

The Correlation Among Sports Performance, Agility and Jumping Ability of Elite Football Players

Ms. Vaishali Vinay Kumar Verma¹, Dr. Ankita Dabshede²

¹Intern, Physiotherapy Department, TMV's Indutai Tilak College of Physiotherapy

²Associate Professor, Physiotherapy Department, TMV's Indutai Tilak College of Physiotherapy

Abstract

Background: Satisfactory performance in sports like football requires many specific abilities like change-in-direction ability, jumping ability and ball kicking ability. The ability of the player to perform these activities is important for his personal performance and the performance of the team. Thus, it is suggested that agility, jumping ability and ball kicking accuracy are the key performance indicators in football players and therefore skill-related components that should be a part of standard physiological testing for players. The correlation among the tests is necessary to find the dependency of one ability on another.

Method: A cross-sectional study was conducted with 52 elite football players aged 15-30 years, who were assessed for their agility using the Hexagon test, jumping ability using the Sargent jump test and kicking accuracy using the Loughborough Soccer Shooting Test.

Results: The findings suggest that there is a negative correlation between agility, sports performance and jumping ability. All the three qualities require different training process. These results highlight the potential benefits of sports performance assessment in football players

Keywords: Jumping Ability, Agility, Football Players.

Introduction:

Football, widely recognized as the most popular sport globally, has historically faced challenges in gaining a firm foothold in India, where cricket has held dominant status. Nevertheless, a significant transformation is underway as football gathers momentum through the establishment of national leagues and the growth of grassroots programs. By the early 20th century, football had become one of India's most beloved sports, leading to the formation of numerous clubs and leagues throughout the country. ⁽¹⁾

Scientists describe football as a high intensity, intermittent sport or repeated sprint sport. In others words there are periods of very intense effort that tend to be short lived, and these are interspersed with longer periods of low intensity activity. Players cover between 9-14kms during a 90 minute game. Approximately 60% of this is walking and 26% is jogging. Only 2% of total distance covered in a game is classified as high speed running and sprinting just 1%. Intensity of work is constantly changing in football. Players will sprint every 90-120 seconds for an average of 2-4 seconds each. The significant majority (96%) of these sprints are less than 30m. In addition to changes in speed, players make between 1200-1400 changes of direction during a match. On average, a player can expect anywhere between 150-250 brief, intense

efforts. This constant state of change places huge physical demands on the body, even if the speed of movement appears to be slow. ⁽²⁾

Kicking is the most widely studied football skill as it is the defining action in the game with 80.69% of goals being scored by means of this action. Shooting performance in football depends on two factors, how fast the ball moves and how accurately it reaches its target. There are several basic techniques that are required to play the sport, such as receiving, shooting, passing, chipping, heading, and dribbling the ball. There are various techniques and movements that players can do on the field, there are various combinations of techniques and movements that support players achieve victory. In reality on the field, the game of football is dominated by mastery of fast passing balls between players and good shooting skills. ⁽⁶⁾

Agility is defined as “a rapid whole-body movement with change of velocity or direction in response to a stimulus”. Satisfactory performance in sports like football requires change-in-direction ability. Thus, it is suggested that agility is one of the key performance indicators in football players and therefore a skill-related component that should be a part of standard physiological testing for players. The hexagon test is a measure of agility that is routinely used in the strength and conditioning profession to assess athletic performance and ability. ^(3,4)

The jumping ability of a football player is a basic factor for good performance in the specific sport. The leg extensor power ability is a very significant factor for performance, especially in sports such as basketball, football, volleyball etc. which require too many explosive actions. Flexibility and agility are also key factors that permit quick stops, starts, and turns that must be performed by athletes as well as sport-specific skills that is essential for successful competence in a national and international level. The ability of the player to perform fast and high jumps is important for his personal performance and the performance of the team. For example there is no chance for a successful header in soccer if the jumping ability is not well-developed. A football player jumps in average 15.5 times, with about nine headers per match. Jumping drills and especially vertical jumps are the most common exercises used for the development of power. Vertical jumps are explosive movements which require a fast reaction and strength especially from the leg extensors. The power of the leg extensors is one of the most important factors for the performance in the vertical jump. One way to evaluate the jumping ability, especially in sports which require explosive movements such as soccer, is the use of vertical jumps. For the reasons mentioned above, the evaluation of the jumping ability has been placed between the performance tests of soccer players. ⁽⁵⁾

The results of such tests are used to gain information that can be used to optimally train the athlete and to predict athletic performance. ⁽⁴⁾

Methods

Research design

This cross-sectional study aimed to find out the relation between sports performance, agility and jumping ability of an elite football player. This study is designed to assess sports performance, agility and jumping ability of an elite football player and then correlate the test results. This study was conducted within a time period of 6 months.

