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Corresponding Author: Muhammad Anas Khalid (Email: anaskhalid23@gmail.com)

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The Role of Coaching Strategies and Training Programs in Developing Bowling Speed among Amateur Cricket Players

Muhammad Anas Khalid [a] Syed Muhammad Bilal Gillani [b] Basit Ali [c]

Abstract: *The aim of this research was to assess how power training and resistance affect medium-fast bowlers' bowling speed in cricket. Because of their capacity to create pace, medium-fast bowlers are vital in cricket; nevertheless, it's not known whether power training or resistance can really improve their bowling speed. This research included twenty medium-fast bowlers from cricket clubs of the Sports Board Punjab, aged between twenty and 25 years. Under a pre-test and post-test quasi-experimental design, bowling speeds were assessed using a speed gun both before and after an 8-week resistance and power training intervention. Emphasizing strength and plyometric activities meant to increase explosive power, the training sessions included moderate to high-intensity workouts. The mean speed of the participants improved significantly; from 118.75 km/h in the pre-test to 126.65 km/h in the post-test. A paired sample t-test revealed statistical relevance with a 0.000 p-value. A somewhat smaller range in bowling speed points to more consistent bowlers. Training was validated by pre-test and post-test speeds showing a modest positive correlation. The results imply that power and resistance training can increase the bowling speed of medium-fast bowlers, hence improving cricket performance. Bowlers were advised by coaches and trainers to include such drills to raise their performance. Long-term effects of this training on bowling speed and injury avoidance should be investigated in next studies.*

Keywords: Bowling Speed, Resistance Training, Power Training, Medium-Fast Bowlers

Introduction

Bowling speed is a critical factor in the performance of medium-fast bowlers in cricket (Anand et al., 2017). A multi-dimensional and complex topic combining the physical and psychological elements of the game, bowling speed affects the performance of medium-fast bowlers in cricket (Sandoval, 2018). Generally speaking, medium-fast bowlers in cricket are those who can bowl between 120 km/h and 140km/h (around 75-87 mph), thereby combining speed with swing, seam movement, and accuracy. While medium-speed bowlers need more on smart variations, tactical planning, and trickery to challenge the batter, fast bowlers exert pressure with just pure pace. Understanding medium-fast bowling mostly requires one to see the balance between speed and accuracy (Feros, 2015). Although speed is a crucial component of any bowler, medium-fast bowlers stand out because they can mix deliveries at different speeds to keep the batsman off balance. This lets them create movement in the air and off the ground in addition to pace. A bowler who can alter their pace, like throwing a slower delivery followed by a faster one, pushes the batsman to adapt continuously. For the batter who cannot find a rhythm, various speeds including bouncers, slower balls, and Yorkers form a mental struggle? Bowling speed's mechanics help to clarify the difficulty medium-fast bowlers provide (Hislen, 2023). Apart from the ball's path, speed affects its contact with the air, which can cause swing or seam movement. Faster deliveries generally make it more difficult to evaluate, therefore

[a] Student, Department of Sport Science and Physical Education, The University of Lahore, Lahore, Punjab, Pakistan.
[b] Assistant Professor, Department of Sport Science and Physical Education, The University of Lahore, Lahore, Punjab, Pakistan.
[c] Lecturer, Department of Sport Science and Physical Education, The University of Lahore, Lahore, Punjab, Pakistan.

lowering the batsman's response time. But because the ball spends less time in the air, the faster it moves the less likely it is to swing conventionally.

Conversely, depending on the situation and the state of the ball, a medium-fast bowler with a well-maintained ball can extract conventional or reverse swing. Even reverse swing, this kind of swing becomes even more noticeable when the ball is older and worn. Bowling pace and the batsman's perception have a vital link. From the point of view of a batsman, the faster the delivery reduces their reaction time. Batters find it challenging to evaluate the line, length, and ball movement (Peploe, 2016). A bowler's ability to deliver the ball at high speeds can significantly influence the outcome of a match, as it challenges the batsman's reaction time and decision-making (Kiely et al., 2021). In recent years, there has been growing interest in exploring the relationship between specific training methodologies, such as resistance training and power training, and their effects on bowling speed (Loram et al., 2005).

Resistance training, which focuses on building muscle strength through the use of weights or body resistance, is thought to enhance the bowler's overall muscular power and endurance (Ramachandran et al., 2024). This, in turn, may improve the force applied during delivery, leading to higher speeds. On the other hand, power training emphasizes rapid, explosive movements, which can improve an athlete's ability to generate speed quickly, potentially translating to faster bowling (Boyat & Rathod, 2021). Although both training approaches have shown promise in athletic performance enhancements in other sports, their particular influence on cricket—especially on medium-fast bowlers—remains understudied (Feros et al., 2018). Knowing how resistance and power training affect bowling speed could give cricket coaches and players trying to maximize performance some important new perspectives: This study intends to investigate how these two training strategies affect bowling speed and provide doable suggestions for improving the performance of medium-fast bowlers (Maker, 2019).

