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Review Article

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Recent Advances in Physiotherapy Intervention on Patellofemoral Pain Syndrome - A Systemic Review

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Abstract

Background: Patellofemoral Pain Syndrome (PFPS) is a prevalent knee condition characterized by anterior or retro patellar pain, often triggered by activities like climbing stairs, squatting, or prolonged sitting. It arises from multifactorial causes, including malalignment, muscular imbalances, and biomechanical abnormalities. Recent physiotherapy advancements aim to enhance pain management, muscle function, and knee stability, emphasizing patient-centered approaches.

Methodology: Eligible studies included randomized controlled trials (RCTs), cohort studies, and case series focusing on patients with PFPS. Data extraction encompassed patient demographics, intervention protocols, and outcome measures, including the Visual Analog Scale (VAS) and Anterior Knee Pain Scale (AKPS).

Results: The review synthesized findings from 10 RCTs with 1,472 participants. Neuromuscular training, kinesiology taping, high-intensity laser therapy, and patient education were identified as effective short-term interventions. Combined therapies demonstrated superior outcomes in pain reduction, functional improvement, and muscle strength compared to isolated approaches. However, variations in follow-up durations and small sample sizes limited insights into long-term efficacy.

Conclusion: This review highlights the need for a multifaceted, individualized treatment approach for PFPS. Neuromuscular stimulation, targeted exercise, and patient education emerged as effective strategies for pain management and functional recovery. Future research should focus on long-term outcomes and the integration of patient-specific biomechanics into treatment protocols.

Keywords: Patellofemoral Pain Syndrome, physiotherapy, neuromuscular training, kinesiology taping, knee pain, systematic review

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1. Introduction

Patellofemoral pain syndrome (PFPS) is a prevalent condition that affects 15% of people of all ages. (1)Anterior Knee Pain, or patellofemoral pain syndrome (PFPS), is a common cause of persistent recurrent knee discomfort. (2) Causes of PFPS are usually complicated patellofemoral malalignment and mal tracking (patho mechanics) result in PFPS (2) the main reasons may be as follows: the different activation rates of medial femoral muscle and lateral femoral muscle, especially at the end of knee extension; abnormal Q-angle, which is more common in women, weakness of the gluteal muscle, especially in the middle gluteal muscle, which leads to

decreased abduction and rotation of the hip joint during exercise and femoral anteversion or tibial torsion.(1)

The four major contributing factors for patellofemoral pain syndromes: malalignment of the lower extremity and/or patella, muscular imbalance of the lower extremity, overactivity/overload, and trauma.(2)

PFPS is also referred to as anterior knee pain since it is characterized by retro patellar (behind the kneecap) or peripatellar (around the kneecap) pain. The majority of the time, the pain is felt when the knee extensor mechanism is under stress, as in the case of jogging,

cycling, squatting, climbing stairs, or sitting with the knees bent. (3)

The multifactorial nature of patellofemoral pain syndrome (PFPS) appears to be the consequence of intricate interactions between intrinsic anatomical variables and extrinsic training factors.(4) One of the contributing cause that has been identified is the decreased hip muscular strength.(5)

The most probable causes are frequently linked to biomechanical abnormalities, which are due to lack of dynamic stability in the trunk and lower limbs when doing weight-bearing exercises including climbing stairs, leaping, and squatting. (6)

Patients with Patellofemoral pain syndrome usually exhibit a significant weakness of the lateral trunk flexors as well as the weak hip abductor, lateral rotator muscles, and knee extensors These patients do not have normal control of lower limb movements and exhibit deficient neuromuscular parameters, such as the activation time and electromyographic activity of the hip muscles, It is also known that abnormalities of lower limb movement patterns during weight-bearing activities can directly affect referred pain. (6)

2. Discussion

A systematic review that included 10 randomized controlled trials (RCTs) and a total of 1,472 patients with Patellofemoral Pain Syndrome (PFPS) persisting for more than six weeks provided comprehensive insights into various therapeutic interventions. All treatments were found to be superior to a wait-and-see approach in terms of the primary outcome—any improvement—measured at 3 months. Patient education combined with physical therapy interventions appeared to be the most effective in the short term. After 12 months, education alone, education combined with additional exercises, orthotic interventions, or patellar-specific treatments resulted in similar improvement rates. However, no studies included a wait-and-see group for any improvement at the 12-month mark, which limited comparisons regarding its longer-term effectiveness. For the secondary outcome, pain intensity during the previous week, no treatment demonstrated superiority over the wait-and-see approach

The systematic review on Patellofemoral Pain Syndrome (PFPS) utilized several databases, including MEDLINE, PubMed, and ResearchGate, to search for relevant studies. The review focused on studies published between 2014 and 2024, specifically selecting English full-text articles from peer-reviewed journals. Eligible study designs included randomized controlled trials (RCTs), cohort studies, and case series, ensuring a comprehensive evaluation of recent advances in the treatment of PFPS.