Participants

The samples were selected according to the inclusion and exclusion criteria. Participants were explained

about the aim and objectives of the study. The consent forms were filled by the participants and the study and procedure was explained to the participants. The athletes fitting in the inclusion criteria were evaluated by the outcome measures of Hexagon Test, Sargent Jump Test and Loughborough Soccer Shooting Test. The study was conducted with 52 elite football players, both male and female, aged 15-30 years.

Research tool

- 1. Loughborough Soccer Shooting Test:** Ten kicks, following the LSST protocol, with 10 seconds of recovery between each trial, in order to achieve the maximum score in each kick.
- 2. Hexagon Test:** Using a tape a hexagon with each side of 24 inches (60.5 cm) in length and each angle of 120 degrees is drawn on the ground. Prior to the test make the player perform a standard warm-up. The player begins with both feet together in the middle of the hexagon facing the frontline. On "GO" command they jump ahead across the line and then back over the same line into the middle of the hexagon. Continue this pattern for 3 full revolutions. Perform the test clockwise and anticlockwise. The score time is taken from the best of 3 trials. Comparison of the anticlockwise and clockwise directions will show if any imbalances exist between left and right movement skills.
- 3. Sargent Jump Test:** Ask the athlete to perform warm up for prior to the test. The athlete chalks the end of their fingertips. He stands on the side of the wall, keeping both feet on ground reaches up as high as possible with 1 hand and marks the wall with the tip of finger (M1) Then he jumps as high as possible and then marks the wall with the fingertip (M2). The assistant records the distance between M1 and M2. Repeat the test 3 times and note down the best performance record. Interpretation (Arkinstall 2010).

The correlation among the tests is calculated and determined.

Ethics, consent and permissions

Participants in this study received a consent form which introduced the research project by including the title of the study, the aims of the study and reassuring the participants their information confidentiality as well as of their responses. Consent was given by each participant.

Data collection

The permission to perform and obtain data collection was taken from the ethical committee of the college. Data collection took place between September 2023 and February 2024. The data collection sheet contained sections on personal as well as work demographics with test reading.

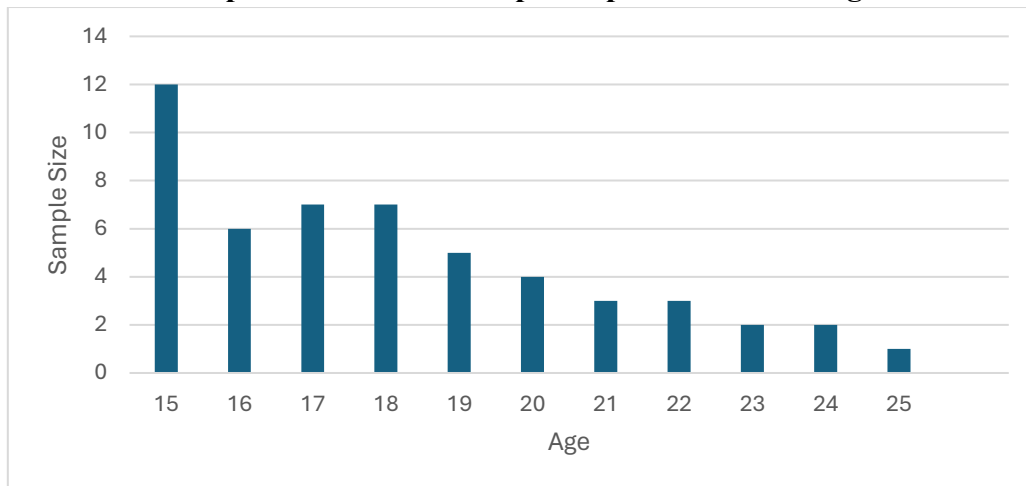
RESULT

Table 1: The number of participants with their age

Age	Sample Size	Percentage
15	12	23.08
16	6	11.54
17	7	13.46
18	7	13.46
19	5	9.61
20	4	7.69
21	3	5.77

