



RELATIONSHIP BETWEEN REPEATED SPRINT ABILITY AND ACCURACY OF SOCCER SHOOTING PERFORMANCE IN YOUNG PLAYERS

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Abstract:

Soccer is an intermittent sport in which players require an ultimate level of physical fitness. On the pitch, repeated sprint capability fulfills the physical fitness demands. Shooting accuracy is a significant attacking skill and occurs repeatedly in a match. The purpose of the present study was to know repeated sprint ability and its relationship with accuracy of soccer shooting performance of Bangladeshi young players. The study was carried out in 70 male soccer players aged between 16 to 19 years. Accuracy of soccer shooting and repeated sprint ability assessed using Loughbrough soccer shooting test and repeated sprint ability test. Data was analyzed using Pearson correlation of coefficient and multiple regression equation. The moderate relationship was found between repeated sprint ability and accuracy of soccer shooting except sprint decrement rate. It is recommended that a proper training schedule must be arranged and implemented to develop the accuracy of shooting performance. Therefore, while selecting soccer players for the team repeated sprint ability would also be taken into consideration along with the soccer technique and skills.

Keywords: soccer; accuracy; shooting; sprint; repeated

1. Introduction

Soccer is the only team sport that extends across the globe (John, 2018). The simplicity of the game and very few simple rules make the game popular. Soccer's basic principle

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is to achieve more goals than he opposing team (Ali et al., 2007). So, the accuracy of the shooting impacts the outcome of the match. However, soccer is a field sport that requires several motor skills, such as running, sprinting and jumping at different velocities (Attene et al., 2016). Players often have to alter the direction of their sprint during competitive match by suddenly accelerating with minimal braking time (Sheppard & Young, 2006). Repeated sprinting capabilities, however, resemble a major motor component in soccer matches (Buchheit, Mendez-Villanueva, Simpson, & Bourdon, 2010). In addition, Soccer match requires a short duration of maximal or near maximal sprints over an extended period of time (Fitzsimmons et al., 1993). On the other hand, shooting accuracy is one of the most important abilities linked to attacking skills of soccer and many motor movements. During a match running profiles contribute partly to performance in most team sports (Smith et al., 2016). Repeated sprinting ability could therefore have an impact on repeated shooting accuracy testing. However, shooting at the goal-post represents technique rather than skill from a static position (Ali et al., 2007). So, the present scholars are therefore examining the Loughbrough soccer shooting test (LSST) as this test represents dynamically the ability of soccer shooting accuracy (Stone & Oliver, 2009). Repeated high intensity sprinting is required for better soccer performance. Similarly, the ability of soccer players to perform repeated high-intensity activities is considered an important aspect of elite soccer (Ermanno Rampinini et al., 2009). Furthermore, in our knowledge, there is a lack of research concerning the relationships between the field tests of soccer shooting accuracy with repeated high intensity sprint test scores in Bangladesh, as the game is certainly very popular here.

1.1 Objective

The objective of this study was to examine the relationships between Loughbrough soccer shooting accuracy test (LSST) with repeated sprint ability (RSA) scores.

2. Methods and Procedures

Our research was a study of correlation. The participants for this study were purposively selected from the national youth level soccer players in Bangladesh. Players were chosen on the grounds of inclusion and exclusion criteria after screening. The study's operation, benefit and hazards were clarified to the chosen participants. We took into account the sample size more than the estimated value and also the availability of the participant as well as the study period when predicting the sample size. Finally, the players were selected from various recognized soccer clubs and academies in Bangladesh. Upon assessment the inclusion criteria were, (1) total of seventy (70) male soccer players, aged ranged between 16-19 years, (2) all the players were field player from different playing positions and goalkeepers were excluded, (3) at least three years' experience of playing at competitive level, (4) Body Mass Index (BMI) in the standard range (18.5-24.9kg/m²), (5) all participants had normal vision and were

right and left handed both. Upon evaluation, the exclusion criteria were, (1) the history of any neurological deficiency as described by the player that may influence the result of the study, (2) any history of the pathological status of the bones or joints as described by the player that may influence the result of the study, and (3) any history of musculoskeletal or traumatic status as described by the player that may influence the result of the study. Participants were notified verbally and in writing about the nature and requirements of the study. After completion of a health questionnaire, written informed consent was obtained from all participants. The “Board of Studies,” Department of Physical Education, Visva-Bharati University, went through this study’s entire procedure and forwarded it to the institutional (university) research board. Finally, the study was approved by the university research board.

