Effect of Resisted Sprint Training on Lower Limb Performance in Amateur Cricket Batsmen

Shreya Mishra [1], Dr. Pradeep Borkar[2]

[1]Intern, Dr. APJ Abdul kalam College Of physiotherapy, Pravara institute of medical sciences, Deemed to be university, Loni, Maharashtra 413736, India

[2]Sports Physiotherapy department, Dr. APJ Abdul kalam College Of physiotherapy, Pravara institute of medical sciences, Deemed to be university, Loni, Maharashtra 413736, India

Abstract

Background: Enhancing strength and sprint performance with reduced injury risk involves plyometric and resistance sprint training. Improved physical fitness is crucial for developing technical skills and motor competence, essential for explosive leg power and functional performance. Tailored training regimens targeting specific movements boost explosive strength. In a 50-meter sprint competition, phases for acceleration and maximum speed are vital, requiring quick spurts. Fast bowlers and batsmen should prioritize upper body acceleration for optimal performance. Acceleration is key in both sprinting and cricket, emphasizing the importance of targeted training to enhance overall athletic ability and minimize injury risk.

Objective: To find out the effects of resisted sprint training among amateur cricket batsmen player

Methodology: The study received Institutional Ethical Approval, and consent was obtained from all 40 participants. They were screened and recruited based on selection criteria, then randomly allocated into Group A (n=20) and Group B (n=20). The exercise program involved 30-minute sessions, three times per week, over six weeks

Result: The experimental group (Group A) showed significant improvement in lower limb performance ($p < 0.0001$) with resisted sprint training. However, there was no significant difference observed in the conventional group when comparing between groups ($p < 0.7755$).

Conclusion: The study concludes that resisted sprint training is effective in improving lower limb performance in amateur cricket batsmen.

Keywords: Resisted, Agility, Balance, Sprinting

1. INTRODUCTION

Effective strategies for enhancing strength and sprint performance while lowering the risk of injury include plyometric and resistance sprint training [1]. Importantly, improved physical fitness is necessary for both the development of technical skills and motor competence, which are necessary to increase functional performance that primarily depends on explosive leg power [1]. Training regimens tailored to specific movements help increase explosive strength. There are phases for acceleration and maximum speed in a 50-meter sprint competition. While the maximum speed phase necessitates the legs' backward and forward rotation (hamstrings), the acceleration phase depends on a strong extension of the leg joints (gluteus maximus) [2]. During the acceleration phase, the leg (quadriceps), ankle (gastrocnemius and soleus), and hip (gluteus maximus and hamstrings) extensor muscles are needed.Growth and maturity naturally increase one's running speed and force production capacity still, one can further optimize the development of speed and its underlying factors. It has been demonstrated that for young people to enhance their sprinting speed, focused sprint training—that is, resisted and unresisted sprinting—is more beneficial than nonspecific training approaches, such as resistance training and plyometrics . Specific sprint training approaches, which are based on the principle of specificity, seek to enhance musculoskeletal and neurological adaptations that are dependent on task and velocity (6). In addition, compared to more conventional forward running (FR) programs, innovative sprint training techniques like backward running (BR) have improved youth athletes' speed, jumping height, and leg stiffness more than they have.Resistance training is a type of exercise that particularly for its ability to improve athletic performance by increasing muscle strength, power, and speed (Kraemer & Ratamess, 2004). Our muscles become stronger and more flexible when we work against a moderate level of resistance. Cricket has become immensely popular in India, and the overall ability of players has improved over time. However, achieving uniformity in performance remains a challenge. The fact that cricket lacks clear-cut criteria for batting technique is one of the contributing elements to this problem.. While there has been much discussion about the demands of cricket, scientific investigations in India to validate the significance of various parameters and essentials in the sport have been limited. Gone are the days when exceptional skills alone were sufficient to win matches. In the present era, cricket has become more systematic, and there is a growing focus on improving the selection process for potential cricket players and implementing scientific training programs. Comprehending the distinct batting style employed by accomplished cricket players is essential in this endeavor. The goals of batting are to defend the wicket, score runs, stay out of trouble, and strike the ball deliberately into open areas.

