



## Original Article



## Assessment of Pain and Functional Outcomes in Individuals with Patellofemoral Pain Syndrome

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## ABSTRACT

Patellofemoral pain syndrome is a pathological condition of the patellofemoral joint characterized by knee pain in the peripatellar, anterior, and even retro patellar regions. Between 15% and 45% of persons in their 20s to 40s experience patellofemoral pain. **Objective:** To assess pain and functional outcomes in individuals with patellofemoral pain syndrome. **Methods:** At Mayo Hospital and the University of Lahore Teaching Hospital, 87 people enrolled in this cross-sectional study using a non-probability convenience sampling technique during the period of 20th January 2024 to 20th July 2024. Both male and female patients between ages of 20 to 40 years with a positive patellar grind test were included. The numeric pain rating scale and Kujala score were used for data collection to assess pain and functional outcomes respectively. Data were analyzed using IBM SPSS Statistics 25.0. All qualitative variables were shown as frequency and percentages; all quantitative data were provided as Mean  $\pm$  S.D. **Results:** Mean age of participants was 30.68  $\pm$  5.62 years. Out of 87 participants, there were 41 (47.1%) females and 46 (52.9%) males. The mean score of the Numeric Pain Rating Scale was 6.31  $\pm$  1.56 and the Kujala score was 46.37  $\pm$  10.36. Out of 87 participants, 6 (6.9%) had mild pain, 62 (71.3%) had moderate pain and 19 (21.8%) had severe pain. The NPRS and Kujala Score have a very weak correlation of 0.049 with a p-value of 0.655. **Conclusions:** It was concluded that this study had a significant impact of patellofemoral pain syndrome on pain and functional outcomes in affected individuals.

## INTRODUCTION

Patellofemoral pain syndrome (PFPS) is a pathological condition of the patellofemoral joint characterized by knee flexion and extension-related pain in the peripatellar, anterior, and even retro-patellar regions (i.e., running, stair climbing, walking, and squatting [1]. Typical symptoms are joint crepitus during flexion motions and instability during loading activities [2]. PFPS, which affects 22.7% of the general population [3]. Between 15% and 45% of persons in

their 20s to 40s experience patellofemoral discomfort; almost twice as many women as men experience this condition [4]. Some of the minor musculoskeletal disorders are untidy and affect many people; chronic knee pain or patella-femoral pain. As a 'silent' disease this can disable people in their homes, impair their daily activities, and lead to a very long shadow of gloom over their lives. Being musculoskeletal, it is common and causes pain in the



knee's patellar (anteromedial) side. The patient may experience symptoms gradually, such as a steady increase in pain or sudden discomfort when squatting, sitting for extended periods, or climbing stairs [5]. The main dynamics are made up of numerous intertwined processes where the support for the development and maintenance of PFPS is based. The causes of this condition, which can be from biomechanically faulty movements to neuromuscular pathology, can be quite hidden, and as such require a team effort to manage. It also entails precisely assessing how effective the disease is and how much of an impact it has on a person's life as a whole. Some recent papers have tried to give a better understanding of this crucial question focused on the methodological strategies that allow evaluating the amount of pain and the limitations of functioning that result from it [6]. Complaints in individuals involve pain in or around the anterior knee region that is aggravated by weight-bearing exercise. Some patients have said that staying for long periods with the knee flexed can worsen pain or joint stiffness. Patients should state if they have a history of knee surgeries or injuries, how physical they are at present and if this has changed in any way [7]. Knee overuse syndrome is commonly associated with PFPS. Knee buckling is usually caused by quadriceps weakness or pain, which results in a transient reduction of muscle tone as opposed to intrinsic laxity of the knee joint [8]. The degree of pain variation across PFPS patients, if pain varies throughout distinct functional tasks, and whether asymptomatic controls exist during those tasks are yet unknown. Researchers discovered significant differences in pain levels during daily activities when comparing people with PFPS to those who are asymptomatic. Tasks as seemingly basic as crouching, climbing stairs, or prolonged sitting can cause intense pain for persons with PFPS, significantly limiting their ability to perform daily tasks [9]. All people who have knee pain should get a physical exam. It is not common for PFPS to have large joint effusions, erythema, or elevated temperature. It may indicate infection, severe trauma, or inflammatory arthritis. A meta-analysis revealed that the physical examination finding that was most sensitive for PFPS was pain when squatting, and the highest positive likelihood ratio was seen in a positive patellar tilt test. The study also looked at the effectiveness of routinely used physical examination tests in diagnosing PFPS. Female gender is a risk factor, as are activities like sprinting, crouching, and stair climbing. The study found that decreasing quadriceps strength increases the incidence of PFPS, possibly due to patellar instability. One of the many possible causes of patellar instability is a sprained knee. Another PFPS-related process is dynamic valgus. Dynamic valgus occurs when there is significant valgus or internal-external rotation causing the knee to collapse medially. As a result, the patella experiences more lateral stress, which contributes to poor tracking. Female athletes are more