This systematic review highlights the efficacy of combining patient education with physical therapy in the short term, while showing that several approaches have similar effectiveness over longer durations. However, the absence of longer-term wait-and-see comparisons suggests further investigation is needed to determine the sustained effects of interventions versus non-intervention over time.

Traditional methods for treating patellofemoral pain syndrome (PFPS) include a range of conservative approaches. Rest and activity modification are typically advised, with patients encouraged to avoid pain-inducing activities. Ice and heat therapy are commonly applied to manage inflammation and promote muscle relaxation. Pain medication, such as nonsteroidal anti-inflammatory drugs (NSAIDs), is frequently used for pain relief and reducing inflammation. Orthotics, including prescribed shoe inserts, help in correcting foot mechanics. Basic strengthening exercises often focus on simple quadriceps training.

Recent advanced physiotherapy treatments for PFPS have expanded to include a more comprehensive approach. Biomechanical assessments evaluate gait, muscle balance, and movement patterns, providing a detailed understanding of underlying issues. Targeted strengthening and conditioning exercises emphasize the quadriceps, hip abductors, external rotators, and core muscles to improve stability and function. Neuromuscular training enhances muscle coordination and joint stability, while manual therapy, such as myofascial release, patellar mobilizations, and soft tissue manipulation, addresses specific dysfunctions. Patellar taping and bracing techniques are employed to correct patellar tracking and alleviate pain. Movement retraining focuses on teaching proper movement patterns to reduce knee stress, while kinesiology taping supports the knee, improves circulation, and diminishes pain. Functional and sport-specific training prepares patients for a safe return to activities, and biofeedback and technology-assisted therapy, such as virtual reality, enhance exercise performance. Patient education and self-management strategies play a vital role in helping individuals understand their condition and adhere to rehabilitation programs.

The articles reviewed highlight several strengths and weaknesses in the approaches to treating Patellofemoral Pain Syndrome (PFPS). Among the strengths, some studies showcased comprehensive treatment strategies that effectively combined neuromuscular and somatosensory training with exercise therapy, leading to notable pain reduction and functional improvement (1,12). Innovative methods were also explored, such as the evaluation of taping techniques, where McConnell taping demonstrated superior outcomes in terms of pain relief and gait improvement (9,8).

Additionally, high-intensity laser therapy (HILT) emerged as a promising non-invasive modality for managing pain and promoting tissue healing, highlighting its potential as part of a holistic treatment plan (14). Collectively, these approaches underscore the importance of integrating various modalities to address the multifactorial nature of PFPS.

Despite these advancements, several limitations were identified. Certain methods, such as Kinesio taping, showed inconsistent results, potentially due to variations in patient populations and study designs (9).

