CONTRIBUTION OF THE EVALUATION OF THE CLINICAL SIGNALS IN PATIENTS WITH PATELLOFEMORAL PAIN SYNDROME

Rogério Ferreira Liporaci[1], Marcelo Camargo Saad[2], Lílian Ramiro Felício[2], Augusto do Prado Baffa[2], Débora Bevilaqua Grossi[2]

ABSTRACT

Objective: As patellofemoral pain syndrome (PFPS) is a common disorder characterized by multifactorial etiology and whose the most prevalent symptom is a diffuse pain, usually located on the retropatellar region, however, it also shows signs and symptoms that can be related as excessive subtalar pronation, external tibial torsion, patellar displacement alterations, painful range of motion of the knee, pain in the patellar borders, muscular tightness and changes in quadriceps angle (Q Angle), the objective of this work was to determine the frequency of these signs and symptoms associated to a previous knee pain questionnaire. Methods: Thirty-nine sedentary female volunteers had been evaluated, divided in two groups, PFPS (19) and Control (20). These subjects were evaluated for signs and symptoms described above, in addition to pain assessment by questionnaire. Results: The results demonstrated a high frequency of pain in six of the thirteen questions in relation to the control group. Conclusion: According to these findings, we conclude that the functional evaluation of individuals with PFPS should consist of a previous knee pain questionnaire and an evaluation of the characteristic signs and symptoms for examination of the entire lower limb during static and functional situations. ***Level of Evidence II, Diagnostic Studies.***

Keywords: Knee joint. Patellofemoral pain syndrome. Physical therapy specialty. Questionnaires.

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INTRODUCTION

The patellofemoral pain syndrome (PFPS) is considered one of the most frequent conditions of the knee and its etiology is not well established, but it seems to be related to multifactorial causes, complicating the characterization of individuals with PFPS.[1-3]
PFPS is defined as the presence of anterior knee or retropatellar pain, the main characteristic of the syndrome,[4,5] associated to activities that increases stress on the patellofemoral joint (PFJ) as crouching down or climbing or descending stairs.

Besides characteristics signs and symptoms, such as knee pain on movement, pain on palpation and alteration of patellar mobility, and changing the Q angle among other structural changes, these signs and symptoms isolatedly evaluated have been inconsistent regarding the differentiation of patients with and without PFPS. The lack of valid assessment tools or a gold standard test, make difficult the clinical evaluation of PFPS,[6,7] thus generating numerous physical therapy intervention strategies for the treatment of PFPS.[8]

It is common to base the evaluation of kinematic and structural changes, such as abnormal motion of the tibia and femur in the frontal and transverse planes, weakness of the muscles of the hip stabilizers and a decrease in femoral rotation, because there is scientific evidence to support it, as described in the literature that these changes may lead to patellofemoral pain.[9]
Some studies indicate that the bad distribution of ground reaction forces due to changes in ankle and foot, as excessive subtalar pronation, or external tibial torsion can trigger patellofemoral dysfunctions.[10-13] However, the analysis of this uneven distribution of reaction forces, misalignment of the lower limb or the study of the imbalance of static and dynamic stabilizers of the patella, separately, have not shown significant differences,[3,14,15] making these individual signals inconsistent. However, the association of these findings and the joint analysis of structural changes, stabilizing and kinematics, can demonstrate the triggering factors of the syndrome.[3,16]

Some authors incorporate functional testing in the assessment, as the jump test,[17] but there are other skills that the patient with

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1. Laboratory of Movement Analysis - LAM. Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo, Ribeirão Preto, SP, Brazil.
2. Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo, Ribeirão Preto, SP, Brazil.

Work performed at Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo, Ribeirão Preto, SP, Brazil.
Mailing address: Rogerio F. Liporaci, Av. dos Bandeirantes 3900, CEP 14048-900, Ribeirão Preto, SP, Brazil. rogerioliporaci@gmail.com

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suspected PFPS can play or plays during activities of daily living (ADL) as a way to exacerbate the pain, which can be reported in questionnaires for anterior knee pain or also applicable as functional tests.

