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Correlation Of Core Endurance And Core Strength With Sprint Speed In Amateur Cricket Batsman.

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Abstract

Cricket, especially in shorter formats like T20 and One-Day matches, requires batsmen to perform repeated high-speed sprints while running between the wickets. Sprint performance plays a crucial role in improving scoring rate and reducing the risk of run-outs. Core muscles are believed to contribute significantly to athletic performance by providing stability and efficient transfer of force between the upper and lower body. However, there is limited research exploring how core endurance and core strength relate to sprint speed in amateur cricket players.

The present study aims to investigate the correlation between core endurance, core strength, and sprint speed in amateur cricket batsmen. A total of 80 male participants aged between 18–25 years will be selected using convenient sampling from cricket clubs. Core endurance will be assessed using the McGill torso endurance tests, core strength will be measured using the plank test, and sprint performance will be evaluated using the Repeated Sprint Ability (RSA) test.

Data will be analyzed using statistical software to determine the relationship between these variables. It is expected that core strength will show a stronger correlation with sprint performance compared to core endurance. The findings of this study may help in designing better training programs focusing on core strengthening to enhance sprint ability and overall performance in amateur cricketers.

Keywords - Amateur cricket batsmen, Core strength, Core endurance, Sprint speed, Repeated Sprint Ability (RSA), McGill torso endurance test, Plank test, Athletic performance, Running between the wickets, Sprint performance

Introduction

- Cricket is popular sport played by millions of individual world wide. With a rich history and wide range of physical demands. In cricket to achieve high score of runs batsman need to take single and double runs which need to have run as much fast.(1)
- The shorter game formats tend to be more physically intensive when related to match duration, incorporating more maximal sprints when batting.(2)
- Batting requires the ability to run between the wickets effectively. An increase in scoring rate is seen with effective running between the wickets, which allows batsmen to get full value for their shots while batting.(3)
- Sprint speed is the maximum speed at which a person can run.(3)
- There is a need for batsmen to maximize scoring in popular shorter formats of the game like T-20 cricket and one day cricket. Batsmen take greater risks to increase the run scoring rate due to limited availability of overs in formats like T-20, and run between the wickets as an attempt to score the most.(4)
- An amateur cricket batsman is a player who participates in the sport primarily for enjoyment and personal development rather than for financial gain or professional status. They play local leagues and not participate in professional league.(2)
- The core muscles, which include the abdominals, lower back, and hip stabilizers, are essential for maintaining stability, generating power, and ensuring efficient movement patterns during dynamic sports activities.(3)
- Core endurance is defined as the ability to maintain a position or perform multiple repetition.(3)
- Adequate core muscle endurance may play an important role in injury-free performance among athletes.(3)
- Core strength referrer to the ability of the musculature to produce force through contractile force and intra-abdominal pressure .(4)
- It has been theorized that a strong core will allow a transfer of forces from the lower body to the upper body with a minimal dissipation of energy.(2)
- There for purpose of this study is correlation of core endurance and core strength with sprint speed in amateur cricket batsman.

Need of study

- In cricket batsman best way to score more runs is by strike rotation. Which need fast running between the wickets.
- Cricket batting requires rapid movements, quick changes of direction, and explosive acceleration, making core endurance and strength crucial.
- Sprint performance is one of the key indicators to success in various of sports either for individual or team sports. (7)
- In batsman fast sprint speed and good core muscle endurance and core strength play important role to become successful in cricket.
- With the high sprint speed batsman can reduce chance of run out and can give his contribution in the improve high score run.
- As amateur cricketers often lack specialized training programs, it is important to understand how their core endurance and strength relate to their sprinting ability. This understanding could lead to better conditioning programs designed to improve both sprint performance and injury prevention.
- Limited research exists on the correlation between core endurance, core strength, and sprint speed specifically in amateur cricket batsmen.

