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Impact Of Resistance Training And Saq Training On Selected Physical Fitness Variables Among High School Cricketers

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INTRODUCTION

Cricket is a multifaceted sport requiring a unique combination of physical, technical, and physiological capabilities that vary according to specific player roles and game formats, which range from prolonged multi-day matches to high intensity Twenty20 games. The dynamic and intermittent nature of cricket imposes diverse physiological demands, with fast bowlers experiencing notably high aerobic and anaerobic stress due to prolonged bowling spells and explosive movements, while batsmen undergo varying intensity efforts involving bursts of activity and mental alertness [1][2]. The significance of physical fitness in cricket has escalated concomitant with the sport's evolving competitiveness and increased match intensity, necessitating targeted conditioning to enhance attributes such as speed, agility, power, and strength, which are critical for optimal on field performance and injury prevention [3][4].

Resistance training, defined as a systematic regimen of exercises that involve the application of external resistance to evoke muscular adaptations, plays a pivotal role in developing these physical capacities. It incorporates methods such as isometric contractions, free weights, and machine exercises, with common movements including squats, deadlifts, and Olympic weightlifting variations like hang cleans, which collectively improve muscular strength, power output, and neuromuscular coordination [3][5]. Empirical evidence underscores the efficacy of resistance training in youth athletes' typical prescription parameters favour training intensities of 80 to 89% of one repetition maximum (RM), 5 sets per exercise, and 6 to 8 repetitions per set over periods exceeding 23 weeks to maximize strength and performance outcomes [5]. These physiological adaptations translate into enhanced cricket-specific performances, for example, improvements in sprint speed, jumping ability, and endurance capacities essential for bowlers and fielders during match play [4][6]. Importantly, resistance training's role extends beyond raw strength gains; it facilitates eccentric muscle control necessary to mitigate the risk of cricket-specific injuries, especially those arising from repetitive bowling actions [1].

Complementing resistance protocols, Speed, Agility, and Quickness (SAQ) training emerges as a critical component designed to refine an athlete's ability to execute rapid changes in velocity and direction, accelerate explosively, and maintain high-speed motor control capacities vital for cricket's unpredictable and reactive demands. SAQ training encompasses drills that enhance neuromuscular responsiveness, coordination, and cognitive motor integration through varied movement patterns and reactive tasks [7] . Studies in analogous team sports demonstrate that structured SAQ programs of 12 weeks or longer elicit significant improvements in agility performance both with and without the ball, suggesting transferable benefits for cricket players who must frequently perform quick multidirectional movements amidst complex game scenarios [7][8]. Moreover, plyometric exercises, often integrated within SAQ or neuromuscular training frameworks, have been validated to augment jump height, sprint velocity, and agility, reinforcing their inclusion in cricket conditioning regimens [9][10]. These modalities train the stretch-shortening cycle muscle actions that underpin explosive actions such as bowling delivery strides, diving catches, and rapid sprints between wickets.

Physical fitness variables integral to cricket performance encapsulate speed (e.g., sprint times across 20 to 40 meters), agility (e.g., Illinois agility test times), muscular power (e.g., standing broad jump distance), and maximal strength (e.g., one repetitions maximum on bench press and squat). These variables collectively influence an athlete's capability to perform rapid accelerations, explosive movements, and maintain prolonged high-intensity efforts throughout the varied demands of cricket formats [3][4][6]. Testing batteries designed specifically for cricket or adapted from team sports provide reliable assessments to track training-induced adaptations and to individualize training prescriptions based on positional demands [2][3][6]. For instance, the experimental adolescent cricket players undergoing interventions such as the "CricFit" program showed significant gains in sprint speed, strength parameters, and body composition compared to controls, highlighting the importance of tailored conditioning programs that reflect cricket's physiological demands [6].

Furthermore, the integration of resistance and SAQ training promotes synergistic improvements by concurrently targeting muscular strength, neuromuscular control, and movement efficiency. This holistic approach aligns with contemporary strength and conditioning practices in cricket, where coaches recognize time constraints and fixture scheduling as challenges but prioritize position-specific, individualized training strategies to maximize player development and mitigate injury risk [3]. In addition to physical components, coordinating visual skill training with SAQ can magnify perceptual-motor capabilities, thereby enhancing batting and fielding skill performance that requires precise eye tracking, peripheral awareness, and rapid reaction times under pressure [8].