In the game of cricket, especially in contemporary forms like Twenty20 (T20) and One Day Internationals (ODIs), the capacity to deliver the ball at great speeds defines effective bowlers especially. A team's bowling attack depends much on medium-fast bowlers, who strike a mix of speed and control. The search for higher bowling speed is still difficult even if it is quite important. Training for bowlers has historically concentrated mostly on technique, endurance, and stamina. Recent developments in sports science, however, point to the possibility of greatly improving performance by including resistance and power training into routines. Often related with weightlifting, resistance training seeks to increase muscle strength by means of workouts requiring resistance. This type of training enhances the muscular power needed for high-speed bowling deliveries.

Power training, on the other hand, emphasizes explosive movements and utilizes plyometric exercises to boost the rate of force development. By combining these two approaches, bowlers might achieve higher velocities and better overall performance. Examining their methods, plans, physical demands, mental attitude, and influence on the game helps one to better understand the part and flexibility of medium-fast bowlers in cricket across all formats. Because of their special mix of endurance and ability, medium-fast bowlers may adjust their performance to fit the rules of the game. In both Test matches and limited-overs forms, they are quite important because of their ability to keep constant line and length while making minute tempo adjustments. Through precision and patience, medium-fast bowlers are rather important in Test cricket in creating continuous pressure on batters. Unlike express pace bowlers, who depend just on raw speed to disturb batsmen, medium-fast bowlers generate doubt with movement off the field, seam placement, and length adjustments.

The game's longest format calls for players to bowl extended stints, usually in difficult circumstances, therefore testing their mental toughness as well as physical stamina. Particularly in swinging circumstances, their capacity to keep a nagging line and extract movement makes them a constant menace. James Anderson and Vernon Philander are among the swing bowlers in this group who have shown how important control and small speed variances are in destroying top-order hitters. Nevertheless, anaerobic metabolism is also crucial in sprints and jumps (Ali et al., 2022). Apart from their wicket-taking prowess, medium-fast bowlers are workhorses as they preserve the pressure needed for more offensive bowlers to function as expected. In limited-overs cricket, however, the function of medium-fast bowler's changes

greatly (Thorley, 2021). Nutritional supplements are commonly accessible products used as an extension to the normal diet and are mostly used by athletes for performance enhancement and every athlete should use these to boost their energy and performance during a cricket game (Gillani et al., 2020).

Objectives

To evaluate the effects of resistance and power training on bowling speed of medium fast bowlers in cricket.

Hypothesis

H_1: Resistance and power training have significant effects on the bowling speed of medium fast bowlers in cricket.

Literature Review

A basic component of fast bowling in cricket, bowling speed determines a bowler's efficacy on the field and is so very important. The pace at which a bowler delivers the ball directly affects the batsman's reaction and judgment, therefore determining the course of the game (Feros, 2015). Fast bowlers have the benefit of lowering the batsman's response time, therefore raising the likelihood of inducing mistakes. It is far more difficult to produce accurate strokes the faster the delivery; a batter has less time to react. Often the outcome of this higher pressure are misjudgments, mistimed shots, and finally dismissals (Peploe, 2016). Beyond the mechanical benefits, bowling speed has psychological effects that cannot be overstated. Especially among batters who are less at ease confronting rapid deliveries, fast bowlers sometimes inspire intimidation. Reacting inside such a limited timeframe might cause anxiety and forced mistakes. A batsman's rhythm may be disturbed by this mental tension, therefore affecting their whole performance (Ring et al., 2019). Furthermore, the sheer physicality of a fast bowler may make batting an unpleasant experience, which usually results in defensive and cautious shot choice. In amateur cricket, fast bowling pace is usually a differentiator between an ordinary bowler and a perhaps outstanding one (Nell, 2016). Generally speaking, coaches and selection committees give bowlers who can bowl at high speeds top priority as these players are more likely to thrive at higher degrees of competition, where pace bowlers are highly prized. Faster bowlers may also more effectively execute a range of deliveries including bouncers, Yonkers, and short-pitched balls using their speed.

