



Effectiveness Of Gait Retraining Along With Muscle Strengthening Exercise On Subjects With Patellofemoral Pain Syndrome For College Athletes: An Observational Study

AUTHORS:

Author: Dr. Arun B¹, Shanmuga Adhithiya², DR. Lokesh R³

¹Assistant Professor, Adhiparasakthi College of Physiotherapy, Melmaruvathur, Tamil Nadu, India

²BPT Internee, Adhiparasakthi College of Physiotherapy, Melmaruvathur, Tamil Nadu, India

³Associate Professor and Research & Development Coordinator, Adhiparasakthi College of Physiotherapy, Melmaruvathur, Tamil Nadu, India

ABSTRACT:

BACKGROUND OF THE STUDY: Patellofemoral pain syndrome (PFPS) is common Musculoskeletal impairment. It is a knee condition that causes pain at the front of the knee, around or behind the kneecap (patella). Patellofemoral pain syndrome (PFPS) is a prevalent condition among young athletes, often resulting in pain, reduced performance and potential long term disability if not properly addressed. This study investigates the effectiveness of gait retraining along with muscle strengthening exercise for college going athletes.

OBJECTIVE: The purpose of the study is to evaluate the effectiveness of gait retraining along with strengthening exercise on subject with patellofemoral pain syndrome for college athletes. To determine the pre-test and post-test level to reduce the symptoms and increase the functional score.

METHODOLOGY: The observational study was conducted on 30 college going athletes with patellofemoral pain syndrome in age of 18-25. Gait retraining and Muscle strengthening exercise are given to the participants from six weeks, for four sessions per week. An assessment for outcome measures by Knee Outcome Survey Of Daily Living Scale (KOS-ADLS) and Visual Analog Scale (VAS) was done prior to starting of the treatment and after six weeks of intervention.

RESULT: As the statistical analysis of this study shows the patients who received gait retraining along with strengthening exercise had highly significant improvement in reducing the pain and functional activities among the college athletes.

CONCLUSION: This study concluded that the gait retraining along with muscle strengthening exercise Shows a significant impact on reducing pain and improve functional abilities among the college athletes.

KEYWORDS: Patellofemoral pain syndrome, college athletes, Gait retraining, Muscle Strengthening exercise, KOS-ADLS, VAS Scale.

INTRODUCTION:

Patellofemoral pain syndrome commonly referred to as runner's knee or anterior knee pain is a common condition characterized by pain in the front of the knee. It primarily affects the area where the patella glides along the groove of the femur (thigh bone). PFPS often occurs during physical activities that involve repetitive knee movements, such as running, jumping, squatting, or climbing stairs.⁽¹⁾

Patellofemoral pain syndrome is characterized by discomforting pain experienced in the area surrounding or behind the patella (kneecap) and is worsened by engaging in activities that apply pressure to the patella while bearing weight on a bent knee.⁽²⁾

It is estimated that approximately 1.75 million patients, or roughly 6%, experienced PFPS. 55% of the reported cases were found in women. The South region had the highest proportion of cases at 42%, while the Northeast region had the lowest at 14% following 1,319 physically healthy and active young adults with no prior PFPS history; it was found that 3% developed PFPS over a period of 2.5 years. Additionally, women were more prone to developing the condition compared to men. There is 68% Prevalence of Anterior Knee Pain (AKP) in Marathon runners in the age group of 15 to 30 years .⁽¹⁾

Patellofemoral pain (PFP) is one of the most common lower extremity injuries in recreational athletes. It has been reported that over one-third of runners will experience chronic knee pain. Additionally, having PFP as a young adult can serve as a risk factor for knee arthritis later in life. PFP often presents itself without any further radiologic or other imaging features. Appropriately, PFP has been described as “one of the most vexatious clinical challenges in rehabilitative medicine” .⁽¹⁾

