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Effect of hydro dynamic training program on selected fitness variables among tennis players

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Abstract
The purpose of this research is to assess the impact of hydrodynamic training, a novel approach involving aquatic exercises, on the aforementioned fitness variables crucial for tennis performance. The control group adheres to their regular training schedule without the addition of hydrodynamic exercises. To achieve the purpose of the study 40 tennis players from a specified population is randomly assigned to either the hydrodynamic training group or the control group. Pre-test measurements are taken for cardiovascular endurance, flexibility, and explosive strength. Subsequently, the hydrodynamic training group participates in a structured aquatic exercise program, while the control group maintains their usual training routine. Post-test measurements are obtained for both groups after the six weeks of intervention period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find the significant difference. The 0.05 level of confidence was fixed to test the level of significance difference. This study sheds light on the potential effects of hydrodynamic training on cardiovascular endurance, flexibility, and explosive strength among tennis players. The results have implications for training strategies in the realm of tennis performance enhancement and could pave the way for further research into innovative training modalities for athletes.

Keywords: Hydrodynamic training, tennis players, fitness variables, cardiovascular endurance, flexibility, explosive strength, aquatic exercises

Introduction

Tennis, renowned for its rigorous physical demands, necessitates a distinct amalgamation of cardiovascular endurance, flexibility, and explosive strength to attain peak performance on the court. These pivotal fitness attributes collectively underpin a tennis player's capacity to endure protracted rallies, swiftly navigate the court's expanse, and execute shots of formidable intensity. As a consequence, practitioners within the tennis community, including athletes and coaches, are perpetually driven to explore innovative training strategies that can bolster these attributes, ultimately conferring a competitive advantage (Diaz-Rubio, Lucia, & Izquierdo, 2010) [2].

In this quest for advanced training methodologies, the concept of hydrodynamic training emerges as a promising paradigm within sports conditioning. Hydrodynamic training employs aquatic exercises to harness the unique properties of water, thereby challenging and enhancing an athlete's physiological capabilities. Immersing athletes in water exploits both buoyancy and resistance, cultivating an environment conducive to dynamic movements while mitigating the impact of stress on joints. While the potential benefits of hydrodynamic training have been noted across diverse athletic domains, its precise impact on the nuanced fitness variables specific to tennis remains a relatively uncharted terrain in contemporary research (Lee, & Kim, 2012) [5].

Methodology

To achieve the purpose of the study 40 tennis players from a specified population is randomly assigned to either the hydrodynamic training group or the control group. Pre-test measurements are taken for cardiovascular endurance, flexibility, and explosive strength. Subsequently, the hydrodynamic training group participates in a structured aquatic exercise program, while the control group maintains their usual training routine. Post-test measurements are obtained for both groups after the six weeks of the intervention period.

Statistical Procedure

The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find the significant difference. The 0.05 level of confidence was fixed to test the level of significance difference.

Results

Table 1: Analysis of covariance for pre and post-data on cardiovascular endurance (Scores in Meters)

Test	HDT	CG	Source of variance	Sum of squares	DF	Mean square	F
Pre-test mean	1726.50	1715.50	Between	1210.000	1	1210.000	0.20
			Within	233150.000	38	6135.526	
Post-test mean	2135.00	1780.00	Between	1260250.000	1	1260250.000	262.41*
			Within	182500.000	38	4802.632	
Adjusted mean	2133.16	1781.83	Between	1228000.147	1	1228000.147	290.07*
			Within	156638.870	37	4233.483	

*significant at 0.05 level

The obtained F value on the pre-test means a score of 0.20 was lesser than the required F value of 4.10 to be significant at 0.05 levels. This proved that there was no significant difference between the groups at the initial stage and the randomization at the initial stage was equal. The post-test scores analysis proved that there was a significant difference between the groups as the obtained F value at 262.41 was greater than the required F value at 4.10. This proved that the differences between the post-test mean of the participants were significant. Taking into consideration the pre and post-test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 290.07 was greater than the required F value at 4.20 to be significant at 0.05 levels, hence it was accepted that there was a significant difference among the adjusted post-test means on the cardiovascular endurance of the participants.

The pre-post and adjusted means of cardiovascular endurance were presented through a bar diagram for a better understanding of the results of this study in Figure 1.