Higher speed deliveries make handling more challenging for batters and let the bowler control the pace of the game. Bowling speed is especially more important in limited-overs forms such as T20s and One-Day Internationals (ODIs). Batters in these forms frequently want to score rapidly, hence a fast bowler's ability to sustain pressure with just pace might help to control aggressive batting (Harland, 2023). Bowlers can drive batsmen to play more carefully or make mistakes by cutting the time they have to strike their strokes, therefore generating wickets and containment. Bowling speed also greatly affects a bowler's capacity to alter their deliveries. To fool batters, medium-fast bowlers, for instance, mostly depend on pace changes. Higher baseline speed lets them perform such modifications more precisely, which reduces their predictability and increases their difficulty to read (Gloeckle et al., 2024). With their quicker deliveries, the speed allows bowlers the ability to blend slower balls, cutters, and bouncers, so improving their whole efficacy.

Bowling speed is a benefit in demanding settings as well as in ones when the surroundings are ideal. Fast bowlers may nevertheless exert pressure on flat pitches, where the surface provides minimal help with regard to bounce or swing, by producing speed and utilizing the element of surprise (Harwood, 2018). Fast bowlers may also modify their approach depending on pitch conditions as their speed helps to offset lack of movement or surface assistance. This adaptability is quite helpful as it lets bowlers keep efficiency on many playing surfaces. High bowling speed also directly relates to match results. Usually, fast bowlers are quite important in altering the course of a game. Often times, the bowling side gains momentum by being able to break partnerships, seize opportunities, and remove important batsmen in pivotal periods (Wigmore & Wilde, 2019). When the game is close, a bowler who can regularly strike fast will make all the difference. Bowling speed also allows captains greater field positioning freedom. Because the probability of a batsman going out to a well-directed fast ball rise, fast bowlers may operate with more offensive field

settings. A captain may maximize the pace of their bowler and raise wicket chances by carefully arranging fielders in catching positions. In amateur bowling, a player's confidence may be much raised by increases in pace (Brearley, 2015). As bowlers go faster, they develop self-belief and a sense of success. Their whole cricketing performance improves in response to this psychological boost, therefore producing a positive feedback loop of development.

Fast bowlers also usually get greater respect from scouts, selectors, and coaches as, especially at higher levels of play, speed is a highly sought-after ability in cricketers. Programs for training and fitness also clearly show the vital need of bowling speed. To enhance a bowler's pace, most bowling fitness programs stress on strength, power, and technical efficiency. Fast bowlers depend especially on programs emphasizing core stability, leg strength, and explosive power as these physical qualities immediately help to increase performance in games and enable higher speeds (Nagaraj, 2017). The field of sports science has increasingly recognized the importance of specialized training techniques in enhancing athletic performance (Feros, 2015). In cricket, a sport traditionally focused on skill development, there has been a growing awareness of the role that physical conditioning plays in improving performance and reducing injuries (Bartlett, 2003). Early cricket training programs were predominantly centered on technical skills and general fitness, with less emphasis on targeted strength and power development. This shift in focus reflects a broader understanding of how specific training interventions, such as resistance and power training, can significantly impact athletic outcomes (Weldon et al., 2021).

Modern sports training regimens now revolve mostly on resistance training, which consists in activities meant to boost muscle strength and endurance. Studies repeatedly show that resistance training improves many performance criteria, including speed, agility, and endurance. Particularly for bowlers in the context of cricket, resistance training is crucial for developing the strength needed to produce strong deliveries and preserve performance levels over a match (Johnstone et al., 2014). Though its significance is great, more study especially catered to the particular needs of cricket bowlers is needed. Another important element that has attracted a lot of interest in sports science is power training, which consists of Olympic lifting and plyometric workouts (Pote, 2018). For athletes that must execute high-intensity movements, including quick bowling in cricket, this type of training concentrates on building explosive strength and rate of force production—qualities absolutely vital . Although other sports have extensively reported on the use of power training techniques, more research is needed on how best to combine them into cricket training schedules, particularly for medium-fast bowlers.

Though studies in other sports offer insightful analysis, the literature on the particular effects of resistance and power training on medium-fast bowlers in cricket is conspicuously lacking (Christie, 2012). Examining current studies, evaluating their relevance to cricket, and pointing up areas where more study is required helps this literature review to close this gap. This review attempts to guide researchers and practitioners on optimizing training programs to improve the performance and resilience of medium-fast bowlers by combining present knowledge and stressing important findings (Noakes & Durandt, 2000). Cricket is a game that has changed significantly over time, and with that development in the game, training strategy has also changed significantly (Noorbhai & Noakes, 2015). Cricket instruction historically concentrated mostly on improving technical skills including hitting, bowling, and fielding. This entailed bowlers honing their tactics and delivery to increase accuracy and consistency. A major component of the conditioning programs for cricket players was also endurance training, which mostly consisted in long-distance running (Mani, 2009). Emphasizing skill development and endurance, this conventional method sometimes overlooked the need of strength and power training. Early in the 20th century, technical ability and cricket-specific skills took front stage. Unlike now, physical conditioning was not as developed or scientifically informed (Lascu et al., 2021). Bowlers used their inherent ability and consistent bowling technique practice to raise their performance level. This strategy stemmed from the conviction that elite performance in cricket could be attained with just skill improvement and match experience. The importance of physical conditioning started to be understood by the middle of the 20th century, and more regimented exercise regimens started to take front stage (Weldon et al., 2021).