Table 1. Type of study, Participants Details and study result

Sr.no	Year & type of study Participants details	Treatment interventions & outcome measures	Results
01	<p>2019 Randomized controlled trial (1) INCLUSION CRITERIA: (1) aged 20–50 years; (2) running more than half a year and pain lasting longer than one month; (3) anterior or retro patellar knee pain from at least two of the following: prolonged sitting; climbing stairs; squatting; running; kneeling; and hopping/jumping.</p> <p>EXCLUSION CRITERIA: (1) meniscus injury; (2) laxity of articular ligament; (3) pressure pain on the tibial tract, the goose foot tendon, and patellar ligament; (4) effusion of knee joint; (5) history of patellar dislocation</p>	<p>The neuromuscular training group will undergo muscle strength, balance, and knee joint proprioception training, with "Y" and "I" taping applied three times weekly for three months. The health education group will receive weekly lectures for three months.</p> <p>Outcome measures: VAS, AKPS (the Anterior Knee Pain Scale Index)</p>	<p>Compared with health education and taping, neuromuscular training exercise could provide more beneficial effects on alleviating the pain, ameliorating knee function, and improving the PFPS patients' quality of life</p>
02	<p>2024 Single blinded randomized controlled clinical trial (7) INCLUSION CRITERIA : experiencing pain or exacerbation of pain during activities such as running, jumping, stair climbing, squatting, kneeling, etc; in 2 or more of the mentioned activities; positive results in the patellar tilt test, patellofemoral joint grinding test, resisted knee extension test, patellofemoral joint tenderness test</p> <p>EXCLUSION CRITERIA current use of non-steroidal anti-inflammatory drugs such as cortisone; other knee joint lesions or articular bone injuries; knee joint injury or surgery in the past 3 month</p>	<p>Control group : The control group underwent routine functional training, including warm-up activities, strength training, balance training, and relaxation exercises. Experimental group: Which included functional training along with neuromuscular electrical stimulation were performed for 45 minutes per session, 3 days per week for 6 weeks</p> <p>Outcome measures: VAS & kujala Rating scale</p>	<p>Functional training and NMES combined with functional training are helpful to improve pain, knee function and muscle recruitment of PFPS patients. NMES combined with functional training was more effective compared to the control group.</p>
03	<p>2022 Randomized controlled trial (8) INCLUSION CRITERIA :</p> <p>The inclusion criteria were as follows: (1) a person who experienced anterior knee pain at least once within the last three months in two or more movements during prolonged sitting, stair walking, squatting, running, kneeling, and jumping [18]; (2) unilateral PFPS; (3) voluntary participation</p> <p>EXCLUSION CRITERIA (1) history of subluxation or dislocation of the patella; (2) lower extremity (LE) surgery within the last year; (3) sensory or motor paralysis due to neurological damage; (4) a score of 80 or higher on the anterior knee pain scale</p>	<p>Randomly assigned 26 patients to either the McConnell or the Kinesio taping groups. We measured their knee pain and gait parameters during stair ambulation before and after the interventions.</p> <p>Outcome measures : AKPS scale</p>	<p>The McConnell and Kinesio tapings were effective in improving knee pain and gait parameters during ambulation in patients with PFPS, but we found that the McConnell taping had a significant impact on pain reduction during stair ambulation, resulting in further improvement in the gait variables.</p>
04	<p>2020 Double blind , randomized , controlled pilot study (9) experiencing pain or exacerbation of pain during activities such as running, jumping, stair climbing, squatting, kneeling.</p>	<p>Using KT® for patellar medialization (KT-PM), using KT® (KT-LRFT), and the control group (CG). All groups underwent the same muscle strengthening and motor control procedures for 12 weeks.</p>	<p>There were clinically significant differences between the KT-LRFT and the CG in terms of AKPS and NPRS scores during effort at the 6-week and 12-week follow-ups. All groups (within group) showed a significant improvement in pain and function</p>