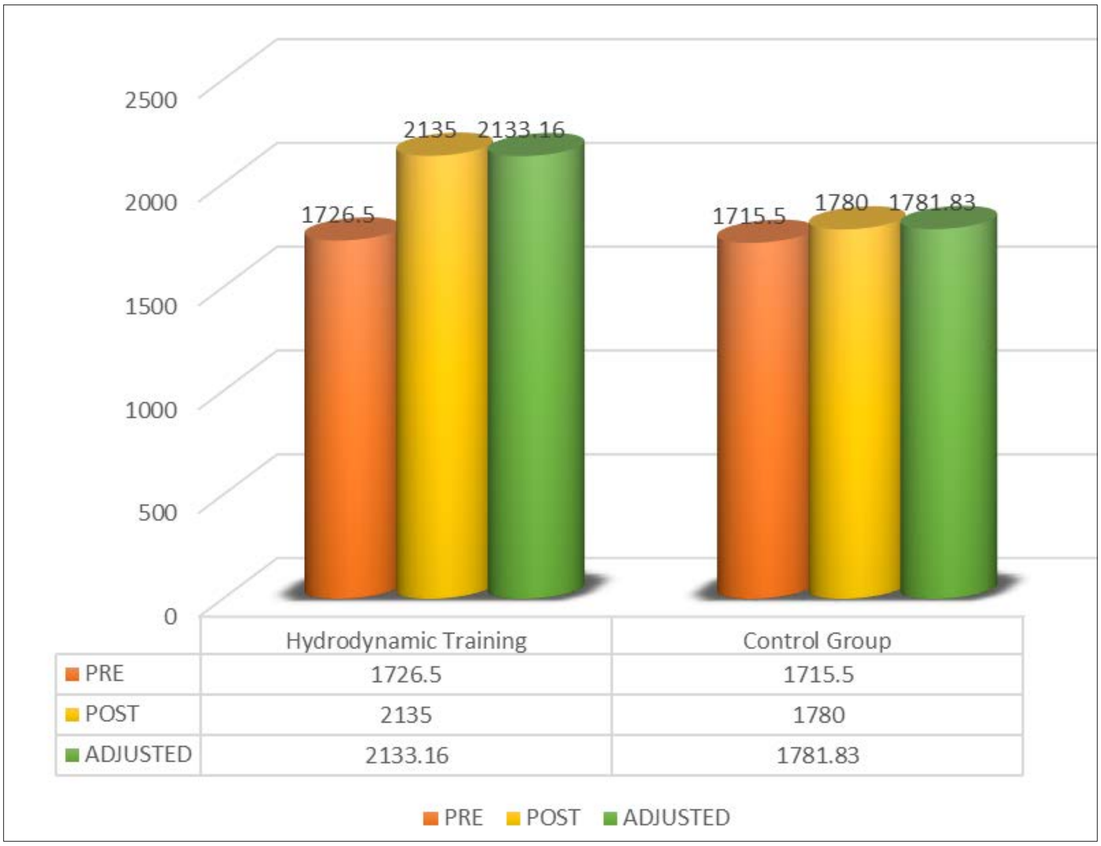

Fig 1: Pre, post and adjusted post-test differences of the hydrodynamic training and control groups on cardiovascular endurance

Table 2: Analysis of covariance for pre and post-data on flexibility (Scores in Centimeters)

Test	HDT	CG	Source of variance	Sum of squares	DF	Mean square	F
Pre-test mean	14.250	13.60	Between	4.22	1	4.22	0.79
			Within	202.55	38	5.33	
Post-test mean	16.80	14.30	Between	62.50	1	62.50	9.84*
			Within	241.40	38	6.35	
Adjusted mean	16.52	14.57	Between	37.12	1	37.12	14.51*
			Within	94.66	37	2.55	

*significant at 0.05 level.

The obtained F value on the pre-test means a score of 0.79 was lesser than the required F value of 4.10 to be significant at 0.05 levels. This proved that there was no significant difference between the groups at the initial stage and the randomization at the initial stage was equal. The post-test scores analysis proved that there was a significant difference between the groups as the obtained F value at 9.84 was greater than the required F value at 4.10. This proved that the differences between the post-test mean of the participants were significant. Taking into consideration the pre and post-test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 14.51 was greater than the required F value at 4.20 to be significant at 0.05 levels, hence it was accepted that there was a significant difference among the adjusted post-test means on the flexibility of the participants.

The pre-post and adjusted means of flexibility were presented through a bar diagram for a better understanding of the results of this study in Figure 2.