RESEARCH QUESTION

Will there be any correlation between core endurance and core strength with sprint speed in amateur cricket batsman?

AIM

To study the correlation of core endurance and core strength with sprint speed in amateur cricket batsman.

OBJECTIVES

Primary objective

1.To study correlation between core endurance using McGill endurance test and sprint speed using repeated sprint ability test in amateur cricket batsman.

2.To study correlation between core strength using plank test and sprint speed using repeated sprint ability test in amateur cricket batsman.

Secondary objective

3.To compare whether core endurance or strength have better correlation with sprint speed in amateur cricket batsman

REVIEW OF LITERATURE

1. Dhvani Topiwala, Sonal Patole, Sucheta Golhar, Trupti Ranglani **Effectiveness of sprint interval training on repeated sprint ability (RSA) and lower limb power in amateur cricket batsmen at the end of 4 weeks: An experimental stud.** IJAR 7 (8), 192-201, 2021 Purpose: Cricket necessitates intermittent activities, which include high intensity sprinting. Stop and go nature of the sprinting between the wickets puts stress on the cricketers. Batting requires the ability to run between the wickets effectively to increase the scoring rate.
2. Nawaf Almutairi, Ahmad Alanazi, Mohammed Seyam, **Relationship between core muscle strength and dynamic balance among hospital staff.** Faizan Zaffar Kashoo, Danah Alyahya, Radhakrishnan Unnikrishnan Bulletin of Faculty of Physical 0 27 (1), 24, 2022 The plank exercise test is a position developed to assess the strength of the core stabilization muscles, and it is one of the exercise used to strengthen core stability. The plank test is reliable on the (ICC = 0.915) and a valid measure to evaluate performance in both older and younger adults.
3. Osama Ragaa Abdelraouf, Amr Almaz Abdel-Aziem International **The relationship between core endurance and back dysfunction in collegiate male athletes with and without nonspecific low back pain.** journal of sports physical therapy 11 (3), 337, 2016 This goal can be achieved effectively through specific exercises that target the strength and endurance of the core musculature. The core plays an important role in stabilizing the peripheral joints and reducing the risk for injury especially during high levels of physical activity
4. Robert G Lockie, Samuel J Callaghan, Matthew **Analysis of specific speed testing for cricketers.** D Jefbattin The Journal of Strength & Conditioning Research 27 (11), 2981-2988, 2013. Cricket has undergone dramatic changes in recent years, with the development of 1-day and Twenty20 cricket altering some of the vital characteristics of the game. The shorter game formats tend to be more physically intensive when related to match duration.
5. Andy Waldhelm, Li Li Journal of Sport and Health Science 1 **Endurance tests are the most reliable core stability related measurements.** (2), 121-128, 2012. To determine the intra-tester reliability of clinical measurements that assess five components related to core stability: strength, endurance, flexibility, motor control, and function.
6. Kerrie Evans, Kathryn M Refshauge, Roger Adams. Journal of science **Trunk muscle endurance tests: reliability, and gender differences in athletes.** and medicine in sport 10 (6), 447-455, 2007. Intra-rater reliability Intra-rater reliability values were high for all tests, with the lowest ICC(3,1) being 0.81. S.E.M.s for the side bridge endurance tests ranged from 14.9 to 17.8 s and, for the trunk flexor endurance test, from 59.1 to 77.6 s. Inter-rater reliability Inter-rater reliability values were also high for all tests, with the lowest ICC(2,1) being 0.82. S.E.M.s for the side bridge endurance tests ranged from 10.5 to 18.9 s and, for the trunk flexor endurance test, from 50.2 to 60.2 s.
7. Mohamed Azizul Mohamed Afandi, Nur Ikhwan Mohamad, Nor **The Relationship between Core Strength Performance with Sprint Acceleration.** Fazila, Abd Malek, Chamnan Chinnasee, Ali Md Nadzalan. Journal of Physics: Conference Series 1793 (1), 012056, 2021 Sprint performance is one of the key indicators to success in various of sports either for individual or team sports.
8. Rampinini, Aldo Sassi, Andrea Morelli, Stefano Mazzoni, Maurizio Fanchini, **Repeated-sprint ability in professional and amateur soccer players.** Aaron J Coutts Applied Physiology, Nutrition, and Metabolism 34 (6), 1048-1054, 2009. If performance in the first sprint of the RSA test was slower than the criterion score (i.e., an increase in time > 2.5%), the test was ended and participants were required to repeat the RSA test with maximal effort after a further 5-min rest. The shortest time in a single sprint (RSA best), Mean time (RSA mean), and percent decrement (RSA dec) during the RSA test were determined according to Rampinini et al. (2007)