likely to have dynamic valgus, which could explain their increased prevalence of PFPS [10]. The femur's trochlea and patella are joined by the patellofemoral joint and play a crucial role in Patellofemoral pain syndrome. Anterior knee discomfort in outpatient settings is frequently caused by patellofemoral pain syndrome (PFPS) in youngsters and adults under the age of 60 [11]. The incidence in the United Kingdom is between 3% and 6%. Anterior knee pain or surrounding it is a hallmark of PFPS, which worsens with weight-bearing activity. PFPS pain can intensify with prolonged seated or stair-climbing. Pain felt when squatting is the most significant physical test finding. PFPS may be related to patellar mal-tracking. Patellar mal-tracking, or sideways translation, is more common in PFPS patients when they are in load-bearing postures like squatting [12]. Although PFPS is a clinical diagnosis, imaging can assist in excluding other possible causes of knee discomfort. If pain doesn't go away after 4 to 8 weeks of conservative therapy, imaging might be necessary. Osteoarthritis can be ruled out with simple radiography of the knee in persons over the age of 50, patellar fractures in trauma patients, and osteochondritis whether it appears from the physical assessment or the history. It can be quite helpful to have anterior-posterior, sideways, and sunrise/merchant views. Magnetic resonance imaging results of lesions in the bone marrow, excessive fat pad signal, and small abnormalities in the patellar cartilage do not suggest PFPS. Therefore, imaging is recommended for PFPS [13]. Healthcare practitioners now have a better understanding of the complexities of PFPS, allowing them to guide patients towards long-term rehabilitation. A multimodal approach that includes multiple interventions has been recognized as the most effective method for managing this condition and improving quality of life [14]. A comprehensive care strategy that includes concentrated physical therapy and exercises, as well as biomechanical anomalies and training regimen adjustments, can help persons with PFPS increase mobility, reduce pain, and restore independence. As musculoskeletal research develops, so will our understanding of PFPS, paving the way for more tailored and effective treatments. This is why patellofemoral pain syndrome, is an illness that decreases quality of life because of low functional capacity and pain that arises in the knee joint in young athletes. Therefore, it is crucial to quantify the extent of pain and limitation of function in a subject with PFPS to enable the design of adequate treatment and regimens. Those offering health care are likely to be in a position to deliver the rehabilitation programs that would address the various risks, and promote regaining strength and, in general well-being, through critiquing of such performances. In addition, this evaluation can also increase the existing body of knowledge regarding the effectiveness of different treatment approaches in the case of PFPS that will in the long run improve the compassion for PFPS patients.

This study aimed to evaluate pain and functional status in participants with patellofemoral pain syndrome.