Sports science's application to cricket training began to shape our knowledge of it. Though in a crude form, coaches started including fundamental strength and conditioning activities into training schedules. This included including workouts to increase general fitness and strength for bowlers, which was seen to help with their bowling performance (Malcolm et al., 2013). Modern athletic conditioning, including cricket (Weldon et al., 2021), now consists mostly in resistance training. Exercises in this type of training impart resistance to the muscles, therefore building muscular strength, endurance, and hypertrophy. Free weights, resistance bands, or bodyweight workouts are just a few of the several places where one could find resistance. Resistance training is absolutely vital for cricket bowlers—especially medium-fast bowlers—in order to increase both strength and accuracy. Exercises that improve lower body strength—which is crucial for producing power during the bowling action—are often the emphasis of resistance training for bowlers (Johnstone et al., 2014). Squats, deadlifts, and lunges target the main muscular groups in the legs and lower back, so building the required strength to support explosive motions (Pote, 2018). Improving the force and control of the bowling delivery depends also on upper body strength workouts like bench presses and rows. Studies have indicated that athletic performance can be much improved by resistance training. Emphasize how resistance training improves muscular activation—a vital ability for sports demanding explosive power (Johnstone & Ford, 2010). Specifically looked into how resistance training affected cricket players and discovered it enhanced muscle activation patterns and bowling biomechanical effectiveness. This implies that including resistance training into a bowler's program will result in higher general effectiveness and bowling speed (Herridge et al., 2020). Including resistance training into cricket training courses calls both great planning and implementation. A well-designed resistance training program should concentrate on the particular demands of bowlers, including activities that improve strength, power, and endurance.

Beyond only building strength, resistance training can prevent injuries by strengthening the muscles and joints utilized in bowling. Designed to increase explosive power and rapidity of force development, power training—which includes Olympic lifting and plyometric exercises—is High-intensity, explosive motions include jump squats, box jumps, and depth leaps (Callaghan et al., 2024) plyometric involve. These drills seek to improve muscular contraction speed and force, which are vital for sports requiring quick and forceful motions. Cleanes and snatches in Olympic lifting help to coordinate and improve general power. Particularly important for cricket bowlers is power training (Sholto-Douglas et al., 2020). High speed bowling calls for a mix of explosive force and neuromuscular control. Olympic lifts increase general power production; plyometric exercises strengthen the fast-twitch muscle fibres in charge of quick, forceful actions. By incorporating power training into their regimen, bowlers can improve their ability to generate force quickly and efficiently, leading to increased bowling speed and performance. The importance of developing maximal neuromuscular power through power training (Pyne et al., 2006). Improving a bowler's physical strength, power, and endurance all of which directly affects their on-field performance depends critically on resistance training. Working against an external resistance, including weights, resistance bands, or even bodyweight, this kind of training consists on workouts aiming at certain muscle areas (Elahi, 2024).

Resistance training is particularly important for cricketers as it helps build the strength and power required to create high bowling speeds, preserve control, and prevent injury over the length of a match. Resistance training calls for several techniques, each with special advantages for bowlers (Forrest et al., 2018). Often used to target big muscle groups and build general strength are free weights such dumbbells and barbells. Leg strength is crucial for producing power throughout the bowling stride, hence exercises including squats, deadlifts, and lunges are quite helpful. Key for ball release, upper body workouts include bench presses and overhead presses assist strengthen the shoulders and arms (Boyce & Schoenfeld, 2022). More regulated motions from machines and guided weights let bowlers target particular muscular groups such as the quadriceps, hamstrings, and glutes without running the danger of form or injury. Particularly in the core, bodyweight workouts include push-ups, planks, and pull-ups help to increase functional strength and stability. Another great item are resistance bands, which vary in resistance to help in key regions such the shoulders, forearms, and legs increase flexibility and strength (Popowych, 2021).

Ultimately, plyometric exercises including medicine ball tosses and box jumps help bowlers acquire explosive strength, a crucial ability for rapid bowling.

