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Determining the isometric hip abduction and adduction profile in a competitive surfing cohort

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Background

- Previous injury epidemiology research has shown the knee to be an injury prone region within competitive surfers



Frequency of acute knee injury ranges from 19-35%^{1,2,3}

- Research supports the influence that hip strength has on knee alignment and subsequent injury⁴
- It is theorized that the long hip abductors and adductors may provide mechanical support to the medial and lateral knee



- Minimal scientific research has been conducted specific to the hip region in a competitive surfing cohort

Purpose

- The primary aim of this study was to profile the isometric hip abductor and adductor muscle strength of competitive surfers using a clinical assessment method
- A secondary aim was to compare the surfing cohort to a group of age matched recreational athletes

Methods

- A cross sectional study design was used
- A total 14 elite surfers were recruited from the Surfing Australia High Performance Centre (4 females)
- 21 recreational athletes were recruited from Bond University (4 females)

- Hip abduction and adduction isometric strength was measured using a hand-held dynamometer (Commander PowerTrack II™ (Nihon Medix, Matsudo, Japan))



- Abduction (Image A) and Adduction (Image B) strength was measured in supine
- A belt was used to stabilize the participants pelvis
- The examiner maintained a stride stance with the testing elbow positioned against their own iliac spine to limit any movement of the hand-held dynamometer
- The hand-held dynamometer was positioned 5cm proximal to the medial / lateral malleolus



- Two maximal isometric contractions (separated by 10 seconds) were sustained for 3 seconds for each movement and repeated on each side
- The testing order was randomised to test side
- To calculate Torque (Newton/ meters) the lever arm was measure from the Greater Trochanter to 5cm proximal to the malleoli
- Normalised force (newtons per kilogram, N/kg) and torque (newton meters per kilogram, Nm/kg) were derived and compared between groups

Results cont.

Table 1: Demographics

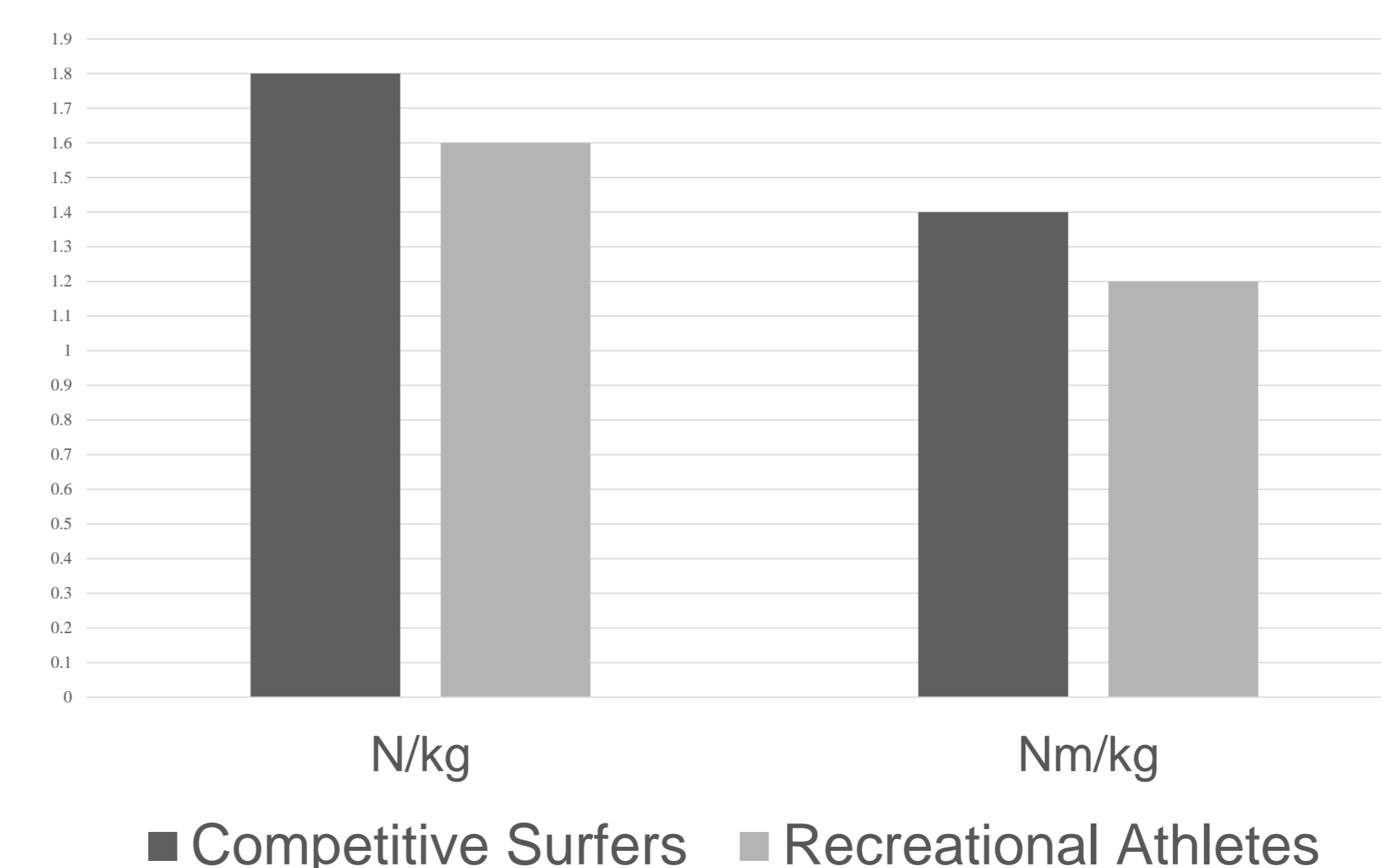
| | Competitive Surfers | Recreational Athletes |
|----------------------------------|---------------------|-----------------------|
| Age (years) | 24.5 ± 6.5 | 25.3 ± 2.7 |
| Weight (kg) | 71.3 ± 8.3 | 80.0 ± 12.4* |
| Land Based Training (hours) | 4.7 ± 2.6 | 5.9 ± 2.5 |
| Weekly Surfing Frequency (hours) | 11.6 ± 4.5 | - |