METHODOLOGY

Study design – Correlation study

Sample size- 80

Sampling method- convenient sampling .

Study population – Amateur cricket batsman .

Study setting –Cricket club in and around City

Study duration -6 month .

Criteria

1.Inclusion criteria :

Male Amateur cricket batsman.(18-25 age)(1)

Player playing for minimum 2 year.(1)

Player practicing minimum 4 times a week .(1)

Normal BMI(18.5-24.9)

Normal height(165-175cm) (12)

Normal cardio-pulmonary endurance.(Yo-Yo test -Good Rating)

2. Exclusion criteria

Female.

Player those doing core strengthening and core endurance training.

Recent fracture of lower limb.

Lower limb pain.

Player with any reconstructive surgery With in past 2 year.

Any soft tissue injury in past 6 month.

Pathological conditions Heart and lungs like(Hypertension,,asthama, bronchitis etc)

Materials

1.pen

2.paper

3.cones

4. measuring tape

5.Stopwatch

6.Yoga mat

Outcome measures

1.The McGill Torso Endurance Tests .(6)

Reliability

Intra-rater reliability -0.81

Inter rater reliability -0.82

Four core endurance tests will performed. The objective of the

Endurance tests will be hold a static position for as long possible. The endurance tests are.

1.trunk flexor test. 3.left side bridge test

2.trunk extensor test. 4.Right side bridge test.

Interpretation

Trunk flexor endurance test Time to completion: _____	
Trunk lateral endurance test Right side time to completion: _____ Left side time to completion: _____	
Trunk extensor endurance test Time to completion: _____	
Ratio of Comparison	Criteria for Good Relationship Between Muscles
Flexion:extension	Ratio less than 1.0
Right-side bridge:left-side bridge	Scores should be no greater than 0.05 from a balanced score of 1.0
Side bridge (each side):extension	Ratio less than 0.75
Flexion:extension ratio: _____	Rating: ☐ Good ☐ Poor
Right-side bridge:left-side bridge ratio: _____	Rating: ☐ Good ☐ Poor
Side-bridge (each side):extension ratio: _____	Rating: ☐ Good ☐ Poor

1. Trunk flexor test-

The trunk flexor test began with the participant in the sit-up position with their trunk supported at 60° of trunk flexion.

Knees and hips are fixed at 90°, arms cross over chest, and feet secured. The support of the trunk will then remove, and the participant held the position for as long as possible.

The test will terminat when the participant was no longer able to hold the position.



Fig- Trunk flexor test

2. Trunk extension test-

Trunk extensor test will perform with the participant lying prone on a treatment table.

Their pelvis, hips, and knees will secure to the treatment table, while a chair at the same height as the surface of the table supported the trunk and upper extremities.

The chair will be removed, and the individual held a horizontal body position for as long as possible with arms crossed over chest. The test was discontinued when the participant fell below the horizontal position.



Fig-Trunk extension test.

3. Side bridge test-

The side bridge tests will perform in the side-lying position on a treatment table.

The participant's knees are extend with the top foot placed in front of the lower foot. The participant supported their weight only on their lower elbow and feet while lifting their hips off the mat.

