Establishing Reliability of Soccer Specific Interval Test (SSIT) On Male Indian Soccer Players

-Authors-

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ABSTRACT

The purpose of the study was to assess the reliability of Soccer Specific Interval Test (SSIT) on Indian male soccer players. The objective of SSIT is to obtain important information of an individual's capacity to perform repeated intense exercise and to examine changes in performance. Distance covered by the players has been selected as the criterion measure for the current study. To assess the reliability, Fifteen (n=15) male soccer players performed three trials of Soccer Specific Interval Test (SSIT) with the gap of seven days in between. The distance covered by each player during the three trials was recorded. The mean ± S.D value for SSIT Trial 1 was 1028.60 ± 178.48, for Trial 2 was 1052.40 ± 174.10 and for Trial 3 was 1114.80 ± 172.37. The Cronbach’s Alpha for Soccer Specific Interval Test was found to be .92, which clearly indicates the close relationship between the trials. The present study reveals that the Soccer Specific Interval Test is reproducible and can be used to assess the ability of the soccer players to perform intense intermittent exercise with the high rate of aerobic and anaerobic energy turnover.

Key words: - Soccer Specific Interval Test (SSIT), Cronbach’s Alpha, Aerobic and Anaerobic.

INTRODUCTION

Soccer is the world’s most popular sport. It is simply known as Football in most English speaking countries and is often called by its popular name Soccer, also known as Association Football. (Clive Gifford, Soccer 2009). With a population of more than 1billion one might expect India to be among the world's soccer superpowers. But India is not even one of the leading teams in Asia. Domestic football in India is far more popular than domestic cricket, and many teams in the country's National Football League trace their origins back to the 1880s, when the game was introduced by British colonials. (http://news.bbc.co.uk/sport2/hi/football/world_football/3937015.stm). Soccer is a sport requiring high levels of physical fitness. It is one of those rare games which demands not only speed but agility, strength, power and endurance. Players at top levels can run over 14 km in a game whilst not forgetting the frequent accelerations, decelerations, changes of direction and jumps they must undertake. Soccer players must be able to perform prolonged intermittent exercise (endurance), exercise at high-intensity, sprint, and develop high levels of power (force) when kicking and tackling. Good levels of agility and coordination are also necessary (www.soccerperformance.org/introfitness.htm).
Soccer is perhaps the most demanding of all sports. In the modern game (at any level) soccer training and conditioning is essential. Few sports are played on as large a playing field, lasting as long and without regular rest periods. Players cover 8-12km during a match, consisting of 24% walking, 36% jogging, 20% coursing, 11% sprinting, 7% moving backwards and 2% moving whilst in possession of the ball. Soccer player’s posse’s excellent endurance with VO2max reported to range between 55 and 70 ml/kg/min in elite performers. The game is played at an average intensity close to the lactate threshold - approximately 80-90% of maximum heart rate. (Reilly, 1996) Soccer is characterized by variations in intensity. Short sprints are interspersed with periods of jogging, walking, moderate-paced running and standing still. This kind of activity has been termed "maximal intermittent exercise". English researchers Reilly and Thomas, 1976 investigated the patterns of football play in the old first division. They found that a player would change activity every 5 to 6 seconds, and on average he would sprint for 15 meters every 90 seconds.

Physiological Demands of Soccer

Soccer incorporates periods of high-intensity exercise interspersed with periods of lower-intensity exercise. The physiological demands of soccer require players to be competent in several aspects of fitness, which include aerobic and anaerobic power, muscle strength, flexibility and agility.

Summary of energy systems

- Anaerobic alactic – high intensity, duration 0 to 15 seconds, used in soccer sprinting, kicking, tackling
- Anaerobic lactic – high moderate intensity, duration 15 to 120 seconds, used in sprinting, recovery, runs, heart rate of 180–190, (> 90% of maximum).
- Aerobic – moderate to low intensity, duration 120 seconds plus, used in soccer whilst jogging, walking, duration of game, heart rate of 160–170, (80% of max).

The game of soccer is essentially aerobic with intermittent anaerobic and alactic bursts of energy. Outfield players average 160bpm during soccer games and operate at 75–80% of their maximum oxygen uptake (VO2 max) which is comparable to marathon running. However, soccer is not characterized by steady heart rates of 160bpm which are sustained for 90 minutes of play. On the contrary, heart rates are continually fluctuating depending on the nature of the activity the soccer player is performing. The debate on conditioning for soccer players comes from the large distances a soccer player covers in a match. In the past coaches had a tendency to prescribe long, slow running during pre-season training. But as we have seen above, during a game the intensity of exercise varies continually and fitness training should reflect this as realistically as possible. Training should also involve regular use of the ball as this will not only help develop the specific muscles involved in match play, but will also help improve technical and tactical skills and help keep players interested and keen (Jimmy Petruzzi, 2009).