In addition to clinical trials,[18] in order to analyze the pain among the patient's complaints, the use of questionnaires for anterior knee pain has been used to monitor changes in patients conditions and evaluate the effectiveness of treatment. These surveys are based on categories such as pain level and activity, function and functional movements that may be susceptible to change due to pain, as well as clinical measurements such as muscular trophism and amplitude of movement.[19,20] These questionnaires, among them Kujala's et al.,[20] can be an important tool in the attempt to characterize the symptoms involving the presence of PFPS,[21] scoring which activities require greater stress from the individual and to his patellofemoral joint and assign them to functional assessment.

This study aimed to determine the frequency of signs and symptoms of PFPS on a functional assessment of the lower limb in subjects with and without anterior knee pain, such as increased Q angle, excessive subtalar pronation, external tibial torsion, abnormal patellar mobility, pain on palpation of the patellar edges, pain in motion tour of the knee and the presence of muscle retractions, as well as the frequency of survey responses of anterior knee pain,[20] in order to verify the prevalence of these clinical signs and symptoms in patients with the PFPS and thus determine which measures may be most relevant in the construction of the clinical evaluation of these individuals.

METHODS

We have studied 39 sedentary females, with a mean age of 20.5 years old (± 4.3), mean body mass of 54.88 kg (± 3.29) and mean height of 160.7 cm (± 4.3), divided into two groups: individuals with presence of anterior knee pain forming the PFPS group, and subjects without knee pain complaints, both with no history of ostheomyoarticular injury on hips, ankles or feet.

For inclusion in the pain group, volunteers were asked to present a minimum of 3 cm at the pain visual analog scale (VAS) in the last month and report anterior knee pain in at least three of the following activities: staying sitting too long, climbing stairs, descending stairs, squatting, running, walking and jumping.[1,22]

There were excluded from both groups individuals who undergo physical therapy prior to PFPS, had a history of injury or surgery in the lower limb ostheomyoarticular system, or presented a neurological, cardiovascular or rheumatic disease.

Inclusion criteria for the control group were: presence of a maximum of two signs indicating PFPS observed during functional evaluation[1,22] and absence of anterior knee pain checked by VAS.

All volunteers underwent functional evaluation and signed a consent and enlightenment form according to the standards of the Ethics Committee of Hospital das Clinicas, Faculty of Medicine, Universidade de São Paulo - HCRP 4250/2005 and the National Committee on Research Ethics - CONEP - Resolution of the National Health Council 196/96.

The signs and symptoms evaluated were: external tibial torsion, navicular drop test, Q angle, patellar mobility, pain in knee range of motion and during palpation of the boarders, Ober's test, and Thomas' test.

The frequency of signs and symptoms observed between the groups and the frequency of survey responses for anterior knee pain was compared by the nonparametric statistical chi-square from the Statistica software for Windows, with a significance level set at 5%.

RESULTS

According to the data collected in this study, the response frequency of individuals with PFPS and control subjects to anterior pain questionnaire of Kujala et al.,[20] are shown in Table 1. A high frequency to each of the questions regarding pain reporting, with a prevalence of "severe pain occasionally" (52.63%), discomfort or limitation to reporting such as "claudication", "walking", and "running", except for the presence of abnormal patellar movements and disability in knee flexion in the control group have been observed. The data demonstrated a statistically significant frequency of painful support (68.4%), pain when descending and climbing stairs (52.63%), painful repetition of the squat (68.42%) in relation to the control group.

