IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Harness Running As A Catalyst For Enhancing Biomotor Fitness In Cricket: Analyzing Performance Gains In Speed And Power

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Abstract: The physical demands of cricket necessitate a blend of endurance, strength, speed, and agility. This study examines how cricket players' biomotor fitness and physiological parameters are affected by harness running and sand running. Strength, power, coordination, and endurance have all been enhanced by the application of resistance-based training techniques like sand running and harness. In cricket players between the ages of 18 and 30, the study intends to examine their individual and combined effects on speed, agility, muscular endurance, and cardiovascular fitness. Cricket-specific fitness tests were used to evaluate pre-test and post-test performance metrics during a 12-week intervention. The findings show notable gains in speed, power, and reaction time; harness running is better for building strength, while sand running improves agility and endurance. The results help to improve athletic performance, injury prevention, and conditioning regimens tailored to cricket.

Keywords: Cricket fitness, Biomotor abilities, Physiological parameters.

Introduction

Cricket requires high physical fitness, skill, and strategy for players. Harness and sand running are resistance-based conditioning techniques that improve biomotor abilities and physiological capacities. Harness running increases strength, speed, and power, while sand running enhances muscular endurance, balance, and agility. This research aims to examine their combined effects on cricket players. Understanding the impact of training techniques on cricketers can help develop effective conditioning programs, enabling higher performance and reducing injury risks. Cricket, a globally popular sport, involves a series of innings and requires comprehensive fitness and training programs to enhance player performance. In cricket, each innings consists of six deliveries per over, with the fielding side aiming to limit runs and take wickets. Biomotor fitness, including coordination, strength, speed, endurance, agility, and flexibility, is crucial for optimal performance in batting, bowling, and fielding. A well-rounded training program can enhance performance, reduce fatigue, and lower injury risks. Cricket players require high-speed capabilities, agility, flexibility, and coordination for efficient ball chases, quick throws, and high-pressure scenarios. They also need flexibility and coordination to perform a wider range of movements and reduce injury risk. Physiological parameters, such as VO2 Max, lactate threshold, heart rate, and muscular endurance, are crucial for improving performance and injury prevention.Crucial physiological markers include the heart rate, lactate threshold, and VO2 max of crickets. VO2 Max, a measure of aerobic fitness and cardiovascular endurance, quantifies the maximum amount of oxygen consumed during intense activity.

The lactate threshold aids in sustaining high-intensity activity prior to fatigue. Heart rate recovery indicates increased cardiovascular fitness since it lowers the resting heart rate. For athletes participating in sports like cricket, heart rate recovery, muscle endurance, body composition, and respiratory efficiency are critical. Players can get back to being ready for the next play with a quick recovery heart rate. A lean body composition improves endurance, speed, and response time; strength training and a healthy diet all contribute to peak performance. Improved respiratory efficiency in athletes, particularly in endurance sports, allows them to handle higher levels of exercise without breathlessness. This is achieved through respiratory exercises, aerobic conditioning, and breath control techniques. Monitoring physiological parameters, such as heart rate variability and lactate levels, helps athletes fine-tune their conditioning regimens and achieve performance goals. By monitoring physiological indicators with wearable fitness trackers, lactate threshold testing, VO2 Max testing, and heart rate monitors, athletes can maximize their potential, avoid injuries, and sustain peak performance. While surface variety training in cricket tests muscles and increases balance and adaptability, resistance training increases strength, endurance, and power. Training on varied surfaces improves proprioception, balance, and adaptability in cricket. It reduces joint impact during high-intensity activities, prevents injuries, and strengthens stabilizing muscles. Combining resistance and surface variability training enhances speed, power, and endurance, while reducing injury risk. This training method is practical in cricket. Despite the widespread use of fitness training programs in cricket, There is not enough specificity in integrating modern methods like resistance and surface variability training. Existing research lacks comparative studies, cricket-specific insights, and injury prevention research, emphasizing the necessity of conducting more thorough research on these approaches.

The research aims to identify the efficiency of harness running and sand running on cricket players' biomotor and physiological attributes, and determine which method leads to optimal results for improving game-specific performance. The study also seeks to explore the comparative effectiveness of these methods in cricket fitness programs. This study investigates the effects of harness running and sand running on cricket players' biomotor fitness and physiological parameters. It aims to analyze individual and comparative impacts, offering insights into optimizing cricket-specific fitness programs for enhanced athletic performance. The study also looks at possible synergistic benefits of sand running and harness running. This study investigates the effectiveness of resistance and surface variability training in improving cricket players' performance. It aims to develop evidence-based recommendations for coaches and trainers to incorporate these training methods into comprehensive cricket-specific fitness programs. The findings will help prevent injuries and optimize athletic performance in high-demand sports like cricket.This research compares the effeciency of harness running and sand running on cricket players' biomotor and physiological fitness. It creates training recommendations after analyzing the combined effects of different training techniques on overall cricket performance. The study will focus on male cricket players aged 18-30, assessing fitness levels before and after the interventions. Enhancing biomotor fitness components for cricket performance—such as speed, strength, power, agility, endurance, and flexibility—is the goal of the study. Additionally, it will assess physiological factors like stability, balance, lactic acid threshold, muscular endurance, and cardiovascular fitness. Twelve weeks will pass during the course of the study. This study examines the value of harness running and sand running for cricket players. Among the disadvantages are a small sample size, short duration, external factors influencing performance, training specificity, and limitations related to facilities and equipment. More comprehensive insights might be obtained from a larger and more varied group. The study's objective is to monitor physiological parameters of cricket players using harness and sand running. It hypothesizes that these methods improve biomotor fitness and physiological parameters, with harness running having a more significant impact on strength and power development. The study also suggests a significant relationship between these methods. This research explores biomotor fitness, physiological parameters, and harness and sand running as training methods for cricket players. Speed, strength, endurance, flexibility, balance, agility, and coordination are the main topics, along with how these affect how well they perform in practice and competition. The study also examines the effects of these training methods on players' performance.

