



Effect of Patellar Tendon Straps on Knee Joint Moments During a Drop-Jump



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Background

- Patellar tendinopathy (PT) is defined as anterior knee pain with patellar tendon tenderness during physical activity, commonly occurring in jumping activities.¹ PT is especially prevalent in jumping sports such as basketball and volleyball, and 1 in every 5 elite athletes suffer from PT.²
- Common treatments include strapping for pain relief. Some symptomatic individuals have reported reduced pain when using patellar tendon straps. The simple design and affordable cost encourages use, but little biomechanical evidence supports their effectiveness.
- Past studies have demonstrated decreased knee moments in subjects with PT compared to controls, suggesting reduced loads at the patellar tendon and increased loads at the hip;³ however, few studies have examined how patellar tendon straps affect knee moments and provide symptomatic relief.

Purpose

- To determine if there are differences in sagittal plane knee moments during a drop-jump between 3 types of patellar tendon straps and a control condition: Cho-Pat strap, Matt strap, pre-wrap, and no strap (Figure 1).
- We hypothesized patellar tendon strap groups would demonstrate significantly lower knee moments than the control group.



Figure 1. Left to right: Cho-Pat strap, Universal Matt Strap, and pre-wrap

Participants

- 22 volunteer recreational athletes who self-reported at least 90 minutes of exercise per week with no history of knee pain.
- 11 males, 11 females. Age 20.5 ± 1.7 years, height 173.0 ± 8.7 cm, mass 71.1 ± 11.7 kg.

Interventions and Measures

- Participants completed an injury history and activity questionnaire. Anthropometrics were measured, and the dominant limb was used as the test leg. Limb dominance was defined as the preferred limb used to kick a ball.
- Participants drop-stepped off a 40cm box onto 2 force plates (Bertec Corp., Columbus, OH, 1200 Hz), landed on 2 feet, and immediately performed a maximum vertical jump. Lower extremity kinetics and kinematics were collected with a motion capture system (Vicon-MX40, Vicon, Oxford, UK, 120 Hz), and 5 trials were performed for each strapping condition. Condition order was counterbalanced.
- Sagittal plane knee moments were calculated from Workstation Software (OMG Plc., London, UK) using inverse dynamics and scaled to body mass. 3 trials were averaged.
- One-way repeated measures analyses of variance ($p < .05$) were utilized to compare joint moments among strapping conditions.
- Post-hoc testing used pairwise comparisons ($p \leq 0.05$) to identify specific differences among the four conditions.

Results

- The Cho-Pat strap demonstrated significant reduction in knee extensor moment (0.69 ± 0.17 Nm/kg) compared to the control (0.99 ± 0.13 Nm/kg, $p = .01$), Matt strap (1.01 ± 0.17 Nm/kg, $p = .02$) and pre-wrap (1.05 ± 0.20 Nm/kg, $p = .02$) conditions.
- No differences were seen in hip and ankle moments for all strapping conditions.

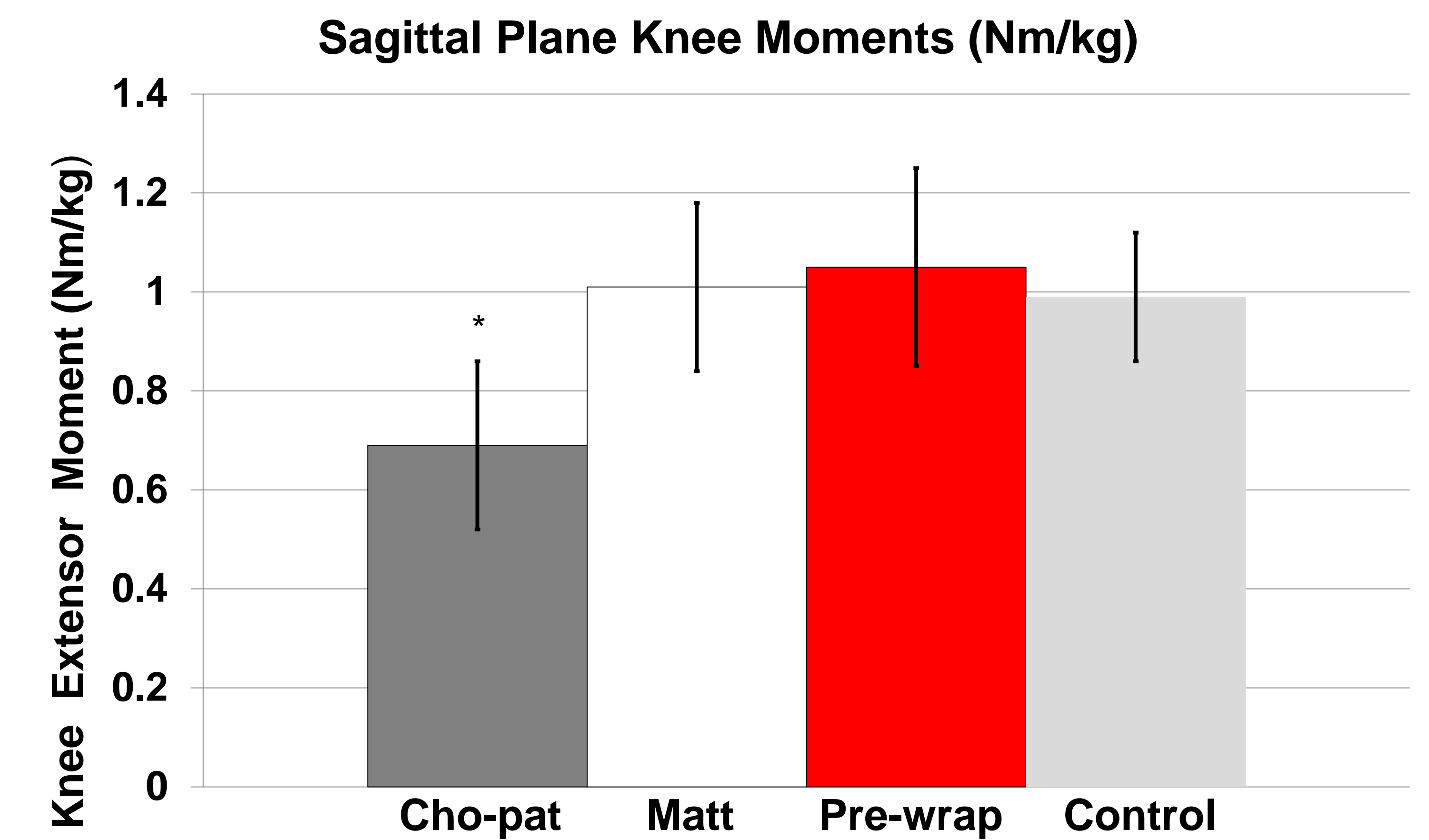


Figure 2. Knee moments (Nm/kg) for Cho-Pat, Matt strap, pre-wrap, and control conditions. *Cho-Pat significantly lower knee extensor moment than other conditions ($P < 0.05$).

Conclusions

- Only the Cho-Pat strap appeared to acutely alter knee moments in recreationally active individuals without knee pain.
- The decreased knee extensor moment of the Cho-Pat strap, if due to decreased knee extensor force, which is not yet known, may reflect a mechanism to explain why symptomatic knee pain wearers may report improvement in symptoms.
- Future research may focus on individuals suffering from symptomatic patellar tendinopathy to identify movement alterations and potential benefits of use when wearing patellar tendon straps.

References

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