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ORIGINAL ARTICLE

Symptoms and functional limitations of patellofemoral pain syndrome patients*

Sintomas e limitações funcionais de pacientes com síndrome da dor patelofemoral

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SUMMARY

BACKGROUND AND OBJECTIVES: Patellofemoral pain syndrome (PFPS) is one of the commonest disorders affecting knee joint. This study aimed at evaluating symptoms and functional limitations of PFPS patients.
METHOD: Participated in this study 26 PFPS patients (PFPSG) and 31 clinically healthy patients (CG), paired by age, height and body mass. Evaluation cards and Kujala questionnaire were applied. Then patients went through two functional tests: crouching, climbing and descending a step for 30 seconds, in addition to being oriented to walk 8 m in a leveled surface, to climb and descend a stair and a ramp, and such activities were randomly performed. Pain intensity was evaluated through the visual analog scale (VAS) before and after each activity. Wilcoxon and U Mann-Whitney tests were used for statistical analysis, considering significant $p = 0.05$.
RESULTS: The PFPS group had lower scores (75.8 ± 11.8) in Kujala questionnaire, as compared to the C group (100 ± 0.0) ($p = 0.001$). From 26 PFPS patients, 23 reported pain when crouching, 18 when climbing or descending stairs, 25 when kneeing, 14 when running, 16 when sitting for a long period and 9 when practicing sports. Pain intensity by VAS has confirmed such statements with pain exacerbation after crouching ($p = 0.001$), climbing and descending a step ($p = 0.001$), walking on a leveled surface ($p = 0.01$), climbing and descending a stair ($p = 0.001$) and ramp ($p = 0.01$) in patients with PFPS.
CONCLUSION: PFPS may lead to pain and functional limitations which impair daily life activities.

Keywords: Causalgia, Knee, Patellofemoral pain syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A síndrome da dor patelofemoral (SDPF) é uma das desordens mais comuns que afetam a articulação do joelho. O objetivo deste estudo foi avaliar sintomas e limitações funcionais de pacientes com SDPF.
MÉTODO: Foram estudados 26 pacientes com SDPF (GSDPF) e 31 clinicamente saudáveis (GC), pareados em idade, estatura e massa corporal. Foi aplicada uma ficha de avaliação e o questionário de Kujala. Em seguida os pacientes realizaram 2 testes funcionais, agachar e subir e descer um *step* por 30 segundos, além de serem orientados a deambular por um percurso de 8 metros em superfície nivelada, subir e descer de uma escada e rampa, sendo a ordem de realização destas atividades aleatória. Foi avaliada a intensidade da dor pela escala analógica visual (EAV) antes e após cada atividade. Para o tratamento estatístico foram utilizados os testes de Wilcoxon e U Mann-Whitney, com significância de $p \leq 0,05$.
RESULTADOS: O GSDPF apresentou menor pontua-

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ção (75,8 ± 11,8 pontos) no questionário de Kujala em comparação ao GC (100 ± 0,0 pontos) (p = 0,001). Constatou-se que dos 26 pacientes com SDPF, 23 relataram sentir dor ao agachar, 18 ao subir e descer escadas, 25 ao ajoelhar, 14 ao correr, 16 ao ficar sentado por tempo prolongado e 9 ao praticar esportes. A intensidade da dor pela EAV confirmou estas afirmações, ocorrendo exacerbação da dor após agachar (p = 0,001), subir e descer de um *step* (p = 0,001), caminhar em superfície plana (p = 0,01), subir e descer escada (p = 0,001) e rampa (p = 0,01) nos pacientes com SDPF.

CONCLUSÃO: A SDPF pode levar a dor e limitações funcionais que comprometem a realização das atividades de vida diária.

Descritores: Causalgia, Joelho, Síndrome da dor patelofemoral.

INTRODUCTION

One of the commonest musculoskeletal disorders affecting knee joint is patellofemoral pain syndrome (PFPS). Its incidence is higher in physically active populations such as adolescents and young adults[1,2], being more frequent among females due to structural differences in pelvic width, femoral anteversion, Q angle, tibial torsion, quadriceps strength and knee ligaments laxity[3].

PFPS etiology is still unclear, being its most common cause the poor positioning of the patella[4]. Among factors mentioned in the literature there are increased Q angle, vastus medialis oblique insufficiency and weak activation of posterior gluteus medius fibers[5]. In addition, one has to highlight excessive pronation of the subtalar joint leading to biomechanical compensations which overload knee joint[6].

Pain may be considered a normal and predicted physiological response caused by a mechanical, thermal or chemical stimulation[7].

Pain is the major symptom of PFPS patients, and is characterized as diffuse, retropatellar or peripatellar, often bilateral and with exacerbation periods[2,8]. Patients complain of pain especially during activities involving knee flexion, such as climbing and descending stairs, crouching and sitting down for long periods[9,10].