According to Table 2, the signs and symptoms that present most frequently to the PFPS group compared to the control group were external tibial torsion, increased Q angle,[18] excessive subtalar pronation (navicular drop test),[23] reduced patellar mobility, pain to palpation of the patellar edges, pain at the arch of motion and muscle retractions. However, it was detected, for the control group, an increased frequency compared to the PFPS group, patellar hypermobility (30%) and positive Ober's test (10%) compared with the PFPS group (15.78% and 0 % respectively).

DISCUSSION

In view of the difficulty in grouping signs and symptoms that best characterize the PFPS, due to its multifactorial etiology, as well as the presence of characteristic clinical signs in patients without episodes of pain anterior knee, the evaluation of frequency of signs and characteristic symptoms of PFPS can be an aid instrument in best standardization of assessing these individuals.

This difficulty in the evaluation is due to the fact that individuals that do not present anterior knee pain, do present for some signals in relation to the PFPS group, a high frequency of the signs and sintomas.[7,17]

The data of the present work show significant differences between PFPS and control groups in all evaluated parameters, however, regarding the external tibial twist, increase of the Q angle, excessive subtalar pronation, reduction of patellar mobility, the frequency of these measurements in the group without pain is high, however, it is not higher than in PFPS group. Therefore, it shows that an isolated evaluation of these parameters might not be effective in the diagnosis of PFPS.

Given this, we face the difficulty of using these tests isolatedly in an attempt to discern an individual with PFPS from another with no tendency of developing PFPS. The elevated frequency of signs in these individuals in the control group can demonstrate a pre-disposition to developing PFPS.

In a recent review article, Waryasz and McDermott[24] listed risk factors for the development of PFPS, where studies that compared PFPS patients and control were verified, and risk factors such as abnormalities in ankle and foot, as changes in fore-

Table 1. Frequency of responses (%) from individuals with PFPS and individuals from the control group to the pain questionnaire from Kujala et al.[2]

	PFPS	Control
1. Claudication		
None	42.10%[a]	100%
Light or periodic	42.10%[a]	---
Constant	15.8%	---
2. Support		
Total painless support	31.6%	100%
Painful	68.4%[b]	---
Impossible to support	---	---
3. Walking		
No limitation	36.84%[a]	95%
Over 2 Km	36.84%[a]	5%
1- 2 Km	26.32%[a]	---
Unable to walk	---	---
4. Stairs		
No difficulties	26,32%	100%
Light pain descending	21.05%	---
Pain climbing and descending	52.63%[b]	---
Unable to climb or descend	---	---
5. Crouching		
Without difficulty	---	95%
Repeating crouching painful	68.42%[b]	5%
Pain any time crouching	10.53%	---
Possible with partial weight support	21.05%	---
Unable	---	---
6. Running		
No difficulties	42.10%[a]	
Pain after over 2 km	26.32%[a]	100%
Light pain after starting	31.58%[a]	---
Severe pain	--- ---	---
Unable	--- ---	
7. Jumping		
No difficulties	63.16%[b]	100%
Some difficulties	31.58%	---
Constant pain	5.26%	---
Unable	---	---
8. Stay for a long period with flexed knees		
No difficulties	---	100%
Pain after	21.05%	---
Constant pain	42.11%[a]	---
Pain forces to extend knees	36.84%[a]	---
Unable	---	---
9. Pain		
None	---	100%
Light or occasional	36.84%[a]	---
Interrupt sleep	10.53%[a]	---
Occasionally severe	52.63%[a]	---
Constant and severe	---	---
10. Edema		
None	78.95%[b]	100%
After hard exercises	21,05%	---
After daily life activities	---	---
Every night	---	---
Constant	---	---
11. Patellar movements abnormally painful (sub dislocation)		
None	100%	100%
Occasionally in sports activities	---	---
Occasionally in daily activities	---	---
At least one episode of documented dislocation	---	---
Over two dislocation episodes	---	---
12. Thigh atrophy		
None	73.68%[b]	90%
Light	15,79%	10%
Severe	---	---
13. Flexion deficiency		
None	84,21%	100%
Light	15,79%	---
Severe	---	---

[a]: Significant differences of alternatives in comparison to the control group.
[b]: Significant most frequent alternative.