The study examines how cricket players' muscular strength, endurance, lactate threshold, agility, power output, and cardiovascular endurance are affected by harness jogging. It measures both cardiovascular and muscular endurance, as well as the influence of sand running on lactate threshold, agility, power output, and cardiovascular endurance. This study explores the impact of harness running and sand running on cricket players' fitness and performance. It focuses on neuromuscular coordination, resistance training, and surface variability. The findings can be used to design more efficient conditioning programs and enhance on-field performance by improving essential skills like speed, strength, endurance, and agility. This study investigates how cricket players' physiological and motor fitness is affected by harness and sand running training methods. It offers advice on how to improve performance, avoid injuries, and use it practically for different ability levels. The results can be used in other sports where comparable strength, speed, and stamina are needed.

REVIEW OF LITERATURE

Schmidt and Lee(2011) discussed the principles of motor control and learning in sports. Their framework emphasized the importance of biomotor skills (strength, speed, agility, flexibility, and endurance) in enhancing sports performance. They established a link between neuromuscular coordination and physical abilities, reinforcing the importance of targeted training interventions to improve biomotor fitness. Bompa and Haff(2009) introduced the concept of periodization, which is crucial for improving biomotor fitness in athletes. They suggested that a systematic and progressive increase in training intensity can improve strength, endurance, and power, emphasizing that different sports require specialized training regimens to optimize biomotor components. Behm and Sale (1993) investigated how strength training affected biomotor skills and neuromuscular coordination. They discovered that resistance training enhances motor unit recruitment and synchronization, which results in improved athletic performance overall, especially in games like cricket that call for quickness and explosive power. Young et al(2001) investigated how different training methods enhance speed and agility in athletes. Their findings suggested that resistance and surface variability training can significantly improve an athlete's acceleration, change of direction, and overall agility. These are key biomotor skills required for effective cricket performance.

Turner and Stewart(2014) focused on cricket-specific strength and conditioning programs, demonstrating how targeted exercises improve biomotor components such as endurance, strength, and speed. A mix of weight training and agility drills enhances performance, especially when fielding and running between wickets, according to their case study on professional cricket players. Siff and Verkhoshansky's(2009) work on biomotor abilities provides a comprehensive look into how various training modalities—such as resistance and surface-based training—impact physiological and motor adaptations. They emphasized that the development of speed, power, and endurance must be sport-specific, making their findings particularly relevant to cricket. Reilly and Hardiker(1981) investigated the connection between elite cricket players' motor performance and body composition (somatotype). They discovered that body type differences have a major impact on biomotor skills, indicating that in order to maximize strength, speed, and agility, training regimens should be customized for each athlete's unique physique. Zatsiorsky and Kraeme(2006) provided an in-depth exploration of strength training and its impact on biomotor fitness. Their research emphasized the importance of progressive overload and specificity in training programs, showing that cricket players benefit from tailored strength exercises that improve explosive movements like bowling and batting..

Coutts and Duffield(2010) compared the physiological responses of cricket players during different training regimens. Their research highlighted the effectiveness of high-intensity interval training (HIIT) and surface-based variability exercises like sand running in improving endurance, cardiovascular fitness, and recovery rates, which are necessary for cricket.. Blanch and Gabbett (2016) examined the changes in the physical demands of professional cricket training and competition. According to their findings, training volume and intensity have increased, which has been linked to a rise in injury rates. The review underscores the need for careful management of training loads to balance performance enhancement with injury prevention.

The following Table-1 summarizes the key problems identified from the literature and suggests recommendations for improving research and practice in cricket-specific fitness training.