22	3	5.77
23	2	3.85
24	2	3.85
25	1	1.92

Graph 1: The number of participants with their age

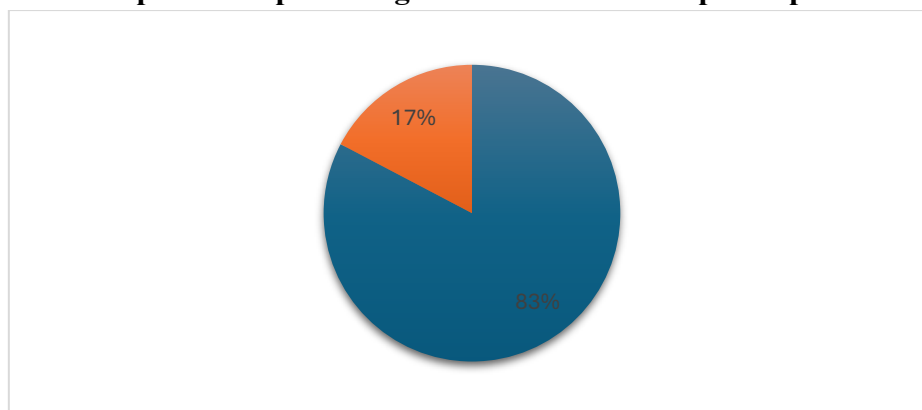


Interpretation: Higher percentage of participants were of 15 years of age and very low percentage of players were of 25 years of age.

Table 2: The percentage of male and female participants

Gender	Sample Size	Percentage
Male	43	82.69
Female	9	17.31

Graph 2: The percentage of male and female participants



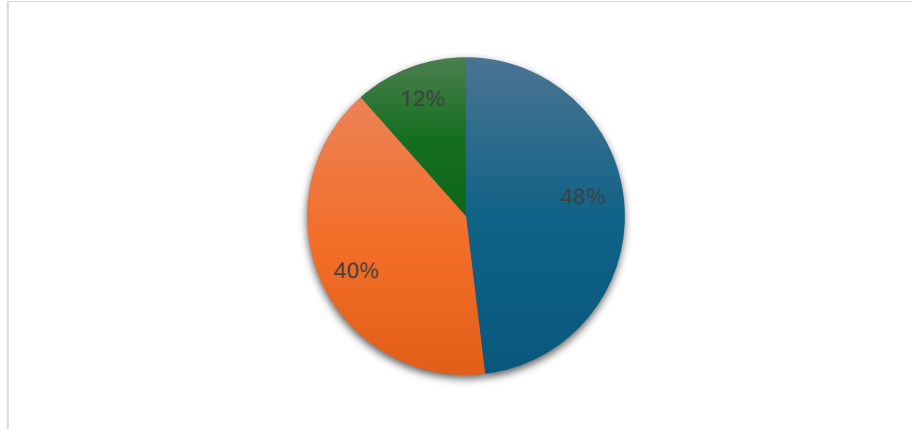
Interpretation: 82.69% participants of the study were male and the remaining 17.31% were female.

Table 3: The level of game played by the players and their percentage.

Level	Sample Size	Percentage
District	25	48.08
State	21	40.38

National	6	11.54
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Graph 3: The level of game played by the players and their percentage.

