint. It created by the patella and the femoral trochlear groove articulating. PFJ is prone to developed patellofemoral pain syndrome.11 ".Patellofemoral pain syndrome" (PFPS) is the commonest musculoskeletal disease. 1

The largest sesamoid bone in human body is patella, having very thick cartilage. Patella having seven articular surfaces with change in curvature and lengths. On the articulating surface patellar ridge separates the medial and lateral facet. The patella serve as a connection between the tibia and the knee extensor muscles, which include the rectus femoris, vastus medialis obliqus(VMO), vastus intermedialis and vastus lateralis(VL). Through the patellar tendon, the patella helps by transmitting the force of the quadriceps to the tibia.11

During extension of knee, patella are at groove of trochlear with some articular surface contact in the posterior lateral facets. The patella is pulled into groove of trochlear as knee is flexed. The medial facets of patella fixed in the groove of trochlea at around 30° of knee flexion.11

As flexion increase at knee joint flexion at patella is also increased. Initially patella move in the medial direction and then increased lateral tracking and laterally tilting of the patella with increasing knee flexion.11

INCIDENCE AND PREVELANCE :

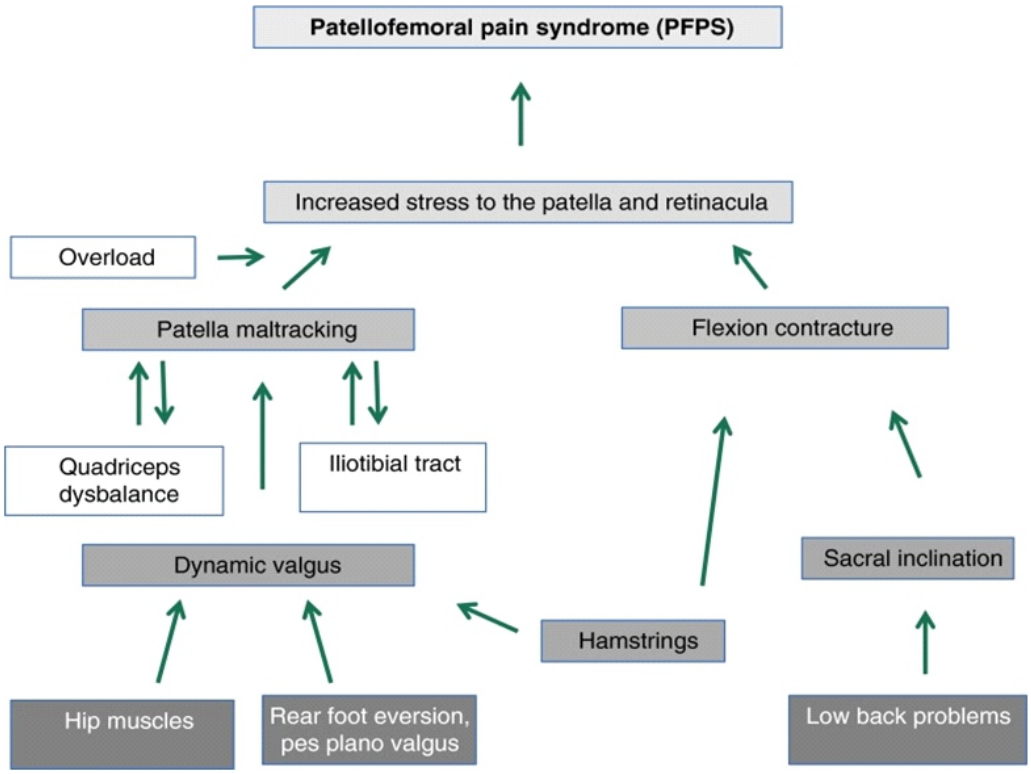
PFPS had an incidence rate of 22/1000 person years. Comparing males and females, PFPS was around two times more common in women. It has been estimated that 25% of men and women who participate in sports activity experience anterior knee pain. Anterior knee discomfort is found to affect 9.7 out of 100 athletes and 1.1 out of 1000 athlete exposure. 9 The patellar malalignment and muscle imbalance may cause PFPS.2

CAUSING FACTORS :

There are several reason that can lead to both patello femoral pain and patellar instability: vastus medialis obliqus (VMO) weakness, medial patella femoral ligament laxity, tightness of lateral

University Research Resource Journal
ISSN : 2581-3730
JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR
Volume 6, Issue 2 (April-June, 2023)

retinaculum, increased quadriceps(Q) angle, hip abductor and lateral rotator weakness, patella upward shifting , and trochlear dysplasia. During assessment of patellofemoral pain, one should assess for all above mention facto. 7



