

EFFECTIVENESS OF A 12-WEEK ELASTIC BAND EXERCISE PROGRAM FOR SWIMMER'S SHOULDER ON ROTATOR CUFF STRENGTH AND BALANCE IN COMPETITIVE SWIMMERS

Nuno Tavares^{1,4,5}, *João Paulo Vilas-Boas*² and *Maria António Castro*^{3,4,5}

¹ Faculty of Sport, University of Porto, and CIEFEL, Porto, Portugal. fnunotavares@gmail.com

² LABIOMEPE-UP, Faculty of Sports, and CIFI2D, University of Porto, Porto, Portugal. jpyb@fade.up.pt

³ School of Health Sciences, ciTechCare, CDRSP, Polytechnic University of Leiria, Leiria, Portugal. maria.castro@ipleiria.pt

⁴ RoboCorp, 12A, Polytechnic Institute of Coimbra, Coimbra, Portugal.

⁵ CEMMPRE, University of Coimbra, Coimbra, Portugal.

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1 INTRODUCTION

Due to many training and competition events, there is a normal tendency during the season for a progressive imbalance of shoulder rotator ratios in elite swimmers [1, 2]. Regarding swimmers, the interval between 0.66–0.75 was considered the non-injury conventional concentric ratio (conER:conIR) [3], and the interval between 0.68–0.86 was considered the non-injury functional ratio (eccER:conIR) [1].

To minimize these natural changes that increase the probability of a swimmer's shoulder injury, compensatory and preventive exercise programs have been implemented in swimmers' weekly training routines [4, 5]. Although recent reviews indicate that strength programs with a few exercises performed out of the water and in an open kinetic chain appear to have better results, there continues to be a lot of heterogeneity about the constitution of preventive exercise programs and their results in rotator cuff strength and balance [5, 6].

The study aimed to verify the differences in the shoulder rotator's peak torque, conventional conER:conIR ratio, and functional eccER:conIR ratio after implementing a 12-week preventive elastic band program for swimmer's shoulder in competitive swimmers.

2 METHODS

A physiotherapist and participants blinded, parallel, randomized controlled trial with two groups was completed from September 2022 to April 2023.

The sample consisted of 20 Portuguese competitive swimmers with a mean age of 19.30 ± 3.25 years, divided through stratified randomization according to the team, sex, and main swimming style into two groups: the experimental group performed an elastic band program with 5 preventive exercises for swimmer's shoulder, twice a week, over 12 weeks, and the control group carried out a sham intervention consisted of 5 shoulder mobility exercises without preventive aim, twice a week, over 12 weeks.

Before (T0) and after (T1) the intervention, concentric and eccentric internal and external rotation peak torques of the non-dominant shoulder were assessed through an isokinetic dynamometer Biodex System 3, at 60°/s, 120°/s, and 180°/s, and posteriorly calculated the conventional and functional ratios. Collected data was previously filtered, windowed, and processed using the Acqknowledge 4.1 software. The Independent Sample T-test or the Mann-Whitney U-test was used to compare differences between the two groups in T0 and T1.

3 RESULTS

Table 1 – Internal and external rotators' peak torque differences between T0 and T1.

		Experimental group (Nm/kg)	Control group (Nm/kg)	p-value
Internal rotation	concentric at 60°/s	0.92	-8.81	0.003*
	eccentric at 60°/s	1.84	-4.32	0.143
	concentric at 120°/s	1.48	-7.65	0.008*
	eccentric at 120°/s	-0.62	-5.35	0.190
	concentric at 180°/s	3.21	-5.88	0.005*
	eccentric at 180°/s	2.44	-7.51	0.014*
External rotation	concentric at 60°/s	-2.35	-5.36	0.173
	eccentric at 60°/s	-0.73	-0.19	0.698
	concentric at 120°/s	-2.69	-4.93	0.277
	eccentric at 120°/s	-1.70	-1.18	0.803
	concentric at 180°/s	-1.40	-4.60	0.133
	eccentric at 180°/s	-1.02	-3.43	0.247

* Statistically significant difference

Table 2 – Conventional and functional shoulder ratios differences between T0 and T1.

		Experimental T0 (%)	Experimental T1 (%)	Control T0 (%)	Control T1 (%)	p-value
Conventional ratio	60°/s	106.23 ± 16.95	90.46 ± 8.50	83.48 ± 15.28	90.98 ± 14.82	0.001*
	120°/s	105.57 ± 17.40	85.88 ± 6.92	82.65 ± 22.95	88.73 ± 16.36	0.004*
	180°/s	112.30 ± 19.02	86.67 ± 10.70	85.25 ± 26.14	91.56 ± 16.58	0.005*
Functional ratio	60°/s	118.27 ± 21.31	108.90 ± 8.63	88.95 ± 27.55	113.70 ± 26.59	0.002*
	120°/s	127.23 ± 29.73	111.90 ± 13.76	92.18 ± 24.43	112.67 ± 20.37	0.011*
	180°/s	150.01 ± 36.04	122.40 ± 16.64	103.66 ± 23.69	122.73 ± 36.19	0.029*

* Statistically significant difference

4 CONCLUSION

The swimmers who performed the sham intervention lost more shoulder internal rotation than the experimental group. No differences were found between groups in the external rotation strength variation over 12 weeks. Considering the non-injury ratio intervals, the experimental group shows an improvement in the rotator cuff balance of the non-dominant shoulder. In turn, the control swimmers have a deviation of the non-injury shoulder ratio intervals. Including a preventive program in a swimmer's weekly routine has good results in rotator cuff strength and balance, one important musculoskeletal risk factor for a swimmer's shoulder injury.

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