## METHODS

A cross-sectional survey was done among participants attending Mayo Hospital Lahore, and the University of Lahore Teaching Hospital for the period of 20<sup>th</sup> January 2024 to 20<sup>th</sup> July 2024. Permission from the ethics committee of the University of Lahore Teaching Hospital was obtained before the start of this study (REC Number: 388/24) and (Reference Number: REC-UOL-/388/08/24). Before beginning the data collection process, informed consent was obtained. Religious and cultural factors were appropriately considered while gathering data. The total sample size calculated through the open epi tool was 87 using the formula  $n = [DEFF * Np(1-p)] / [(d2/Z21-\alpha/2*(N-1) + p*(1-p)]$ . The % frequency of outcome factor in the population was 6% taken from a previous study [15]. Both male and female patients between the ages 20 to 40 years with a positive patellar grind test and anterior knee discomfort that has persisted for two to three months and is worsened by walking, climbing stairs, or spending extended amounts of time sitting were included in this study [16]. The participants with recently sustained trauma or fracture, acute illness, knee replacement, a tumour or infection surrounding the knee, rheumatoid arthritis, pregnancy, joint excessive mobility, any deformity, and disease of the patellar tendon were excluded. For the assessment of pain, a numeric pain rating scale was used. Extreme values on the Numeric Pain Rating Scale (NPRS) range from "no pain" to "severe pain," on a horizontal or vertical line of scale. The NPRS can be self-reported or given by a physician. The NPRS is a pain scale that ranges from zero (no pain) to ten (worst suffering). This scale has high reliability (0.84-0.92) and high validity (0.83=0.94). For the assessment of functional outcomes, the kujala score was used. Kujala score has high reliability (0.83-0.98) and validity (0.90-0.92). It has thirteen items that assess several elements of knee function, such as quadriceps strength, oedema, instability, and pain during exercises. Higher scores indicate improved knee function. Each item is scored, and the overall score runs from 0 to 100. Based on the total score, functional outcomes are classified as poor (0-49), fair (50-69), good (70-89), or outstanding (90-100), offering a thorough evaluation of how knee pain impacts everyday activities and overall knee health [17]. Data were analyzed by IBM SPSS Statistics 25.0. Whereas all qualitative factors were shown as frequency and percentages, all quantitative data were provided as Mean  $\pm$  S.D. The correlation was measured by Pearson's correlation coefficient.

## RESULTS

The mean score of numeric pain rating scale was  $6.31 \pm 1.56$

and the mean kujala score was  $46.37 \pm 10.36$ . Descriptive statistics of pain and functional outcomes of participants are given in table 1.

**Table 1:** Descriptive Statistics of Pain and Functional Outcomes of Participants

Variables	Mean $\pm$ S.D
NPRS	6.31 $\pm$ 1.56
Kujala	46.37 $\pm$ 10.36

It showed that the mean age of participants was  $30.68 \pm 5.62$  years. Out of 87 participants, 46 (52.9%) were male and 41 (47.1%) were female. The demographic profile of participants is given in table 2.

**Table 2:** Demographics of Participants

Variables	Mean $\pm$ S.D	
Age (In Years)	30.68 $\pm$ 5.62	
Gender n (%)	Male	46 (52.9%)
	Female	41 (47.1%)

Out of 87 participants, 6 (6.9%) had mild pain, 62 (71.3%) had moderate pain and 19 (21.8%) had severe pain. The pain categories of participants are shown in table 3.

**Table 3:** Pain Categories of Participants according to numeric pain rating scale

Variables	Mean $\pm$ S.D
Mild Pain	6 (6.9%)
Moderate Pain	62 (71.3%)
Severe Pain	19 (21.8%)
Total	87 (100.0%)

The NPRS and Kujala Score have a very weak, non-significant linear association, according to the Pearson correlation of 0.049 with a p-value of 0.655. The correlation of the NPRS and the Kujala Score is shown in table 4.

