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CORRELATION BETWEEN PATELLOFEMORAL PAIN SYNDROME AND SELECTED RISK FACTORS IN THE GENERAL POPULATION- A CROSS SECTIONAL STUDY

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ABSTRACT

Background : Patellofemoral Pain Syndrome (PFPS) is one of the most common causes of anterior knee pain, especially among young adults. Several modifiable and non-modifiable factors such as BMI, Q-angle, and pain intensity may influence the occurrence and severity of PFPS. However, the relationship between these factors and functional disability remains inadequately explored in general populations.

Aim: To determine the prevalence of PFPS in the general population and to examine the correlation between selected risk factors (BMI, Q-angle, and VAS) and functional disability assessed using the Kujala Anterior Knee Pain Scale.

Methodology: A cross-sectional study was conducted on 100 participants aged 20–40 years in the physiotherapy outpatient department of a multispeciality hospital. BMI, Q-angle, and pain intensity (VAS) were recorded, along with functional disability using the Kujala Score. Data were analyzed using descriptive statistics and Karl Pearson correlation.

Results: A strong negative correlation was found between Kujala Score and BMI ($r = –0.94$), Q-angle ($r = –0.92$), and VAS ($r = –0.91$). Higher BMI, increased Q-angle, and higher VAS scores were associated with poor knee function.

Conclusion: The study demonstrates that BMI, Q-angle, and pain intensity are strongly associated with PFPS severity. Early identification and modification of these risk factors may help prevent functional decline and chronic knee pain.

Keywords : Patellofemoral Pain Syndrome, Kujala Anterior Knee Pain Scale, Body Mass Index, Visual Analog Scale.

INTRODUCTION :

Knee pain is the second most common condition. It is characterized as non-traumatic in nature, with generalized anterior knee pain during joint-loading movements as running, squatting, climbing, and descending stairs (1). Sitting for extended periods of time or going down stairs can exacerbate PFPS pain. Squatting pain is the most sensitive physical examination finding

Patellofemoral pain syndrome appears to be caused by a variety of factors, including changes in the knee's biomechanics during dynamic motions. These biomechanical alterations are frequently caused by weak muscles and inadequate neuromuscular control, which results in an imbalance in the forces controling patellar tracking during knee motions. (2) Overuse, injuries, muscular dysfunction, tight lateral constraints, patellar hypermobility, and inadequate quadriceps flexibility are other factors that may contribute to patellofemoral pain syndrome.

The patella, the largest sesamoid bone in the human body, protects the tibiofemoral joint and increases flexion efficiency. (3) The patella is stabilized by the quadriceps tendon, lateral retinaculum, medial retinaculum, and patella tendon. Five major genicular arteries the superior medial and lateral, intermediate, and inferior medial and lateral genicular arteries form a vast network of anastomoses that deliver arterial blood to the knee.

RISK FACTORS:

1. Adult Age Group
2. Gender.
3. Obesity.
4. Poor Lower Limb Alignment.
5. Functional Ability.

MATERIAL AND METHODOLOGY

MATERIALS USED FOR THE STUDY

- Consent form.
- Data collection form.
- Pen.
- Paper.
- Visual Analog Scale (VAS).
- Kujala Anterior Knee Pain Scale.
- Goniometer.
- Weight machine.
- Stadiometer or inch type.

STUDY DESIGN

A Cross Sectional Observational Study.

STUDY DURATION

The study duration was about 6 months.

STUDY SETTING

The study was carried out in the outpatient physiotherapy department, Sri Ramakrishna Multi Speciality Hospital.

SAMPLING METHOD

Purposive Sampling method.

SAMPLING SIZE

A total sample of 100 participants were selected based on inclusion and exclusion criteria.

CRITERIA FOR SAMPLING

Inclusion criteria :

- Age group of 20 to 40 years.
- Both gender.
- Individual experiencing pain during ascending and descending stairs.
- Individual experiencing pain during Prolonged standing.
- Individual experiencing pain during Physical activity such as squatting, kneeling, running, or jumping.

Exclusion criteria:

- History of knee trauma or dislocation.
- History of previous knee injury.
- Presents of Ligamentous instability of the knee.
- Individual diagnosed with OA knee.
- Presence of Hip or Spine pathology.

VARIABLES

Dependent variable :

Kujala Anterior Knee Pain Scale (AKPS).