05	<p>2023 Randomized controlled trial(10) INCLUSION CRITERIA:</p> <p>If the patients presented anterior knee pain with a catching or click around the patella during knee flexion-extension, they were considered to have abnormal tracking of the patella.</p> <p>EXCLUSION CRITERIA :</p> <p>(1) history of trauma around the knee joint, knee surgery, knee osteoarthritis or chondromalacia (3) KT-related allergic reaction on skin</p>	<p>Twenty patients (27.5 ± 5.4 years) with PFPS who applied KT and 19 patients (27.3 ± 7.4 years) who did not were included in this study. Quadriceps muscle strength and acceleration time (AT) were assessed using an isokinetic device.</p> <p>Outcome measures: AKPS</p>	<p>Adding KT to exercise therapy did not elicit extra benefits in quadriceps muscle strength and AT, and AKPS among PFPS with abnormal patellar tracking at one month. There is a possibility that KT might rather interfere with quadriceps strength gain over a period of one month.</p>
06	<p>2023; Randomized controlled trial (11) Subjects are included in the study if they had pain for at least one month around or behind the patella while doing two or more of the following activities such as standing, sitting down after a lengthy period of standing, kneeling, squatting, climbing, or descending stairs, or running. Patients who have had ligament, meniscus, or bone injuries, as well as those who have referred pain from lesions of the lumbar spine, hip, or ankle, or who have neuromuscular problems, are not eligible for the study.</p>	<p>Group A: participants were given NMES Group B: Participants were given quadriceps strengthening</p> <p>Outcome measures: AKPS</p>	<p>Combination group showed significant improvement when compared to QS group followed by NMES group. Control group did not show any improvement. Neuro muscular Electrical Stimulation in combination with quadriceps strengthening showed a better outcome than in isolation on quadriceps muscle architecture after 10 weeks.</p>
07	<p>2024 Randomized controlled trial RCT(12) The patient's diagnosis was made using the patellar grind test. Male and female runners between the ages of 18 to 40 years who were willing to engage in the study were included in our research. Participants had a history of prior knee surgery, or participated in any sport other than running were excluded.</p>	<p>Participants received 30-45 minutes of isometric exercises and 15 minutes of somatosensory training every four days. The visual Analog scale, joint position sense test, and Y-balance test were taken as outcome measures to measure PFPS before and after the intervention.</p> <p>Outcome measures: VAS & AKPS</p>	<p>The result revealed significant ($p=0.0001$) improvement in PFPS following the intervention. Both the isometric exercises and somatosensory training were found to be significant in reducing the intensity of the pain and improving the proprioception and balance of the individuals.</p>
08	<p>2024 Randomized controlled trial RCT(14) INCLUSION CRITERIA : Patients diagnosed with unilateral PFPS; aged between 25 and 45 years; patients with knee pain that lasted more than 3 months, and having two or more of the symptoms that occurred without trauma such as sitting for a long time, climbing and descending stairs, running, bending the knee, jumping. EXCLUSION CRITERIA: history of previous knee pain, trauma, surgery, and other joint diseases; signs of knee osteoarthritis in knee X-ray; having neurological problems that will affect walking; pregnancy; history of chronic diseases; and the presence of malignancy and infection.</p>	<p>Group 1 (high-intensity laser) Group 2 (ultrasound and TENS) Group 3 (ultrasound and interferential)</p> <p>Outcome measures: VAS & AKPS , knee flexion range of motion.</p>	<p>This study indicated that high-intensity laser therapy was found to be a more effective method in the treatment of patellofemoral pain syndrome after 3 months of follow-up compared to US-TENS combination and US-interferential current combination treatments. Also, HILT can be used as an effective method in combination with an appropriate exercise program including vastus medialis strengthening to reduce pain and increase functionality in the patients with PFPS.</p>

09	<p>2023 Randomized controlled trial (15) INCLUSION CRITERIA : (1) 18–40 years of age; (2) unilateral or bilateral anterior knee pain over four weeks with a minimum pain level of 3/10 on a visual analogue scale (VAS); (3) insidious onset of symptoms unrelated to a traumatic accident; (4) presence of pain in any two activities of running, jumping, squatting kneeling, walking upstairs/downstairs or prolonged Sitting EXCLUSION CRITERIA : (1) history of patellar dislocation, subluxation, chondral damage, ligament laxity or other knee joint injuries; (2) suspicion of patellar tendinopathy, localized pain on patellar tendon and relieved pain during knee resisted extension; (3) previous knee surgery or arthritis.</p>	<p>Patients who had PFP were randomly allocated to an intervention group (IG) or control group (CG). Patients in the IG received a 6-week tailored home-based exercise program with health education via remote support, while patients in the CG group only received health education Outcome measures: VAS & AKPS muscle strength.</p>	<p>At 6-week follow-up, the intervention group showed a greater worst pain reduction (between-group difference, and pain with daily activity (between-group difference, than the control group. Similarly, the intervention group had better improvements in AKPS (between-group difference, and knee extensor strength compared to the control group.</p>
10	<p>2024 Randomized controlled trial RCT(16) INCLUSION CRITERIA : Individuals aged 18–35 years old with a BMI ranging from 18 to 25 kg/m² were eligible for enrollment. For patients who had (1) anterior or retropatellar knee pain for at least six weeks (2) navicular drop test of more than 10 mm and (3) pain elicited at least by two of the following four tests: (i) isometric muscle contraction with a slight bent knee, (ii) palpation of the patellofemoral joint line, (iii) patellar compression against the femoral bone, and (iv) active resisted knee extension.</p>	<p>They were equally and randomly assigned into two groups; the study group which received short foot exercise in addition to hip and knee exercises and the control group which received hip and knee exercises only Participants received their interventions during consecutive weeks (12 sessions). Outcome measures: pain intensity, function, abductors quadriceps muscle strength, and balance were assessed using the Visual Analog Scale, anterior knee pain scale (AKPS), hand-held dynamometer, and the Biodex Balance System respectively</p>	<p>within-group comparison showed significant improvement in pain severity, function, balance, and hip abductors, and quadriceps muscles strength in both groups post-treatment compared with pre-treatment. Between groups analysis, however, showed no significant statistical difference between both groups in all variables, except in pain, function, and mediolateral stability which showed better improvement compared to the control group.</p>
	<p>were enrolled in the study EXCLUSION CRITERIA: (1) underwent previous knee surgery (2) had knee pathologies (e.g., osteoarthritis, patellar tendinopathy, lesions of menisci, cartilage, bone, or ligaments) (3) underwent physical therapy 4 weeks before enrollment in the study (4) had taken non-steroidal anti-inflammatory drugs during the previous week, and (5) psychological disorders</p>		