The test will stops when the side-lying position was lost or when the hips return to mat.



Fig-side bridge test

2. Core muscle strength test.

Plank test –Reliability –(ICC=0.915)

- The plank test is a position developed to assess the strength of the core stabilization muscles.
- Normative values
- Rating
- Time
- 1.Excellent - greater than 6 min
- 2.Very good - 4-6 min
- 3.Above average - 2-4 min
- 4.Average - 1-2 min
- 5.Below average - 30-60 sec
- 6.Poor - 15-30sec
- 7.Very poor - <15sec
- Participants maintain a prone posture in which the forearm bears the weight of the body while the hands make a fist. The elbows are placed shoulder distance apart with the ankle joint at 90° angulation.
- The shoulders, trunk, hips, and knees were held in a straight line with toes touching the ground.

- While performing the plank test exercises, participants will instruct to maintain a neutral pelvis and spine position and breathe regularly.(2)



Fig-plank test

3. RSA: Repeated Sprint Ability:

- Reliability –(ICC-0.98)
- The RSA test involved six repetitions of maximal 2×15 -m
- During the 14-s recovery between sprints, participants were required to stand passively.
- Two seconds before starting each of the sprint, The participant will assume the start position as detailed for the 10-m sprints and await the start signal. Strong verbal encouragement will provide to each participants during all sprints.
- Fast sprint time usually the first sprint; the mean sprint time will be noted and then percent sprint decrement will be calculated.
- Percent sprint decrement(PSD%)- Is measure of fatigue or Decline in performance over repeated efforts.
- $(\text{Mean sprint time} / \text{Best sprint time}) \times 100 - 100$
- Lower the PSD Value higher the The sprint performance.
- Normative values on PSD Value.(8)
- Excellent –less than 5%
- Good -5-10%
- Fair-10-15%
- Poor->15%.

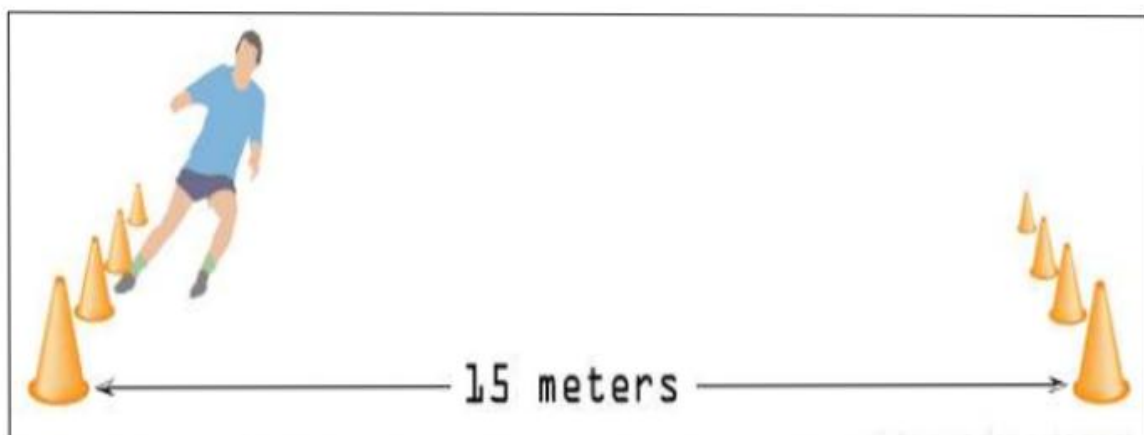


Fig-RSA (Repeated sprint speed test)

Procedure

The study will begin with a synopsis presentation in front of ethical committee in PES modern college of physiotherapy.

Ethical clearance will be obtained from committee.

Subject will select according to inclusion and exclusion criteria.

Then study will be explained to subject individually and written consent will be taken from them.

During the testing sessions, participants required to wearing proper sports shoes.