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2. MATERIALS AND METHODS

2.1 Design

Participants involved in the group were blinded. Randomization of participants into 2 groups were performed using computer generated randomization method. All participants were asked to deeply read the study procedures and sign a detailed consent from before starting study procedures. The study has begun after the Ethical Clearance from the Institutional ethical committee. The IEC no is **PIMS/DR.APJAKCOPT/IEC/2023/347**.

2.2 Study Setting

It was main ground Of PIMS (DU) Ahmednagar district Maharashtra, India.

2.3 Study Duration

January 2023 to January 2024.

2.4 Sample size calculation

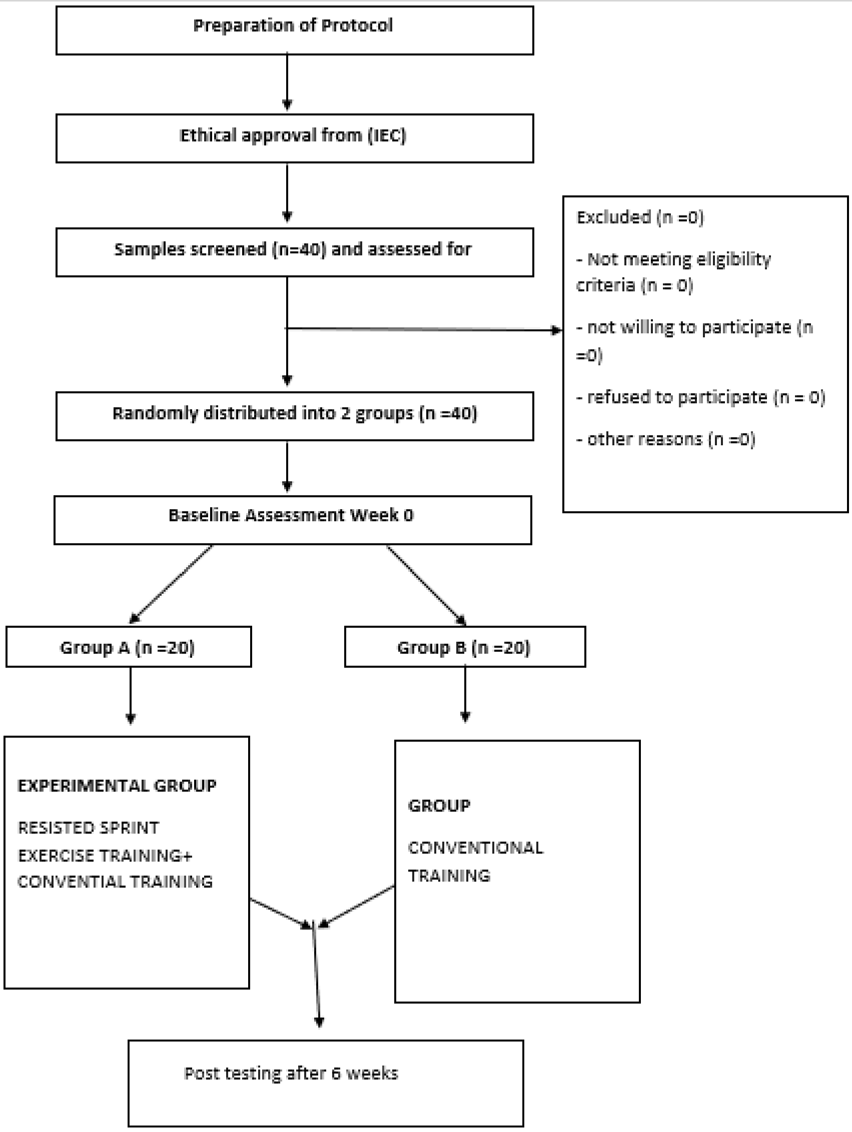
Sample size was calculated using open Epi software, with 95% confidence interval and power of 80%. Grounded on the above-mentioned assumptions, the sample size needed for this study was 40 participants.