Short follow-up durations in many studies restricted the understanding of the long-term efficacy of interventions, and small sample sizes in several investigations reduced the generalizability of findings (12,8).

Moreover, the lack of standardized treatment protocols, including variability in exercise regimens and taping techniques, made cross-study comparisons challenging.

The integration of neuromuscular electrical stimulation (NMES) with functional training demonstrated enhanced outcomes for pain reduction and knee joint function. NMES was particularly effective in targeting muscle weakness and joint instability, common contributors to PFPS. This combination approach proved more effective than exercise therapy alone, emphasizing the necessity of incorporating neuromuscular training into rehabilitation plans. Taping techniques were also explored, with McConnell taping showing significant biomechanical support for knee stability and improved function during weight-bearing activities, such as stair ambulation (9). These findings suggest its utility in addressing substantial biomechanical challenges. On the other hand, the addition of Kinesio taping to exercise therapy produced mixed results, with limited added benefits in certain cases, indicating that its effectiveness may be influenced by application techniques and patient-specific factors (1).

HILT was identified as an effective modality for pain relief and functional improvement over a three-month period (14). Its ability to promote tissue healing and reduce inflammation highlights its value as a non-invasive option when combined with structured exercise programs. Isometric and somatosensory training also demonstrated significant improvements in pain, proprioception, and balance, which are critical for retraining neuromuscular control, maintaining joint stability, and reducing pain in PFPS (12). Home-based rehabilitation programs supported by remote health education were noted for their ability to promote self-management and enhance patient adherence. This approach emphasizes the role of education in achieving long-term symptom management and cost-effective treatment.

Additionally, incorporating short foot exercises into traditional hip and knee protocols was shown to improve pain and stability. By addressing multiple muscles involved in knee stabilization, this combination underscores the importance of comprehensive lower limb training to target different aspects of function (16).

This review underscores the complexity of PFPS and the necessity for multifaceted, individualized treatment approaches. Comparative analysis of interventions, including NMES, taping techniques, and exercise combinations, highlights the importance of tailoring rehabilitation protocols to patient-specific needs. While education and combined treatments generally yield optimal outcomes, certain techniques may require customization based on biomechanics and treatment response. The findings advocate for a holistic approach to optimize pain relief, function, and long-term management of PFPS.

Future research should focus on standardizing intervention protocols and exploring the long-term benefits of various therapies. Understanding patient-specific factors, such as biomechanics and muscle imbalances, can facilitate the development of tailored treatment strategies. This narrative review provides valuable insights into the diverse therapeutic options available for PFPS and reinforces the importance of a patient-centered approach in managing this complex condition.

3. Methodology

This review was conducted and reported according to the Preferred Reporting Items for Systematic reviews

3.1 Eligibility criteria and study selection:

The following study designs, published in full text peer reviewed journals, were eligible: case series, cohort studies, controlled clinical trials and randomised controlled trials (RCT).

Subjects are included in the study if they had pain for at least one month around or behind the patella while doing two or more of the following activities such as standing, sitting down after a lengthy period of standing, kneeling, squatting, climbing, or descending stairs, or running. Patients who have had ligament, meniscus, or bone injuries, as well as those who have referred pain from lesions of the lumbar spine, hip, or ankle, or who have neuromuscular problems, are not eligible for the study. Anyone who is unwilling was excluded from the study.