Participants will ask to perform individual warm up before any testing sessions starts.

Cooling down will be after each testing sessions.

Data will be collected and analysed.

Fig. Trunk flexion test



Fig. Plank test



Fig. side bridge test



Fig. trunk extension test



Data analysis and results

- In this study 80 individuals were assessed for core strength , core endurance and sprint speed using plank test, McGill core endurance test and Repeated sprint speed ability test. Data collected was entered in excel spread sheet, tabulated and subjected to statistical analysis.
- Correlation between core strength and sprint speed was correlated by using Pearson correlation coefficient(r).
- Correlation between core endurance and sprint speed was correlated by using Pearson correlation coefficient (r).

Table 1:Age wise distribution

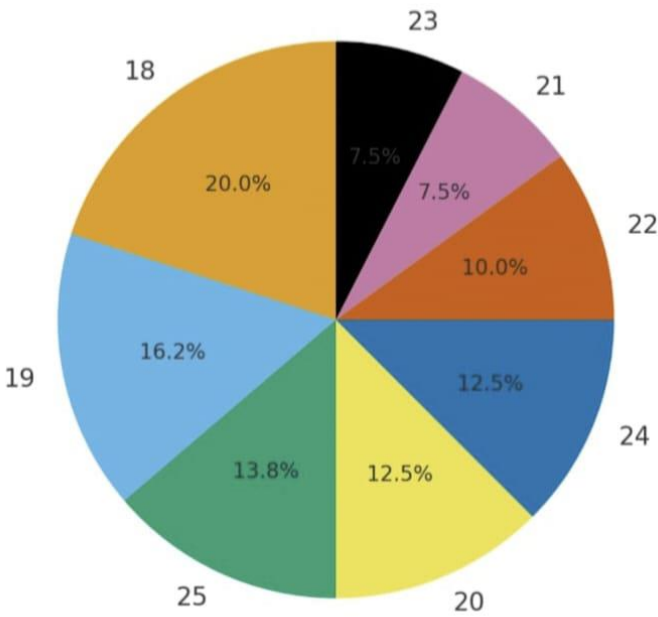
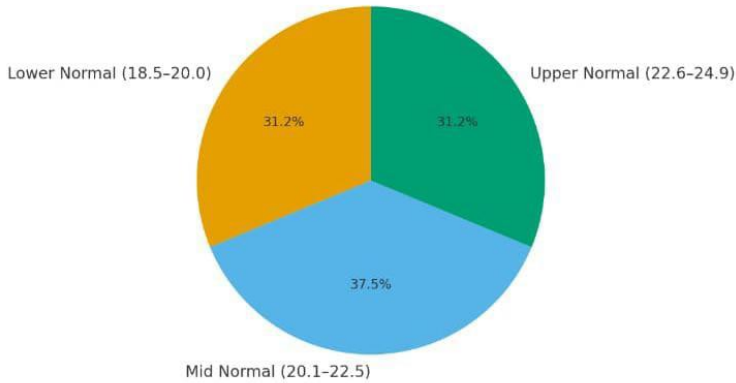


Table 1:Age wise distribution



Graph 2: BMI Distribution

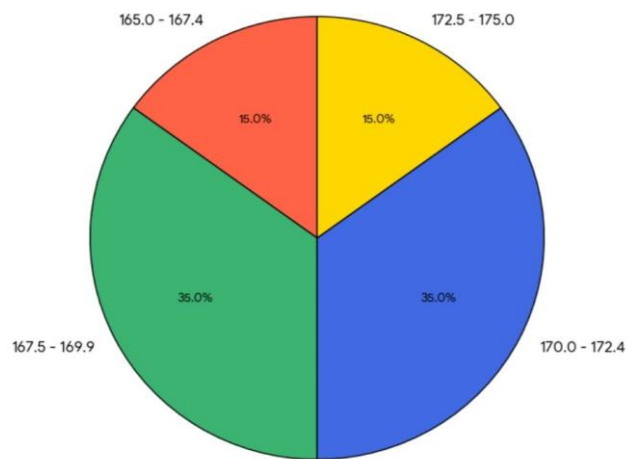
Age	Percentage of participants
18	20.0%
19	16.2%
20	12.5%
21	7.5%
22	10.0%
23	7.5%
24	12.5%
25	13.8%