The main advantage of resistance training for bowlers is the increase of muscular strength. Particularly in the legs, core, and upper body, stronger muscles let bowlers produce greater force during their deliveries. Particularly important is leg strength as the lower body provides much of the force needed for quick bowling. Key for producing speed, exercises include squats, lunges, and leg presses assist bowlers increase their run-up, stability, and explosive push off the ground. A bowler also depends on a strong core as it allows the effective transmission of power from the lower body to the upper body and finally to the ball. Exercises such planks, Russian twists, and cable rotations help to strengthen the core, thereby improving balance and stability qualities necessary for an efficient bowling action. Furthermore, upper body strength helps the bowler to have better control over the ball and speeds the release of it. Bench presses and shoulder presses are among resistance training activities that strengthen the shoulder and arm muscles, which speed the ball during the release. Apart from strength, muscle endurance is similarly vital for bowlers, particularly in longer forms of the game where consistent performance over time is absolutely critical.

Methodology

Proposed Place of Work and Facilities Available

The research was conducted at sports board Punjab, with following facilities:
Ground: For field-based training and pre post testing.
Gym: Equipped with weights and training equipment.
Plyometric Box: For power training exercises.

Plan of Work and Methodology Adopted

This study aims to investigate the effects of resistance and power training on bowling speed of medium fast bowlers in cricket through a pre- and post-testing Quasi experimental research design. The methodology involves assessing medium fast bowlers in cricket speed with speed gun before and after the intervention period of resistance and power training. Data analysis employed T-tests and descriptive statistics to compare the results and measure any significant changes in bowling speed. This approach provided valuable insights into how resistance and power training can potentially enhance bowling speed of medium fast bowlers in cricket.

Interventions:

Duration: The training program lasted for 8 weeks.
Session: 6 sessions of resistance and power training per week.
Exercise: 90 to 100 minutes of moderate to high intensity exercise (Interval training).
Intensity: 70-80% of MHR (Moderate to High Intensity.

Table 1

Eight Weeks Training Plan of the Participants

Day	Activity	Duration	Details
Day 1 to Day 6	Warm-Up	10 minutes	Dynamic stretches (leg swings, high knees, butt kicks); Light jogging or jumping jacks
	Resistance Training	30 minutes	- Squats: 4 sets of 8-12 reps - Deadlifts: 4 sets of 8-12 reps - Bench Press: 4 sets of 8-12 reps - Bent Over Rows: 4 sets of 8-12 reps - Shoulder Press: 3 sets of 10-15 reps - Pull-Ups/Lat Pulldowns: 3 sets of 10-15 reps

Day	Activity	Duration	Details
	Plyometric Training	30 minutes	- Box Jumps: 3 sets of 10 reps - Hurdle Jumps: 3 sets of 10 reps - Medicine Ball Slams: 3 sets of 15 reps - Bounding: 3 sets of 20 meters - Jump Squats: 3 sets of 15 reps - Lateral Skater Jumps: 3 sets of 15 reps each side
	Skill-Related Work	25 minutes	- Flying Sprints: 4 sets of 20 meters - Acceleration Runs: 4 sets of 15 meters - High Knees with Sprint: 4 sets of 20 meters - Quick Feet Exercise: 4 sets of 30 seconds
	Cool-Down	5 minutes	Static stretching focusing on legs and hips; Deep breathing exercises
Day 7	Rest Day	-	Full rest or optional light activity (e.g., stretching, walking, yoga)

Note. This table displays the training schedule of 8 weeks.

Intensity: Maintain moderate to high intensity throughout the sessions, focusing on controlled movements and breathing.

Cool Down: Always include a cool-down period at the end of each session with gentle stretches and relaxed movements in the water.

Parameters/Variables to be Studied

Independent Variable: Resistance and power training.
Dependent Variables: Bowling speed.

Methods of Data Collection

- Participants' consent was obtained and then demographic and data related to the history of any medical condition was collected.
- Within 3 to 5 days after base training pre-test was be conducted in the morning by using speed gun.
- Post-test was conducted after completion of resistance and power training sessions.

Sample Size

A total of 20 medium-fast bowlers (Akhtar et al., 2015).

Sampling Technique and Procedure

Purposive sampling was used, selecting available medium-fast bowlers from local clubs, with assessments conducted before and after the training program to measure changes in bowling speed.

Inclusion Criteria

- Cricket players who are from cricket clubs of Sports board Punjab.
- The players who are part of cricket clubs of Sports board Punjab.
- Cricket players, who consented to the participation in this study.
- Cricket players whose age was between 20-25 Years.

Exclusion Criteria

- Cricket Players who were taking any steroids did not take part in the study.
- The players who had any injury did not take part in the study.
- The player who had any medical conditions like (cardio, heart or lungs disease) did not took part in the study.
- Cricket players, who not consented to the participation in this study.
- Cricket players whose age is less than 20 or more than 25 Years.

