Original Article

Influence of resisted and assisted sprint training on anaerobic power among women Kho-Kho players

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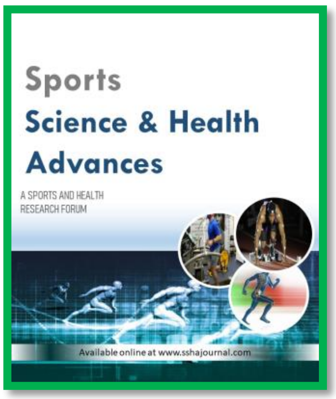

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Abstract

The current study aimed to analyze the effects of aided and resisted sprint training on anaerobic power in female Kho-Kho athletes. Thirty female Kho-Kho players, aged 17 to 23, from Annamalai University, Annamalai Nagar, Chidambaram, Cuddalore District, Tamil Nadu, participated in the study. They were randomly assigned, with ten subjects each, to the aided sprint training group, resisted sprint training group, and control group. The training schedule consisted of three sessions per week for twelve weeks. Aided sprint training activities included high-speed treadmill sprinting, assisted pulling, downhill sprinting, and uphill sprinting. Resisted sprint training activities involved weighted vest exercises, sprint parachutes, and harness running. Anaerobic power was measured using a running-based anaerobic power test before and after the training period. ANCOVA was employed to statistically analyze the collected data, with a significance level set at 0.05. Scheffe's post hoc test was used to determine paired mean differences when the obtained "F" ratio was significant. The results indicated a significant increase in the anaerobic power of female Kho-kho players after twelve weeks of both aided and resisted sprint training.

Keywords: Assisted sprint training, resisted sprint training and anaerobic power

Introduction

Speed, particularly high maximum velocity, is often correlated with success in field sports (Upton, 2010). However, athletes in sports like soccer and rugby union seldom have the opportunity to reach their maximum speed during competition due to the limited distances covered. Consequently, the ability to accelerate, defined as the rate of change of velocity, is deemed more essential for success in these team sports than achieving top speed (Cronin, 2005; Delecluse, 1995). Therefore, strength and conditioning researchers have focused their efforts on identifying appropriate training methods to enhance the acceleration abilities of such athletes.

Football, basketball, baseball, and soccer are among the primary sports that need sprinting speed and acceleration. Speed, which is commonly given in meters per second (m/s), is defined as the maximum running velocity and is computed by dividing the distance traveled by the duration. Similar to this, acceleration is the rate at which velocity changes. It is computed by dividing the change in speed by the passage of time, and it is commonly written as m/s/s or just m/s2.

Athletes are always searching for the most effective methods to improve their performance, and coaches employ a range of training regimens to strengthen both components. Many strategies, including resistance training to build strength, have been applied to increase velocity (Mior et al., 2007).

Speed and athletic performance can be increased by combining generic training techniques with targeted sprint training (Young & others, 2001). Training specialization aims to encourage adaptations that have a direct application to sports in this way. Strength coaches are fond of two distinct sprint speed programs: overload or resisted training and over speed or aided training (Upton et al., 2011). Anaerobic power differences between assisted and resisted sprint training have not been examined scientifically. As a result, the researcher is driven to choose resisted and aided sprint training as experimental factors. While aided training involves going beyond and beyond your comfort zone through downhill running, elastic cord help, or assisted towing, resistance training involves providing an overload using a sled, parachute, or weighted vest (Harrison & Bourke, 2009). Training approaches that are either facilitated or resistant lead to certain performance improvements and adaptations. In order to help strength and conditioning coaches understand the best practices for these two different approaches, this article will provide a quick overview of the most recent research on resisted and aided sprint training.

Methodology

Participants

The goal of the current study was to investigate the effects of assisted and resisted sprint training on male kabaddi players' anaerobic power. Thirty female Kho-Kho players from Annamalai University in Chidambaram, Cuddalore District, Tamil Nadu, aged between 18 and 24, participated in the research for this purpose. The randomly selected subjects were divided into 10 for each of the experimental and control groups. Groups I and II underwent assisted sprint training, while Group III served as the control group, and Group IV underwent resisted sprint training. Anaerobic power, the chosen dependent variable, was evaluated before and after the training course using a running-based anaerobic power test. The experimental groups underwent their respective training programs three days a week during the training period (on alternate days).

Training Protocol

The primary objective of this study was to explore the impacts of both assisted and resisted sprint training on the anaerobic power of male kabaddi athletes. A cohort of thirty female Kho-Kho players, aged between 18 and 24, hailing from Annamalai University in Chidambaram, Cuddalore District, Tamil Nadu, were enlisted for this investigation. Through random assignment, these individuals were allocated to a twelve-week training intervention, which was incorporated into their existing academic commitments. The intervention consisted of two distinct groups: one engaged in assisted sprint exercises, encompassing activities such as downhill sprinting, assisted towing, and high-speed treadmill sprinting, while the other focused on resisted sprinting techniques employing weighted vests and sprint parachutes. The prescribed regimen entailed running a standardized distance of 50 meters at an initial intensity level of 75%, with incremental increases of 5% every fortnight. Participants were instructed to execute these exercises at a pace conducive to their comfort level and in adherence to the specified intensity guidelines.

Statistical Analysis and Experimental Design

For this study, a random group design experiment included thirty volunteers. Analysis of covariance (ANCOVA) served as the statistical method to determine whether a significant difference existed between the pretest and posttest data of the selected dependent variable. Scheffe's post hoc test was utilized to assess paired mean differences in instances where the adjusted posttest 'F' ratio value reached significance. A significance threshold of $p < 0.05$ was acknowledged.

Results of the Study

The corrected post-test (Table 1) mean for anaerobic power is 99.03 for the control group, 105.39 for the resisted sprint training group, and 102.49 for the aided sprint training group. The adjusted post-test mean's calculated "F" ratio of 83.34 is more than the table value of 3.37 needed for significance at the 0.05 level for df 2 and 26. The study's findings demonstrated that the three groups' anaerobic power varied significantly from one another.

Table 1 ANCOVA for Pre and Post-Training on Anaerobic Power of Control and Experimental Groups

		AST Group	RST Group	Control Group	SOV	SS	Df	MS	F ratio
Pre-training	Mean	99.93	99.46	99.13	B:	133.77	2	67.88	2.51
	SD	4.66	3.09	3.69	W:	76.29	27	2.82	
Post training	Mean	106.06	102.53	99.33	B:	262.96	2	131.48	63.44
	SD	5.06	2.85	3.86	W:	84.96	27	3.14	
Adjusted Posttest Mean	Mean	105.39	102.49	99.03	B:	294.86	2	147.43	83.34
					W:	296.93	26	11.38	

*AST: Assisted Sprint Training, RST: Resisted Sprint Training, SOV, *Significant F = (df 2,27) (0.05) = 3.35; (P ≤ 0.05) and F = (df 2,26) (0.05) = 3.37; (P ≤0.05)*

Table 2 The Adjusted Post-Test Pairwise Mean Difference on Explosive Power and Anaerobic Power is Measured Using Scheff's Post-hoc Test

	AST Group	RST Group	Control Group	Mean difference	Confidence interval
Anaerobic power	102.49	105.39		3.1	3.3
	102.49		99.03	3.46*	3.3
		105.39	99.03	6.39*	3.3

*Significant at the 0.05 confidence level. *AST: Assisted Sprint Training, RST: Resisted Sprint Training,*

According to Table 2, the differences in adjusted posttest paired means for anaerobic power between the assisted sprint training group and the resisted sprint training group, the assisted sprint training group and the control group, and the resisted sprint training group and the control group are, respectively, 3.1, 3.46, and 6.39. at the 0.05 level of confidence, they exceeded the 3.3 confidence interval value. the study's findings suggest that while there was no significant difference in anaerobic power between the two training groups, assisted sprint training and resisted sprint training significantly increased anaerobic power when compared to the control group.

Discussion

Exercise produces beneficial changes in the functioning of all internal organs, including the heart, lungs, and circulatory system. The heart of a physically fit individual beats slower and pumps more blood, which indicates a considerable increase in their ability for physical exertion. In comparison to the control group, anaerobic power increased significantly for both aided and resisted sprint training, according to the study's findings. Nonetheless, the increases in anaerobic power for both groups were almost equal, indicating that there is no distinction between them. Elastic strength is the product of combining speed and strength, and assisted sprint training helps to strike a balance between these two training modes. This program contributes to the simultaneous improvement of strength and speed, which increases anaerobic power in the end. These findings corroborate the finding of Laursen et al. (2005), who suggested that higher anaerobic capacity after different types of high intensity training is probably due to peripheral adaptation rather than central adaptation. Hindistan, et al., (2020) study showed that all sprint interval studies on horizontal and sloping surfaces have a positive effect on aero- bic power, and uphill and combined training are the most effective methods for the improvement of anaerobic power. Elgammal et al., (2020) concluded in his study combining repeated sprint training with blood flow restriction yields significant improvements in lower body strength and aerobic capacity among basketball players, suggesting its efficacy for enhancing overall athletic performance in this population. Sökmen et al., (2018) showed Sprint Interval Training with Active Recovery (SITAR) offers a time-efficient approach for improving aerobic and anaerobic fitness, strength, and sprint performance compared to traditional Endurance Training (ET). Vadivelan , & Sudhakar , (2015) conducted a study that plyometric training Group exhibits superior gains in Anaerobic Power and Agility compared to the Sprint Training Group. This highlights the efficacy of Plyometric Training in specifically targeting and enhancing lower body Explosive Power and Agility. Given the critical role of explosive actions in numerous sports and activities, coaches and athletes should prioritize incorporating Plyometrics into their training routines, and tailoring exercises to address individual performance needs effectively. According to Rodas et al. (2000), a program that combines brief training sessions with maximum loads and lengthy recovery intervals appears to be successful in enhancing the enzymatic activity of the energy pathways quickly. According to research by MacDougall et al. (1998), initially, untrained people's anaerobic and aerobic capacity were enhanced by a comparatively short sprint training session. These findings concur with the earlier discovery made by Nowberry & Flowers (1999), who reported a notable increase in anaerobic power after speed training. According to Medbo & Burgers (1990), anaerobic capacity was enhanced after six weeks of short-duration, intensive exercise. They discovered that because sprinters emit more anaerobic energy, they have a higher anaerobic capacity than endurance athletes. Mahon (2000) proposed that greater coordination and motor neuron firing rate were the causes of the increased anaerobic power output.

Conclusion

The study's findings suggested that participants in both the resisted and assisted sprint training groups experienced a significant increase in anaerobic power. However, in terms of enhancing anaerobic power, resisted sprint training demonstrated superior effectiveness compared to aided sprint training. The results underscored that both aided and resisted sprint training modalities have the potential to enhance anaerobic power performance. Consequently, it is recommended that the judicious implementation of both resisted and assisted sprint training can lead to improvements in overall health and fitness, while also providing notable functional benefits.

Conflict of Interest: No Conflict of Interest were declared among authors

References

Angius, L. et al. (2012). Aerobic and anaerobic capacity of adult and young professional Soccer players. Sport Science Health, 8, p. 95–100.

Clarkes H. B. and Taylor, N. B. (1972). The Body. London: Champon and Hall Limited, p. 156.

Csanadi, A. (1978). Soccer. Hungary: Covina Kiado, p.660.

Journals and Articles

Cronin, J. B., & Hansen, K. T. (2005). Strength and power predictors of sports speed. Journal of Strength and Conditioning Research, 19(2), 349–357.

Delecluse, C., Van Coppenolle, H., Willems, E., Van Leemputte, M., Diels, R., & Goris, M. (1995). Influence of high-resistance and high-velocity training on sprint performance. Medicine and Science in Sports and Exercise, 27(9), 1203–1209.

Elgammal, Mohammed & Hassan, Ibrahim & Eltanahi, Naglaa & Ibrahiem, Heba. (2020). The Effects of Repeated Sprint Training with Blood Flow Restriction on Strength, Anaerobic and Aerobic Performance in Basketball. 8. 7. 10.13189/saj.2020.080619.

Hindistan,I., Ozdogan, E., Bilgin, G., Colak, O. & Ozkaya, Y.(2020). Effects of sprint interval training on sloping surfaces on aerobic and anaerobic power. Biomedical Human Kinetics,12(1) 41-50. https://doi.org/10.2478/bhk-2020-0006

Laursen PB. Shing CM. Peake JM. Coombes JC. Jenkins DG (2005). Influence of High-Intensity Interval Training on Adaptations in Well-Trained Cyclists, J Strength Cond Res. 19(3):527-33.

Mahon AD (2000). Exercise training, Pediatric Exercise Science and Medicine, (Champaign IL: Human Kinetics, 201-222.

Medbo JI, Burgers S (1990). Effect of Training on Anaerobic Capacity, Journal of Medicine, Science, Sports and Exercise. 22(4):501-507.

Moir G, Sanders R, Button C, Glaister M (2007). The effect of periodized resistance training on accelerative sprint performance. Sport Biomech 6(3): 285-300.

Paradisis GP, Bissas A, Cooke CB (2009). Combined uphill and downhill sprint running training is more efficacious than horizontal. Int J Sports Physiol Perform 4(2): 229-243.

Rodas G. Ventura JL. Cadefau JA. Cusso R. Parra J (2000). A Short Training Programme for the Rapid Improvement of both Aerobic and Anaerobic Metabolism, Eur J Appl Physiol. 82(5-6):480-6.

Sökmen, B., Witchey, R. L., Adams, G. M., & Beam, W. C. (2018). Effects of sprint interval training with active recovery vs. endurance training on aerobic and anaerobic power, muscular strength, and sprint ability. *Journal of Strength and Conditioning Research, 32*(3), 624-631. DOI: 10.1519/JSC.0000000000002215

Upton DE (2011). The effect of assisted and resisted sprint training on acceleration and velocity in Division IA female soccer athletes. J Strength Cond Res 25(10): 2645-2652.

Upton, D. E. (2010). The effect of assisted and resisted sprint training on acceleration and velocity in Division 1A female soccer athletes. Journal of Strength and Conditioning Research, 25(9), 2645–2652.

Vadivelan , K. ., & Sudhakar , S. . (2015). To Compare The Effects of Sprint And Plyometric Training Program on Anaerobic Power and Agility in Collegiate Male Football Players. International Journal of Physiotherapy, 2(3), 535–543. https://doi.org/10.15621/ijphy/2015/v2i3/67027

Young W, Benton D, John Pryor M (2001). Resistance training for short sprints and maximum-speed sprints. Strength & Cond J 23: 7.