Table 1 Summary of the identified problems

Problem Identified	Description	Recommendation
Limited Research on Sport-Specific Training Protocols	Most studies use general fitness programs without cricket-specific adaptations.	Develop cricket-specific training protocols, integrating sport-specific drills with fitness components.
Inconsistent Use of Cricket-Specific Tests	Fitness tests used in studies are often not tailored to cricket-specific performance measures.	Standardize and implement cricket-specific tests to evaluate the effectiveness of training.
Lack of Longitudinal Studies	Research often focuses on short-term training effects, with little attention to long-term impact on performance.	Conduct long-term studies to assess sustainability of fitness improvements over a cricket season or career.
Insufficient Focus on Injury Prevention	Few studies explore the direct relationship between fitness training and injury prevention in cricket players	Increase focus on how specific training (e.g., strength, flexibility) contributes to reducing cricket injuries.
Limited Exploration of Combined Training Effects	Most studies focus on isolated fitness components rather than combinations like speed, strength, and endurance training together	Explore the synergistic effects of combined fitness components for a more holistic approach to cricket training.
Lack of Individualized Training Programs	Most fitness programs are generalized, without considering player roles (batsman, bowler, wicketkeeper) or individual physical conditioning levels.	Design personalized and role-specific training programs for cricketers based on their position and conditioning.
Minimal Focus on Recovery and Regeneration Techniques	Recovery strategies, such as active recovery and sleep optimization, are often not addressed in fitness training studies.	Investigate and incorporate recovery techniques to enhance performance and reduce injuries in cricket players.

The research review emphasizes how important physiological factors and biomotor fitness are to cricket-specific performance. Even though previous studies have examined a number of factors, including strength, endurance, agility, and flexibility, there are still a number of gaps, especially when it comes to training regimens tailored to cricket. According to the research, existing fitness programs frequently fall short of a thorough, sport-specific strategy that incorporates the particular requirements of cricket, such as role-specific conditioning for fielders, bowlers, and hitters.

METHODOLOGY

The methodical process involves identifying problems, selecting subjects, variables, tests, and ensuring data reliability, followed by pilot studies, training programs, and statistical procedures. The study aimed to assess the efficacy of harness running and sand running training for cricket players aged 18-21 and 22-25. The participants were selected through a random group design and underwent game-specific SAQ training for 12 weeks. The study's success relied on careful selection of participants, with inclusion criteria defining eligibility, exclusion criteria defining conditions to exclude, and recruitment processes ensuring consistency. The study included players with at least two years of competitive cricket experience, active involvement in regular training for at least six months, and no major musculoskeletal injuries. Participants were also required to commit to the 12-week training intervention, ensuring consistent follow-up and valid comparisons between pre-test and post-test results. Exclusion criteria excluded players with existing medical conditions, specialized fitness or resistance training, performance-enhancing substances, missed more than 10% of scheduled training sessions, and those unable to complete baseline fitness tests due to lack of motivation, fatigue, or discomfort. The recruitment process involved recruiting participants from local cricket clubs, sports academies, and universities, who were fully briefed on the study's nature and potential risks and benefits. To ensure participant homogeneity, reduce the risk of damage, maximize outcomes, and streamline the recruiting process, the inclusion and exclusion criteria were meticulously crafted.

Table 2 displays the mean and standard deviation values for the age, height, and weight of the cricket players in each age group.

Table-2 : Physical Characteristic of the Participants

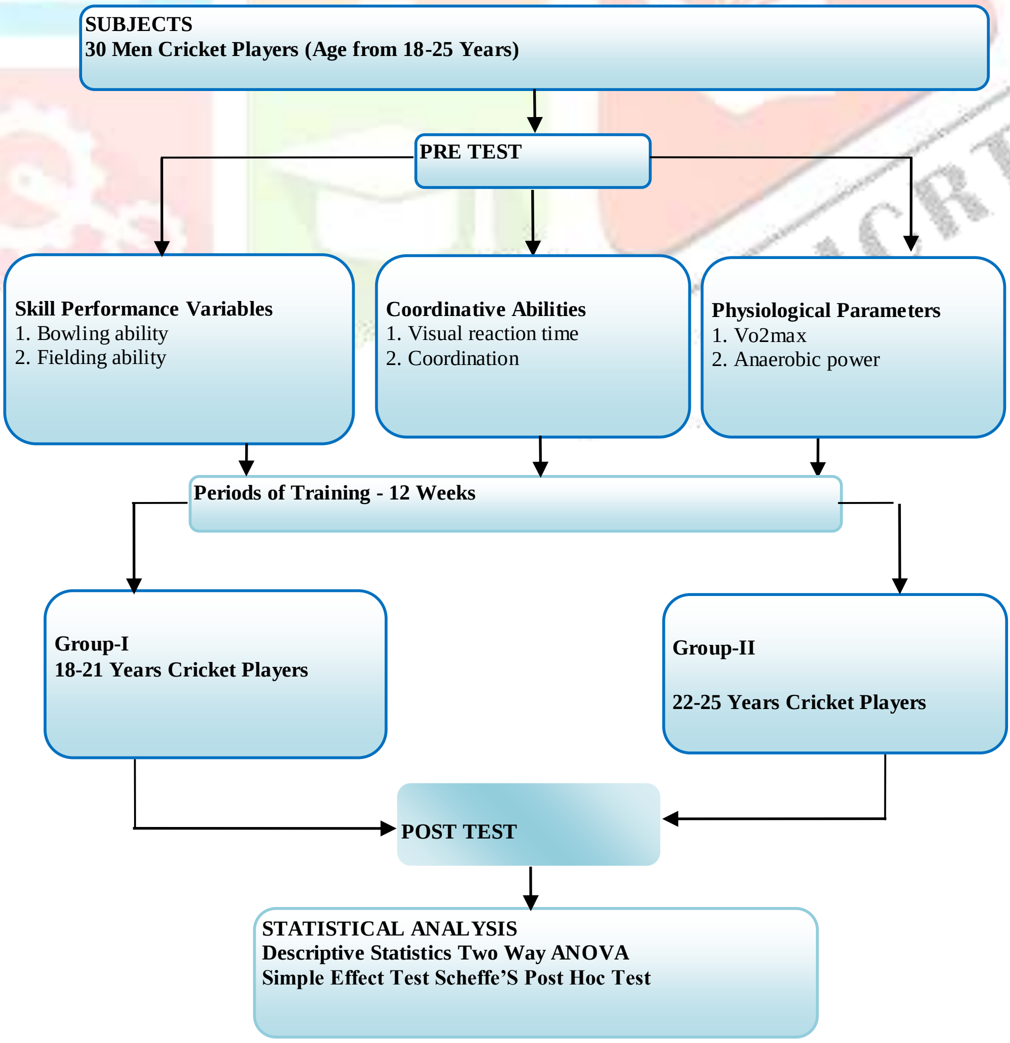
Group	Number	Age (years)	Height (cm)	Weight (kg)
18-21 years cricket players	15	20.67±2.63	172.58±2.74	70.37±4.59
22-25 years cricket players	15	23.85±2.72	173.36±4.16	73.24±5.72

