

## Acute effect of posterior deltoid static stretching on Glenohumeral Internal Rotation Deficit in elite swimmers after competition. A randomized trial

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**Objectives:** The aim of this study was to determine whether a static stretch of posterior deltoid could reduce the glenohumeral internal rotation deficit (GIRD) and the total arc of movement deficit (TAMD) in professional swimmers after competition.

**Methods:** *Participants:* A total of 74 professional swimmers aged from 16-33 years volunteered to participate in the study. Their competition experience were more than 2 years at national level. All the subjects were informed in written and verbal form and signed their informed consent before being assessed. *Design and procedures:* A randomized repeated measures design was used to assess the glenohumeral rotation in 3 moments: prior to the race, just after finishing their trial and after performing a static passive stretch of posterior deltoid muscles of 90-sec. In randomized order the computer selected 20 subjects as a control group (CG) who didn't perform the stretching. The experimental group (EG) included 54 swimmers. The glenohumeral internal and external rotation (IR and ER) were recorded by a video camera (iPhone 6S, version 10.1), in sagittal plane, with the center of the screen at shoulder high. Subjects were laying on supine position over a massage table, with the glenohumeral joint at 90° of abduction, the elbow at 90° of flexion, and the researcher controlling the scapula movements by pushing the shoulder over coracoid apophysis. The App Thechnique (Ubersense ©) was used to measure the glenohumeral rotation degrees between the vertical line (controlled by a plumb) and the forearm segment.

**Results:** The multifactorial ANOVA showed that there were significant differences on GIRD and TAMD between the experimental and the control group performing the stretching  $F_{(2,70)}=49.150$ ,  $P=0.000$ ,  $\eta^2_p=0.992$ . The experimental group reduced the GIRD a 16.2% and the TAMD a 6.7%. The dominant IR mean values changed significantly from  $66.3\pm 12.5$  to  $79.2\pm 10.4$  degrees for EG ( $P=0.00$ ) and non-significantly for CG, from  $74.6\pm 12.7$  to  $77.6\pm 13.9$  degrees ( $P=0.11$ ). The dominant TAM means changed significantly in EG from  $173.2\pm 16.8$  to  $192.0\pm 17.0$  degrees ( $P=0.00$ ) and non-significantly for CG  $181.5\pm 21.7$  to  $188.2\pm 23.3$  degrees ( $P=0.12$ ).

**Conclusion:** To apply a static passive stretching on posterior deltoid during 90-sec reduced GIRD and the TAMD in professional swimmers after competition, which suggest a reduced risk of shoulder injury in these overhead athletes.

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