Table 2. Frequency of clinical signals to the PFPS group and the control (painless) group (%).

Clinical Signals Evaluated	PFPS	Control
External tibial torsion	84,21*	45
Navicular Drop Test	57,89*	40
Increase of Q angle	84,21*	45
Patellar hipermobillity	15,78	30*
Patellar hipomobillity	15,78*	0
Pain to palpation of the edges	84,21*	0
Pain at the Arc of movement	100*	0
Positive Ober's test	0	10*
Uniarticular positive Thomas' test	15,75*	0
Biarticular positive Thomas' test	100*	60

Reference values: Navicular Drop Test (10mm),[23] Q angle (18º of the feminine gender).[18]

foot, midfoot, hindfoot and arches plantar; deficits on functional testing as in jump test, step test; weakness and muscular retractions as well as changes on knee static stabilizers like ligament laxity, changes in Q angle and patellars and in patella kinematics were found. However, we did not find studies that follow the evolution of these risk factors in patients without pain symptoms, with the objective of evaluating the development of PFPS in those individuals who present a high number of these risk factors.

In order to use these signals in an attempt to assess the patient with suspected PFPS, it is necessary to present high levels of reliability, due to the strong presence of these characteristic signs of PFPS in clinically healthy individuals. Piva et al.[25] verified the reliability of some signs of bad alignment of the lower limb associated with the onset of PFPS and concluded that parameters such as retraction of the quadriceps muscles, excessive subtalar pronation, Q angle and external tibial torsion levels have moderate to excellent reliability, demonstrating that these parameters are reliable, also used in this study. Due to the difficulty of differentiating individual with PFPS from individuals without PFPS only by the other set of evaluated clinical signs, the presence or absence of pain proves to be an important signal of the evaluation. As in the present study, Cowan et al.[1,22] and Powers et al.[26] also used the presence of pain in the last month and during functional activities as criteria for inclusion in the sample, suggesting the importance of this sign in PFPS.

The prevalence of signs such as increased Q angle,[27] increased frequency of excessive subtalar pronation and navicular drop test,[10,12,13,28] external tibial torsion[28] and muscular retractions[5,29] combined, corroborate that PFPS is not characterized by a single factor,[30] suggesting that these parameters, associated with the presence of anterior knee pain during functional activities such as predisposing biomechanical changes in the lower limbs that can trigger PFPS.

The questionnaire by Kujala et al.[20] proves to be of great importance in characterizing the effects of pain during daily life activities of individuals with PFPS. According to our findings, one can observe the presence of pain during activities that require dynamic movement of the knee, such as walk, run, crouch, climb stairs, and the presence of pain during stance and during the prolonged stay with flexed knees. This prevalence verified by the questionnaire demonstrates the negative impact of PFPS in functional activities and daily life of the individual, reducing the quality of life and reaffirming the importance of effective treatment for PFPS.

With the data from this study, we demonstrated a focus not on the characterization of individuals with PFPS, but a set of signs and symptoms of high prevalence in our findings, together with the questionnaire for anterior knee pain that combined with clinical examination may be the ideal way to structure a functional assessment and better understanding of PFPS.

There are some aspects considered by this study, secondary in the functional assessment, which may be part of the physical examination: Weakness and flexibility of the gluteus medius muscle, iliac psoas, hamstrings and gastrocnemius; presence of patellar crepitus, ligament and meniscal integrity; neurovascular investigation (patellar reflection, assessment of lower limb dermatomes and dorsalis pedis artery pulse-popliteal and dorsal); history of physical activities.

CONCLUSION

According to our findings, we found that the functional evaluation of patients with complaints of anterior knee pain should consist of a questionnaire of anterior knee pain and a set of signs and symptoms that evaluate the entire lower limb statically and during functional situations.

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