Table: 2 BMI wise distribution

BMI level	No.of participate(%)
Lower normal (18.5-20)	31.2%
Mid normal (20.1-22.5)	37.5%
Upper normal (22.6-24.9)	31.2%

Graph 3: HEIGHT WISE DISTRIBUTION

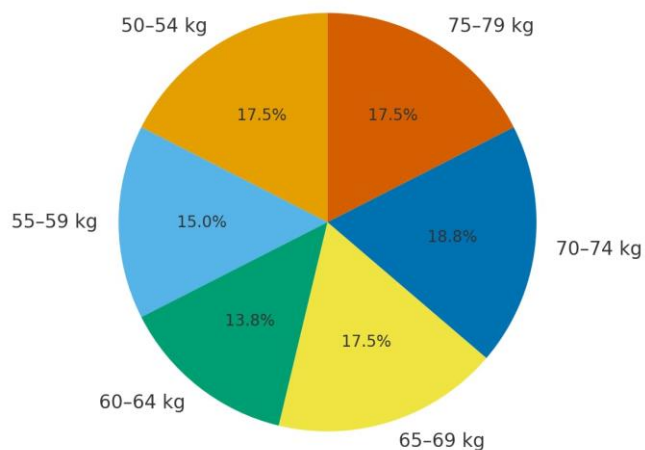
Table 3:table showing height



Height	Percentage of participants
165-167.4CM	15.0%
167.5-169.9CM	36.0%
170-172.4CM	36.0%%
172.5-175.0CM	15.0%

Table 4: weight wise distrubition

Weight Distribution of 80 People (50-79 kg)



Weight range	Percentage of participants
50-54 kg	17.5%
55-59kg	13.0%
60-64kg	13.8%
65-69 kg	17.5%
70-74 kg	18.8%
75+79 kg	17.5%

Graph 5: Correlation Between core strength and Percent sprint decrement in amateur cricket batsman.

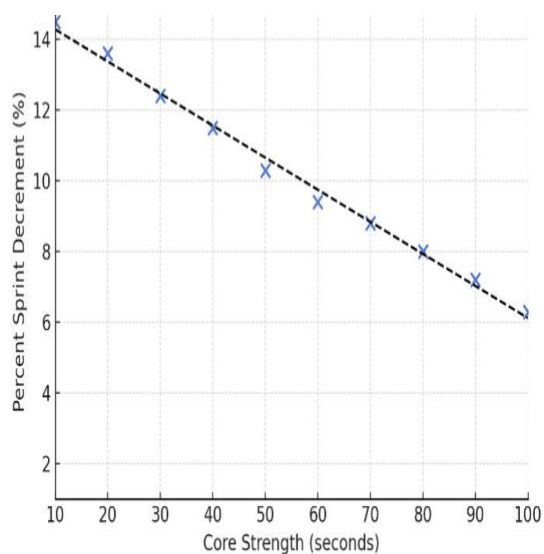


Table 5: core strength vs PSD

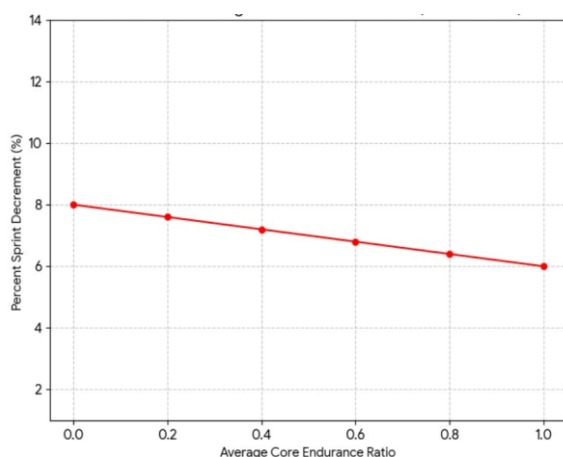
Variable	Correlation with sprint decrement (r)	P- value	Correlation
Core strength	-0.15	>0.5	Weak negative correlation (not significant)