Physical therapy is the mainstay treatment for PFP. This typically involves exercise in various forms, bracing, taping, foot orthotics, and a gradual return to sport. However, there are instances when this approach does not successfully resolve symptoms, especially once an athlete begins to increase their running volume or activity. The return of symptoms generates frustration for both the athlete and physician . Emerging evidence suggests gait retraining provides an effective intervention in the management of PFP. The biomechanical etiology of PFP is multifactorial in nature. However, one important underlying factor is the magnitude of patellofemoral joint stress. Running is a common activity in over ground sports and has been the primary sport in which PFP and gait retraining have been studied. It has been reported that runners with PFP exhibit greater peak patellar stress compared with healthy runners. Elevated patellofemoral joint stress may be due to higher patellofemoral joint forces which can result from higher ground reaction forces. These increased stresses may also be the result of altered hip and knee kinematics which can, in turn, reduce the patellofemoral joint contact area. Some of the abnormal movement patterns that have been associated with PFP include increased hip adduction, internal rotation, and contra lateral pelvic drop. Thus, interventions may aim to either alter these movement patterns or reduce ground reaction forces during running to reduce patellofemoral joint stress.⁽¹⁾

Patients with PFPS usually exhibit a significant weakness of the lateral trunk flexors as well as the hip abductor, lateral rotator muscles and the knee extensors. Exercise programs based on strengthening the quadriceps and gluteal muscles have been shown to decrease pain and improve motor function and lower movement patterns.⁽¹⁾

OBJECTIVE OF THE STUDY:

The purpose of the study is to evaluate the effectiveness of gait retraining along with strengthening exercise on subjects with patellofemoral pain syndrome for college athletes.

To determine the pre-test and post-test level to reduce the symptoms and increase the functional score.

LITERATURE REVIEW:

Raju, Aiswarya MPT et.al., (2024) Effects of hip abductor with external rotator strengthening versus proprioceptive training on pain and functions in patients with patellofemoral pain syndrome.

Davis IS et.al., (2020) Gait Retraining as an Intervention for Patellofemoral

Pain. Esculier JF et.al., (2018) Is combining gait retraining or an exercise programme with education better than education alone in treating runners with patellofemoral pain? A randomized clinical trial.

Hussain, G et.al., (2023). Prevalence of Patellofemoral Pain Syndrome and Its association with Knee Stiffness in Sanitary Workers: Prevalence of Patellofemoral Pain Syndrome.

Liao T-C et.al., (2018) Runners with patellofemoral pain exhibit greater peak patella cartilage stress compared with pain-free runners. This paper concludes that elevated peak cartilage stress is seen in individuals with patellofemoral pain compared with pain-free individuals. Therefore, reducing this stress may lead to reduced pain.

MATERIALS AND METHODS:

The observational study was conducted on 30 college going athletes with patellofemoral pain syndrome in age of 18-25 years based on inclusion and exclusion criteria. The methodology was explained to subjects and informed consent was obtained. The subject receives gait retraining and muscle strengthening exercise. The duration of this protocol will be for 6 weeks for 4 sessions per week. An assessment for outcome measure by KOS-ADL and VAS was done prior to starting of the treatment and after six weeks of intervention.

GAIT RETRAINING:

Transition from a rear foot strike pattern to a forefoot strike pattern:

- Transition to a forefoot strike pattern shifts some of demand of the knee extensors to the plantar flexors, effectively reducing in patellofemoral joint stress. This transfer can also eliminate the impact transient of the vertical ground reaction force, thereby reducing the vertical load rate.
- Runners receives both verbal and visual (via mirror feedback) over the course of 18 retraining sessions.
- Participants had a 10 minutes treadmill session with physiotherapist feedback of every visit.⁽³⁾

Adopting a more forward trunk lean:

- Adopting a forward trunk lean during running may also be a viable retraining strategy to reduce patellofemoral joint loads in individual with patellofemoral pain syndrome.
- This was done by providing faded verbal cueing over 18 sessions.
- Participants have a 10 minutes treadmill session with physiotherapist feedback at every visit.⁽³⁾

STRENGTHENING EXERCISES:

Side lying abduction:

- Side lying with the bottom hip and knee flexed for stability.
- Lift the top leg into abduction keeping the hip neutral to rotation and in slight extension.
- Do not allow the hip to flex or the trunk to roll backward.
- Add ankle weight to provide resistance as the strength improves.⁽⁶⁾

Clam shell exercise:

- Patient in side lying.
- Lower extremities partially flexed at the hip and knee and the heel of the top leg rest on the heel of the bottom leg.
- The patient lifts the knee of the top leg, keeping the heel together.
- Add resistance by placing an elastic resistance band around the distal thigh of the both legs.⁽⁶⁾

Bridging:

