EFFECT OF PATELLOFEMORAL PAIN ON THE KNEE STRENGTH, MOMENT, AND COP DURING DROP LANDING IN ADULT FEMALES

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INTRODUCTION

Patellofemoral pain (PFP) can develop due to knee overuse and internal or external factors, and it results in knee instability and pain, and is generally more common in females than in males (Vora et al., 2017). The exact cause of PFP is uncertain, but weakened quadriceps, greater Q-angle, patellar instability, and other factors can be cause of PFP (Sick et al., 2019). PFP has many noncontact factors, such as jumping-landing maneuver, running, and switching directions, in addition, jumping-landing maneuver is the major cause of PFP (Cho et al., 2011).
Accordingly, it is important to define knee strength difference in PFP and normal, and that how to perform jumping-landing maneuver in female PFP patients.

PURPOSE

This study investigated the effects of patellofemoral pain on knee strength which can effect on knee moment and center of pressure during drop landing in adult females.

METHODS

Participants

30 adult females were divided in to the PFP group (n=15, Age 23.13±2.77 yrs, Height 160.97±3.79 cm, Weight 51.19±4.86 kg) and normal group (n=15, Age 22.80±2.54 yrs, Height 164.40±5.77 cm, Weight 56.14±8.16 kg), with 15 participants in each group. Their dominant leg was the right side, and they did not have lower limb injuries over 1 year.

Experimental Design

To examine the differences of knee isokinetic peak torque and relative strength between the PFP and normal group, we used the Isokinetic Extremity System (Humac Norm Testing and Rehabilitation, CSMi Solution, USA).

To collect the knee moment and center of pressure data during drop-landing, Motion Capture System (6 Eagle and 2 Raptor cameras, Motion Analysis Corp., USA), and 2 ground reaction force devices (OR6-5-2000, AMTI Inc., USA) were used.

Measurement

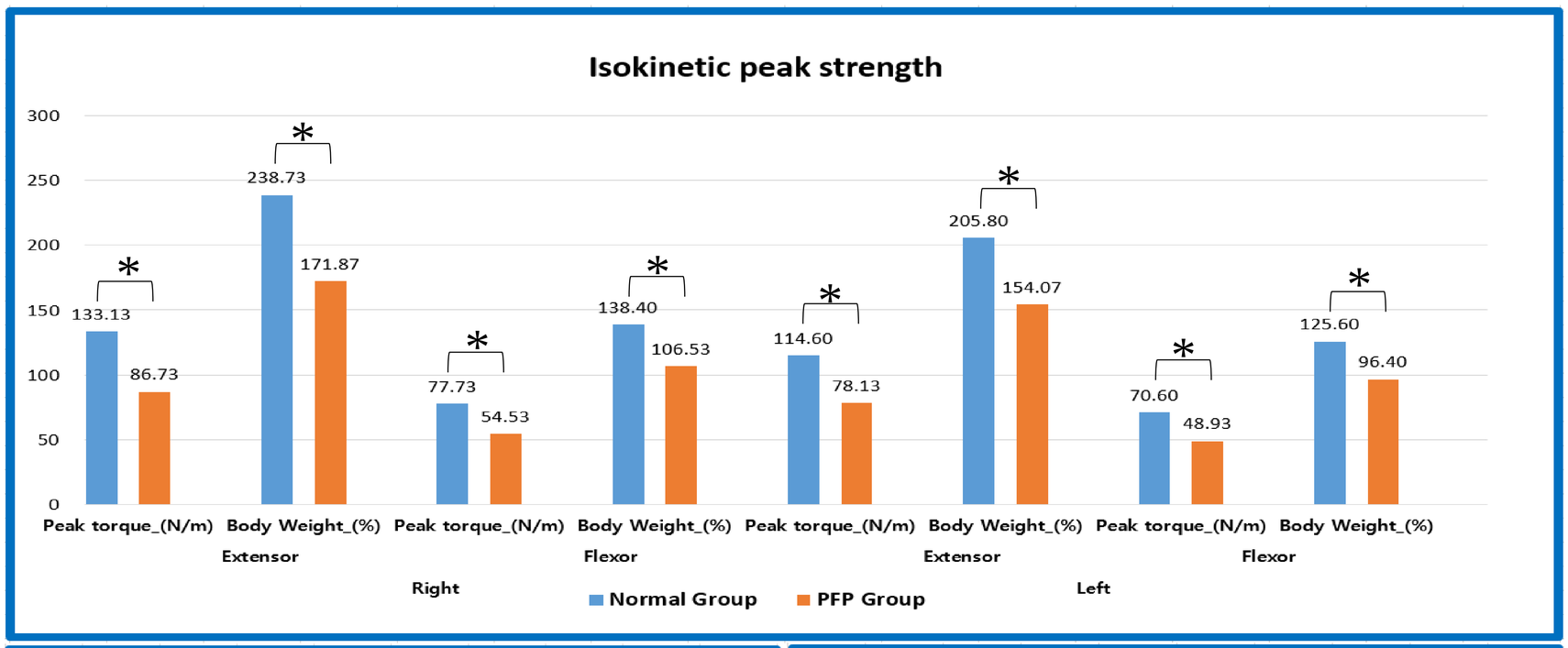
Knee isokinetic peak torque and relative strength, Knee moment and anteroposterior center of pressure (COP) during drop-landing at the point of the vertical peak ground reaction force at initial contact during drop landing.