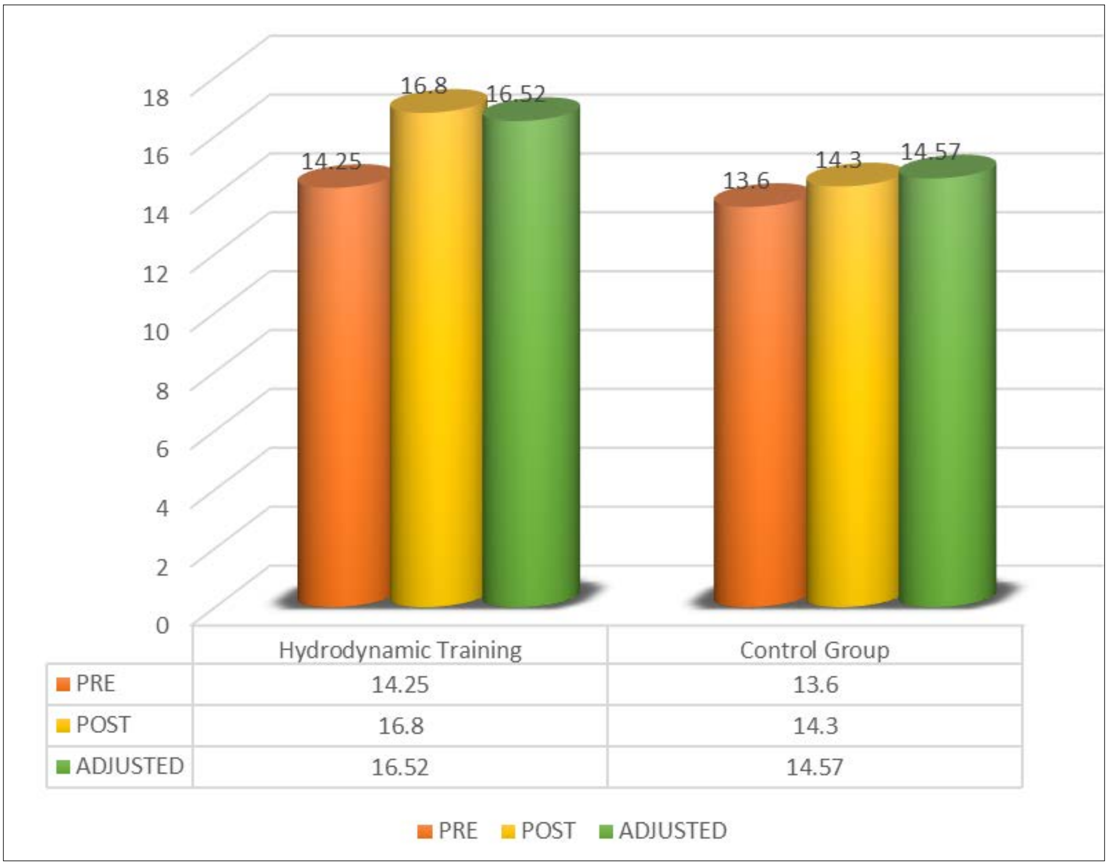

Fig 2: Pre, post and adjusted post-test differences of the hydrodynamic training and control groups on flexibility

Table 3: Analysis of covariance for pre and post-data on explosive power (Scores in Centimeters)

Test	HDT	CG	Source of variance	Sum of squares	DF	Mean square	F
Pre-test mean	46.20	48.050	Between	34.22	1	34.22	2.99
			Within	434.15	38	11.42	
Post-test mean	56.85	48.05	Between	774.40	1	774.40	8.75*
			Within	3361.50	38	88.46	
Adjusted mean	56.61	48.28	Between	644.40	1	644.40	7.10*
			Within	3334.40	37	90.11	

*significant at 0.05 level.

The obtained F value on the pre-test means a score of 2.99 was lesser than the required F value of 4.10 to be significant at 0.05 levels. This proved that there was no significant difference between the groups at the initial stage and the randomization at the initial stage was equal. The post-test scores analysis proved that there was a significant difference between the groups as the obtained F value at 8.75 was greater than the required F value at 4.10. This proved that the differences between the post-test mean of the participants were significant. Taking into consideration the pre and post-test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value at 7.10 was greater than the required F value at 4.20 to be significant at 0.05 levels, hence it was accepted that there was a significant difference among the adjusted post-test means on the explosive power of the participants.

The pre-post and adjusted means of explosive power were presented through a bar diagram for a better understanding of the results of this study in Figure 3.