- Begin in the hook lying position.
- Have the patient to press the back and feet into the couch, elevate the pelvis and extend the hips.
- This strengthening the hip extensors in coordination with the trunk stabilize.⁽⁶⁾

Wall slide:

- Standing and the back against a wall with feet forward and shoulder width apart.
- Have the patient slide the back down the wall by flexing the hips and knee and slide up the wall by extending the hips and knees.
- This strengthening the hip and knee extensors eccentrically and concentrically.
- If sliding the back directly against the wall causes excessive friction, place a towel behind the patient’s back.⁽⁶⁾

Partial squat/Mini squat:

- In bilateral stance, have the patient lower the body by flexing the hip and knee as if sitting on the chair.
- Apply elastic resistance around the thigh, while abducting and externally rotating the thighs against the resistance, have the patient perform partial squats to coordinate strengthening of the gluteus maximus, medius and external rotators.⁽⁶⁾

FINDING AND ANALYSIS:

KNEE OUTCOME SURVEY ACTIVITIES OF DAILY LIVING:

Pre Test:

Mean Value:56.3000

P value:3.81603

t value:-70.81

Post Test:

Mean value:76.5000

P value:3.36052

t value:-70.81

VISUAL ANALOG SCALE:

Pre Test:

Mean value:4.633

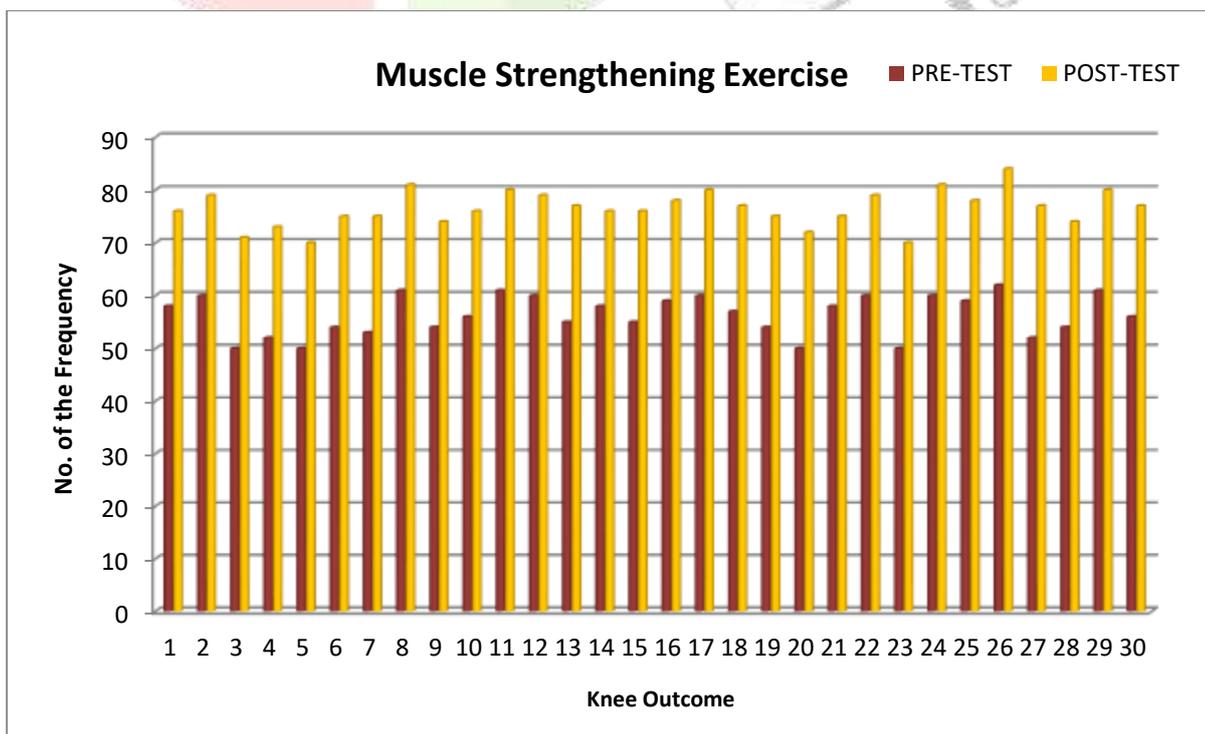
P value:0.718

Post Test:

Mean value:2.633

P value:0.718

The correlation and t cannot be computed because the standard error of the difference is 0.