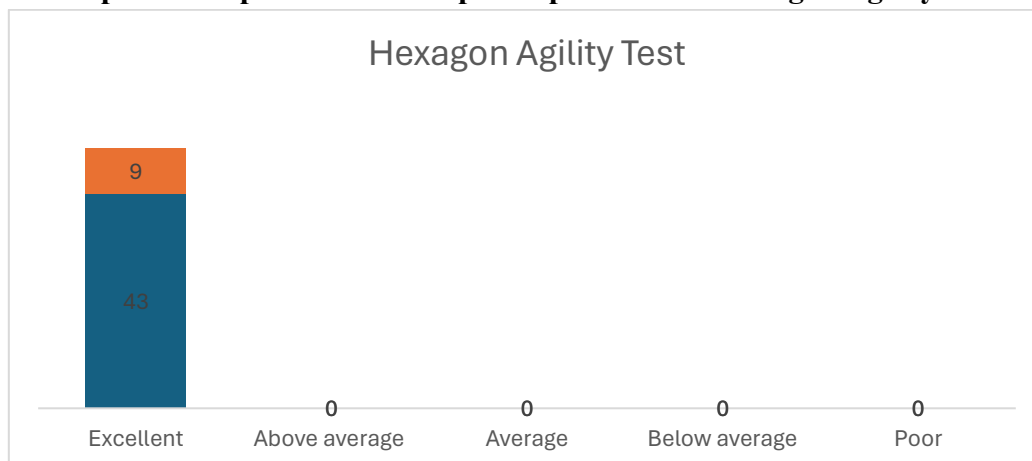


Interpretation: 48.08% participants of the study were of district level, 40.38% participants were of state level and the remaining 11.54% were of national level.

Table 4: The performance of participants in the Hexagon Agility Test.

Grade	Male	Female
Excellent	43	9
Above average	0	0
Average	0	0
Below average	0	0
Poor	0	0

Graph 4: The performance of participants in the Hexagon Agility Test.



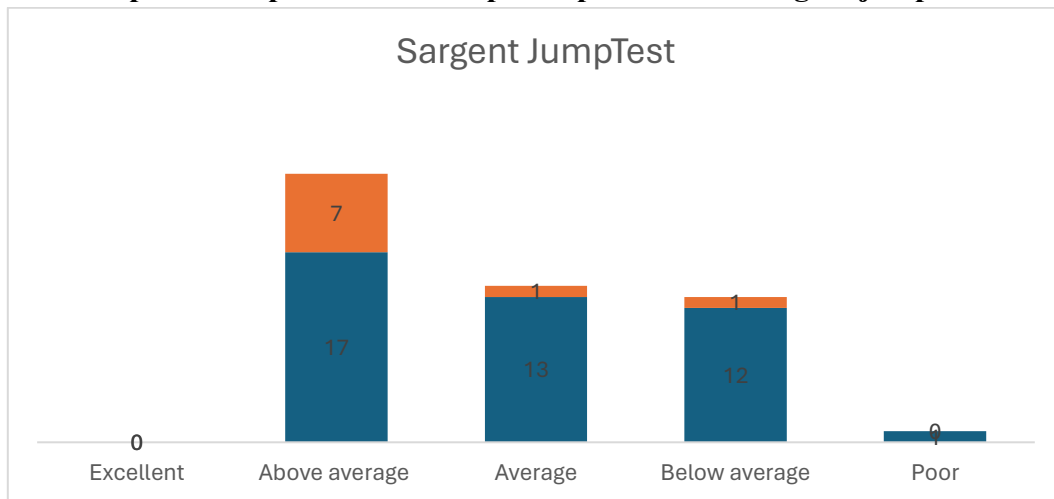
Interpretation: All 52 participants (43 male and 9 female) of the study stood in the excellent category in the Hexagon Test.

Table 5: The performance of participants in the Sargent jump test.

Grade	Male	Female
Excellent	0	0

Above average	17	7
Average	13	1
Below average	12	1
Poor	1	0

Graph 5: The performance of participants in the Sargent jump test.

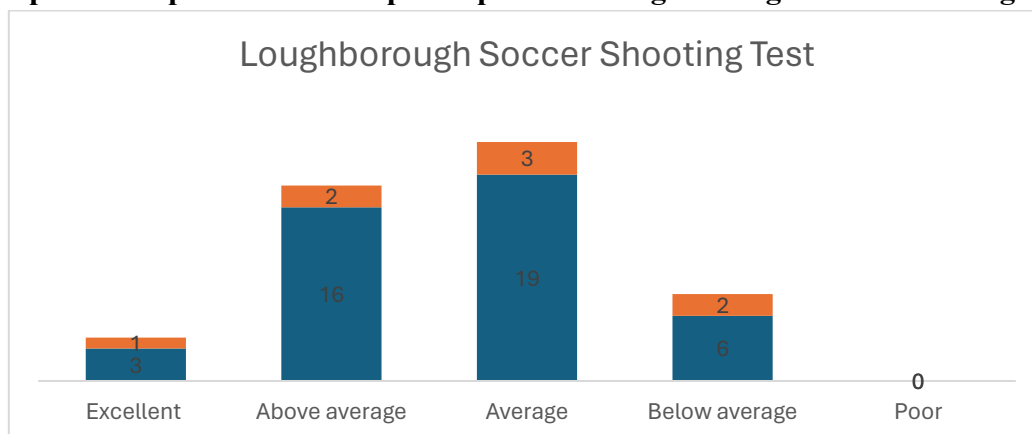


Interpretation: No players stood in the excellent category, 24 players (17 males and 7 females) performed above average, 14 players (13 males and 1 female) had an average performance, 13 players (12 males and 1 female) performed below average and 1 male player was poor in their performance.