Interpretation – significant correlation between core strength and sprint speed .

Negative correlation means: as core strength/endurance improves, percent sprint decrement decreases (i.e., better sprint performance).

Graph 6: Correlation between core endurance and Percent sprint Decrement

Table 6: core endurance vs Percent sprint decrement



Parameter	Correlation with percent sprint decrement(r)	P- value	Correlation
Core endurance	-0.15	>0.5	Weak negative correlation (not significant)

Interpretation-No significant correlation between core endurance and sprint speed

Graph 7:Comparison of core strength and core endurance with sprint speed.

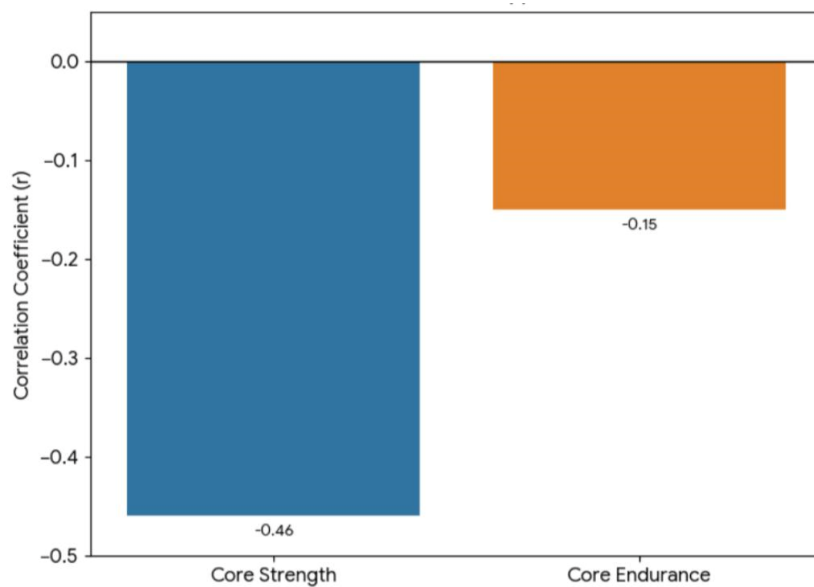


Table7 : core endurance vs core strength

Parameter	Correlation(r)with percent sprint decrement%	Interpretation
Core endurance	-0.15	Weak correlation(Not significant)
Core Strength	-0.46	Moderate correlation (better predictor)

Interpretation- Core strength had moderate significant correlation. Core endurance had weak, non-significant correlations.

Result

- The following study was conducted to check the correlation between core endurance and core strengths with sprint speed in amateur cricket batsman.
- The values of the core endurance, core strength and sprint speed are correlated using Python statistical tools and IBM SPSS Software.
- The Mean values for core strength and sprint speed (PSD value) were 106.8 and 8.7% respectively.
- Mean value of core endurance ratio Flexion: Extension, Right side bridge:Left side bridge and side bridge: Extension is -0.17,-0.13 and -0.15 respectively.
- The core strength showed the strongest and significant correlation with sprint speed.
- Core endurance had weak, non-significant correlation correlation with sprint speed.