RESEARCH DESIGN

The study evaluates the impact of resistance and surface variability training on biomotor fitness and physiological parameters in cricket players. The research design includes pre-test and post-test measurements, with a random group design and dependent variables including coordination abilities, game skills, and physiological parameters. The methodology is specified in the Flow chart.

Chart – I

Flow Chart showcase the approach used in this Research



RELIABILITY OF DATA

The consistency of the data was ensured by assessing the instrument reliability, test reliability, subject dependability, and tester competency.

INSTRUMENT RELIABILITY

The necessary tools were in fine operating order. The standardized and reliable company was the source of the instruments. The calibrations of the instruments were evaluated and found to be sufficient for the purpose of this work.

TESTER'S COMPETENCY

With the help of research academics, the investigator gathered the data. The testers were given an explanation and demonstration of the study's goal as well as the testing methods. To become familiar with the precise testing procedure, the investigator conducted several practice sessions. The test-and-retest system identified the dependability of the testers. Test reliability and the tester's capacity to take measurements were accepted due to the extremely high correlation that was found.

SUBJECT DEPENDABILITY

Because the testing personnel utilized the same individuals under different situations, the test and retest scores showed subject consistency.

RELIABILITY OF TESTS

As test reliability increased, so did the tester's proficiency in administering the tests. The test-and-retest approach was used to assess the tests' dependability. Ten volunteers were chosen at random for this reason and used in the study's experiments. The same subjects were examined twice for each of the selected criterion variables in the same conditions, five days apart. For each criterion variable, the univariate correlation (intraclass correlation), as proposed by Johnson and Nelson (1988), was computed independently. Table 4 provides the computed coefficient of correlation.

Table – 4 : Correlation's intraclass co-efficient on the variables chosen

S. No.	Dependent Variables	'R' Value
1	Bowling ability	0.83*
2	Fielding ability	0.85*
3	Visual Reaction time	0.78*
4	Coordination	0.89*
5	Vo_2max	0.87*
6	Anaerobic power	0.85*

**Significant (0.05 level of confidence).*

The data were regarded as consistent in terms of the subjects, tester and instrument because the acquired "r" values were significantly greater than the necessary value.

TRAINING PROGRAMME

SAQ Training

Following the first assessments, the participants in both groups were given a specially created training program known as game-specific SAQ (speed, agility, and quickness) training. Over the course of twelve weeks, the training sessions were held six days a week. With the exception of the warm-up and warm-down, each experimental session lasted 30 to 45 minutes. For the experimental groups, the training started with a week of basic physical conditioning to prepare the subjects both mentally and physically to handle the particular load that was administered to them for the study. Following a week of conditioning, the experimental groups received training that included agility, speed, and quickness exercises. Experienced coaches oversaw the game-specific SAQ training sessions. Over the course of a week, the experimental group participated in six game-specific SAQ training sessions. Over the course of the 12 weeks, the sessions were gradually organized to increase in intensity.

As seen in Table 5, a week's schedule was carried over to the next week, and the load was gradually changed. The following process was used for the load progression: The training zone for the subject was set between 65% and 90% HRmax. From the first week to the next, the workout intensity was gradually raised. Training took place six times a week. The warm-up and warm-down periods were set at ten minutes each.