2.5 Participant recruitment

Participants who play cricketl with age ranging from 18 to 24 years-old, both male and female amateur cricket players who qualified PARQ questionnaire, ready to signed the consent were included in the study. The players suffering from any recent injuries, any type of systemic illness, players who are irregular and for involved in any other type of personal training methods, or taking any medications that may effect their sprint power

2.6 Randomization Allocation

The courts obtained from randomization were maintained in opaque sealed envelope until the intervention begin. The allocation was concealed by Sequentially numbered, opaque, sealed envelope (SNOSE).



2.7 Procedure

Prior to the tests, the participants executed a standardized warm-up protocol. The intervention group performed resisted sprint training, while the control group performed the regular training program. The sessions were held on Mondays, Wednesdays, and Fridays. Both the groups were assessed at week 0 and week 6. Before the intervention protocols, demographic data were collected.

2.7 Outcome measures

2.7.1 LONG JUMP TEST

Long jump test was used to assess the lower limp functional performance . At each assessment, the subjects were instructed to take up long jump and the distance was measures using measuring tape in meter . A total of three successful trials (maximum of three unsuccessful attempts) were conducted for each task.

2.7.2 Resisted Sprint ability

Resisted Sprint was used to asses the sprint ability in athletes. a total of 50 meter sprint was performed by the athletes and the time was noted in seconds . a total of 3 trials were conducted for each task

2.8 Statistical analysis

Analyses was conducted using InStat software. Paired T test was used to identify between group difference. Quantitative variables were reported as mean and standard deviation. The mean between-group difference between the experimental and control groups was calculated with unpaired data and reported with a 95% confidence interval.

3. RESULTS

Group A demonstrated significant improvement in lower limb performance ($p < 0.0001$) in group A using long jump test . Whereas, no significant difference was seen when intergroup comparison was done in group B in long jump test ($p < 0.3027$) .

Group A demonstrated significant improvement in sprint performance using ($p<0.0001$). group B did not show significance in sprint performance ($p< 0.7755$)

TABLE 1: There is no significant difference found in baseline characteristics between 2 groups for age height, weight and BMI.

Characteristics	**Experimental (n=20)**	**Control (n=20)**
Age, mean (SD)	20(1.57)	19.95(1.54)
Height, mean (SD)	168.95(10.57)	162.1(6.92)
Weight, mean (SD)	62.6(8.83)	66.85(7.36)

GROUP A: CONVENTIONAL EXERCISES + EXPERIMENTAL GROUP

EXERCISES	VOLUME	FREQUENCY
1.WARM UP . High knees. .Ankle Rotations .Heel Slides. .Side to Side leg swings . Marching Slow running	10 Repetitions with 2 SETS	3 DAYS / PER WEEK FOR 6 WEEKS
Resisted parachute sprint	50 METER SPRINT /6 LAP	3 DAYS /PER WEEK FOR 6 WEEK
Cool Down Exercises Stretching of all major group muscles		3 DAYS/PER WEEK FOR 6 WEEK

GROUP 'B' : CONVENTIONAL EXERCISES

EXERCISES	REPETITIONS	SESSIONS
1.WARM IP .High Knees	10 repetitions with 2 sets	3 DAYS/WEEK FOR 6 WEEK

.Ankle Rotations .Heel slide .Side to side .Marching Slow running		
Squats	5 repetitions with 2 sets	3 DAYS/WEEK FOR 6 WEEK
Distance Running	10 MINUTES	3 DAYS/WEEK FOR 6 WEEK

TABLE 4: Mean (SD) of groups, mean (SD) within-group difference and mean (95% CI) between-group difference

Outcome	Groups				Within Groups	
	Week 0		Week 6			
	Exp	Control	Exp	Control	Exp	Control
Long Jump Test	2.05±0.46	1.87±0.51	2.35±0.44	1.97±0.37	2.35±0.44	1.97±0.37
Resisted Sprint Ability	11.08 ± 2.02	9.27 ± 1.07	8.26 ± 1.77	11.94 ±3.00	8.26 ± 1.77	11.94 ±3.00

4. DISCUSSION

The findings of this study shed light on the significant improvements in lower limb functional performance observed among amateur cricket batsmen following a structured training intervention incorporating resisted sprint training alongside conventional exercises. These results are consistent with previous research in the field, providing valuable insights into the efficacy of resistance-based training modalities in enhancing athletic performance.