2.1 Selection of Variables

Taking into account the feasibility criterion, the current research scholars were selected the following variables for the present study. All variables have been tested by three skilled, Asian Football Confederation (AFC) certified coaches.

A. Dependent variable

- Loughbrough Soccer Shooting Test (LSST),

B. Independent variables

- Repeated sprint ability mean time (RSA_{mean}),
- Repeated sprint ability best time (RSA_{best}),
- Repeated sprint ability percentage decrement (RSA_{dec}).

2.2 Loughborough Soccer Shooting Test (LSST)

The shooting accuracy was measured using the Loughborough Soccer Shooting Test (LSST), which was recommended as a reliable and valid method for evaluating shooting skills in research (Ali et al., 2007). Several researchers used Loughborough Soccer Shooting Test (LSST) (Smith et al., 2016; Stone & Oliver, 2009; Owen, Kehoe, & Oliver, 2013) as the test can assess shooting accuracy and speed in the multifaceted aspects of soccer skills, including passing, control, turning, sprinting and decision-making. The test did not use the life-size goalkeeper or sports radar to measure shot speed as detailed by (Ali et al., 2007; Stone & Oliver, 2009). Researchers Ali and his team argued that the use of the stationary goalkeeper increases ecological validity (Ali et al., 2007). However, the authors admit that introducing high ecological validity might have reduced the reliability of the test. All the players executed a single trial consisting of 10 shots, with a rest period of 30s between each shot sequence. There were 10 trial orders that were randomly selected for each player (five to the right foot and five to the left foot). The labeled scoring regions within the goal-post represent the ideal positioning of a shot to beat an opposing goal-keeper (Ali et al., 2007). Any shots taken outside the specified shooting regions or taken to finish more than 8.5s were discounted. The time occupied to complete each shot order was measured using a Casio digital stopwatch (HS-70W-1DF, Casio Electronics Co, Ltd, China). The Loughborough Soccer Shooting

Test (LSST) performance was evaluated as the total score achieved under the circumstances indicated. 8 (eight) soccer balls (Cosco™, Model-Platina, COSCO India Limited) have been used to carry out the test protocol.

2.3 Repeated Sprint Ability (RSA)

Repeated sprint ability (RSA) is a reliable and valid test to evaluate match related physical performance in team sports (Jones et al., 2013; Daneshfar et al., 2018; Ermanno Rampinini et al., 2009; Sánchez-Sánchez et al., 2019; Gabbett, 2010). The required data was collected by administering repeated sprint ability (RSA) test as proposed by Rampinini and his team (E. Rampinini et al., 2007).

2.4 Procedure for the RSA

Prior to the RSA test, all the participants had a dynamic warm up of 10 minutes low-intensity running with dynamic stretches. The test was consisted of six 40m (20+20 m) shuttle sprints separated by 20s of passive recovery (Figure 1). The athletes started from a line 'A', and sprinted for 20m then touched a line 'B' marked on the other side with a foot of the player and returned to the starting line 'A' as fast as possible to cross the line. After 20s of passive recovery, the players had to perform the same for six times. The test protocol was recorded with a digital video camera (Powershot SX60 HS, Canon INC., Japan) which was placed over the line 'A' at 1.5 meter of height and 4 meter away from the line on sagittal plane on the left hand side of the participant. Later, the timing of sprints was analyzed by the motion analysis software Kinovea – 8.24. **Scoring:** Three scores; RSA_{mean} , RSA_{best} , RSA_{dec} , were calculated from the RSA test and these scores were counted as different variables in the study. RSA_{dec} was calculated using the following formula:

$$RSA_{dec} = ([RSA_{mean}] / [RSA_{best}] \times 100) - 100$$

(E. Rampinini et al., 2007)