Table-5 : SAQ Training Programme

Week	Day	SAQ drills	Duration of each exercise	No. of Sets	Rest between Set	Rest between Exe.
I II	Mon	Harness Pull, Acceleration Marches, Butt Kickers, Galloping, In-out Shuffle, Cross Over Skipping, Lateral quick steps, 20Yards Shuttle,	20 sec	4	1:2	1:1
	Wed			4	1:2	1:1
	Fri	In Place Tuck Jump, Side Shuffle, Barrier Jumps, Wheel Barrow Drill.		4	1:2	1:1
III IV	Mon	Falling Starts, Skip for distance, Bounding, B – Skip, 30 - Yard T-Drill, Carioca, Five-Cone Drill, Cart Wheel, Lateral Skaters, Medicine-Ball Wall Side Toss (2 kg), In Place angle Jump, Back Pedal	25 sec	4	1:2	1:1
	Wed			4	1:2	1:1
	Fri			4	1:2	1:1
V VI	Mon	A-Skips for height, Speed barbell back squats, Sled runs, x cone drill, 15 - Yard Turn Drill,	30 sec	5	1:2	1:1
	Wed			5	1:2	1:1
	Fri	In-out Shuffle, ladder T, X, Y, 5 - 10 - 5 Drill, Star Drill, Lateral Skaters to Sprint, Simple reaction drills, Reaction ball, fast foot ladders		5	1:2	1:1
VII VIII	Mon	Acceleration Marches, Butt Kickers, Galloping, Harness Pull, 20Yards Shuttle, In-out Shuffle, Cross Over Skipping,	35 sec	5	1:2	1:1
	Wed			5	1:2	1:1

	Fri	Lateral quick steps, Barrier Jumps, Wheel Barrow Drill, In Place Tuck Jump, Side Shuffle		5	1:2	1:1
IX X	Mon	Falling Starts, Skip for distance, Bounding, B – Skip, 30 Yard T-Drill, Carioca, Five-Cone Drill, Cart Wheel, Lateral Skaters, Medicine Ball Wall Side Toss (2 kg), In Place angle Jump, Back Pedal	40 sec	6	1:2	1:1
	Wed			6	1:2	1:1
	Fri			6	1:2	1:1
XI XII	Mon	A-Skips for height, Speed barbell back squats, Sled runs, x cone drill, 15 - Yard Turn Drill,	45 sec	6	1:2	1:1
	Wed	In-out Shuffle, ladder T, X, Y, 5 - 10 - 5 Drill,		6	1:2	1:1
	Fri	Star Drill, Lateral Skaters to Sprint, Simple reaction drills, Reaction ball, fast foot ladders		6	1:2	1:1

Collection of Data

After 12 weeks of intervention with a game-specific SAQ training method, initial and end tests were performed on coordination abilities, game skills, and physiological characteristics. Before the test, participants warmed up and refrained from strenuous exercise.

Experimental Design and the Statistical Technique

To determine whether there are any significant differences between the before and post tests, the data gathered from the two groups on certain dependent variables will be statistically examined using the paired "t" test. Additionally, a percentage of changes will be computed to determine how the experimental treatment has affected specific dependent variables. Using the random group design, two groups of people (18–21 and 22–25 years old) were randomly selected from the same population. No effort was made to equalize the groups prior to the start of the experimental therapy. The data collected from the two groups (18–21 and 22–25 years of age group) at the time of before and post experimentation were statistically analyzed using a two-way (2 x 2) factorial ANOVA. According to Thomas and Nelson (1996), whenever the main objective is usually found in the contact, it is sufficient to discuss the interaction impact alone, unless there are extraordinary situations. Usually, there is little interest in assessing the principal consequences. Consequently, anytime the estimated "F" ratio for the interaction effect was found to be significant, the simple effect test was used. If the resulting "F" ratio value in the simple effect was significant, the Scheffe's test was employed as a post hoc test to find any paired mean differences that might have existed because there were two groups and two different tests to compare. Two-way (2 x 2) factorial ANOVA were processed by using information passage Software- Micro Soft Excel Statistical Software = SPSS (Statistical Package for Social Science), Version = SPSS 22. The.05 level of statistical significance was set in all situations.

ANALYSIS OF DATA AND RESULTS OF THE STUDY

The study investigates the impact of game-specific SAQ training on coordination abilities, game skills, and physiological parameters in male cricket players of different ages. The study involved 30 participants aged 18-25, who received 12 weeks of training for speed, agility, and quickness. The data collected from the elite and 22-25 age groups was analyzed using two-way analysis of variance to determine the influence of each factor separately and their combined influence. The study aimed to determine the effects of these adaptations on cricket players' performance in intercollegiate competitions.

ANALYSIS OF BOWLING ABILITY

The bowling ability of different age group cricket players was analyzed statistically by two factor (2X2) (groups X tests) ANOVA and the calculated results are put on show in table-6 & 7.

Table – 6 :Results of Descriptive Statistics on the Bowling Ability of Cricket Players in Various Age Groups Before and After SAQ Training

18-21 age group cricket Players				22-25 age group cricket Players			
Pre (N=15) **Mean & SD**	**Post** (N=15) **Mean & SD**	**Paired 'T' test**	**Changes in %**	**Pre** (N=15) **Mean & SD**	**Post** (N=15) **Mean & SD**	**Paired 'T' test**	**Changes in %**
17.43 0.34	21.12 0.23	6.96*	4.19%	18.57 0.47	23.78 0.46	8.55*	9.30%

* *Significant(0.05)*

The 18-21 age group cricket players showed significant improvement in passing ability scores before and after SAQ training, with a 4.19% enhancement in bowling ability and a 9.30% enhancement in bowling ability for the 22-25 age group. The study analyzed data from cricket players aged 18-21 and 22-25 prior to and following SAQ instruction on their bowling ability using two-factor ANOVA, as shown in table-4.2.

