

PREVALENCE OF PATELLOFEMORAL PAIN SYNDROME IN STATE LEVEL CYCLISTS

Gaurai Gharote¹, Shraddha Mansawale², Ujwal Yeole³, Rasika Panse⁴,
Shweta Kulkarni⁵, Pournima Pawar⁶
1, 4, 5, 6; Assistant professor, 3: Principal; 2 final yr. student;
Dept. of Physiotherapy; Tilak Maharashtra Vidyapeeth Pune.
Corresponding Author: Dr. Gaurai Gharote
Assistant Professor;
Dept. of Physiotherapy; Tilak Maharashtra Vidyapeeth Pune.
Contact No: 9922091649
Email id-gaurai.gharote@gmail.com

Abstract:-

Background: State level cyclists are engaged in activities where they have to do repetitive knee flexion/extension results in peri-patellar pain. During cycling, the force generated by quadriceps muscle contraction during the down stroke (knee extension) is translated to the patellofemoral joint. The reaction force is thought to injure the peri-patellar structures, resulting in injury.

Aim and Objectives: To find the prevalence of patellofemoral pain in state level cyclists. **Methodology:** 50 state level cyclists with knee pain since 6 months were assessed.

Apprehension test for lateral patellar instability was performed & Kujala score questionnaire was also noted of the people having knee pain to check the score of pain and instability. **Results:** Mean age was \pm 25.26 years. Apprehension test was positive in 21 cyclists (42%) and negative in 29 cyclists (58%). According to Kujala score questionnaire the mean score was 85.84 for knee disability. The patellofemoral pain syndrome was affected in unilateral dominant 14%; non-dominant 6% and bilateral knees were more affected in 22% cyclists. **Conclusion:** There is 42% prevalence of patellofemoral

pain syndrome in state level cyclists.

Keywords: Patellofemoral pain syndrome, state level cyclists, apprehension test, kujala pain scale.

Introduction: Patellofemoral pain syndrome is a clinical syndrome that has been defined as pain originating from the structures of the patellofemoral joint, caused by an abnormality in the biomechanics of the patellofemoral complex.¹The pain might be caused by degeneration of hyaline cartilage, that causes changes in the energy absorption and then transfers excessive loads to the subchondral bone.²The most important clinical sign of diagnosis is patellar tenderness. Compression of the patella often results in pain on the ventral aspect of the patella.³, ⁴PFPS is an early indication of cartilage softening that can progress to cartilaginous damage. Abnormal 'tracking' of the patella can result in uneven wear on the back of the patella associated with increased pain under the knee and a grating sensation.

The most common cause for chronic anterior knee pain in cyclists is patellofemoral pain syndrome (PFPS). This is a condition where repetitive flexion/extension of the knee results in peri-patellar pain. As the knee flexes and extends the patella glides between the grooves created by the condyles at the distal end of the femur. There are therefore a variety of factors which can result in movement

of the patella or 'mal-tracking' and ultimately result in pain. These include muscle length, control and strength. During the pedal cycle, the knee goes through approximately 80 degrees of motion. The knee begins the power phase flexed at about 110 degrees and extends to about 30 degrees of flexion. The quadriceps provides most of the force but there is also input from the hamstrings and gluteals. During a concentric contraction of the quadriceps there are increased compressive forces around the PFJ. These forces can be further increased by poor saddle or cleat positioning, cycling in high gears, hill climbing and a too slow cadence. The force generated by quadriceps muscle contraction during the down stroke (knee extension) is translated to the patellofemoral joint. This patellofemoral joint reaction force is thought to injure the peri-patellar structures, resulting in injury. The site of patellofemoral pain in cyclists is reported more frequently in the superior, superomedial, and retropatellar areas of the patella.², ⁵, ⁶, ⁷, ⁸ During palpation, of the patella in cyclists it is mostly tender in the superior or superomedial aspect of the patella.³, ⁴The onset of pain varies with the severity of this condition. It can present as pain only after cycling (grade I), pain during cycling (grades II and III) and less frequently, severe pain that prevents the cyclist from training (grade IV).³