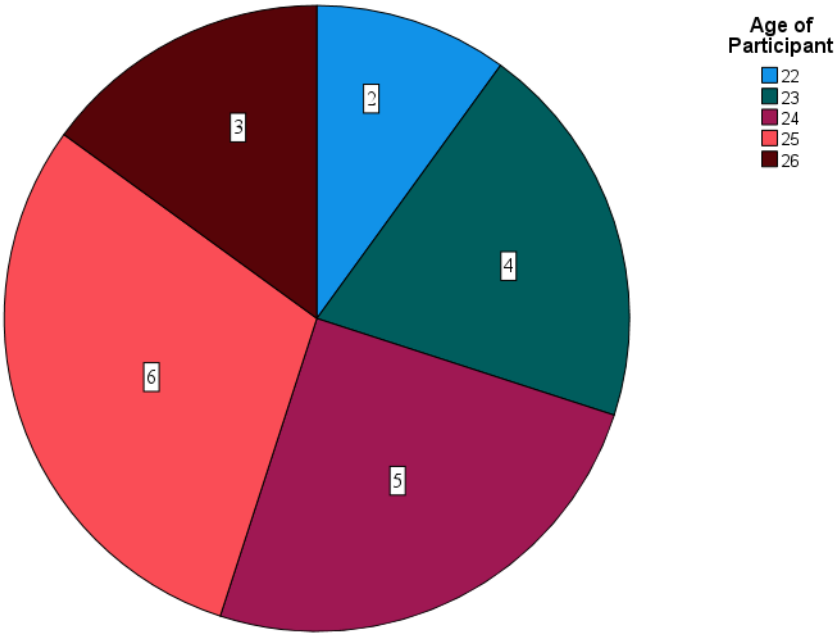
Statistical analysis/test to be used

- Paired sample t-Test and Descriptive statistics was used.
- All statistical analysis was calculated by using the Statistical Package for the Social Sciences (SPSS), version 23.
- Statistical significance was kept at an alpha level less than or equal to 0.05.
- To note whether there were differences in cricketer's bowling's speed in response to the resistance and power training program. In addition, to examine the pre -post training effect of training program speed gun test was employed.

Results

Figure 1

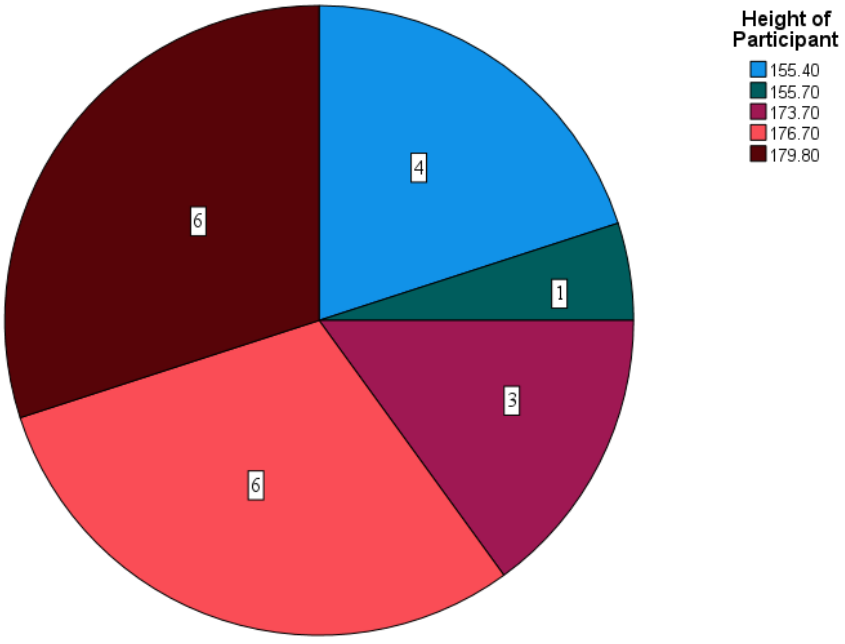
Age distribution of the participants



Note: This figure shows the age distribution of the participants.

