

Isokinetic profile of the shoulder internal and external rotators in surfers

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Introduction:

Shoulder pain and shoulder instability has been largely associated with overhead sports as swimming, volleyball or baseball (1-2). The measurement of concentric torque and agonist/antagonist ratio of the internal (IR) and external rotators (ER) of the shoulder, has been used to relate the symptoms with altered parameters in this assessment (3). Surfing, as an exponential growing sport, is also considered an overhead sport, since over 50% of the time spent practicing is done by paddling technique (4). To date, there was no study found to evaluate shoulder internal and external rotators isokinetic profile in this population. As so, the aim of this study is to characterize the isokinetic profile of the shoulder internal and external rotators in surfers.

Materials and Methods:

The authors measured bilaterally the shoulder concentric torque and unilateral ratios for the internal and external rotators of 5 male surfers, aged between 19 and 23, who have been practicing for at least 3 years for a minimum of 2,5h per week. The procedure was done in the sitting position with 90° shoulder abduction and 90° elbow flexion (figure 1 and 2) at 60°/s and 180°/s angular speed by means of 3 and 20 repetitions respectively, using an isokinetic dynamometer (Biodex System 3).



Figure 1 - Surfer's positioning and end range of external (A), internal (C) rotations for the left shoulder test procedure (B)

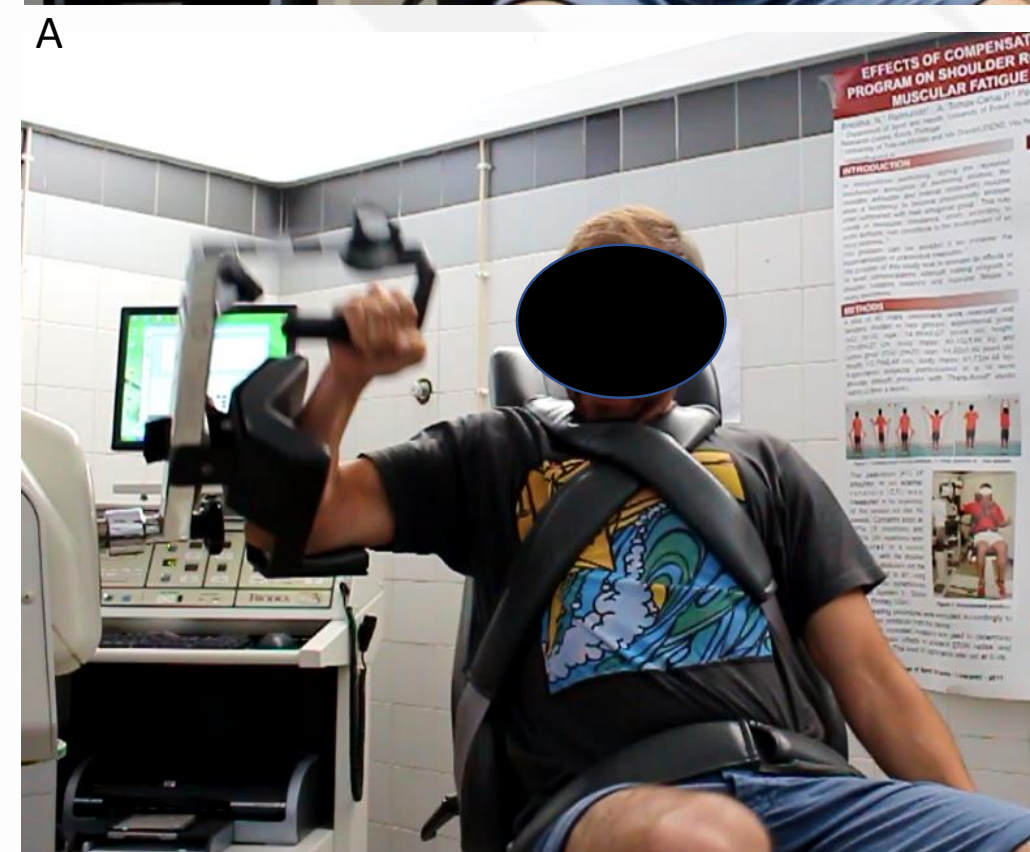
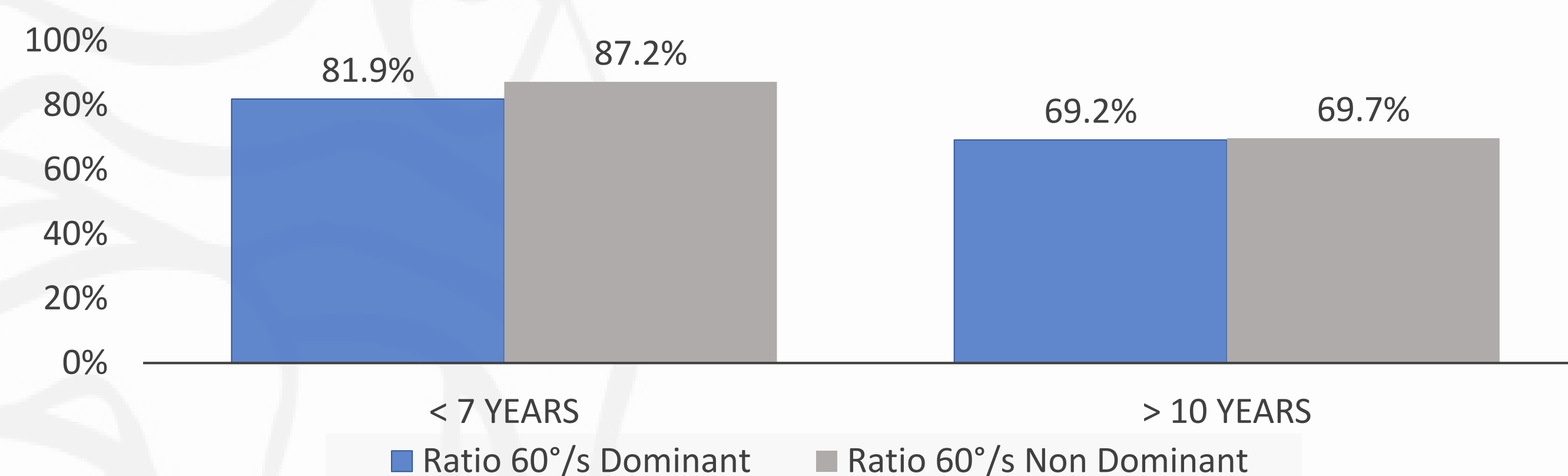