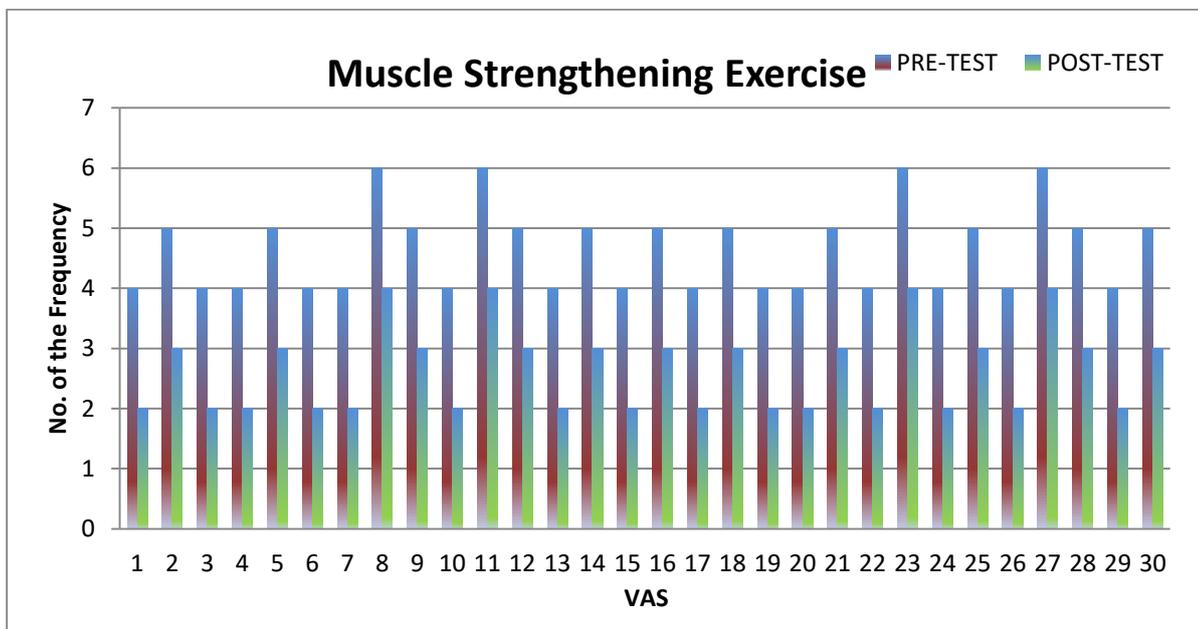


Figure: Post test analysis

DISCUSSION:

- Physical therapy is the mainstay treatment for PFP. This typically involves exercise in various forms, bracing, taping, foot orthotics, and a gradual return to sport. However, there are instances when this approach does not successfully resolve symptoms, especially once an athlete begins to increase their running volume or activity. The return of symptoms generates frustration for both the athlete and physician.
- Davis IS et al., Studied that immediate effect of Movement retraining in rehabilitation is the process by which a motor program is changed with the overall goal of reducing pain or injury risk. Movement retraining is an important component of interventions to address patellofemoral pain.
- Snyder KR et al., Studied that immediate effect of Resistance training is accompanied by increases in hip strength and changes in lower extremity biomechanics during running

RECOMMENDATIONS:

- This study was very short term study and therefore to make the results more valid, a long-term study should be done.
- This study has been done with a smaller sample and hence further studies should be conducted with a large scale.
- The present study is performed with Gait retraining and Muscle strengthening exercise in reducing pain and improve the functional ability of athletes with patellofemoral pain syndrome. In the future, techniques and incorporate education on biomechanics, posture, and injury prevention to improve adherence and awareness.
- This study should be analyzed using various other scales like Anterior Knee Pain Scale, Kujala Patellofemoral Scale, Numerical Pain Rating Scale etc.,
- This study may not be long enough to observe significant long-term effects and changes in biomechanics and it should be investigated further.
- Compare gait retraining combined with muscle strengthening to isolated interventions or traditional physical therapy.

CONCLUSION:

- This study concluded that the gait retraining along with muscle strengthening exercise Shows a significant impact on reducing pain and improve functional abilities among the college athletes.
- The findings of this study suggest that a combined approach of gait retraining and muscle strengthening exercises is effective in managing patellofemoral pain syndrome (PFPS) among college athletes

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