Biomechanical malalignment can also

contribute to cycling injuries by causing patellofemoral tracking problems. If measurement of Qangle is more than 20° is considered abnormal and is usually associated with external or internal tibial torsion or genu valgum or varum. Pronation of the foot or hindfoot valgum also contributes to this malalignment. Patellofemoral pain syndrome commonly develops on the lateral aspect of the patella, suggesting that frontal plane loads may play a large role in the development of patellofemoral pain syndrome. The abnormal patellar mal-tracking, has been shown to be a contributing factor to this pathology.^{9, 10} A mechanism hypothesized to cause patellar mal-tracking is an imbalance in the temporal component of the muscle activity of the vastus medialis relative to the vastus lateralis¹¹ and an imbalance in the temporal component of the muscle activity of the semitendinosus relative to the biceps femoris¹².

Methodology: Initially the synopsis was submitted to the institute and was approved by the institute and ethical committee. It was prevalence based study. The sample size constituted of 50 state level cyclists (32 males, 18 females) aged 15-40 years. Inclusion criteria were both male & female cyclists involve in state level cycling and having anterior knee pain since six months were considered. Cyclists with previous trauma to the knee, biomechanical abnormalities (genu valgum, patellar alta, etc.) and post knee

surgical cases were excluded. All subjects were explained about the research and informed consent was signed by them. All were explained the procedure of the physical diagnostic test and questionnaire. The cyclists fitting in the inclusion criteria were evaluated by the physical diagnostic test i.e. apprehension test (specificity-88.4%)¹³ was performed to confirm the PFPS. The Kujala Pain Questionnaire¹⁴ that only assessed the severity of the pain and wasn't a diagnostic criteria [reliability (inter-class coefficient=0.986) and validity ($\alpha=0.136$, $P=0.284$)].¹⁴ In kujala questionnaire the cyclists were interviewed by asking 13 questions about activities that aggravated pain or symptoms that are said to causes PFPS like swelling, crepitus, squatting, limping, abnormal patellar movement. After the data collection procedure all data was statistically analyzed.

Results: From the table no. 1, it shows that there were about 6 cyclists in 15 to 20 age group, 17 cyclists in 21 to 25 age group, 25 cyclists in 26 to 30 age group and 2 cyclists in 31 to 35 age group. The mean age of cyclists was 25.26. From the graph no. 1, it shows that Apprehension test was positive in 21 cyclists (42%) and negative in 29 cyclists (58%). From the graph no. 2, a result shows that, out of 32 males 19 were positive for patellofemoral pain syndrome and from 18 females 8 were positive.

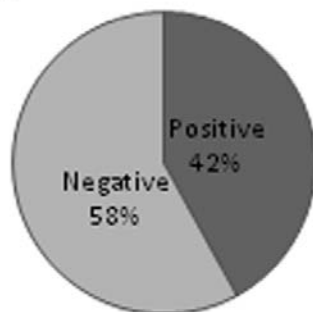
From the table no. 2, the Kujala Pain Scale showed 5 cyclists with excellent results, 13 with good results, 18 with fair results and 14 with poor results. The cyclists varied in their intensity of pain but still carried out their cycling. This shows that severe symptoms indicative of surgery for PFPS were not present in the cyclists. The mean of Kujala Pain Scale was 85.84.

Table No. 1: Age wise distribution of cyclists.

Age	Girls	Boys	Total
15 to 20	2	4	6
21 to 25	8	9	17
26 to 30	8	17	25
31 to 35	0	2	2
TOTAL	18	32	50

Graph No. 1: Apprehension test in cyclists with anterior knee pain.

Apprehension Test



Graph No. 2: Gender wise PFPS affection in cyclists.