Soccer players require technical, tactical and physical skills to succeed. In part, professional soccer emphasizes selection between players as well as development of the players’ performance (Shephard, 1999). Individual technique, tactics and physical resources are all important when evaluating performance differences in soccer. It is difficult to discriminate between the relative importance of each of these elements when evaluating performance differences. Muscular strength and power share importance with endurance within the physical resources (Hoff, 2004).

Physiological determinations, such as heart-rate recordings as well as metabolic measurements of muscle and blood samples collected during competition, have furthermore shown that in many of these sports the aerobic loading is high throughout the competition and that the anaerobic energy turnover is extensive.
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during periods of competition (Bangsbo et al. 1994; Ekblom et al. 1986; Krstrup et al. 2005 and Mcinnes et al. 1995). The aerobic and anaerobic capacity of an athlete may determine the outcome of the competition and it is therefore important to evaluate the athletes' ability within these areas. Traditionally, the capacity of an athlete has been evaluated using continuous exercise tests, including the Léger shuttle-run test (Léger and Lambert, 1982) a 12-minute running test or a maximum oxygen uptake ($V\text{-dotO}_2\text{max}$) test. However, the relevance of these tests to intermittent sports has been questioned (Bangsbo, 1994; Castagna et al. 2005; Krstrup et al. 2001 and Krstrup et al. 2003) leading to the development of the Yo-Yo intermittent recovery (IR) tests (Bangsbo, 2005). The Yo-Yo IR tests have rapidly become some of the most extensively studied fitness tests in sports science.

The average exercise intensity for a player in a 90- min soccer match is close to that of the lactate threshold, or 80 – 90% of maximal heart rate (Bangsbo, 1994; Reilly, 1990). It would be physiologically impossible to maintain a higher average intensity over a longer period of time due to the resultant accumulation of blood lactate. Expressing intensity as an average over 90 min could result in substantial loss of specific information. In soccer matches, the high-intensity periods usually constitute the most interesting parts of the game, where accumulation of lactate takes place. It is necessary for the players to experience intervening periods of low-intensity exercise to remove lactate from the working muscles and from the blood.

There is a significant correlation between maximal oxygen uptake ($VO_2\text{max}$) and distance covered during a match (Bangsbo, 1994; Smaros, 1980). Distance covered during a match was shown to differ a lot in studies carried out in the early 1970s, partly because of flawed methods. Measurements have become more reliable (Reilly, 1990) and differences between top teams are now considered to be quite small. For example, it has been reported that male players cover 10,245 m (Van Gool et al. 1988), 9,845 m (Ohashi et al. 1988), 10,800 m (Danish elite players: Bangsbo, 1992), 11,527 m (Australian elite players: Withers et al. 1982) and 10,335 m (elite junior players: Helgerud et al. 2001). These values are considered reliable, objective and valid.

In intermittent or interval type team sports, such as soccer, the players require a wide range of fitness abilities that are specific to the sport. The players not only required to reproduce high intensity sprints, they also need to be strong and powerful, run fast, be agile and keep running for extended periods (high aerobic endurance). The physiological demands of the sport may also be determined by the playing position, level of play, the officiating style of the referee and the tactics used. A good understanding of the physiological demands of the sport is required to design an appropriate testing regime, and the fitness test protocols should be closely matched to the physiological demands. Due to range of fitness requirements of players involved in intermittent or interval type team sports, they must therefore undergo a wide range of tests to fully assess their fitness. Uniquely to intermittent sports is ability to continually produce short bursts of high intensity work, often with short periods for recovery. To cope with the physiological demands of soccer, players must be competent across several fitness components. The use of fitness tests in the laboratory and field assist in examining soccer player’s capabilities for performance both at the amateur and elite levels. Laboratory tests provide a useful indication of player’s general fitness. Accurate test results can be obtained with the use of a thorough methodology and reliable equipment. Laboratory tests are used sparingly during the season because of the time-consuming nature of the tests. Instead, tests are generally carried out at the start and end of the pre-season period to evaluate the effectiveness of specific training interventions. Field tests provide results that are specific to the sport and are therefore more valid than laboratory tests. Since specific soccer field tests can be more reliable and effective to reflect the physical capacity of the intermittent sport performance, there are a number of researchers developing lots of specific soccer field tests (Edwards et al. 2003) to replicate the exactly physical demands needed by the players during the match, such as the Interval
Shuttle Run Test (ISRT) (Lemmink et al. 2004), 20 meter multistage shuttle run test (MST), and the Yo-Yo intermittent tests (Bangsbo, 1996).

The CAP (Centers for Athletic Performance) Soccer Specific Interval Test (SSIT) was created in 2009 by the Soccer Fit Academy (Scott Moody, CEO and Founder) based in United States of America. This test is unique in that it involves varied locomotive patterns, changes of pace, changes of direction and a recovery period. The test evaluates an individual's ability to repeatedly perform an exercise interval over a prolonged period of time. The test can be done with and without a ball, which incorporates a skill factor and makes the drill closer mimic the sport.