Table 6: The performance of participants in Loughborough soccer shooting test.

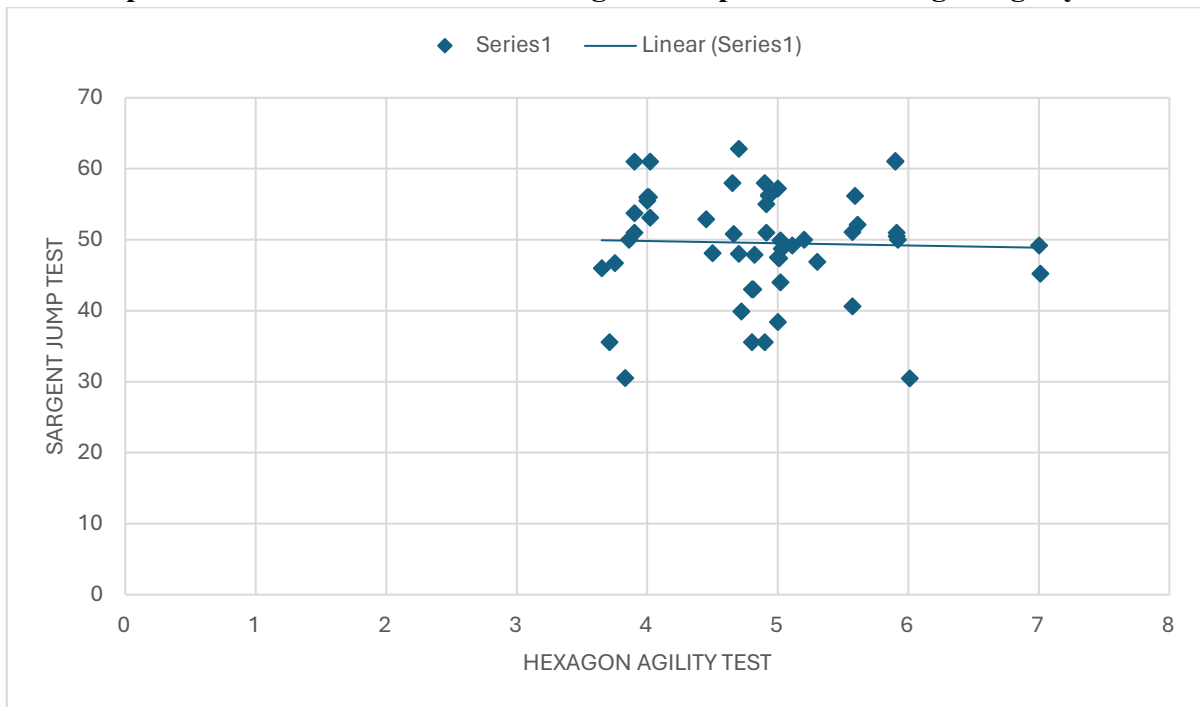
Grade	Male	Female
Excellent	3	1
Above average	16	2
Average	19	3
Below average	6	2
Poor	0	0

Graph 6: The performance of participants in Loughborough soccer shooting test.