Independent variable :

- BMI.
- Pain.
- Q – angle.

ASSESSMENT TOOLS

- Body Mass Index (BMI).
- Goniometer.
- Visual analog scale.
- Kujala anterior knee pain scale.

PROCEDURE

A cross-sectional observational study was conducted among individuals who met the inclusion criteria. After obtaining ethical clearance from the institutional review board, the study was carried out in the Physiotherapy Outpatient Department of Sri Ramakrishna Multi Speciality Hospital.

Participants aged 20–40 years who presented with symptoms related to patellofemoral pain during activities such as stair climbing, prolonged standing, squatting, kneeling, running, or jumping were screened. Eligible participants were informed about the purpose of the study, and written informed consent was obtained.

Demographic details including age, gender, occupation, and duration of symptoms were recorded using a structured data collection sheet. Anthropometric measurements were taken first: height was measured using a stadiometer, and body weight was recorded with a weighing machine. Body Mass Index (BMI) was calculated using the formula weight (kg)/height (m^2).

Q-angle was measured using a universal goniometer with the participant in a standing position. Anatomical landmarks—the Anterior Superior Iliac Spine (ASIS), the center of the patella, and the tibial tuberosity—were identified and marked. The angle formed between the line from the ASIS to the patella and the line from the patella to the tibial tuberosity was recorded as the Q-angle.

Pain intensity was assessed using the Visual Analogue Scale (VAS). Participants were asked to rate their knee pain on a 10-cm scale ranging from “no pain” to “worst possible pain.”

Functional knee ability was evaluated using the Kujala Anterior Knee Pain Scale, which includes items related to activities such as walking, running, jumping, squatting, and prolonged sitting.

All measurements were taken by a single assessor to minimize inter-observer variability and measurement bias. The recorded data were entered into a structured sheet and analyzed using descriptive statistics and Karl Pearson correlation to determine the relationship between PFPS severity and the selected risk factors (BMI, Q-angle, and VAS).

RESULTS :

A correlation analysis was conducted to examine the relationship between the Kujala Score and the selected risk factors, including Body Mass Index (BMI), Q-angle, and pain intensity (VAS).

There was a very strong negative correlation between BMI and the Kujala Score, $r = –0.94$, indicating that individuals with higher BMI had lower Kujala Scores, reflecting greater functional impairment.

A strong negative correlation was observed between Q-angle and the Kujala Score, $r = –0.92$, suggesting that an increased Q-angle was associated with greater severity of patellofemoral pain syndrome and reduced functional knee performance.

Pain intensity (VAS) also demonstrated a strong negative correlation with the Kujala Score, r = –0.91, indicating that higher pain levels were associated with poorer knee function and increased disability.

Overall, the findings indicate that all three selected risk factors—BMI, Q-angle, and pain intensity (VAS)—showed a strong inverse relationship with functional knee performance as measured by the Kujala Score. These results suggest that increases in these risk factors are associated with greater functional impairment in individuals with patellofemoral pain syndrome.

DISCUSSION

The findings of this study indicate a strong association between PFPS severity and the selected risk factors—BMI, Q-angle, and pain intensity. The strong negative correlation between BMI and Kujala Score supports existing evidence that increased body weight triggers greater patellofemoral joint compression, leading to pain and functional limitations.

Similarly, increased Q-angle demonstrated a significant negative correlation with Kujala Score, aligning with previous literature stating that altered knee alignment increases lateral patellar tracking and joint stress. This supports the biomechanical theory that structural misalignment greatly contributes to PFPS.

Pain intensity (VAS) was also strongly correlated with disability, consistent with studies highlighting that higher pain reduces quadriceps activation, impairs movement, and increases activity avoidance. This reinforces that subjective pain level is a reliable predictor of functional impairment.

The results collectively indicate that PFPS is multifactorial and influenced by both biomechanical and modifiable lifestyle factors. Early screening of these variables in the general population may help prevent the progression of PFPS into a chronic pain condition.

CONCLUSION

This study concludes that BMI, Q-angle, and pain intensity was significantly associated with the severity of Patellofemoral Pain Syndrome in adults aged 20–40 years. Individuals with higher BMI, increased Q-angle, and higher pain levels show reduced functional ability according to the Kujala Anterior Knee Pain Scale.

Early identification and targeted physiotherapy interventions addressing weight management, alignment correction, strength training, and pain control may help minimize PFPS-related disabilities.

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