Considering that pain and difficulty to perform daily activities are major complaints of PFPS patients and that few studies have quantified such symptoms, further studies are needed to evaluate pain behavior during daily life activities, as well as limitations imposed by PFPS to perform them, so that through such evidences it is possible to develop a treatment plan. So, this study aimed at evaluating symptoms and functional limitations of PFPS patients.

METHOD

After the approval of the Ethics Committee, University of the State of Santa Catarina (protocol 33/2010) this transversal, descriptive and comparative study was carried out and was followed up according to orientations of Resolution 196/96 of the Ministry of Health on researches with human beings.

Participated in this study 57 female patients, divided in 2 groups: 26 with PFPS (PFPSG) with mean age of 22.88 ± 6.1 years, 59.8 ± 8.1 kg and 1.65 ± 0.07 m height, and 31 clinically healthy (CG) with 21.4 ± 3.6 years, 59.1 ± 8.1 kg and 1.64 ± 0.05 m height.

Inclusion criteria for PFPSG were anterior or retropatellar pain exacerbated by at least 3 of the following situations: climbing or descending stairs, crouching for a long period, kneeing, running, sitting down for long periods, when statically contracting femoral quadriceps and when practicing sports; insidious onset of symptoms unrelated to a traumatic event; pain intensity equal to or higher than 2 by the visual analog scale (VAS) on the patellofemoral joint in the seven days preceding the test, while performing above described activities.

Inclusion criteria for CG were absence of history of meniscal or ligament injury, trauma, surgery or lower limb fracture; no pain in knee or patellofemoral joint; absence of any problem in hip and foot joints, neurological or musculoskeletal system disease and not having been submitted to lower limb physical therapy treatment.

Exclusion criteria for both groups were presence of neurological disease; history of lower limbs trauma, knee meniscal or ligament injury; recurrent patellar luxation; history of knee or lower limbs surgery; lumbar spine injury or pain in the last three months and presence of systemic diseases which could impair locomotion.

Pain intensity was evaluated by VAS consisting in a 10-cm horizontal line where edges define minimum (no pain) and maximum (most severe pain) pain perception[11]. This is a valid and reliable tool[12], in addition to having good repeatability with correlation coefficients of 0.97 to 0.99[11]. Additionally, Kujala questionnaire[13] was applied, which has been specifically developed to evaluate patellofemoral joint disorders. It is composed of 13 items regarding functional activities and patellofemoral joint signs and symptoms, where patients mark the situation with which they are mostly identified. Minimum score of this questionnaire is zero and maximum

is 100. The higher the score the better the situation of the patient with more ability to perform functional activities and lower knee pain intensity.

Data were collected in the Biomechanics Laboratory, University of Passo Fundo, from January to May 2011 and comprised two stages. In the first stage, patients were informed about evaluation procedures, have signed the Free and Informed Consent Term, have filled the evaluation form and the Kujala questionnaire for patellofemoral joint disorders. In the second stage they performed two functional tests: crouching at 90º and descending a 25-cm height step for 30s. In addition, patients were oriented to walk for 8 meters in a leveled surface and to climb and descend a stair with 11 steps (16.5 cm height, 271 cm width and 30.5 cm length) and a ramp with inclination angle of de 12º (1378 cm length x 153 cm width). Tasks were randomly performed. Pain intensity was evaluated before and after each activity.

Microsoft Excel® and SPSS® (Statistical Package for the Social Sciences) were used for data analysis. U Mann-Whitney and Wilcoxon tests were used for descriptive statistics by mean and standard deviation and inferential, considering significant $p \leq 0.05$.

RESULTS

At initial evaluation, 19% of PFPSG reported unilateral pain to the right, 19% unilateral pain to the left, 50% bilateral pain more severe to the right and 12% bilateral more severe to the left. As to symptoms onset, 50% of patients reported that symptoms started less than 2 years ago, 35% between 2 and 4 years and 15% more than 4 years ago. As to physical activities, 35% of PFPSG were practitioners and 32% of CG practiced some type of physical activity.

Table 1 shows the number of patients reporting pain at physical activities such as crouching, climbing and descending stairs, kneeing, running, sitting down for a long period and practicing sports, being crouching and kneeing the activities with more patients with pain.

PFPSG had lower Kujala questionnaire scores (75.8 ± 11.8) as compared to CG (100 ± 0.0) ($p = 0.001$) as seen in graph 1.

Graph 2 shows PFPS patients pain intensity before and after functional activities, where it can be seen the exacerbation of this symptom after crouching ($p = 0.001$), climbing and descending a step ($p = 0.001$), walking on leveled surface ($p = 0.01$), climbing and descending a stair ($p = 0.001$) and ramp ($p = 0.01$).