3.2 Data extraction:

Data were extracted by two researchers using standardised extraction forms adapted from the Cochrane Collaboration

We extracted the following data:

- Publication and study details: For example, authors, year of publication, funding source, possible conflicts of interest, study aim, design and unit of allocation.
- Population: Number of patients included, population characteristics for age, sex, body mass index, activity level, setting where population was recruited, baseline scores for outcome measures (mean, SDs, standard errors extracted for continuous outcomes and number and percentage for categorical outcomes).
- Eligibility criteria and diagnostic criteria used for PFP.
- Treatments: For example, number randomised to group, detailed description of for example, application, dose, intensity, frequency, number of sessions, delivery, tailoring (individual/group), duration of treatment, providers, cotreatments, modification (change to treatment), adherence.
- Outcomes: VAS scale, AKPS scale, Timepoints measured, and the timepoints reported on, outcome definition, person measuring, unit of measurement, scales (upper and lower limits), imputation of missing data, primary and secondary outcomes used in the original trials, unintentional outcomes (eg, adverse events, adverse effects, side effects).

4. Strengths and weaknesses in relation to previous studies

Previous systematic reviews and RCTs on the management of PFP were restricted to traditional comparisons of one treatment versus another, for example, patient education versus exercise. However, our NMA further suggests that combining exercise, (with or without foot orthoses) to education may be most effective for 3-month improvements. This is in keeping with a recent consensus statement from experts in the field of PFP that recommends exercise, orthosis, manual therapy and combined treatments in the management of PFP.⁵⁰ Our NMA supports the view that combined treatment is associated with the best outcomes, but that orthoses may not improve outcomes when added to education, exercises and patellar taping/mobilisations. Our NMA will be updated when new evidence becomes available, ensuring a contemporary overview of the evidence for the best treatment of PFP for patients and clinicians dealing with the condition.

5. Strengths and weaknesses of this study:

There was an overall lack of high-quality, large studies, with only one study including >100 subjects per trial arm. Small trials with varying quality predominate in the field of musculoskeletal health. To ensure, we included credible research to inform the NMA we only included research where (1) patients had the condition for ≥ 6 weeks, and (2) studies included relevant patient-rated outcomes and follow-ups (≥ 6 weeks). As a result, we excluded 128 RCTs. While the comparisons in those studies could add value to the body of knowledge, these were not evaluated by the patient—which is considered the gold standard of outcome measurement by WHO, on which outcomes to use in RCTs through the development of a core outcome set has the potential to move the field of PFP forward. In our study, patients were involved in prioritising our outcomes making our results relevant to patients and clinical practice. Limitations in the conclusions drawn by the NMA are primarily caused by the original data. Overall evidence was graded as very low to low. There was no evidence of heterogeneity between studies with fixed effect models preferred over random effects models based on model fit; however, this may be due to the limited number of studies available per comparison. Consistency between direct and indirect evidence could not be checked for all comparisons in the NMAs. However, where this was possible, by comparing consistency models to models that relaxed the consistency assumption, we did not find evidence of inconsistency. Treatment outcomes may be different on the basis of some characteristics (ie, effect modification). Lankhorst et al suggested that sex and symptom duration may be effect modifiers in the relationship between exercise and function at 3 months, but no significant association was found. As there is no good evidence for any potential effect modifier, we did not include potential effect modifiers when planning the synthesis. This is a limitation that can be overcome in the future when new evidence for effect modifiers becomes available. (16)

6. Conclusion

This systemic review synthesizes diverse therapeutic approaches to managing Patellofemoral Pain Syndrome (PFPS), offering a comprehensive understanding of the efficacy and applications of various treatments. The review underscores the importance of a multifaceted and personalized approach, integrating multiple interventions to address the complex nature of PFPS effectively.

In conclusion, the treatment of PFPS benefits from a tailored, multidisciplinary approach that combines neuromuscular stimulation, advanced therapeutic modalities, and comprehensive exercise programs. The integration of these diverse treatments, tailored to individual patient profiles, can lead to significant improvements in pain management, muscle function, and overall knee stability. Future research should focus on refining these protocols and exploring long-term effects to further optimize patient care and enhance quality of life for individuals with PFPS. This review emphasizes the complexity of PFPS and the necessity of a dynamic, patient-centered approach to achieve effective and sustainable treatment outcomes.

Abbreviations:

PFPS: Patellofemoral pain syndrome
 HILT : high-intensity laser therapy
 NMES : neuromuscular electrical stimulation
 KT-PM : kinesio taping – patellar mobilization
 KT-LRFT : for lateral rotation of the femur and tibia
 AKPS : Anterior knee pain scale
 VAS : visual analogue pain scale
 AT : acceleration time
 KT : kinesio taping

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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