1. The variation in activation of vastus medialis muscle and vastus lateralis muscle may lead to patellar mal position. It will increase lateral force and pressure on lateral facet of the patella. 2 In patellofemoral pain syndrome patients, the vastus lateralis(VL) muscle activated earlier than the vastus medialis obliqus (VMO) muscle during climbed up stairs and down stairs. A lateral patellar tracking could take place due to delayed activation of VMO and the lateral articular surface of the patellofemoral joint may be overloaded resulting in PFPS .1
2. Patellofemoral pain is caused by weak hip abductor and external rotator muscles .When engaging in dynamic weight-bearing exercises, weak hip muscles may result in greater femoral adduction and medial rotation, which could increase the lateral patellofemoral joint vector and result in patellar facet overload. 10
3. PFP syndrome is associated with inflexible hamstrings, due to tightness of hamstring knee joint would not be able to generate sufficient extensor muscle torque . It will lead to excessive pressure and load at the patellofemoral joint(PFJ) . Therefore, one should focus on, to maintain hamstring flexibility in patellofemoral pain .4
4. The medial stability of the patella is provided by medial patellofemoral ligament (MPFL) and it prevent excessive lateralization of patella. As flexion at knee increased, patella move laterally within

University Research Resource Journal
ISSN : 2581-3730
JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR
Volume 6, Issue 2 (April-June, 2023)

the groove of trochlear. The lateral surface of groove of trochlear along with the " medial patellofemoral ligament" limits the lateral translation of the patella.11

5. Iliotibial band provides lateral stabilisation and prevent excessive medial translation of patella. Tightness of Iliotibial band (ITB) cause lateral tracking of patella, lateral patella tilt and more compression on lateral facet of patella.5
6. Lateral retinacular tissues tightness, create lateral pull on the patella. It increased the load in the" patellofemoral joint" or produced stretch in medial retinacular .11
7. The "Quadriceps angle" is formed by a line draw from the centre of patella to tubercle of tibia and the line connecting the anterior superior iliac spine and the patella's centre. It indicate the lateral compression forces on patella. An aberrant lateralization of the tibial tubercle is suggested by a Q angle of more than 14° in males and more than 17° in females.3

References :

1. Cavazzuti L, Merlo A, Orlandi F, Campanini I. Delayed onset of electromyographic activity of vastus medialis obliquus relative to vastus lateralis in subjects with patellofemoral pain syndrome. Gait Posture. 2010 Jul;32(3):290-5. doi: 10.1016/j.gaitpost.2010.06.025. Epub 2010 Aug 19. PMID: 20727760.
2. Chen S, Chang WD, Wu JY, Fong YC. Electromyographic analysis of hip and knee muscles during specific exercise movements in females with patellofemoral pain syndrome: An observational study. Medicine (Baltimore). 2018 Jul;97(28):e11424. doi: 10.1097/MD.0000000000011424. PMID: 29995792; PMCID: PMC6076041.
3. Gulati A, McElrath C, Wadhwa V, Shah JP, Chhabra A. Current clinical, radiological and treatment perspectives of patellofemoral pain syndrome. Br J Radiol. 2018 Jun;91(1086):20170456. doi: 10.1259/bjr.20170456. Epub 2018 Jan 22. PMID: 29303366; PMCID: PMC6223269.
4. Lee JH, Jang KM, Kim E, Rhim HC, Kim HD. Effects of Static and Dynamic Stretching With Strengthening Exercises in Patients With Patellofemoral Pain Who Have Inflexible Hamstrings: A Randomized Controlled Trial. Sports Health. 2021 Jan/Feb;13(1):49-56. doi: 10.1177/1941738120932911. Epub 2020 Aug 13. PMID: 32790575; PMCID: PMC7734366.
5. Leibbrandt DC, Louw Q. The development of an evidence-based clinical checklist for the diagnosis of anterior knee pain. S Afr J Physiother. 2017 Mar 31;73(1):353. doi: 10.4102/sajp.v73i1.353. PMID: 30135903; PMCID: PMC6093140
6. Loudon JK. Biomechanics and pathomechanics of the patellofemoral joint . Int J Sports Phys Ther. 2016 Dec;11(6):820-830. PMID: 27904787; PMCID: PMC5095937.
7. Merchant AC, Fulkerson JP, Leadbetter W. The Diagnosis and Initial Treatment of Patellofemoral Disorders. Am J Orthop (Belle Mead NJ). 2017 Mar/Apr;46(2):68-75. PMID: 28437490.
8. Moyano FR, Valenza MC, Martin LM, Caballero YC, Gonzalez-Jimenez E, Demet GV. Effectiveness of different exercises and stretching physiotherapy on pain and movement in patellofemoral pain syndrome: a randomized controlled trial. Clin Rehabil. 2013 May;27(5):409-17. doi: 10.1177/0269215512459277. Epub 2012 Oct 4. PMID: 23036842.
9. Panken AM, Heymans MW, van Oort L, Verhagen AP. Clinical prognostic factors for patients with anterior knee pain in physical therapy;a systematic review . Int J Sports Phys Ther. 2015 Dec;10(7):929-45. PMID: 26673528; PMCID: PMC4675194.
10. ?ahin M, Ayhan FF, Borman P, Atasoy H. The effect of hip and knee exercises on pain, function, and strength in patientswith patellofemoral pain syndrome: a randomized controlled trial. Turk J Med Sci. 2016 Feb 17;46(2):265-77. doi: 10.3906/sag-1409-66. PMID: 27511483.
11. Wheatley MGA, Rainbow MJ, Clouthier AL. Patellofemoral Mechanics: a Review of Pathomechanics and Research Approaches. Curr Rev Musculoskelet Med. 2020 Jun;13(3):326-337. doi: 10.1007/s12178-020-09626-y. PMID: 32394363; PMCID: PMC7251040.