Figure 2

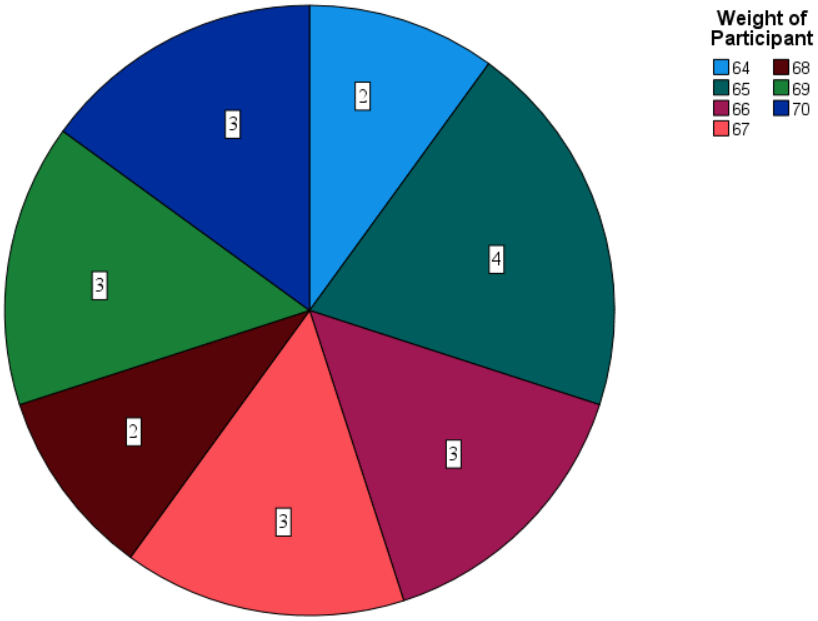
Height distribution of the participants



Note: This figure shows the height distribution of the participants.

Figure 3

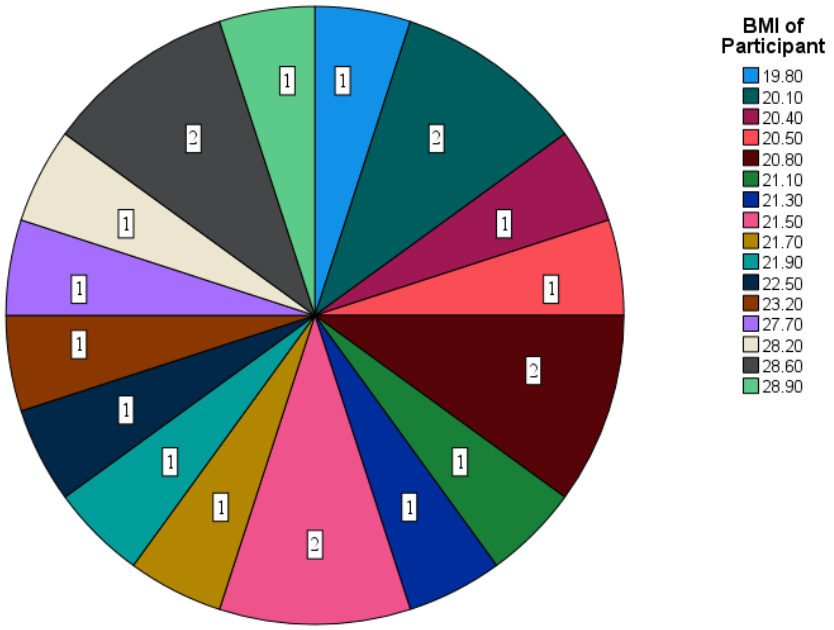
Weight distribution of the participants



Note: This figure shows the weight distribution of the participants.

Figure 4

BMI distribution of the participants



Note: This figure shows the BMI distribution of the participants.

Table 2

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Bowling Speed Pre Test	.139	20	.200*	.967	20	.686
Bowling Speed Post Test	.167	20	.145	.954	20	.424

Note: The pre- and post-test bowling speed norms' findings point to a normal distribution of the data.

Both larger than 0.05, the Kolmogorov-Smirnov test for the pre-test had a significance value of 0.200 and for the post-test was 0.145, therefore suggesting normalcy. Comparably, the Shapiro-Wilk test for the pre-test revealed a significance of 0.686 and for the post-test it was 0.424, both being over 0.05, thus confirming the normalcy of the data. For data analysis, parametric tests such as the paired sample t-test make sense thus.

Table 3

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Bowling Speed Pre Test	118.75	20	2.531	.566
	Bowling Speed Post Test	126.65	20	2.183	.488

Note: The mean bowling speed rose from 118.75km/h in the pre-test to 126.65km/h in the post-test according to paired samples statistics. Bowling speed variability dropped somewhat after the intervention; the pre-test standard deviation was 2.531 and the post-test standard deviation was 2.183. For the pre-test the mean's standard error was 0.566; for the post-test, it was 0.488. With less variation among the bowlers, this implies a clear increase in bowling speed after the program of resistance and power training.

Table 4

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Bowling speed pre test & bowling speed post test	20	.564	.010

Note: With a correlation value of 0.564, the paired samples correlation reveals a moderate positive link between the pre-test and post-test bowling speeds. This suggests a quite weak link between the two metrics. The statistically significant p-value of 0.010 indicates that the resistance and power training program is successful because the increase in bowling speed from the pre-test to the post-test is not resulting from random chance.

