

Effects of Tapering on Upper-Limb Force-Time Characteristics in Young Female Swimmers

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Summary

This study examined the impact of a taper phase on upper-extremity force-time parameters in young female swimmers, revealing significant improvements in performance metrics after tapering, suggesting its potential role in training planning.

Introduction

The force-time characteristics of the upper extremities play a critical role in swimming, as they directly influence stroke efficiency, speed, and endurance. These metrics are also considered vital for overhead athletes, where explosive power and strength contribute significantly to performance outcomes [1]. This study aimed to investigate the effects of a taper phase on upper-extremity force-time parameters in young female swimmers, given the limited research on how tapering influences explosive performance in this population.

Methods

Thirteen competitive female swimmers (mean age: 16.08 ± 2.37 years; experience: 7.66 ± 2.1 years) participated in this study, which included a 3-week taper phase. Upper-extremity kinetics were assessed pre and post-taper using a countermovement push-up on a force platform (Kistler 9260AA), with data analyzed via Bioware Software.

Non-normally distributed data (Shapiro-Wilk, $p < 0.05$) were analyzed using the Wilcoxon signed-rank test in SPSS, with significance set at $p < 0.05$.

Results and Discussion

The descriptive statistics and Wilcoxon test results are presented in Table 1. This study aimed to investigate the effects of the taper phase on upper-extremity force-time parameters in young female swimmers.

The findings emphasize the effectiveness of the taper phase in enhancing explosive power and strength, which are critical for swimming performance.

The observed increases in flight time, impulse, and average force highlight the neuromuscular benefits of tapering, consistent with previous studies supporting the reliability of force-time assessments and their applicability to overhead athletes like swimmers [2]; however, the small sample size and exclusion of male swimmers remain limitations.

Conclusions

This study shows that tapering enhances upper-extremity force-time parameters in young female swimmers, highlighting its role in performance optimization and the value of force-time assessments in training.

References

- [1] Thng, S., et al. (2020), *The prediction of swim start performance based on squat jump force-time characteristics*. Peer., 8: p. e9208.
- [2] Koch, J., et al. (2012) *Ground reaction force patterns in plyometric push-ups*. JSCR, 26(8): p. 2220-2227.

Table 1: Comparison of Taper Pre and Post Force-Time Parameters in Competitive Female Swimmers.

Parameter	Taper Pre (Median, 25th-75th)	Taper Post (Median, 25th-75th)	Z	p (2-tailed)
Relative max F(N/kg)	148.4 (141.225-150.2)	152.9 (147.5-158.25)	-2.511	0.012*
Absolute max F (N)	580.3 (547.4-637.5)	592.0 (553.4-652.0)	-1.413	0.158
Average F (N)	448.5 (416.4-507.5)	476.0 (440.0-508.75)	-2.197	0.028*
Average V (m/s)	0.915 (0.71125-1.35275)	1.215 (1.06625-1.395)	-2.511	0.012*
Average P (W)	461.5 (323.75-581.0)	561.0 (459.5-613.0)	-2.668	0.008*
Impulse FT (N-s)	38.455 (31.015-44.225)	43.425 (35.815-47.2545)	-2.904	0.004*
RFD max (N/s)	2590.0 (1750.0-3284.75)	2547.5 (2077.0-3015.75)	0.0	1.0
Vertical Takeoff Velocity (m/s)	0.901 (0.82-0.97)	0.984 (0.90-1.16)	-2.511	0.012*
Flight time (s)	0.18 (0.16-0.19)	0.19 (0.18-0.23)	-2.828	0.005*