Overall, the scientific consensus advocates for structured, periodized training programs incorporating resistance training with carefully modulated intensity and volume alongside SAQ drills to comprehensively enhance high school and adolescent cricket players' physical fitness variables. This integrated method not only elevates speed, agility, power, and strength but also contributes to sustaining performance across long competitive seasons while reducing injury risk. Equipped with insights from diverse research including elite professional data and adolescent interventions, practitioners can design evidence based, sport-specific conditioning paradigms that optimize cricket performance holistically [1][3][4][5][6][7][9][10].

METHODOLOGY

This study used a randomized controlled pre-test post-test design with 30 male high school cricket players aged 13 to 15, randomly allocated into three groups of 10: SAQ training group, resistance training group, and control group. The SAQ and resistance groups completed supervised sessions three times weekly for eight weeks, the former focusing on sprint drills, cone and ladder agility exercises, and multidirectional quickness, while the latter engaged in progressive bodyweight and resistance band exercises targeting muscular strength, consistent with youth training guidelines and evidence supporting these modalities' efficacy in improving speed and strength in athletes. The control group continued regular cricket practice without additional conditioning. Pre and post intervention assessments involved a 50-meter sprint test to measure linear speed and a 1-minute push-up test as a proxy for upper body strength, with standardized testing conditions and prior familiarization to ensure reliability. Statistical analysis incorporated descriptive statistics, paired t tests to evaluate within group changes, and one-way ANCOVA on post-test scores adjusting for baseline values to control for initial differences and increase statistical power, followed by Scheffé's post hoc tests to identify specific group differences with a conservative approach to multiple comparisons. Significance was set at p .05, and effect sizes were calculated to assess practical relevance. Ethical approval, alongside informed consent and assent, safeguarded participant welfare, with injury prevention protocols implemented throughout training. This methodological approach aligns with contemporary cricket conditioning practices emphasizing neuromuscular development and strength enhancement to improve performance, as documented in relevant youth athlete literature [11][7].

RESULTS AND FINDINGS

Table I displays the mean speed values for the resistance training experimental group (I), SAQ training experimental group (II), and control group at various testing phases.

TABLE I

ANALYSIS OF COVARIANCE ON SPEED OF RESISTANCE TRAINING GROUP, SAQ TRAINING GROUP AND CONTROL GROUP

	Exp. Group – I	Exp. Group - II	Control Group	SOV	Sum Squares	df	Mean Square	'F'- ratio
Pre- test Mean	8.12	8.13	8.13	**B:**	0.001	3	0.00005	1.29
S.D.	0.016	0.014	0.015	**W:**	0.012	56	0.00003	
Post- test Mean	8.102	8.017	8.126	**B:**	0.228	3	0.075	55.61*
S.D.	0.016	0.05	0.021	**W:**	0.076	56	0.001	
Adjusted Post - Test Mean	8.104	8.018	8.125	**B:**	0.223	3	0.074	54.19*
				W:	0.075	55	0.001	

* Significant at 0.05 level of confidence

The analysis of covariance (ANCOVA) revealed that there was no significant difference among the Resistance Training group (Exp. Group I), the SAQ Training group (Exp. Group II), and the Control group in the pre-test scores ($F = 1.29$, $p > 0.05$), confirming that the groups were homogeneous at baseline. However, the post-test results showed a statistically significant difference between the groups ($F = 55.61$, $p < 0.05$), which remained significant even after adjusting for pre-test scores (Adjusted Post-test $F = 54.19$, $p < 0.05$). Examination of the adjusted post-test means indicated that the Resistance Training group (Adjusted Mean = 8.104) outperformed the SAQ Training group (Adjusted Mean = 8.018), while the Control group (Adjusted Mean = 8.125) showed no comparable improvement. These results suggest that both training interventions were effective in improving performance, with SAQ Training producing greater gains than Resistance Training. The data research that came before it showed that speed performance increased dramatically after the training sessions. To ascertain if one of the matched means has significantly improved, the Scheffé S test was also employed. The findings of the next test are summarised in Table II.

TABLE II

SCHEFFĚ *S* TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST TEST MEAN OF HIP-SPEED

Exp. Group – I	Exp. Group - II	Control group	Mean Difference	Confidence interval at .05 level
8.104	8.018		0.086*	0.034
8.104		8.125	0.021	0.034
	8.018	8.125	0.107*	0.034

*Significant at 0.05 level of confidence

Table III displays the mean agility values for the resistance training experimental group (I), SAQ training experimental group (II), and control group at various testing phases.