**Table 4:** Correlation of NPRS and Kujala Score

Correlations		Pain	Kujala Score Total
Pain	Pearson Correlation	1	0.049
	Sig. (2-tailed)	-	0.655
	N	87	87

## DISCUSSION

Understanding the effects of patellofemoral pain syndrome (PFPS) and creating successful treatment plans need measuring the pain and functional outcomes in affected individuals. The present research comprised 87 participants with an average age of 30 years old. It also gives useful information on the degree of pain and the level of functional disability observed in PFPS. In the patients of the current study, the mean NPRS was  $6.31 \pm 1.56$ , which, according to the specified scale, can be considered as a moderate-severe amount of pain. This agrees with research that was conducted by Shabnam et al., in which participants had NPRS scores of about 6.5 patients of similar age to the patients in this study to confirm that pain

levels represented in our sample are mean amongst PFPS patient population. Furthermore, our pain severity classification revealed that 6.9% of participants experienced light pain, 71.3% reported moderate pain, and 21.8% reported severe pain. These distributions indicate the significant pain burden that PFPS is associated with. The lower mean NPRS score of 5.2 reported by Greaves *et al.*, could have been due to variations in the sample characteristics, such as the inclusion of fewer severe cases or discrepancies in the length of symptoms. This gap highlights the potential influence of PFPS chronicity and patient selection factors on self-reported pain levels [18]. Patients in our study had an average Kujala score of  $46.37 \pm 10.36$ , suggesting significant functional impairment. Yanez *et al.*, discovered a mean Kujala score of around 48, which is consistent with our findings and suggests that our patients' functional limits were comparable. Our findings show that PFPS has a considerable impact on daily activities and overall knee function, as measured by the Kujala score, a comprehensive measure of knee function [19]. However, Prieto *et al.*, study found that Kujala scores were higher, averaging around 52. The higher functional outcomes found in this study could be attributed to a longer rehabilitation program, the use of patients with fewer severe symptoms, or variations in intervention strategies. These discrepancies illustrate the need to take into account each study's technique and environment when comparing functional outcomes [20]. In our study, the gender distribution was 47.1% female and 52.9% male. This is in contrast to other studies by Sanchis *et al.*, which discovered a higher prevalence of PFPS in females [21]. The nearly equal representation of our sample guarantees a gender-neutral assessment of functional results and discomfort. However, it's crucial to keep in mind that variations in gender about biomechanical elements, activity levels, and pain perception could affect how severe and persistent the PFPS is. The majority of our study subjects reported substantial discomfort, which is consistent with earlier research highlighting the chronic and debilitating nature of Patellofemoral pain syndrome. For example, our findings are comparable with those of Jayaseelan *et al.*, who discovered that a large proportion of PFPS patients experienced moderate to severe discomfort [22]. The large number of study participants who experienced moderate pain highlights the significant impact of PFPS on quality of life and the necessity for adequate pain management strategies. The NPRS and Kujala Score have a very weak, non-significant linear association, according to the Pearson correlation of 0.049 with a p-value of 0.655. This implies that there is no significant correlation between these two measures and that changes in pain intensity (as determined by NPRS) are not linked to modifications in functional outcomes (as determined by Kujala Score). The lack of correlation

supports the theory that the Kujala Score and NPRS measure different aspects of knee health, with the latter measuring functional outcomes and the former focusing on pain severity. This may suggest that patients' stated pain levels on the NPRS are not indicative of or a predictor of their functional limits as determined by the Kujala Score.

## CONCLUSIONS

It was concluded that this study had a significant impact of patellofemoral pain syndrome on pain levels and functional outcomes in affected individuals. The findings reveal moderate to severe pain and considerable functional impairment, emphasizing the chronic and debilitating nature of PFPS.

## Authors Contribution

Conceptualization: AH,

Methodology: AH, WA, YM, AM, HMW

Formal analysis: AH, MKN, AZ

Writing review and editing: MA, AZ

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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