EVALUATION OF PATELLAR TENDON MECHANICAL PROPERTIES AND THE PREFERRED LANDING LEG IN ELITE JUMPING ATHLETES

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INTRODUCTION: The purpose of this investigation was to evaluate patellar tendon (PT) mechanical properties in healthy, elite jumping athletes and the association with their preferred landing leg.

METHOD: Elite athletes (N=38) free of musculoskeletal pain were recruited from the Australian Institute of Sport, Australia. Subjects included 11 male volleyballers (MVB) (mean (SD) age (years), height (m) and weight (kg)) (17.5 (0.1), 2 (0.1) and 91.6 (8.9)), 13 male basketballers (MBB) (17.2 (1), 2 (0.1) and 87 (13)) and 14 female basketballers (FBB) (17 (0.8), 1.8 (0.1) and 78.1 (10.6)). Diagnostic ultrasound (US) (12MHz transducer, Nemio, Toshiba, Japan) was used to record the PT cross-sectional area. Ramped maximal voluntary isometric knee extension contraction (MVIC) at 90° knee flexion was performed (KinCom dynamometer, Chattanooga, USA). Knee torque and PT length, from inferior pole of the patella to the tibial tuberosity (Image J software http://rsb.info.nih.gov/ij/download.html), were determined at rest and 10% MVIC increments. PT force was calculated as knee extension torque divided by PT moment arm length, measured utilising a custom-made caliper (ICC = 0.7). PT mechanical properties (strain, stress, stiffness and elastic modulus) were calculated at 10% increments from 0 to 100% MVIC effort. T-tests were performed for inter-side and group comparisons. Sporting groups were stratified by landing leg as either left preferred landing leg (LPLL) or right preferred landing leg (RPLL).

RESULTS: In MVB the left and right PT are less stiff for the LPLL group compared to the left and right PT of the RPLL group (p ≤ 0.02) only at sub-maximal efforts in MVB (Table 1).

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<tr>
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<th>Left preferred landing leg</th>
<th>Right preferred landing leg</th>
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<tbody>
<tr>
<td>Left (40-80% MVIC)</td>
<td>(p &lt; 0.02) 0.83 (0.15)</td>
<td>1.16 (0.23)</td>
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<tr>
<td>Right (20-80% MVIC)</td>
<td>(p &lt; 0.02) 0.68 (0.10)</td>
<td>1.09 (0.37)</td>
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PT strain, stress, stiffness and elastic modulus were no different between sides for MVB, MBB or FBB, or between LPLL and RPLL groups in MBB (n=11 for LPLL and n=2 for RPLL) or FBB (n=8 for LPLL and n=6 for RPLL).

DISCUSSION: In volleyball, where there is a greater prevalence of jumper's knee than basketball (Lian Ø.B. et al, 2005), exposure to a sport-specific PT loading strategy may contribute to differences in PT mechanical properties based on the preferred landing leg.

CONCLUSION: This preliminary investigation may demonstrate sport-specific PT loading strategy observed as a difference in PT stiffness based on the preferred landing leg.

REFERENCES: