




A Comparison of the Effects of Six Weeks of Plyometric and Resistance-Power Training on the Performance of Wrestlers in the SJFT Test

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ARTICLE INFO	ABSTRACT
<p>Article History: Received 6 June 2023 Received in revised form 16 June 2023 Accepted 28 September 2023 Available online 29 September 2023</p>	<p>Achieving an appropriate training method to enhance athletic performance is a significant goal for coaches in various sports. The aim of this research was to compare the effects of two training methods, plyometric and resistance-power training, on the performance of young wrestlers in the SJFT test. Twenty-four young wrestlers (mean age 15.2 ± 3.19 years) were divided into two equal groups: plyometric training and resistance-power training. The training sessions were conducted three times a week for six weeks. The SJFT test was administered to all participants before and 48 hours after the training period. Data were analyzed using independent and paired t-tests ($p < 0.05$). The results showed that both plyometric ($p = 0.001$) and resistance-power training ($p = 0.001$) significantly improved the wrestlers' performance in the SJFT test. No significant difference was observed in the post-test performance records between the two training methods ($p = 0.320$). In conclusion, both plyometric and resistance-power training can have positive effects on improving the anaerobic performance of wrestlers.</p>
<p>Keywords: Wrestling, SJFT test, Plyometric, Resistance-power, Athletic performance</p>	

1. INTRODUCTION

Wrestling, due to its dynamic and multifaceted nature, demands a combination of explosive power, muscular strength, anaerobic endurance, and agility [1]. To enhance these physical attributes, coaches and athletes employ various training methods, such as plyometric and resistance-power training [2]. The Special Judo Fitness Test (SJFT) serves as a standardized tool for assessing the anaerobic performance of wrestlers, providing a precise measure of the impact of these training methods on athletic performance [3]. This test, by simulating the specific movements of combat sports, evaluates an athlete's ability to perform explosive and repetitive techniques under time pressure [4]. The aim of this study is to compare the effects of six weeks of plyometric and resistance-power training on the performance of young wrestlers in the SJFT test.

Plyometric training, which focuses on explosive movements such as jumps and bounds, is widely used to enhance explosive power and muscle speed [5]. These exercises improve neuromuscular performance by utilizing the stretch-shortening cycle, enabling athletes to execute rapid and powerful movements more efficiently [6]. Studies have shown that plyometric training can significantly increase anaerobic power and agility in sports like wrestling and

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judo [7, 8]. For instance, Karimi (2019) reported that six weeks of plyometric training had a significant impact on improving wrestlers' performance in the SJFT test [9].

On the other hand, resistance-power training, which involves the use of weights and external resistance to enhance muscular strength and endurance, is recognized as a complementary method for improving athletic performance [10]. These exercises strengthen core muscles and increase force production capacity, helping wrestlers withstand the physical demands of competitions [11]. Research indicates that resistance-power training can improve muscular endurance and anaerobic power, thereby enhancing overall athletic performance [12, 13]. For example, Ravasi et al. (2014) found that resistance-power training significantly improved the agility of freestyle wrestlers [14].

Comparing these two training methods is of particular importance, as each targets specific performance attributes. Plyometric training primarily focuses on explosive power and speed, while resistance-power training emphasizes strength and muscular endurance [15]. However, some studies suggest that combining these methods may produce synergistic effects, leading to more effective performance improvements [16]. Saeidi (2017) reported in his book that combined resistance-plyometric training can significantly enhance speed, agility, and explosive power in wrestlers [17].

One of the main challenges in designing training programs is selecting a method that aligns with the specific demands of the sport [18]. Wrestling, due to its need for explosive movements and anaerobic endurance, requires training programs that can simultaneously enhance multiple fitness components [19]. In this context, the use of supplements such as beta-alanine alongside plyometric training has also gained attention.

Given the importance of the SJFT test in evaluating anaerobic performance and the need for effective training programs for wrestlers, this study seeks to investigate the effects of two common training methods (plyometric and resistance-power) on their performance. The findings of this research could assist coaches and athletes in designing more effective training programs to optimize performance in competitive settings.

2. METHODOLOGY

The present study is categorized as semi-experimental research. The target population includes well-trained wrestlers from the city of Qom with a minimum of two participations in national championship competitions and falling within the age range of 18 to 25 years. From the eligible and willing participants, 24 young wrestlers with an average age of 19.3 ± 2.1 years were randomly selected. Following a briefing session and obtaining written consent, the participants were divided into two equal groups: plyometric training and resistance-power training. Before and after the training intervention, evaluations of height, weight, body composition, and the Special Judo Fitness Test (SJFT) were conducted on all participants.

The SJFT consisted of three-time intervals: 15, 30, and 30 seconds with a 10-second rest between repetitions. During these time intervals, the athlete performed the "Ippon Seoi Nage" technique (similar to the judo throw) on two opponents placed six meters apart, with as many repetitions as possible. Heart rate measurements were taken at baseline, immediately after the test, and one minute after test completion. The test index was calculated using the formula:

$$\text{Index} = (\text{HR}_{\text{after}} + \text{HR } 1 \text{ min}) / \text{total number of throws}$$

A lower index indicates better performance.

The training intervention spanned six weeks, with three sessions per week. Each session began with a 15-minute general warm-up, including running and stretching exercises. The exercise programs for plyometric and resistance-power training are presented in Tables 1 and 2, respectively. The rest-to-exercise ratio between sets was 3:1, and the training duration for each group was approximately 20 minutes. Plyometric exercises were performed according to Table 1, with an increase in the number of sets in the second week. Repetitions were added in the third week, and in weeks four to six, obstacle height (10 cm) and repetitions increased (Stojanovic et al., 2012) [20].

The resistance-power training program, as outlined in Table 2, alternated repetitions and resistance levels from the second to the sixth week, with a one-week interval in between (Santos et al., 2008) [21]. Data were analyzed using independent and paired t-tests, and all statistical calculations were performed using SPSS version 21, with significance set at $p < 0.05$.

Table 1. Plyometric Training Program (First Week)

Barrier height(cm)	repetition	set	Move
50	6	2	Jump over the hurdle
60	10	2	Jump over the hurdle
-	9	2	High jump
-	8	2	Jump with open feet

Table 2. Resistance-Power Training Program (First Week)

Barrier height	Repetition	Set	Move
1RM 50%	6	3	Squat
1RM 50%	6	3	Foot spores
1RM 50%	6	3	Front thigh
1RM 50%	6	3	Back of thigh

3. RESULT

The anthropometric characteristics of the participants are presented in Table 3.

Table 3. Anthropometric Characteristics of the Participants

VO ₂ max (ml/kg ⁻¹ /min ⁻¹)	Weight (kg)	Height (centimeter)	Age (Year)	Variable Group
48.6±1.2	7.86 ± 8.8	177.3±5.4	3/7±2/19	plyometric exercises (n=12)
47.8±2.3	79.8±2.7	172.5±6.3	19/1±1/1	Strength-resistance exercises (n=12)

Table 4 presents the intragroup and intergroup comparison results related to the SJFT (Special Judo Fitness Test) records.

Table 4. Dependent and Independent t-test results for Intragroup and Intergroup Comparison of SJFT Records

between groups	Strength-resistance exercises (n=12)			plyometric exercises (n=12)			Variable
	p	After the test	pre-exam	p	After the test	pre-exam	
0.32	0.001*	32.3±2.4	29.4±3.4	0.001*	32.6±3.3	7/8±2/29	SJFT

Based on the results presented in Table 4, both plyometric training ($p = 0.001$) and resistance-power training ($p = 0.001$) have a significant effect on improving the performance of wrestlers in the SJFT (Special Judo Fitness Test). In the comparison between the test records in the SJFT, no significant difference was observed in the post-test phase ($p = 0.320$).

4. DISCUSSION AND CONCLUSION

The findings of this study provide valuable insights into the effects of plyometric and resistance-power training on the anaerobic performance of young wrestlers, as measured by the Special Judo Fitness Test (SJFT). Both training modalities significantly improved SJFT performance ($p = 0.001$), indicating their efficacy in enhancing the anaerobic capacity required for wrestling. However, no significant difference was observed between the two groups in the

post-test phase ($p = 0.320$), suggesting that both plyometric and resistance-power training are comparably effective in improving anaerobic performance in this context.

Plyometric training, which emphasizes explosive movements such as jumps and bounds, leverages the stretch-shortening cycle to enhance neuromuscular efficiency and explosive power. The significant improvement in SJFT scores in the plyometric group aligns with previous research, such as Karimi (2019) [9], which reported enhanced anaerobic power and agility in wrestlers following plyometric training. This can be attributed to the training's focus on rapid force production, which is critical for executing techniques like the "Ippon Seoi Nage" under time pressure in the SJFT. The progressive increase in repetitions and obstacle height over the six-week program likely contributed to these gains by challenging the athletes' neuromuscular systems and improving their ability to perform repetitive, high-intensity movements.

Conversely, resistance-power training, which focuses on muscular strength and endurance through weighted exercises, also yielded significant improvements in SJFT performance. This is consistent with findings by Ravasi et al. (2014) [14], who noted enhanced agility and muscular endurance in freestyle wrestlers following resistance training. The resistance-power program, with exercises like squats and leg presses at 50% of 1RM, likely strengthened core and lower-body muscles, enabling wrestlers to sustain force production during the SJFT's demanding intervals. The structured progression in resistance levels and repetitions further optimized muscular adaptations, supporting the athletes' ability to meet the physical demands of wrestling.

The lack of a significant difference between the two groups in the post-test phase suggests that both training methods effectively target the anaerobic demands of wrestling, albeit through different mechanisms. Plyometric training enhances explosive power and speed, while resistance-power training bolsters muscular strength and endurance. This finding supports the notion that both methods can be viable components of a wrestler's training regimen, depending on specific performance goals. Additionally, previous studies, such as Saeidi (2017) [17], suggest that combining these methods may yield synergistic effects, potentially offering a more comprehensive approach to improving wrestling performance. However, this study did not explore combined training, which could be a valuable avenue for future research.

One limitation of this study is its focus on a single performance metric (SJFT), which may not fully capture the multifaceted demands of wrestling, such as technical skill or aerobic endurance. Additionally, the sample size ($n=24$) and the specific demographic (young male wrestlers from Qom) may limit the generalizability of the findings. Future studies could investigate the long-term effects of these training modalities, incorporate female athletes, or explore the role of nutritional supplements like beta-alanine in conjunction with training.

In conclusion, both plyometric and resistance-power training are effective in enhancing the anaerobic performance of young wrestlers, as evidenced by significant improvements in SJFT scores. Coaches and athletes can confidently incorporate either method into training programs, tailoring their choice to the athletes' needs and competition demands. These findings underscore the importance of targeted training to optimize performance in wrestling's dynamic and physically demanding environment. Further research is needed to explore combined training approaches and their impact on a broader range of performance metrics.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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