DISCUSSION

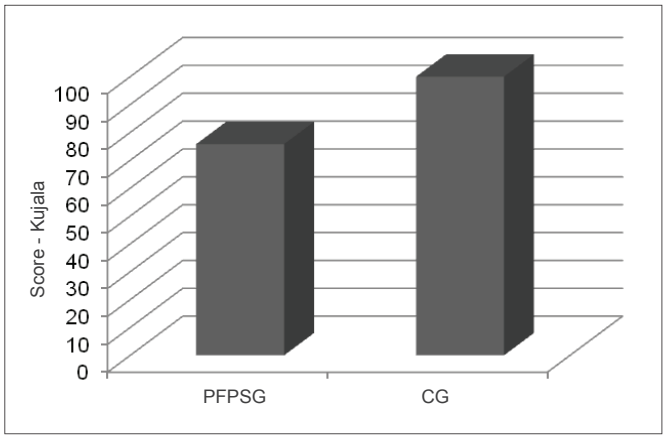
In evaluating pain characteristics, it was observed that most PFPS patients (62%) had bilateral pain. These data are in line with a study[14] which has observed higher prevalence of bilateral pain in PFPS patients, as opposed to other study[5] which has observed that unilateral patellofemoral pain was present in most evaluated patients. When asked about patellofemoral joint pain during activities such as crouching, kneeing, climbing and descending stairs, running, sitting down for a long time and practicing sports, there have been pain reports for all activities, with crouching and kneeing with the highest number of patients with pain. These data may be explained by the fact that patellofemoral pain is in general exacerbated during activities requiring high levels of quadriceps contraction, both concentric and eccentric, such as running, crouching, climbing or descending stairs[10].

Patients' reports were confirmed during functional ac-

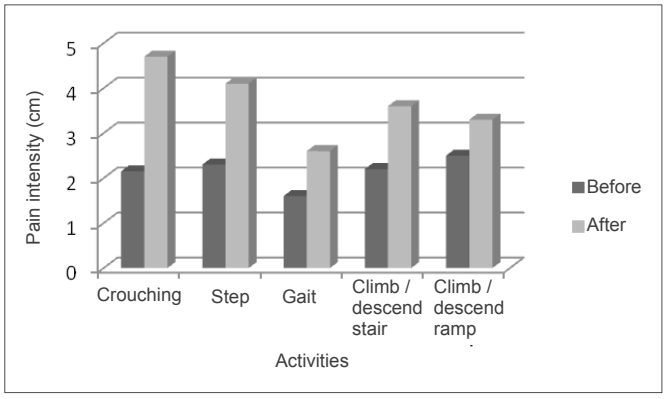
Table 1 – Percentage of patients reporting or not pain when performing activities.

Activities	PFPSG (n = 26)		CG (n = 31)	
	Pain		Pain	
	Yes	No	Yes	No
Crouching	88% (23)	12% (3)	0% (0)	100% (31)
Kneeing	96% (25)	4% (1)	0%(0)	100% (31)
Climbing and descending stairs	69% (18)	31% (8)	0% (0)	100% (31)
Running	54% (14)	46% (12)	0% (0)	100% (31)
Sitting down for long period	62% (16)	38% (10)	0% (0)	100% (31)
Practicing sports	35% (9)	65% (17)	0% (0)	100% (31)

PFPSG = patellofemoral pain syndrome group; CG = control group.



Graph 1 – Kujala questionnaire scores for both groups
PFPSG = patellofemoral pain syndrome group; CG = control group.



Graph 2 – Pain intensity of patellofemoral pain syndrome patients before and after activities

tivities since there has been significant difference in pain intensity of PFPS patients after crouching, climbing and descending a step, walking on a leveled surface, in addition to climbing and descending stairs and ramps. Movements such as climbing and descending stairs, crouching, kneeing, need more knee flexion than walking on leveled surfaces[15]. This highest knee flexion leads to increased reaction forces and contact areas in the patellofemoral joint because the angle between patellar tendon and quadriceps becomes more acute. In addition, as knee flexion increases, femoral and tibial lever arms increase, requiring more quadriceps strength to resist to body weight flexion moment[10,16]. These observations may also explain that crouching was the activity with more pain exacerbation, since this task involves high knee flexion angles.

In addition to pain during functional activities, 62% of patients have reported pain when sitting down for long periods. Some hypothesis for this pain are peripatellar sensory soft tissues tensioning and patellofemoral cartilage deficiency when the knee is totally flexed, or the relative stasis or decreased lubricant sinovial fluid movement between the posterior patella and the femoral groove when remaining in such position for a long time[15].

Kujala questionnaire results have shown lower scores for PFPSG (75.8) as compared to CG (100), showing that these patients have functional limitations. When applying this same questionnaire to patellofemoral pain patients, another study[17] has also observed lower scores for PFPS patients, with 81.72 points in PFPS patients with higher pain levels and 84.11 points for those with lower pain levels after aerobic exercises. Additionally, other authors[18] have also applied Kujala questionnaire to determine the functional capacity of PFPS patients, observing 73.88 points, showing that these individuals have decreased functional capacity and in line with our findings.

So, it is believed that pain reported by patients during functional activities is related to their lower Kujala questionnaire scores, showing that PFPS patients have pain and difficulty to perform daily activities.

CONCLUSION

PFPS signs and symptoms are especially exacerbated during activities such as crouching, kneeing, climbing and descending stairs or step, are bilateral and cause functional limitations which may impair daily life activities.

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