Figure 2 - Surfer's positioning and end range of external (A), internal (C) rotations for the right shoulder test procedure (B)

Results:

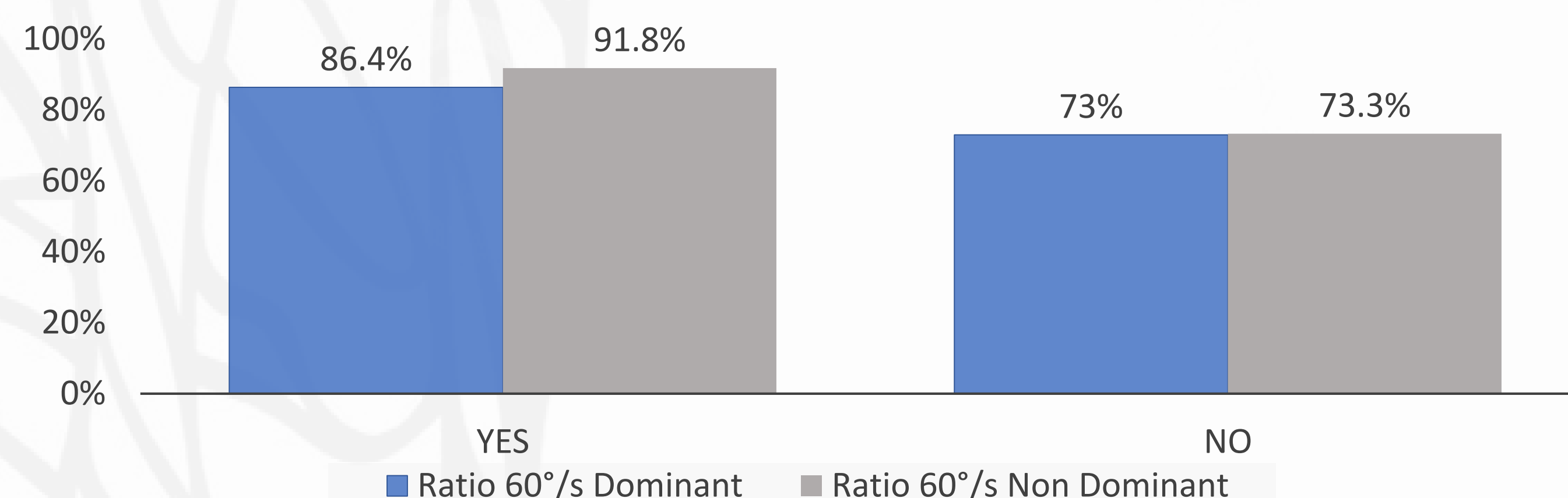
The participants mean age was 22.13±1.78 years, with a BMI of 22.57±2.14 kg/m². Surfers presented for 60°/s concentric torque test of IR of dominant shoulder a 48.73±6.45 Nm and 44.23±11.55 Nm for non-dominant shoulder. Concentric ratio ER/IR at the same speed for the dominant shoulder of 75.53±7.5 % and 78.48±11.69 % for the non-dominant shoulder. At 180°/s concentric torque test of IR of dominant shoulder a 48.08±4.18 Nm and 42.73± 5.21 Nm for non-dominant shoulder. Concentric ratio ER/IR at the same speed for the dominant shoulder of 74.90±8.24 % and 78.55±7.92 % for the non-dominant shoulder. There's a difference between the surfers ER/IR ratio, depending on their surfing experience or other sports/gym practice, showing lower percentage for those who have been surfing the longest or not performing other sport/gym practice (graphic 1 and 2).

Surfing experience vs ER/IR ratio mean



Graphic 1 – Association between surfing experience in years and ER/IR ratio mean for both shoulders for the procedure done at 60°/s

Other sports/gym practice vs ER/IR ratio mean



Graphic 2 – Association between other sports or gym practice vs ER/IR ratio mean for both shoulders for the procedure done at 60°/s

Discussion and Conclusions:

Based on preliminary data, it seems that larger experience (years) is associated with higher shoulder instability. Gym or other sports practice seems to reduce this risk. Surfers obtained higher values for concentric torque of IR and smaller percentage for ER/IR ratio in both dominant and non-dominant limbs when compared to data obtained from other studies with control (non-practice of overhead sport) populations within the same characteristics (5). Studies where ER/IR torque ratio was measured in overhead athletes showed slightly smaller ratios when compared to the surfers (3). This is probably related with the moderate frequency and intensity of training of the surfers in this study when compared with high intensity/frequency of the overhead athletes. The main limitation of the study is the reduced and heterogeneous sample.

References

- McLaine J, Ginn K, Fell W & Bird L. Isometric shoulder strength in young swimmers. *Journal of science and medicine in sport*. 2018; 21(1): 35-39.
- Forthomme B, Croisier L, Delvaux F, Kaux F, Crielaard M, Gleizes-Cervera S. Preseason Strength Assessment of the Rotator Muscles and Shoulder Injury in Handball Players. *Journal of athletic training*. 2018;53(2):174-80
- Batalha P, Raimundo M, Tomas-Carus P, Fernandes M, Marinho A, Silva M. Perfil de força isocinética dos rotadores dos ombros em jovens nadadores. *Rev. bras. cineantropom. desempenho hum*. 2012; 14(5): 545-53.
- Farley O, Harris K & Kilding E. Anaerobic and aerobic fitness profiling of competitive surfers. *The Journal of Strength & Conditioning Research*, 2012; 26(8): 2243-48.
- Lin H, Ko H, Lee K, Chen Y, Wang D. The changes in shoulder rotation strength ratio for various shoulder positions and speeds in the scapular plane between baseball players and non-players. *J. Phys. Ther. Sci*. 2015;27:1559–63.