3. Statistical Analyses

All data are conveyed as mean and standard deviation. Before using parametric tests, the condition of normality of data was verified using the Shapiro-Wilk W-test. Pearson product-moment correlations were used to examine the relationship between LSST and RSA variables. To study the joint contribution of independent variables (RSA_{mean} , RSA_{best} , RSA_{dec}) and dependent variable (LSST), multiple correlation was used. Statistical analysis was performed using SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). The level of significance was set at $P < 0.05$.

4. Results

The procedure was completed by 70 male soccer players (mean age is 16.4 ± 1.05 years old) and used to analyze their outcomes statistically (Table 1).

4.1 LSST performance and RSA scores

Current researchers revealed correlations between Loughborough Soccer Shooting Test (LSST) performance scores and repeated sprint ability (RSA) performances. The results show that the Correlation of Repeated sprint ability (RSA) mean time with shooting accuracy has a statistically significant negative correlation with an r value of -0.340^{**} and a p -value of $.004$. The result also showed that Correlation of Repeated sprint ability (RSA) best time with shooting accuracy has a statistically significant negative correlation with a r value -0.306^{**} and a p -value of $.010$. On the other hand, Correlation of Repeated sprint ability (RSA) percentage decrement rate with soccer shooting accuracy was not statistically significantly correlated with r value of -0.054 and p -value of $.654$ (Table 2). Table 2 clearly indicates a moderate level relationship (status determined using the modified scale by (Hopkins, n.d.) between LSST and repeated sprint ability mean and best time scores as the correlation coefficient value were found greater than the tabulated value at 0.05 level of significance while in case of repeated sprint ability percentage decrement rate no relationship were found.

4.2 Joint contribution of Independent variables in determining Dependent variable

Current researchers also revealed joint contribution of repeated sprint ability test scores in predicting soccer shooting accuracy in repeated manner (Table 3). Table 3 clearly indicates a moderate level relationship was found between Loughborough Soccer Shooting Test (LSST) and repeated sprint ability (RSA) variables as coefficient of multiple correlations was found 0.348^* which is higher than the tabulated value.

5. Discussion

Repeated Sprint Ability (RSA) test has been shown to be a significant match-related fitness prerequisite for soccer players (Gabbett, 2010; "Fifa assistant referee fitness test for linesman," n.d.; "FIFA Assistant Referee Fitness Test," n.d.; Weston, Castagna, Helsen, & Impellizzeri, 2009). The soccer game is therefore defined not only by the ability of a player to perform repeated sprinting abilities, but also by the effective execution of skills (Stone & Oliver, 2009). So, the performance of shooting accuracy (repeatedly doing) is connected with fitness. In the same way, researchers found that fatigue is one of the reason for reducing shooting accuracy (Stone & Oliver, 2009).

However, researchers Sánchez and his team found that physical performance and muscle response in soccer players can be supplementary factors in the management of fatigue by age group (Sánchez-Sánchez et al., 2019). Similarly, researcher can works on young amateur soccer players in different age categories and playing positions. His study revealed that the best time, average time and complete test time of repeated sprint ability test statistically significant differences depending on the playing position and age factor (Can, 2018). However, Investigators were found significant moderate negative correlations between VO_{2max} ($mL \cdot kg^{-1} \cdot min^{-1}$) and Repeated Sprint Ability (RSA) expressed as RSA_{mean} ($r = -0.655, P < 0.01$) and RSA_{total} ($r = -0.591, P < 0.01$) (Jones et al.,

2013). So, it is establish that aerobic capacity is one of the key factors that help soccer players to constantly conduct sprint with brief passive recovery. Ali et al., (2007) suggested that highly skilled players can carry out the attacking skills test without compromising their capacity to pass and control the ball accurately. Therefore, present study, it was hypothesized that there may be relationship between repeated sprint ability variables and Loughborough soccer shooting test of Bangladeshi youth soccer players. The hypothesis is partially accepted due to the reason because there was no relationship found between LSST and RSAdec whereas present study indicates a moderate level relationship between LSST and repeated sprint ability variables.