Table – 7 : Two-Way (2x2) (groups X tests) Analysis of Variance on Bowling Ability of Different age group cricket Players before & after SAQ training

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
Groups (18-21 age group& 22-25 age group)	**12.13**	**1**	**12.13**	**78.87***
Test (Pre & Post)	**4.62**	**1**	**4.62**	**30.07***
Interaction (Groups & Tests)	**0.88**	**1**	**0.88**	**5.77***
Error	**8.61**	**56**	**0.15**	

* ***Significant(0.05)***

Significant differences in bowling performance amongst male cricket players of various ages before and after SAQ training were discovered by the study. The pre-test and post-test data differed significantly, according to the results. It was also discovered that there was a substantial relationship between the tests and age groups. Table 8 also displays the results of the follow-up test.

Table-8 : Follow-Up Test Result on Bowling Ability of Different age group cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
18-21 age Group at Pre & Post test	0.73	1	0.73	8.29*
22-25 age Group at Pre & Post test	4.78	1	4.78	54.31*
Different age Group Pre test	9.79	1	9.79	111.25*
Different age Group Post test	3.22	1	3.22	36.59*
Error	2.46	28	0.088	

** Significant(0.05)*

The speed performance statistics of cricket players aged 18–21 and 22–25 before and after SAQ training showed notable differences, according to the study. While the bowling ability of the 22–25 age group did not significantly improve, that of the 18–21 age group did. There were notable variations in the bowling skills of the various age groups both before and after the test, with the latter demonstrating a notable improvement.

ANALYSIS OF FIELDING ABILITY

Two factor (2X2) ANOVA was used to statistically analyze the fielding abilities of cricket players across various age groups.

Cricket players in the 18–21 and 22–25 age groups had their fielding skill scores compared before and after SAQ training. The findings demonstrated a significant difference between the pre-test and post-test scores for both age groups, with the dribbling skill of the 22–25 age group improving by 5.68% and the fielding ability of the 18–21 age group improving by 4.05%. Two factor (2X2) ANOVA was used to evaluate the data. The findings demonstrated that, regardless of tests conducted before and after SAQ training, male cricket players in various age groups differed significantly in their fielding skills. Regardless of the groups, there was a substantial difference between the pre- and post-test fielding ability data, with the pre-test value being higher than the post-test value. The interaction value was higher than the post-test value for both groups and fielding ability tests. Table 9 also displays the results of the follow-up test.

Table-9: Follow-Up Test Result on Fielding Ability of Different age group cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
18-21 age Group at Pre & Post test	1.20	1	1.20	12.00*
22-25 age Group at Pre & Post test	3.05	1	3.05	30.50*
Different age Group Pre test	13.88	1	13.88	138.80*
Different age Group Post test	9.45	1	9.45	34.50*
Error	2.99	28	0.10	

** Significant(0.05)*

The study found significant differences in the fielding and dribbling abilities of cricket players aged 18-21 and 22-25 before and after SAQ training. The 18-21 age group showed significant improvement in their fielding abilities, while the 22-25 age group showed no significant improvement. The fielding ability of the different age groups significantly differed during the pre-test period and significantly improved during the post-test period, as indicated by the derived 'F' ratio value.

ANALYSIS OF REACTION TIME

Using a two-factor (2X2) ANOVA, the study examined the response time performance of cricket players in different age groups. Prior to and following SAQ training, the study examined the reaction time performance scores of cricket players in various age groups and at leisure levels. Cricket players' response time performance improved by 15.38% and 23.42%, respectively, according to the data, which revealed substantial changes between pre-test and post-test values. Two factor (2X2) ANOVA was used to evaluate the data.

Prior to and following SAQ training, the study discovered notable variations in the response time performance of cricket players across various age groups. The findings demonstrated that there were disparities in the performance statistics before and after the test. It was also discovered that there were notable differences in the interactions between the various age groups and assessments. As indicated in Table 10, the results also revealed a larger F'value for the interaction between groups and tests.

Table-10: Follow-Up Test Result on Reaction Time of Cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of	df	Mean	Obtained
18-21 age Group at Pre & Post test	0.008	1	0.008	8.00*
22-25 age Group at Pre & Post test	0.06	1	0.06	60.00*
Different age	0.25	1	0.25	250.00*
Different age Group Post test	0.11	1	0.11	110.00*
Error	0.008	28	0.001	

** Significant(0.05)*

The study reveals significant differences in reaction time performance across age groups of cricket players before and after SAQ training. The derived 'F' ratio value (8.00) is higher than the table value required for significance, indicating that reaction time performance significantly improved after SAQ training. However, the derived 'F' ratio value (60.00) is higher than the table value, indicating no significant improvement. The derived 'F' ratio value (250.00) is higher than the table value required for significance, indicating that reaction time performance significantly differed before and after SAQ training. The study concludes that the training significantly impacts reaction time performance in cricket players.