Bolger et al. (2015) conducted a comprehensive systematic review, synthesizing evidence from various studies, and highlighted the positive effects of resistance-based training interventions on sprinting performance across diverse populations. Their findings underscored the importance of incorporating resistance training modalities to target specific aspects of sprint performance, such as acceleration, top speed, and change of direction, which are crucial for success in dynamic sports like cricket.

Furthermore, the present study aligns well with the findings of Kusuma et al. (2021), who investigated the efficacy of parachute resistance training in improving running speed among football players. By incorporating resistance training methods that impose greater external loads on the lower limbs, such as resisted sprinting, athletes can effectively enhance their muscle strength, power, and neuromuscular coordination, thereby improving their ability to generate explosive movements during sprinting and other dynamic athletic tasks.

The acute effects of resisted sprint training on sprint kinematics, as explored by Osterwald et al. (2021), further support the notion that resistance-based training can elicit immediate improvements in sprint performance, which may translate into enhanced lower limb functional performance over time.

Moreover, the work of Paulson and Braun (2011) on the influence of parachute-resisted sprinting on running mechanics in collegiate track athletes provides valuable insights into the biomechanical adaptations that occur in response to resistance-based training. By imposing resistance during sprinting, athletes may experience alterations in stride length, stride frequency, ground contact time, and other biomechanical parameters, which could contribute to the observed improvements in sprint performance and lower limb function among participants in Group A.
Additionally, the findings of Ward et al. (2023) from their systematic review and meta-analysis suggest that resisted sprint training can lead to significant improvements in sprint performance among field-based invasion team sport players, further supporting the efficacy of resistance-based interventions in enhancing athletic capabilities across different sporting disciplines.
Furthermore, the present study highlights the importance of considering individual factors, such as limb dominance, when designing training programs for athletes. McGrath et al. (2016) emphasized the influence of limb dominance on lower limb functional performance, suggesting that athletes may exhibit asymmetries in strength, power, and movement patterns between their dominant and non-dominant limbs. Although the current study did not specifically address the effects of limb dominance, future research could explore potential interactions between limb dominance and the efficacy of resisted sprint training in further optimizing athletic performance and reducing injury risk.
In summary, the findings of this study, combined with existing literature, underscore the potential of resisted sprint training as a valuable component of training programs aimed at optimizing lower limb functional performance in athletes across various sporting disciplines, including cricket. By incorporating resistance-based interventions alongside conventional training methods, coaches and practitioners can effectively enhance athletes' speed, power, and agility, ultimately leading to improved on-field performance and reduced injury risk. Future research should continue to explore the mechanisms underlying the effectiveness of resistance-based training modalities and investigate their long-term effects on athletic performance and injury prevention strategies.

5. CONCLUSION

In conclusion, this study investigated the effect of resisted sprint training on lower limb functional performance in amateur cricket batsmen. The findings demonstrate that a structured training intervention incorporating resisted sprint training alongside conventional exercises led to significant improvements in sprint speed, agility, power, and strength among participants. These results align with previous research in the field, highlighting the efficacy of resistance-based training modalities in enhancing athletic performance. Despite certain limitations, such as sample size constraints and the relatively short duration of the intervention, the study contributes valuable insights into the potential benefits of resisted sprint training for cricket batsmen. Moving forward, further research with larger samples and longer intervention periods is warranted to validate and extend these findings. Nevertheless, the observed improvements in lower limb functional performance underscore the importance of incorporating evidence-based training regimens, such as resisted sprint training, to optimize athletic performance and reduce injury risk in amateur cricket batsmen and potentially other athletes in similar sports contexts.

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