

Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters.

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Abstract: Background: Sprinting is running for relatively short distance in a brief period of time. It has been used in sports that involve running, usually as a way to hit a target quickly or to stop or catch an opponent. 50 Meter dash Test is established to measure the sprinting performance. **Objective:** To study the Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters. **Methodology:** Total 44 collegiate sprinters (male=26 and female=18) from various departments of Parul University were included in this study. The test was performed over 2 sessions, each separated by two weeks. All the procedures for the test were administered by the same individual. **Results:** The ICC value and SEM for the sprinting performance of 50 Meter Dash Test were 0.904 (95% CI) and 0.423 seconds respectively. **Conclusion:** This research shows the excellent Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters.

Key words – 50 Meter Dash Test, Test-Retest reliability, sprinting performance, sprinters.

I. INTRODUCTION

Quick acceleration of the body from one spot to another is needed in many competitive sports and especially in sprint running.¹ Since then ancient Olympic Games in the 8th century BC, sprinting has attracted worldwide audiences.²

Sprinting velocity is the outcome of stride rate and stride length. The length of the stride rely mainly on body height or leg length and the muscular force developed by the extensors of the hip, knee and ankle joints in the contact phase. Besides this, stride rate affected by the functioning of the central nervous system on the cortical and sub cortical level and is firmly genetically determined. In fact, maximum sprinting speed is the outcome of an optimum relationship between the individual's stride length and stride rate.³

Earlier literatures have shown that a sprint race consists of multiple phases with varied specifications. The effectiveness of sprinting depends on initially making a quick start during the acceleration phase and then reaching and sustaining high velocity during the full velocity phase. A great net propulsive force is necessary in the acceleration phase to increase the velocity of the sprinter at the greatest possible pace. The cumulative horizontal impulse in the moving direction, neglecting air resistance, uniquely defines the change in running speed at any point of contact. In comparison to the acceleration phase, sprinters seek to retain their optimum velocity as much as possible during the maximum velocity process. During this process, the kinematics and kinetics of sprinting remain reasonably constant.⁴

In order to increase running speed effectively, sound mechanics must be created that combine the motions of the upper and lower extremities (UE and LE) to generate muscular force effectively.⁵ Sprint performance also gets affected by factors other than the runner, such as shoes and the running track.²

To measure the sprinting speed, 50 Meter Dash Test is established. It is a constituent of the international physical fitness test. Split half reliability and Face validity of 50 Meter Dash Test is 0.89 and 0.79 respectively.⁶ However; no previous studies have shown Test-Retest reliability of the 50 Meter Dash Test.

So, the present study aims at studying the Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters.

Null Hypothesis (H₀):- Test-Retest reliability of the 50 Meter Dash Test is less as a measure of sprinting performance in collegiate sprinters.

Alternate Hypothesis (H₁):- Test-Retest reliability of the 50 Meter Dash Test is high as a measure of sprinting performance in collegiate sprinters.

II. MATERIALS AND METHODOLOGY

MATERIALS USED

- Running track or marked area of 50 meters on plane surface (Flat and clear surface of at least 70 meters)
- Cone Markers
- Measuring Tape
- Stopwatch
- Consent Form
- Participant Information Sheet

STUDY SUBJECTS

Total 44 collegiate sprinters from various departments of Parul University were volunteered to participate in this study. Both male (n=26) and female (n=18) sprinters with 18 to 25 years of age were selected. Participants with a history of injury or surgical procedure in the lower limbs and with any other psychological disorder were excluded. Participants fulfilling the inclusion criteria were selected and assessed before starting the intervention. All selected players were informed regarding the study design. A written and informed consent about enrolment in the study and maintaining adequate privacy and confidentiality were taken from all participants included in the study. All confidential data are safe and never shared in public.

PROCEDURE

50 Meter Dash Test

Purpose

To measure sprint performance

Test procedure

Subjects got acquainted with the testing procedure by physical demonstration. The procedure involved running over 50 meters of a single maximal sprint, with the time registered. There was a comprehensive warm up, including the start of some practice and accelerations. Start from a standing posture stationary (hands could not be in contact with the ground), with one foot before the other. The front foot had to be right behind the starting line. Once the participant was geared up and motionless, the instructor instructed the "ready" then "go" instructions. The instructor provided advice for optimizing speed (such as staying low, driving fast with legs and arms) and motivating the participant not to slow down until crossing the finish line. The subjects performed 3 test trials with the best performance used for statistical analyses. Sprinters were also asked to wear the same training shoes on each testing session so as to negate the effect of different designs of shoe and support they provide on individual performance. In between two sessions, they did not undergo any training programs or rehabilitation. The test was performed over 2 sessions, each separated by 2 weeks. All the procedures for the test were administered by the same individual.

Instruction

The subjects were allowed to take standing start prior to running.

Scoring

Time taken to cover 50 Meter distance was expressed in seconds.

III. RESULTS

Results were obtained using an appropriate statistical analysis. SPSS (Statistical Package for Social Sciences) version 20.0 (IBM corporation) was used for the statistical analysis. Normalcy of the data was checked by Kolmogorov – Smirnov test. All statistical analyses were measured using the alpha level 0.05. Reliability and measurement error were analyzed by scores using Two-way random Intraclass correlation coefficient (ICC), SEM, and 95% Confidence Interval (CI). Interpretation of ICC value was done by the recent guidelines developed by the Koo and Li (2016).⁷

Table 1: Performance characteristics of Intraclass correlation coefficient (ICC) and SEM

Measure	Test	Retest	ICC	SEM (s)
	Mean ± SD (s)	Mean ± SD (s)		
50 Meter Dash Test	12.0818 ± 1.32399	12.0818 ± 1.40974	0.904	0.423

The ICC value and SEM for the sprinting performance of 50 Meter Dash Test were 0.904 (95% CI) and 0.423 seconds respectively. SEM was calculated by the following formula.

$$SEM = SD \sqrt{1 - ICC}$$

IV. DISCUSSION

Sprinting performance depends on the stride length, stride rate and explosive power generated by the lower limbs muscles.

50 Meter Dash Test is established to measure the sprinting speed. It is a component of the international physical fitness test. Study done by Tambe RA (2016)⁶ showed that the Split half reliability and Face validity of 50 Meter Dash Test is 0.89 and 0.79 respectively. However, there is lack of research on Test-Retest reliability of 50 Meter Dash Test.

The purpose of this study was to investigate the Test-Retest reliability of the 50 Meter Dash Test as a measure of sprinting performance in collegiate sprinters. The present study rejects the null hypothesis and asserts that 50 Meter Dash Test has an excellent Test-Retest reliability (ICC value above 0.90: excellent). These results were obtained using the ICC value (95% CI) and SEM values.

Limitations: Sample size was small. This study focuses mainly on the 50 Meter dash Test as a whole and did not analyze the reliability in different score categories of this test.

Future recommendations: It can be done with larger sample size. Further, it can be done by assessing reliability of different score categories of this test.

V. CONCLUSION

This study had concluded that the 50 Meter Dash Test has an excellent Test-Retest reliability. The 50 Meter Dash Test can be routinely included by Sports scientists, strength and conditioning practitioners, and sports coaches within an assessment battery for sprinters to evaluate the sprinting performance in sprinters.

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