

### EFFECTS OF A LATERAL INSPIRATION TRAINING PROGRAM ON BUTTERFLY STROKE PARAMETERS

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The purpose of this investigation was to assess the effects of a lateral inspiration-training program in the stroke cycle parameters on Butterfly.

Eleven university students, 9 males and 2 females, volunteered to participate in this study (mean age  $20.0 \pm 1.0$  years,  $175.1 \pm 7.9$  cm of height and  $71.278 \pm 10.569$  Kg of weight). These subjects followed 9 sessions of 100 minutes each, with the objective of learning and exercising the lateral inspiration on Butterfly stroke. Neither of them had ever made lateral inspiration on Butterfly. The evaluation occurred in at two points in time: one before (pre-test) and another after (post-test) the application of the training program. At each point in time, all subjects made two courses of 20 meters Butterfly, one using lateral inspiration and another adopting frontal inspiration, with a start in the water. Between the 5th meter and the 19th meter (i.e. within 14 meters) an observer recorded the time spent and the number of stroke cycles made. Therefore, the mean velocity displacement ( $V = 14 \cdot \text{time}^{-1}$ ), the mean stroke frequency (SF =  $\text{cycles} \cdot \text{time}^{-1}$ ) and the mean stroke length (SL =  $14 \cdot \text{cycles}^{-1}$ ) according to Pelayo et al. (1997) procedures were analysed, as well as the stroke index (SI =  $V \cdot \text{SL}$ ) as it was proposed by Costill et al. (1985) and Tourny (1992). To determine the significance of the mean differences for each stroking parameter, ANOVA with repeated measures ( $p \leq 0.05$ ) was used.

Table 1 presents the mean values and standard deviations of the stroke cycle parameters analysed using the two inspiration techniques on pre-test and post-test. Comparing the frontal inspiration between pre-test and post-test, the V [F(1; 10)=71.904,  $p < 0.0001$ ] and the SI [F(1; 10)=10.257,  $p = 0.0094$ ] were significantly higher in post-test than in pre-test. Comparing the lateral inspiration between the two moments, the V [F(1; 10)=50.800,  $p < 0.0001$ ], the SL [F(1; 10)=16.622,  $p = 0.0022$ ] and the SI [F(1; 10)=23.161,  $p = 0.0007$ ] were also significantly higher in post-test than in pre-test. On the other hand, comparing the two inspiration techniques, it was possible to assert that, in pre-test the mean values were significantly higher using frontal inspiration than the lateral inspiration on V [F(1;10)=24.324,  $p = 0.0006$ ], on the SL [F(1; 10)=6.834,  $p = 0.0259$ ] and on the SI [F(1; 10)=15.635,  $p = 0.0027$ ]. However, on post-test, only V presented a significant difference [F(1; 10)=9.294,  $p = 0.0124$ ]. V was significantly higher using frontal inspiration rather than lateral inspiration. SF [F(1; 10)=0.016,  $p = 0.9027$ ], SL [F(1; 10)=1.165,  $p = 0.3058$ ] and SI [F(1; 10)=3.301,  $p = 0.0993$ ] did not present significant differences between the two inspiration techniques.

Tab.1. Mean values and standard deviations of the stroke cycle parameters analysed using the two inspiration techniques on pre-test and post-test.

	Frontal Inspiration		Lateral Inspiration	
	Pre-test	Post-test	Pre-test	Post-test
V ( $\text{m} \cdot \text{s}^{-1}$ )	1.454 $\pm$ 0.203	1.603 $\pm$ 0.244	1.315 $\pm$ 0.198	1.537 $\pm$ 0.244
SF (Hz)	0.801 $\pm$ 0.236	0.773 $\pm$ 0.185	0.823 $\pm$ 0.157	0.777 $\pm$ 0.166
SL ( $\text{m} \cdot \text{c}^{-1}$ )	1.945 $\pm$ 0.582	2.161 $\pm$ 0.515	1.635 $\pm$ 0.308	2.043 $\pm$ 0.492
SI ( $\text{m}^2 \cdot \text{c}^{-1} \cdot \text{s}^{-1}$ )	2.832 $\pm$ 1.003	3.495 $\pm$ 1.137	2.170 $\pm$ 0.639	3.192 $\pm$ 1.161

The higher values presented on post-test in comparison with pre-test on V and on SI using the frontal inspiration and on V, on SL and on IB adopting the lateral inspiration possibly meant that after nine sessions of training Butterfly stroke, non-expert swimmers might become more efficient in the mechanical point of view. Apparently, it might promote an improvement in stroke cycles parameters, especially for those related to mechanical efficiency of the stroke - SL and SI - for non-experts swimmers using Butterfly with lateral inspiration. This might be an explanation for the significant differences in V, SL and SI in pre-test, while in post-test there were only significant differences in V.

#### REFERENCES

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