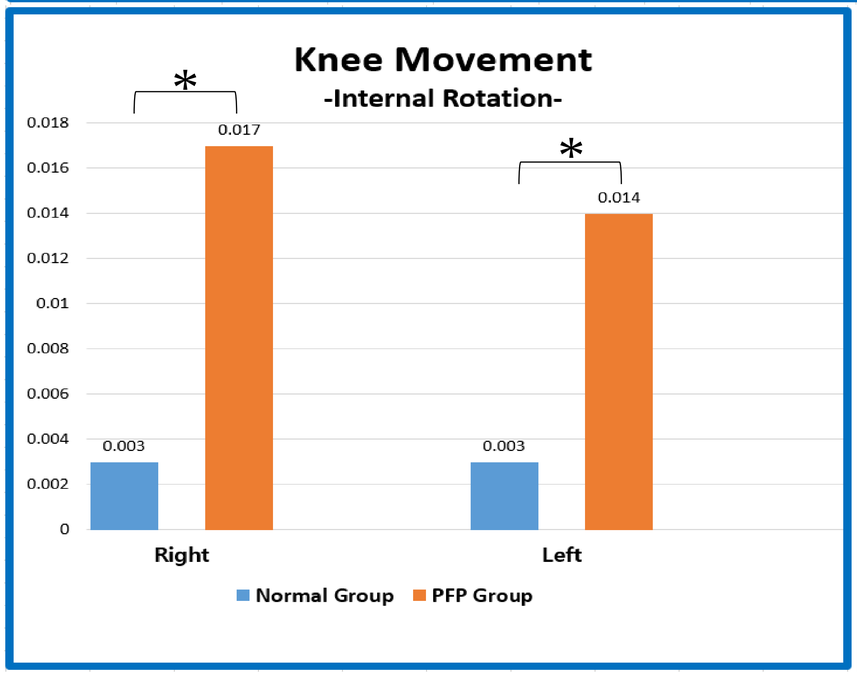
Data Analysis

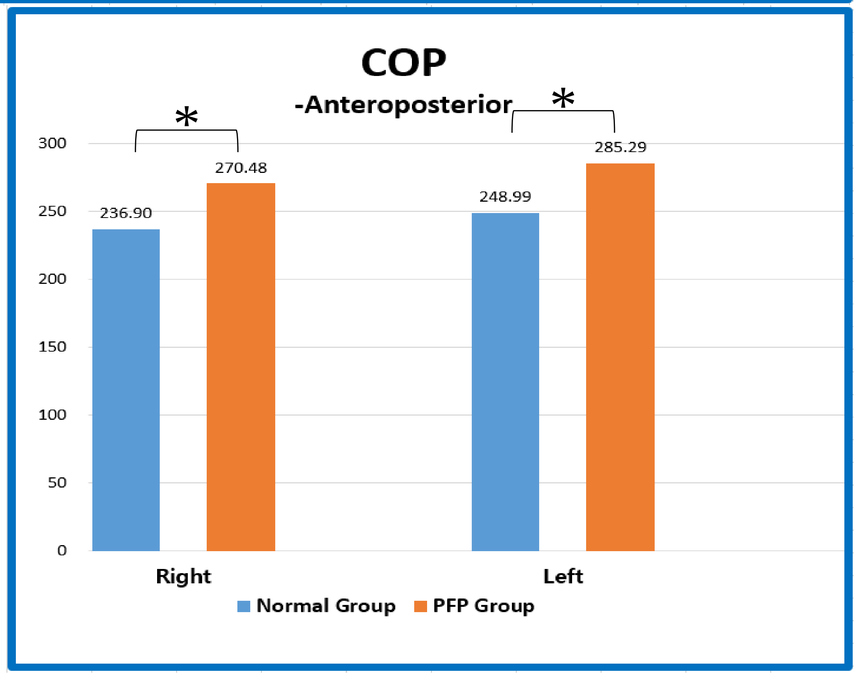
Data were analyzed with the SPSS statistical package (SPSS 25.0, IBM, USA). An independent-samples *t*-test was used to analyze the measurements for comparison between the groups, and all data are shown as mean and standard deviation. Statistical significance was defined as $p < .05$.

RESULTS

Peak torque and relative strength were significantly weaker in the PFP group than normal group ($p < 0.01$). Knee internal rotation moment was significantly greater in the PFP group than normal group ($p < 0.05$). In addition, the anteroposterior COP was significant difference between the groups ($p < 0.05$).







DISCUSSION

In this study, the PFP group had significantly weaker peak torque and relative strengths than the normal group. Moreover, the PFP group had weakened knee extensors and flexors, therefore, we speculate that this was the cause of the unstable landing pattern. The results of knee moment showed that the PFP group had greater knee internal rotation moment than normal group. This moment pattern can cause more stress to the knee joints (Kiapout et al., 2016). In addition, the PFP group had a leaned more forward anteroposterior COP than the normal group. This kind of COP can show chronic ankle instability during balance in instability conditions (Pope et al., 2011). Therefore, we can speculate that the PFP group had unstable COP during drop landing.

CONCLUSION

The patients with PFP had knee strength weakness, and it could result in an unstable landing pattern and cause of more stress in the knee joints.

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