*The recreational athlete group were significantly (p=0.03) heavier (71.3±8.3 vs. 80.0±12.4 kg) and therefore strength values were normalised based on body weight.

Table 2: Isometric hip abduction and adduction strength profile of competitive surfers (n = 14)

| | Hip Abduction | Hip Adduction |
|---------------------------|---------------|---------------|
| Force (N) | 146.7 ± 32.9 | 131.7 ± 29.9 |
| Normalised Force (N/kg) | 2.0 ± 0.3 | 1.8 ± 0.3 |
| Torque (Nm) | 113.9 ± 26.6 | 102.4 ± 24.9 |
| Normalised Torque (Nm/kg) | 1.6 ± 0.2 | 1.4 ± 0.2 |

Normalised isometric hip adduction force and torque values for competitive surfers and recreational athletes



Results cont.

- No significant differences were identified for Nm/kg and N/kg for abduction between the competitive surfers and the recreational athletes (1.6 vs. 1.6 Nm/kg; 2.0 vs. 2.1 N/kg, respectively)
- As seen in the bar graph, the competitive surfer group displayed significantly higher scores for normalised adduction when compared to the recreational athletes (1.4 vs. 1.2 Nm/kg; p<0.01 and 1.8 vs. 1.6 N/kg; p=0.03, respectively)
- The surfer group exhibited an adduction to abduction strength ratio of 0.9 which was significantly (p<0.01) higher than the recreational athlete group (0.8).

Discussion

This study presents an isometric strength profile for the hip abductors and adductors specific to a competitive surfing cohort.

Results indicate that the competitive surfing cohort had significantly stronger adductors and consequently a higher adduction/ abduction ratio when compared with the recreational athlete group.

Implications

This research provides preliminary information specific to hip abduction and adduction strength in a competitive surfing cohort. The data presented provides a baseline specific to competitive surfers who are involved in both land based training and surfing.

The findings may guide rehabilitation or be used as a bench mark to highlight deficiency. Further research is needed to determine how strength at the hip plays a role in injury prevention and performance enhancement.

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