**PROCEDURE AND METHODOLOGY**

**Selection of Subjects**

Fifteen (n=15) male soccer players undergoing regular training were selected as the subjects of the present study. The subjects selected for the study have played at the intercollegiate level and above. The age group of the subjects ranged from 16-24 years.

**Research Design**

To examine the reliability of the SSIT in male soccer players, subjects performed the Soccer Specific Interval Test (SSIT) on three separate occasions, exactly one week apart, and at the same time of the day. Subjects were given trial sessions before the tests in order to get familiarised with the tests.

**Administration**

**Soccer Specific Interval Test (SSIT)**

Each athlete was lined up on the start line. On command all players started dribbling with the ball to the first cone (10 yards), and without stopping went through the entire protocol finishing with a sprint with ball to the start cone within 30 seconds (follow diagram below). At the 30-second mark, all athletes were instructed to start dribble again with ball (repeating the same pattern) and asked to get back to the start within 30 seconds.

![Diagram of Soccer Specific Interval Test (SSIT)](https://example.com/diagram.png)

After the second run at the 30 second level, the athletes were given a 30 second rest. After this rest break, the drill repeated itself 2 more times, but this time the athletes asked to get back within 29 seconds each time. This was be followed by another 30-second rest and repeated in 28 seconds, 27 seconds, and 26
seconds and so on until all players have failed to make it back in the required time. A player was considered “out” if he fails to make it back to the start line in the required time and the total distance was recorded.

Scoring: The distance covered by the subjects was considered as the score.

Statistical Techniques

For the purpose of the present study following statistical techniques were employed:
1. Descriptive Statistics
2. Cronbach’s Alpha
3. Inter-Item Correlation Matrix

RESULTS

The reliability of Soccer Specific Interval Test (SSIT) was investigated and analyzed by applying the Cronbach’s Alpha. The level of significance was set at .05. The descriptive statistics were also computed by computing mean, S.D, min and max.

Finding’s pertaining to descriptive statistics has been presented in table no. 1.1.

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
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<tr>
<td>Soccer Specific Interval Test</td>
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<td>Table No. 1.1</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std. Deviation</th>
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</thead>
<tbody>
<tr>
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<td>809</td>
<td>1317</td>
<td>178.483</td>
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<tr>
<td>Trial2</td>
<td>15</td>
<td>1052.40</td>
<td>809</td>
<td>1317</td>
<td>174.096</td>
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<tr>
<td>Trial3</td>
<td>15</td>
<td>1114.80</td>
<td>878</td>
<td>1399</td>
<td>172.369</td>
</tr>
</tbody>
</table>

Table No. 1.1 indicates that mean ± S.D values for SSIT trial 1 were 1028.60 ± 178.48, for SSIT trial 2 were 1052.40 ± 174.10 and for SSIT trial 3 were 1114.80 ± 172.37.

Reliability Statistics

Soccer Specific Interval Test
Table No. 1.2
Table no. 1.2 indicates the value of Cronbach’s Alpha for Soccer Specific Interval test for N=15 which is .92, which means high association between the trials.

### Inter-Item Correlation

#### Soccer Specific Interval Test

<table>
<thead>
<tr>
<th>Trials SSIT</th>
<th>r- value</th>
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</thead>
<tbody>
<tr>
<td>Trial 1 and Trial 2</td>
<td>.750</td>
</tr>
<tr>
<td>Trial 1 and Trial 3</td>
<td>.712</td>
</tr>
<tr>
<td>Trial 2 and Trial 3</td>
<td>.936</td>
</tr>
</tbody>
</table>

Table No. 1.3 indicates the value of ‘r’ for Trial 1 and Trial 2 is .750, for Trial 1 and Trial 3 is .712 and for Trial 2 and Trial 3 is .936.

**Discussion of Findings**

An analysis of the results shows that there is a close relationship between the three trials of SSIT, as the value of Cronbach’s Alpha comes out to be .92. The value of ‘r’ for Trial 1 and Trial 2 is .750, for Trial 1 and Trial 3 is .712 and for Trial 2 and Trial 3 is .936 respectively, which shows that trial 2 and trial 3 were associated more than Trial 1 and Trial 2 and, Trial 1 and Trial 3, it may be due to adaptability of the test.

**CONCLUSION**

The present study reveals that the Soccer Specific Interval Test (SSIT) is reproducible and can be used to assess the ability of the soccer players to perform intense intermittent exercise with the high rate of aerobic and anaerobic energy turnover. The SSIT test provides a simple and valid way to obtain important information of an individual's capacity to perform repeated intense exercise and to examine changes in performance.

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