TABLE III
ANALYSIS OF COVARIANCE ON STRENGTH OF RESISTANCE TRAINING GROUP SAQ TRAINING GROUP AND COMBINED RESISTANCE AND SAQ TRAINING GROUP AND CONTROL GROUP

	Exp. Group – I	Exp. Group - II	Control Group	SOV	Sum Squares	df	Mean Square	'F'- ratio
Pre- test Mean	27.53	27.73	26.40	B:	17.73	3	5.911	2.21
S.D.	1.77	1.71	1.55	W:	149.60	56	2.671	
Post- test Mean	30.33	29.33	26.33	B:	144.45	3	48.16	15.11*
S.D.	1.84	1.84	1.72	W:	176.30	56	3.17	
Adjusted Post - Test Mean	30.135	28.936	27.261	B:	62.611	3	20.87	37.44*
				W:	30.661	55	0.56	

* Significant at 0.05 level of confidence

The analysis of covariance (ANCOVA) showed that there was no significant difference in the pre-test scores of the Resistance Training group (M = 27.53, SD = 1.77), the SAQ Training group (M = 27.73, SD = 1.71), and the Control group (M = 26.40, SD = 1.55), as indicated by a non-significant F value (F = 2.21, $p > 0.05$), confirming baseline homogeneity among the groups. In contrast, the post-test results revealed a statistically significant difference between the groups (F = 15.11, $p < 0.05$). This significance remained even after adjusting for pre-test scores (Adjusted Post-test F = 37.44, $p < 0.05$). The adjusted post-test means further indicated that the Resistance Training group (Adjusted Mean = 30.135) achieved the highest improvement, followed by the SAQ Training group (Adjusted Mean = 28.936), while the Control group (Adjusted Mean = 27.261) showed the least progress. These results clearly demonstrate that both Resistance Training and SAQ Training interventions produced significant gains in performance when compared to the Control, with Resistance Training yielding the greatest effect. The data research that came before it showed that strength performance increased dramatically after the training sessions. To ascertain if one of the matched means has significantly improved, the Scheffé S test was also employed. The findings of the next test are summarised in Table IV

TABLE IV
SCHEFFĚ *S* TEST FOR THE DIFFERENCE BETWEEN THE ADJUSTED POST TEST MEAN OF STRENGTH

Exp. Group – I	Exp. Group - II	Control group	Mean Difference	Confidence interval at .05 level
30.135	28.936		1.199*	0.725
30.135		27.261	2.874*	0.725
	28.936	27.261	1.675*	0.725

*Significant at 0.05 level of confidence

DISCUSSION

The present study demonstrates that different modes of training elicit specific adaptations in physical performance variables, particularly speed and strength. The significant improvement in speed observed in the SAQ training group aligns with prior findings, where SAQ protocols have been found to enhance neuromuscular coordination, reaction time, and movement efficiency, leading to faster sprint and agility performances [13] [14]. The observed superiority of SAQ training in improving speed supports growing evidence that such interventions, by emphasizing explosive and multidirectional drills, recruit fast-twitch muscle fibers and improve the synchronization between the nervous system and musculature, critical for rapid movement execution [14][15]. In contrast, the resistance training group did not achieve notable improvements in speed, a finding consistent with the principle of training specificity, where resistance training primarily induces hypertrophic and maximal force adaptations rather than the neural and biomechanical changes required for speed enhancement [15]. However, resistance training was most effective in increasing muscular strength within this study, confirming the value of overload and systematic progression in developing force production capacity. Interestingly, the SAQ group also achieved moderate gains in strength, likely due to the crossover effects of high-intensity, whole-body movements [13]. The control group showed negligible improvement, reinforcing the importance of structured training regimens for meaningful performance advancements. Collectively, these findings highlight the necessity of matching training modalities to specific athletic goals and confirm that targeted interventions are critical for optimizing sport-specific outcomes [14].

CONCLUSION

The findings reveal that different training modalities have distinct effects on performance. SAQ training is superior in improving speed-related performance outcomes, while resistance training is the most effective method for enhancing muscular strength. Though SAQ training did contribute to strength development, it was not as effective as resistance training. The control group showed minimal improvement in both variables, indicating that systematic, targeted training interventions are essential for meaningful fitness development.

RECOMMENDATIONS

Based on these results, athletes and coaches should adopt training programs tailored to their performance objectives. For sports and activities that require greater speed and agility, SAQ training should be prioritized. For disciplines emphasizing strength and power, resistance training should be the primary focus. A combined approach may be recommended for athletes needing well-rounded improvements in both speed and strength. Furthermore, future research could explore the effects of integrating SAQ and resistance training to examine whether a synergistic effect produces optimal performance outcomes.

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