ANALYSIS OF REACTION TIME

The coordination ability of different age group cricket players was analyzed statistically by two factor (2X2) (groups X tests) ANOVA. According to the report, cricket players aged 18-21 and 22-25 showed significant differences in their coordination ability scores before and after SAQ training. The 18-21 age group showed a 16.98% improvement, while the 22-25 age group saw a 44.74% improvement. These results suggest that SAQ training can significantly enhance coordination abilities in both age groups, indicating potential benefits for cricket players. The study found significant differences in coordination ability between different age groups of men cricket players before and after SAQ training. The results showed that pre and post-test coordination ability data differed significantly. The interaction between groups and tests on coordination ability was also significantly different.

The F'value for interaction was also higher than the table value needed for significant results. The follow-up test result is also presented in Table-11.

Table-11:Follow-Up Test Result on Coordination Ability of Different age group cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
18-21 age Group at Pre & Post test	853.33	1	853.33	248.78*
22-25 age Group at Pre & Post test	1280.53	1	1280.53	373.33*
Different age Group Pre test	2468.57	1	2468.57	719.69*
Different age Group Post test	2128.51	1	2128.51	620.55*
Error	96.13	28	3.43	

** Significant(0.05)*

The 18–21 and 22–25 age groups' coordination skills before and after SAQ training differed significantly, according to the study. The coordination skills of the 18–21 age group significantly improved, but those of the 22–25 age group did not. There were also notable differences in the coordination skills of the 18–21 and 22–25 age groups before and after SAQ training. There were substantial differences in coordination ability throughout the pre-test time, as evidenced by the computed 'F' ratio value (719.69), which was greater than the table value needed for significance. Additionally, during the post-test period, there was a substantial difference in the coordination capacity of the younger and older age groups.

ANALYSIS OF DIFFERENTIATION ABILITY

The differentiation ability of different age group cricket players was analyzed statistically by two factor (2X2) (groups X tests) ANOVA.The study found that cricket players aged 18-21 and 22-25 showed significant improvements in their differentiation ability and over head shot performance before and after SAQ training. The results showed that the 18-21 age group's differentiation ability increased by 25.56%, while the 22-25 age group's improvement was 63.90%. These findings suggest that SAQ training can significantly enhance these abilities in cricket players. Prior to and following SAQ training, the study discovered notable variations in the capacity of male cricket players of various ages to differentiate themselves. For the 18–21 and 22–25 age groups, the 'F' value exceeded the necessary 0.05 level. There were also notable variations between the pre- and post-test data. As seen in Table 12, the interaction between the groups and differentiation ability tests was likewise greater than the necessary 0.05 level.

Table-12:Follow-Up Test Result on Differentiation Ability of Different age group cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of	df	Mean	Obtained
18-21 age Group at Pre & Post test	520.83	1	520.83	121.12*
22-25 age Group at Pre & Post test	790.53	1	790.53	183.84*
Different age Group Pre test	2050.13	1	2050.13	476.77*
Different age Group Post test	1598.70	1	1598.70	371.79*
Error	120.53	28	4.30	

** Significant(0.05)*

The study reveals significant differences in the differentiation ability of cricket players between the 18-21 and 22-25 age groups before and after SAQ training. The 18-21 age group showed a significant improvement in their differentiation ability, while the 22-25 age group showed no significant improvement. The difference in differentiation ability was also evident during the pre-test period, with a derived 'F' ratio value of 476.77, exceeding the required table value. However, the difference in differentiation ability during the post-test period, with a derived 'F' ratio value of 371.79, also exceeded the required table value, indicating significant difference in the players' ability to differentiate.

Cricket players between the ages of 18 and 21 and 22 and 25 had their VO2 Max performance ratings examined in the study both before and after SAQ training. Pre-test and post-test values differed significantly, with the 18–21 group having a 4.20% increase and the 22–25 group experiencing an 8.21% increase, according to the data. Two factor (2X2) ANOVA was used to evaluate the data, and table 4.20 shows the findings. According to the study, cricket players' VO2 Max performance can be considerably raised with SAQ training.

The research discovered notable variations in VO2 Max performance between different age groups of cricket players before and after SAQ training. The results showed that pre and post-test data showed significant differences. The interaction between age groups and tests on VO2 Max performance was also found to be significant. The results also showed a higher F'value for the interaction between age groups and tests. The follow-up test result is also presented in Table-13.
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Table-13: Follow-Up Test Result on VO2 Max of Different age group cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of	df	Mean	Obtained
18-21 age Group at Pre & Post test	8.13	1	8.13	29.03*
22-25 age Group at Pre & Post test	24.39	1	24.39	87.10*
Different age Group Pre test	59.50	1	59.50	212.50*
Different age Group Post test	31.66	1	31.66	113.07*
Error	8.009	28	0.28	

** Significant(0.05)*

The study reveals significant differences in VO2 Max performance between 18-21 and 22-25 age group cricket players before and after SAQ training. The 18-21 age group showed significant improvement in VO2 Max performance, while the 22-25 age group did not show significant improvement. The derived 'F' ratio value (212.50) for both groups before SAQ training was higher than the required table value. The derived 'F' ratio value (113.07) for both groups after SAQ training was also higher than the required table value, indicating significant differences in VO2 Max performance between the age groups. These findings highlight the importance of VO2 Max training in improving performance in cricket.

