



RESEARCH REPORT

Clinical tests for differentiating between patients with and without patellofemoral pain syndrome



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Abstract Patellofemoral pain syndrome (PFPS) is a very common knee condition with various aetiologies. Because of the nebulous factors of the syndrome, physiotherapists often find it difficult to assess and treat these patients. The aim of this study was to identify the clinical assessment tool that can differentiate PFPS patients from patients with other lower limb conditions. Fifty-two patients from the National Health System (26 with PFPS and 26 with other lower limb conditions) took part in this study. They underwent a series of strength, flexibility, and stress tests. Their pain levels were also recorded. The results showed that among the various clinical tests, only the hip flexion component of the Thomas test was able to differentiate between the two groups. In addition, the stress test showed that the PFPS group could not recover their gluteal muscle strength in the same way the group with the other lower limb conditions did. The Lower Extremity Functional Scale was found to be more able to differentiate between the two groups than the Anterior Knee Pain Scale. This study has shown that it is difficult to find specific clinical tests to diagnose PFPS. More research is needed in this important area.

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Introduction

Patellofemoral pain syndrome (PFPS) is a very common condition especially among runners, and is thus also known as runner's knee [1]. PFPS is a result of a biomechanical problem rather than actual damage of the knee [2], and its aetiology is reported to be multifactorial [3]. There is much literature examining the factors that may cause PFPS. A recent systematic review [4] has reported an increased Q angle, sulcus angle, patella tilt angle, less hip abduction strength, lower knee extension peak, and less hip external rotation strength as important factors that cause PFPS. Regarding muscle strengthening, a recent review [5] has shown the importance of quadriceps and hip muscle strengthening in PFPS treatment. However, research findings on muscle weakness in patients with PFPS are inconsistent. Although all studies have shown weakness in the hip external rotators, the results are mixed for the quadriceps [6,7] and hip abductors [8,9]. The relationship between PFPS and hamstring strength is also not fully understood [10]. An extensive review of soft-tissue tightness by Waryasz and McDermott [10] reported that only the quadriceps muscle was found to be consistently tight in patients with PFPS [2,9,11], whereas contradictory results were found for the gastrocnemius [9,11], the hamstrings [2,9,12], and the iliotibial band [9,13]. Thus, it remains unclear as to what specific tests (e.g., muscle strength and flexibility tests) can differentiate people with PFPS from those with other lower limb conditions.

In a previous study [14], the methods that local National Health Service (NHS) physiotherapists use to assess, treat, and measure outcomes in PFPS were identified. Most of them included strength and flexibility tests of several muscles and visual analogue scales (VASs). The next step was then to identify which of those methods were reliable, valid, and able to differentiate healthy controls from NHS patients with PFPS [15].

This study aimed to identify the strength and flexibility tests that can differentiate patients with PFPS from patients with other lower limb conditions.

Methods

Participants

All participants were recruited by an extended scope physiotherapist who identified them from their NHS physiotherapy referrals. An invitation letter and an information sheet were then sent to potential participants and if they were interested in the study, they were arranged to see the researcher after their first physiotherapy appointment. Participants had at least 2 days to decide whether they would participate or not. Ethical approval was granted by the local NHS Research Ethics Committee (10/WNo01/60). Informed consent was obtained from all participants prior to data collection.

The inclusion criteria were: having been referred to the physiotherapy department of a local hospital (Ysbyty Gwynedd) by their physician or consultant for assessment and treatment due to PFPS or any other lower limb conditions. The other lower limb conditions were those of the knee (e.g., patella dislocations, ligament and menisci tears, and syndromes of the knee different from PFPS), or

the hip (e.g., unspecific hip pain and trochanteric bursitis), or the ankle (e.g., sprains, Achilles tendon problems, plantar fasciitis), or muscle tightness in the lower limb. The aforementioned conditions were all reported in patients' referrals and no further assessment was done by the research team during recruitment.

Participants were excluded if they had any open operation of the hip, knee, or ankle; history of arthritis; neurological conditions; low back pain or sciatic pain; open wounds; fractures; or the patient being unable to undertake both sessions.

The required sample size of this study was calculated by an online calculator for observational, cohort, and clinical trial studies (www.sph-emory.edu/). The two-sided significance level was set at 0.05, power at 80%, the ratio of nonexposed to exposed participants was set at 1.00, and the risk/prevalence difference was set at 0.3. An estimated sample of size of 26 participants for each group was required.

Procedures

After having received their first session of physiotherapy, the study participants met with the researcher (K.P.) who was blinded to the patients' diagnoses. Details of the participants' weight, height, and age were recorded by the same researcher. Participants then underwent the following assessments. All the following physical tests are considered to assess risk factors for PFPS and have been found to be used by NHS physiotherapists [14]. These methods have also been found to be reliable and valid and able to differentiate patients with PFPS from healthy people without any other lower limb conditions [15].

Modified Thomas test

The modified Thomas test was performed with the participant positioned on the edge of a physiotherapy couch. The participant then rolled back on the couch and held both knees to the chest ensuring that the lumbar spine was flat and the pelvis was in a posterior rotation. The participant kept holding the contralateral leg in maximum knee and hip flexion with the arms, while the tested limb was lowered towards the floor. The result was considered to be positive if the tested limb was unable to touch the couch.

Patella compression test

The patella compression test was performed in a supine position with the tested knee flexed to 20°. The patella was then compressed against the femoral groove. When the participant reported pain, the test was recorded as positive [16].

Flexibility tests

First, the modified Thomas test was performed as mentioned earlier, to assess whether there was any tightness in the iliopsoas and quadriceps muscles. To measure iliopsoas tightness, the axis of the goniometer (Absolute-Axis; Baseline, New York, NY, USA) was positioned on top of the greater trochanter, with one arm

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