Discussion

- The following study was done to assess the correlation between core strength, core endurance and sprint speed in amateur cricket batsman.
- In this study total 80 male subjects were included in the age group of 18 to 25 years.
- The findings revealed that players with better core strength demonstrated better sprint performance compared to core endurance.
- A strong core acts like the body's powerhouse—it connects the upper and lower body, allowing smooth transfer of energy during running and batting. When this connection is strong, athletes can sprint faster and more efficiently without unnecessary movements or energy leaks. [10]
- The core is called the body's powerhouse because it keeps the centre of the body strong and steady, helps transfer force between the arms and legs, supports good posture, and creates the internal pressure needed for smooth, powerful movements. When the core works well, the whole body moves more efficiently and feels more controlled.[10]
- These findings are aligned with those of Afandi et al. (2021), who found that strong core muscles help improve acceleration and running technique by stabilizing the pelvis and enhancing ground force use.[10]
- On the other hand, core endurance, which reflects how long the core muscles can maintain stability over time, showed a weaker link to sprint performance.
- Because endurance is more about sustaining posture and preventing fatigue over long durations, rather than generating explosive bursts of power. Abdelraouf and Abdel-Aziem (2016) made a similar observation—core endurance is valuable for reducing injury risk and maintaining balance, but it doesn't necessarily make sprint speed faster.[3]
- The participants showed an average sprint decrement of around 8.7%, which indicates a good ability to maintain speed across repeated efforts. This supports the idea that core strength plays a role in maintaining sprint performance and delaying fatigue during short, high-intensity bouts—something that's crucial in cricket where players often need to sprint multiple times in quick succession.[11]
- These results also agree with Lockie et al. (2013), who emphasized that sprinting and acceleration are key physical qualities for cricketers. In practice, this mean coaches and trainers should focus on core strengthening exercises like planks, side bridges, and stability drills, which improve both trunk control and overall running efficiency. Endurance exercises still matter—but more for overall fitness and posture maintenance over the course of a long game, rather than improving speed itself.[4]
- This study suggests that building a strong, stable core can help amateur cricket players run faster and more consistently between wickets. It may also improve overall athletic performance.

Conclusion

- This study conclude that core strength has statistically significant correlation with sprint speed.
- Core endurance have No significant correlation with sprint speed.

Limitation

- We not include individuals who practice on turf ground to maintain homogeneity.

FUTURE SCOPE OF STUDY:

- Future research can explore how targeted core training contributes to reducing common cricket-related injuries.

Clinical implications:

- This study guiding exercise prescription for amateur players.
- Role in injury prevention and rehabilitation. A stable and strong core helps maintain optimal spinal alignment and reduces compensatory movements during high-speed activities. This can lower the risk of common cricket-related injuries such as lower back strain, hamstring tightness, pelvic instability.

Data collection sheet

1)Name:

2) Age:

3) Gender:

4) Height:

5) Weight:

6) BMI:

7) Year of playing experience in cricket:

8) No. of times practice per week:

9) Any reconstructive surgery with in past 2 year:

10) Any soft tissue injury in past 6 month:

McGill core endurance test	Trunk flexor test	Trunk extension test	Left side bridge test	Right side bridge test
Max time to hold				

Plank test	Max time hold

Repeated sprint ability test		
RSA(best)		
<u>RSA(means)</u>		
<u>RSA(dec%)</u>		

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ANNEXURE

CONSENT FORM

I Mr./Ms. _____ am giving my
Consent for participating in the study of “Correlation of core endurance and core strength with sprint speed in Amateur cricket batsman”. Conducted by Mr. Ramprasad kade(Physiotherapy UG student) as a part of his curriculum under the supervision and Guidance of Dr.Sonal Patole.

I have been informed that no part of my information shall be revealed
Anywhere else except for the study and adequate secrecy will be
Maintained throughout.

I am aware that I may choose to quit being a part of study at any time
Without having to give any reason for doing so. I agree to cooperate fully
And have no objection in participating and hereby give the consent for
Doing so.

Name of the Participant:

Name of the Company:

Signature:

Date