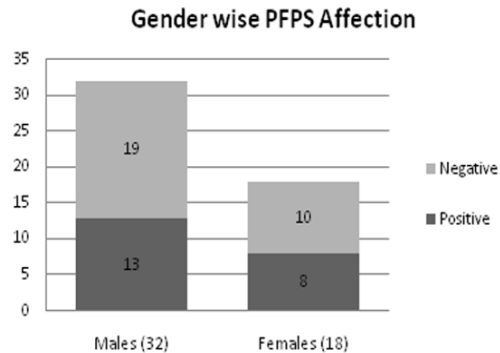


Table No. 2: Kujala pain scale interpretation.

Excellent results (90-100)	20 (40%)
Good results (80-89)	17 (34%)
Fair results (60-79)	13 (26%)
Poor results (less than 60)	0

Discussion: The result shows that the prevalence of patellofemoral pain syndrome in state level cyclists is 42% which was confirmed through the Apprehension test. On investigations out of 32 males cyclists, 13 males were diagnosed with PFPS while out of 18 female cyclists, 8 females were diagnosed with PFPS on apprehension test. The patellofemoral pain syndrome was affected in unilateral dominant 14%; non-dominant 6% and bilateral knees were more affected in 22% cyclists. The kujala questionnaire or

anterior knee pain scale that assess the quality of pain revealed that 26% of cyclists reported with fair results, 34% with good results and 40% with excellent results which shows in spite of the pain the cyclists carried out their cycling. The result showed fair to good results in males and fair results in female cyclists. Few previous studies till date has been conducted showing such variations on the pain through the test and the assessing it through the scale. This draws us to psychological variations about pain in the cyclists and also stated that the cyclists carried out the sport in spite of the pain.

Margaret M. Baker et al supported that Patellofemoral pain syndrome (PFS) is one of the most common joint complaints among young female athletes and more common in females in the age range of 16-26 years and is more often found in athletes. David D. Cosca at al state that physical examination may reveal patellofemoral malalignment, tenderness at the patellofemoral facets, pain on patellofemoral compression test, crepitus on active extension, and a positive "J" sign. As with most over-use injuries, modification of the training schedule is useful.¹⁵ Cyclists may need to adjust their saddle height, cycling position, or pedal/cleat system. Nisell and Ekholm mention in ergometric cycling, the maximum knee flexion load moment is significantly increased by a work-load increase or by a saddle height

decrease. Different pedaling rates or foot positions do not significantly affect the magnitude of the maximum knee flexion load moment.¹⁶ Pedal contact is the relationship of the pedal to the rider's lower extremity. According to Leadbetter and Schneider, patellofemoral contact is maximum at 90° of flexion and decreases as the knee extends. When this finding is applied to the range of motion of the knee in cycling and to the greater pressures exerted across this articulation with the 628 Canadian forces involved in cycling. The rule of the road for many cyclists has come to be, "if the knees hurt, gear down"; the cyclist is likely in too high a gear for the terrain and his or her ability. A high gear means a slower spin and therefore a longer period of increased compressive forces on the patellofemoral articulation.¹¹ Saddle height and foot position can also contribute to cycling injuries. Backward saddle positions increases tibiofemoral anterior shear force, these compressive forces are more sensitive to knee flexion angles and increased patellofemoral knee pain. Knee flexion angle appears to be sensitive to changes in saddle height, low saddle height produces significantly higher knee flexion angle. Due to changes in muscle activation and potential reduction in lateral patellar tracking, increases pronation of the foot leads to increased tibial rotation and increased values forces at the knee.

Conclusion:

According to the present study it was thus found that Patellofemoral Pain Syndrome is prevalent in cyclists with already existing knee pain that Patellofemoral Pain Syndrome is more common in adolescent and adult age group.

Limitations:

Limited sample size.

Limited experimental studies comparing cyclists with and without knee pain.

Studies containing data on cyclists with knee pain but limited research regarding preventative measures in those without knee pain.

Future Scope:

Pre-rehabilitative measures could be assessed with the prevalence of PFPS. Training years could be taken into consideration for Rehabilitation.

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