Table 5

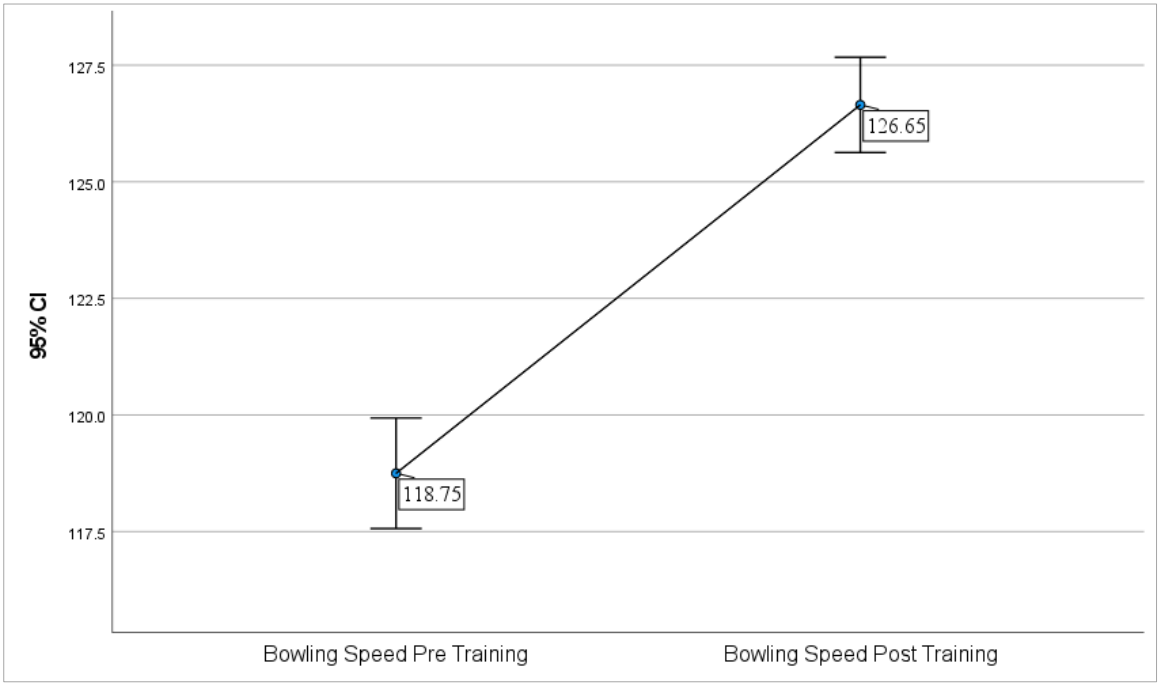
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Bowling Speed Pre test - Bowling Speed Post Test	-7.900	2.222	.497	-8.940	-6.860	-15.901	19	.000

Note: Bowling speed differs statistically significantly between the pre-test and the post-test according the paired samples test. Standard deviation of 2.22 and a standard error mean of 0.497 help to explain the mean difference in speed of -7.90 km/h. After the training, bowling speed has clearly improved; the 95% confidence interval for the mean difference runs from -8.94 to -6.86. The improvement in bowling speed is statistically significant according to the t-value of -15.901 and the p-value of 0.000 (less than 0.05).

Figure 5

Error bar chart showing the difference between pre and post training bowling speed of participants



Note: This figure shows an error bar chart showing how bowling speed changed before and after the training intervention. With error bars to show data variation, the chart graph graphically shows the mean bowling speed rise from 118.75 km/h in the pre-test to 126.65km/h in the post-test. The lower fluctuation after training points to bowlers' increasing consistency. This graphical depiction helps to corroborate the results of the research showing that an eight-week resistance and power training program greatly improved the bowling speed of amateur medium-fast bowlers.

Conclusion

The study aimed to evaluate the effects of resistance and power training on the bowling speed of medium-fast bowlers in cricket. According to the data analysis, participants' bowling speed was much raised by resistance and power training. Performance clearly improved as the mean bowling speed rose from 118.75km/h in the pre-test to 126.65km/h in the post-test. Furthermore, the little drop in the standard deviation after the intervention points to more consistent bowlers' performance among the others. With a noteworthy p-value of 0.000 ($p < 0.05$), the statistical analysis—including the paired sample t-test—confirmed that the rise in bowling speed was not resulting from random chance. Further supporting the efficacy of the resistance and power training program are the modest positive correlation between the pre-test and post-test findings. These results imply that resistance and power training can be quite important in increasing the bowling speed of medium-fast bowlers in cricket, therefore offering insightful information for coaches and athletes trying to raise performance in this field. This study advances knowledge of how strength and power training could improve cricket performance—more especially, the bowling speed of medium-fast bowlers. The findings offer strong proof that such instruction should be part of cricket players' fitness programs to improve their field performance.

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