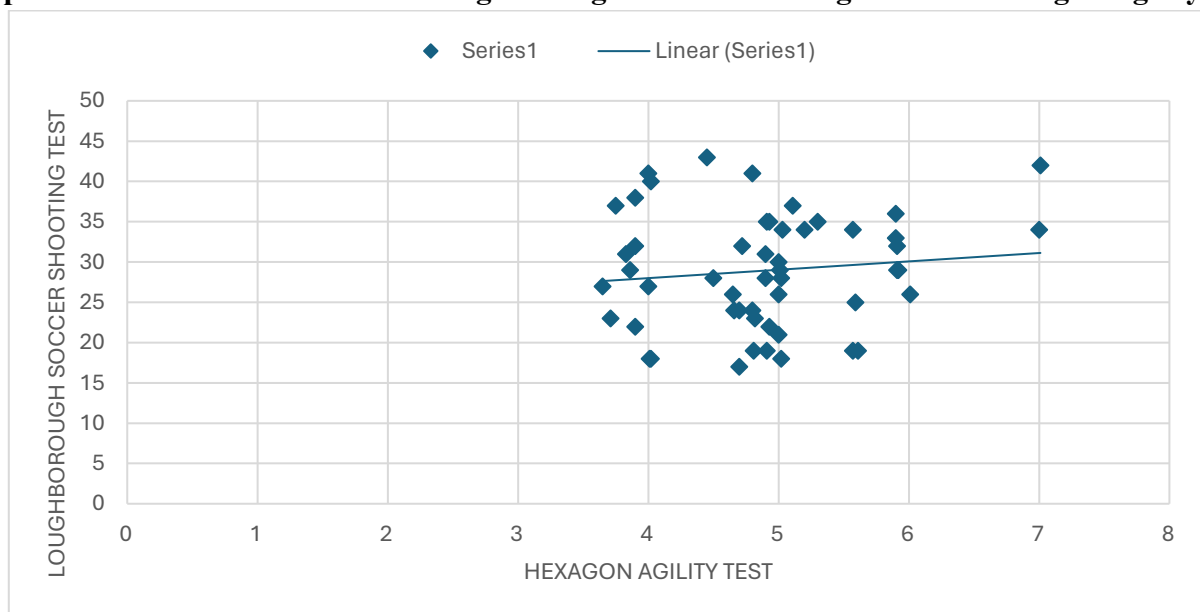
Interpretation: 4 players (3 males and 1 female) were excellent, 18 players (16 males and 2 females) performed above average, 22 players (19 males and 3 female) had an average performance, 8 players (6 males and 2 female) performed below average and no player was poor in their performance.

Graph 7: The correlation between Sargent Jump test and Hexagon Agility Test



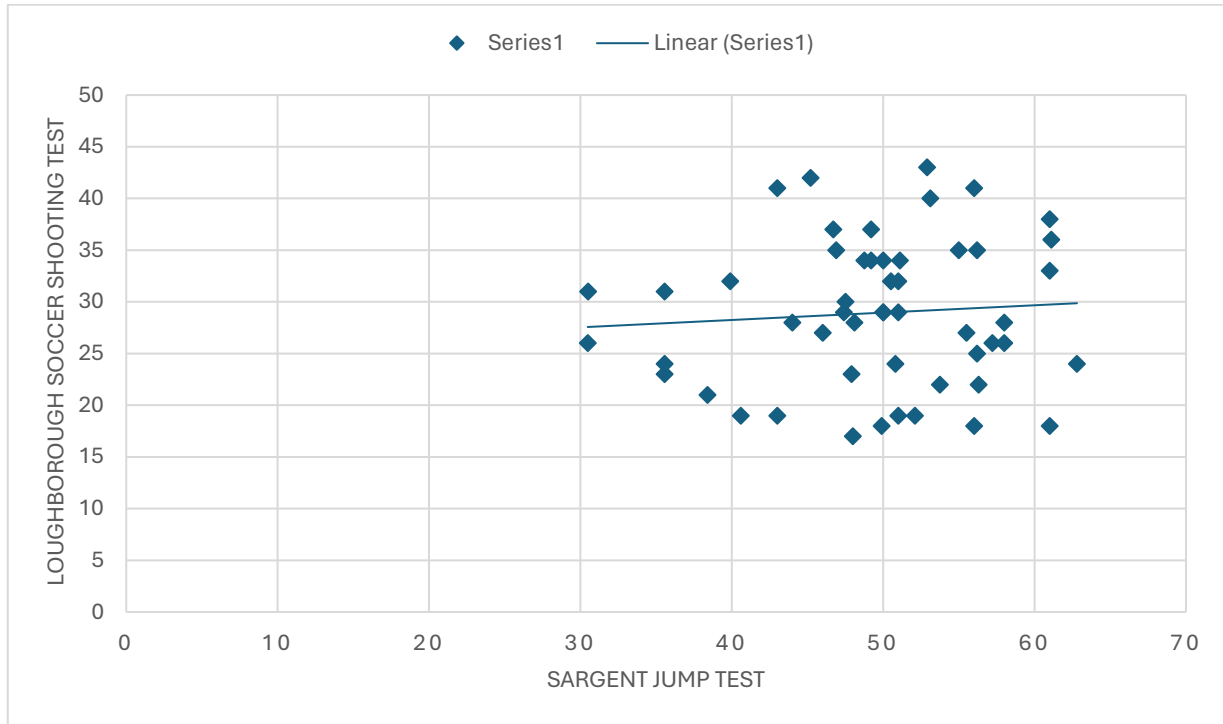
Interpretation: A negative correlation of -0.0443 exists between Sargent Jump test and Hexagon Agility Test.