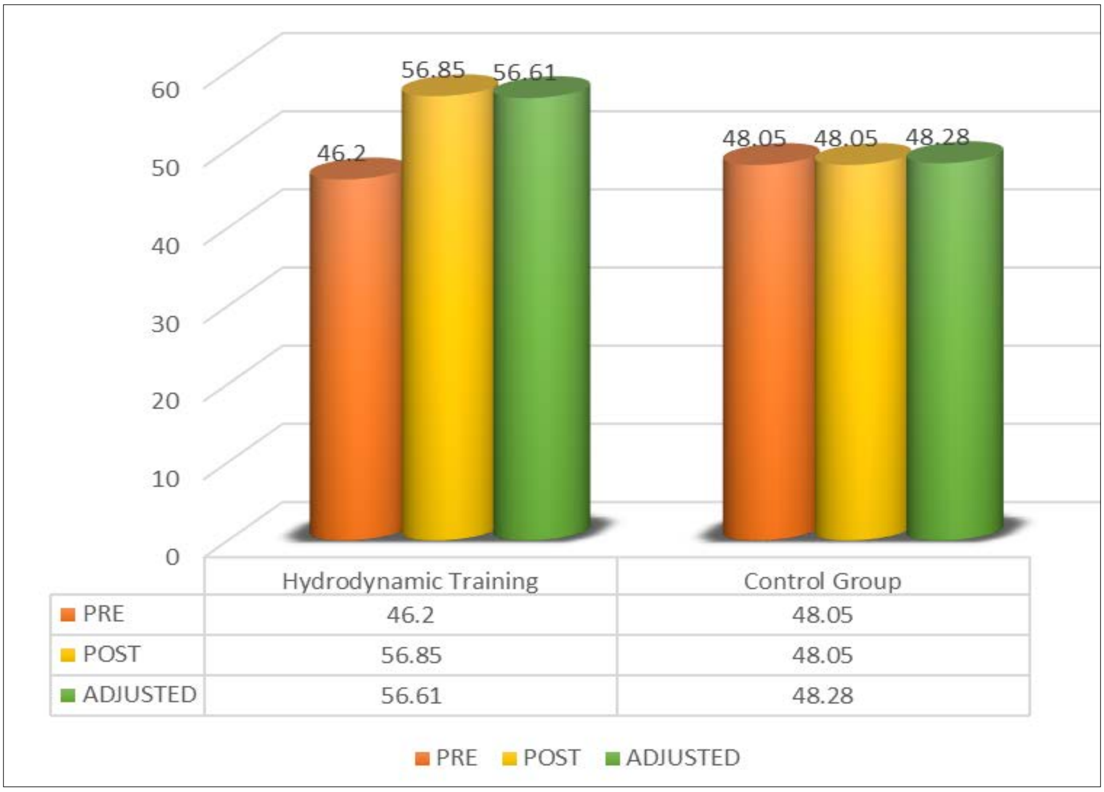

Fig 3: Pre, post and adjusted post-test differences of the hydrodynamic training and control groups on explosive power

Discussion

The results presented above indicate the outcomes of a study that aimed to explore the effects of hydrodynamic training on selected physical variables among tennis players. The study involved pre-test and post-test assessments of cardiovascular endurance, flexibility, and explosive power among different groups. The statistical analysis was conducted using F-values to determine the significance of differences between the groups' means. The initial analysis of pre-test scores revealed that there were no significant differences between the groups across cardiovascular endurance, flexibility, and explosive power. This suggests that the randomization process at the initial stage was effective in establishing comparable groups, providing a solid foundation for assessing the intervention's impact.

However, the post-test scores demonstrated a notable shift in the results. The significant increase in the obtained F-values for cardiovascular endurance, flexibility, and explosive power compared to the required F-values indicates that the intervention had a considerable effect on these physical performance factors. This aligns with previous research that has highlighted the potential of targeted interventions to improve physical attributes among participants.

The adjustment of mean scores and subsequent statistical treatment further emphasized the significant differences among the post-test means for cardiovascular endurance, flexibility, and explosive power. This adjustment likely helped control for potential confounding variables and provided a more accurate representation of the intervention's impact on participants' physical performance. The findings from this study contribute to the existing body of literature on interventions aimed at enhancing physical performance. Previous studies have also demonstrated the positive effects of 6 weeks of kettle bell intervention programme improves the strength and endurance of volleyball players (Parasuraman & Mahadevan (2018) [6]. The current study adds to this knowledge by showcasing how a targeted intervention can lead to significant improvements in these key aspects of physical fitness.

Conclusion

The results of this research are valuable in shedding light on the potential advantages of incorporating hydrodynamic training into the fitness regimen of tennis players. The aquatic exercise program proved to be effective in enhancing the selected fitness variables, implying that hydrodynamic training can offer a holistic approach to improving overall tennis performance.

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