6. Conclusion

Based on the findings and within some limitation of the study the current researchers found that there were moderate level relationship between repeated sprint ability (RSA) and repeated shooting test in LSST, when the test evaluated the accuracy of shooting in Bangladeshi youth soccer players.

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Appendix

Table 1: The LSST and RSA characteristics of the soccer players

Test Protocol	Mean Performance	Standard Deviation (\pm SD)
Age (years)	16.4	1.05
Stature (cm)	168.3	5.7
Body mass (kg)	57.11	5.91
LSST (total points)	17.71	4.26
RSAm _{ean} (seconds)	7.58	0.25
RSAb _{est} (seconds)	7.20	0.27
RSAd _{ec} (% decrement)	4.98	2.20

Table 2: Correlation between Independent variables and dependent variable

SN	Independent Variables	Correlation coefficient
1.	RSAm _{ean}	-0.340**
2.	RSAb _{est}	-0.306**
3.	RSAd _{ec}	-0.054

$r_{0.05} (68) = 0.232$
 * significant at 0.05 level

Table 3: Joint contribution of Independent variables in determining Dependent variable

Criterion Variable	Independent Variables	Coefficient of Multiple Correlation
Loughborough Soccer Shooting Test (LSST)	RSAm _{ean}	0.348*
	RSAb _{est}	
	RSAd _{ec}	

$r_{0.05} (68) = 0.232$
 * significant at 0.05 level

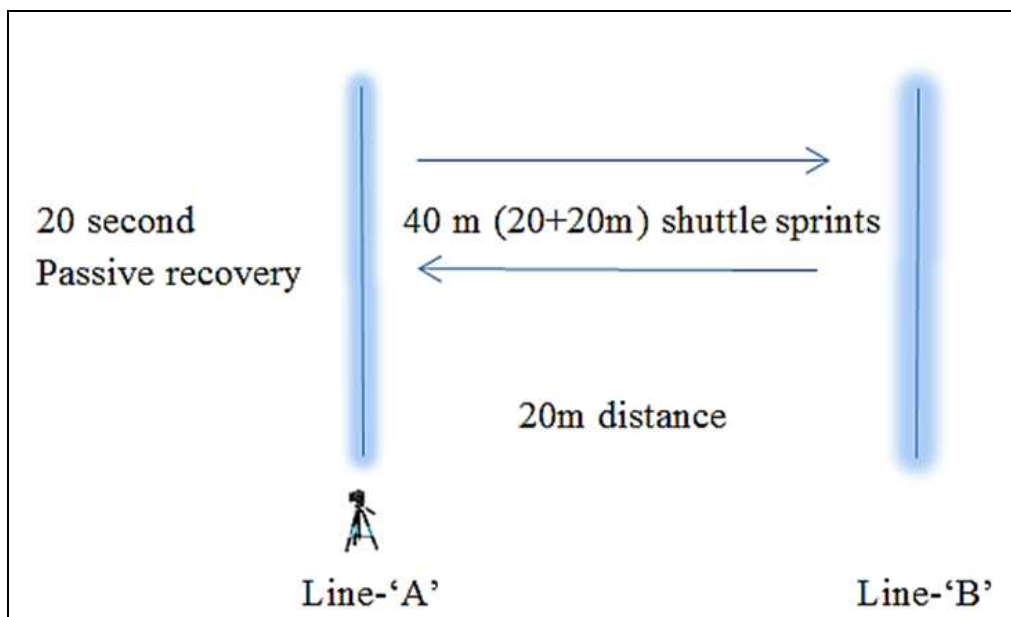


Figure 1: Schematic representation of the Repeated Sprint Ability (RSA) test

Muhammad Shahidul Islam, Brajanath Kundu, Sukanta Saha
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