Analysis of Anaerobic Power

Two factor (2X2) (groups X tests) ANOVA was used to statistically examine the anaerobic power of cricket players in various age groups. Before and after SAQ training, the anaerobic power performance of cricket players in the 18–21 and 22–25 age groups was examined. Significant variations between pre-test and post-test values were found in the results; the 18–21 group improved by 2.48%, while the 22–25 group improved by 2.71%. Two factor (2X2) ANOVA was used to evaluate the data, and table 4.26 shows the findings. The study emphasizes how crucial SAQ training is for enhancing cricket players' anaerobic power performance.

Before and after SAQ training, male cricket players of various ages showed notable variations in anaerobic power, according to the study. The findings demonstrated that there were notable variations between the pre-test and post-test data. Anaerobic power assessments and group interactions were also revealed to be significant. Additionally, the data indicated a larger F'value for the test-group interaction. Table 14 also displays the results of the follow-up test.

Table-14:Follow-Up Test Result on Anaerobic Power of Different age group cricket Players before & after SAQ training [Groups(2) x Tests(2)]

Source of Variance	Sum of Squares	df	Mean Squares	Obtained "F" ratio
18-21 age Group at Pre & Post test	20.61	1	20.61	8.01*
22-25 age Group at Pre & Post test	28.93	1	28.93	11.25*
Different age Group Pre test	228.25	1	228.25	88.81*
Different age Group Post test	203.63	1	203.63	79.23*
Error	72.13	28	2.57	

** Significant(0.05)*

Before and after SAQ training, the anaerobic power of cricket players aged 18–21 and 22–25 differed significantly, according to the study. In contrast to the 22–25 age group, the 18–21 age group shown a notable improvement in their anaerobic power. Significant variations were also observed in the anaerobic power of the 18–21 and 22–25 age groups before and after SAQ training. Significant differences in resting anaerobic power were seen between the 18–21 and 22–25 age groups throughout the post-test period. These results demonstrate how crucial SAQ training is for raising cricket players' levels of performance.

Conclusion

Between the pre-test and post-test periods, cricket players' coordination skills, skill performance, and physiological factors differ considerably. Given that sprints are usually performed at a higher intensity over shorter distances, speed is an essential component of fitness. SAQ training is an essential method for increasing speed and agility. Another crucial aspect of fitness is agility, which calls for high levels of strength, stamina, and agility performance. In order to achieve more quickness, agility, and speed, SAQ training is regarded as beneficial physical exercise since it can enhance hip height, lateral agility, step length and frequency, and movement mechanics. The agility "t"-test and Yo-Yo test performance of speed, agility, and quickness training is more successful than sport-specific training in young Indian kabaddi players, according to Andhare's (2021) study comparing the effects of speed agility and quickness (SAQ) training to sport-specific training. When it came to speed, SAQ training outperformed plyometric exercise. After 12 weeks of SAQ training, Kabaddi players' speed and reaction time significantly improved, according to Kanagaraj and Sethu (2019a). According to Azmi and Kusnanik (2018), soccer players can improve their speed, agility, and acceleration by participating in a speed, agility, and quickness training program. The physical attributes of athletes, such as agility, movement speed, and performance level, could be enhanced by a 10-week S.A.Q. training program.

To sum up, SAQ training works well for enhancing cricket players' physiological characteristics, skill performance, and coordination. Top players must adjust their body posture in order to execute movements with more strength, balance, and control without sacrificing speed. It has been discovered that the Speed, Agility, and Quickness (SAQ) training program is a successful method for enhancing speed and agility in a variety of sports. According to studies, SAQ training can help athletes perform much better throughout the competition season without having the negative impacts of overtraining. It also aids in the development of physical fitness traits like agility, explosive power, muscular strength, endurance, and speed. After 12 weeks of training, the SAQ training group in cricket shown notable gains in physiological parameters such as resting heart rate, vo2max, and forced vital capacity. This is in line with earlier research by Senthil Kumar (2015) and Singh & Singh (2015), which similarly discovered notable alterations in a few physical, physiological, and skill-related performance factors of male collegiate football players. According to Sivaji, Saraboji, and Murugan (2013), junior volleyball players' serving and passing abilities were among the specific skill performance factors that were significantly impacted by 12 weeks of S.A.Q. training. The benefits of SAQ training on certain physical fitness metrics and the kicking skill of male high school football players were examined by Karthick et al. (2016). Senthilkumar and Annadurai (2014) investigated how certain skill performance factors of men's collegiate football players were affected by both individual and combination SAQ and strength training. According to recent research, SAQ training is better than other training programs but just as effective. The disparity amongst SAQ drill literatures may be caused by elements like subject characteristics, training program design, and dependent variable assessment techniques. The training design employed in training interventions, however, might be the primary cause of the reported contradictory results. Given that the criteria selected are crucial for achieving superior performance in a variety of games and sports, it can be concluded from the past and current research that scientifically designed SAQ programs raise the bar for sports performance. To attain the best performance possible in all sports, conditioning plans should incorporate scientifically and methodically designed SAQ routines.

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