Graph 8: The correlation between Loughborough Soccer Shooting Test and Hexagon Agility Test



Interpretation: A low correlation of $r = 0.1145$ exists between Loughborough Soccer Shooting Test and Hexagon Agility Test.

Graph 9: The correlation between Loughborough Soccer Shooting Test and Hexagon Agility Test



Interpretation: A low correlation of $r = 0.6276$ exists between Loughborough Soccer Shooting Test and Hexagon Agility Test.

DISCUSSION

The purpose of the study is to assess the correlation among agility, jumping ability and sports performance of elite football player. 52 football players between the age group of 15 to 30 with more than 5 years of experience were included in this study. The motive was to find out the correlation among agility, vertical jump and shooting accuracy in elite football players using the Hexagon Test, Sargent Jump Test and Loughborough Soccer Shooting Test respectively.

For agility, Hexagon test was used to assess the players. With agility the player has to balance every time the player changes the direction therefore they require a good control, stability and strength in their limbs. There may come instances where the player may need to tackle the ball mid-air requiring him/her to jump. The jumping ability is thus necessary and is assessed using the Sargent jump test. The sports performance was scored by the number of shots the player aimed at the goal post. Thus to find out that if any one ability is lost or affected, the study is to find out correlation between them. It is very important that all tests used in the study are highly reliable due to practical impact of fitness (e.g. returning to sports after injury, planning for rehabilitation, training prescription, etc). All the participants were adherent to this study throughout. Different sports clubs in Pune were approached.

Hexagon Agility Test: the outcome for this test is taken in seconds and then the players are categorized into excellent, above average, average, below average and poor. The lesser seconds required to complete the hexagon the more agile is the player. The graph 4 shows results of hexagon agility test that all the 52 players (43 male and 9 females) completed the hexagon in less than 12 seconds and stood in the excellent category.

Sargent Jump Test: the outcome for this test is taken in centimeters and then the players are categorized into excellent, above average, average, below average and poor. The greater the difference between two

marks the greater is the score. Graph 5 shows their results. In this test no players stood in the excellent category, 24 players (17 males and 7 females) performed above average, 14 players (13 males and 1 female) had an average performance, 13 players (12 males and 1 female) performed below average and 1 male player was poor in their performance. This discrepancy might be due to difference in squatting amongst the players, difference in sample number, age, gender, maturation status, years of experience, level of sports game played.

Loughborough Soccer Shooting Test: in this test the player had to aim and shoot the ball in the goal post. This helped to assess the performance of the player. Players are categorized into excellent, above average, average, below average and poor based on where the ball hits the net on the goal post. Graph 6 shows the results that 4 players (3 males and 1 female) were excellent, 18 players (16 males and 2 females) performed above average, 22 players (19 males and 3 female) had an average performance, 8 players (6 males and 2 female) performed below average and no player was poor in their performance.

We found no significant correlation between hexagon and sargent jump test.

Graph 7 shows that we found a negative correlation of -0.0443 between these tests. The discrepancy might be due to some difference in sample number, age, gender, maturation status, years of experience, level of sports game played.

Graph 8 shows a low correlation of $r = 0.1145$ between hexagon and accuracy test.

Graph 9 shows a low correlation is found between the vertical jump and accuracy test of 0.6176. Thus there is no correlation between these three tests so if any 1 quality is degraded it won't affect the sports performance of the player. All the qualities affected must be trained individually irrespective of the other. Thus, this shows that the coaches should train all the three qualities equally.

Limitations

The research presents several limitations which makes it impossible to make any proper conclusions from the outcomes we received from the data collected

1. Sample size
2. Heterogenicity
3. Measurement tools
4. Ethical considerations

Further investigations considering all these different aspects can be looked after to make firm conclusions on the correlation between the tests.

Conclusion

The study concluded that there is negative correlation between agility, sports performance and jumping ability. All the three qualities require different training process.

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