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Modification and evaluation of specific functional fitness test for young elite football players

Dr. Amarjit Kaur
Professor, Department of Physical Education, Govind National College, Narangwal, Ludhiana, Punjab, India

Abstract
The present study has been conducted on 38 football player (20 university level player, who were considered as elite players and eighteen school level player who were consider as non elite players) were selected to be subjects in this study. University player who are regarded as top level players who have at least five or above years on playing soccer, some of them are Panjab University, Chandigarh team members. The elite subjects aged 19 to 24 Years. The school level players who are regarded as intermediate level player or non elite players were aged between 16 to 19 years. All the subjects were made to perform the specific function test developed by Zelenka *et al* (1964) and also the modified specific fitness test. The construct validity of the modified specific fitness test. The construct validity of the modified test was assessed by two distinct groups, that is one University level soccer players and the other school level players, as it was expected that the group consisted of University level players will posses a higher score in the test and the other a lower score while the concurrent validity was assessed by analyzing the relationship between Zelenka's specific function test and Modified specific fitness test. The reliability of the modified test was assessed by measuring the consistency or repeatability of the modified test. All the subjects were administered both the tests and the modified test on two occasions, with 15 days gap between the days of testing.
The analysis of the results indicate that modified specific functional fitness test has a high construct validity and concurrent validity. It can be safely concluded that the modified specific functional fitness test is valid for examining the performance of University level football players and it is also a reliable test for measuring the physical and technical performance of the University level football players.

Keywords: football player, fitness test, team members

Introduction
Football, no doubt, is one of the popular sports in India, which is regarded as an intermittent-type sport since it involves "exercises ranging from walking to sprinting, and the intensity alters continuously" (Lemmink, Verheijen & visscher, 2004, p. 233). This sport requires both anaerobic and aerobic endurance performance. Because of the nature of the sport, players, especially the elite one, need high demand on the physiological aspect. Several researches pointed out that in a single competitor, Football (soccer) player cover more than 10 kilometers as the total distances, (Bunc & Psotta, 2001; Edwards, Macfadyen & Clark, 2003) and the players need to possess a moderate level aerobic capacity with the maximal oxygen uptake (o2 max) value over 60 ml.kg-1, min-1 (Bunc & Psotta, 2001) As Football (soccer) players need to have a high power output in competitive situations such as kicking jumping and tackling (Bangsbo, 1993) [1, 2], their physical demands are high and complex in a soccer game and therefore lots of researchers are now trying to develop a more precise protocol to test for the real performance of the players. Treamill teste are the standard method to measure the 02 max of the players. (Kemi, Hoff & Helgerud, 2003). However, treadmill tests are regarded as complex and expensive to run, so other protocols are developed to convenient the measurement. According to Kemi, Hoff, Engen, and Helgerud 2003, they developed a field test with ball dribbling, backwards running jumping, turning and some technical skills that frequently use in soccer game. The study was the first suggested that soccer specific field test can get the similar result of 02 max as testing on the treadmill. Since specific soccer field tests can be more reliable and effective to reflect the physical capacity of the intermittent sport performers, there are a number of researchers developed loads of specific soccer field tests (Edwards, Macfadyen & Clark, 2003) to replicate the exactly physical demands needed by the players during the match, such as the interval Shuffle Run Test (ISRT) (Lemmink, Verheijen and Visscher, 2004), Probst test (Labsy, Collomp, Frey, DeCeaurriz, 2004).soccer specific exercise protocol (SSEP) (Thatcher & Batterham, 2004), 20 meter multistage shuttle run test (MST), and the Yo-Yo intermittent tests (Bangsbo, 1996) [1, 2]. The Yo-Yo test is considered as a well-established field test for assessment of performance in intermittent-type sports such as soccer. Recently, a new test was developed for assessing both aspects of physical and technical of soccer players (Rostgaard, Iaia, Simonsen & Bangsbo, 2008).
Although soccer specific field tests are well-established in recent years, most of them were designed for the elite soccer players from Western Countries but not for Indian players. Also there are few tests have been developed for testing the technical performance that may be needed in one match. Zelenka *et al*. (1964) have developed a specific function test for young elite football players. In the test constructed by Zelenka *et al*. (1964), the subject starts from behind goal line

and runs forward up to penalty area line and turns towards goal and runs and jumps over a hurdle and moves under another hurdle and starts dribbling the football, which is placed at a distance from the hurdle and dribbles the ball between 7 gates made with flags along the goal line across and after reaching the other end of goal line shoots the ball into a target goal, which was constructed at a distance of 25 meters by fixing two flags and runs turning towards the goal line to the finishing point. In one round of the test, the subject covered a distance of 123 meters. The test is to be carried out twice with an interval of 45-60 seconds in relation to rest pulse frequency. The test is to be performed in football boota. However, the test was designed to be performed on the football field at the penalty area of one side only, which did not replicate the game conditions. So it was felt modification of the test was needed.

Modified Specific Physical Fitness Test

The modified test will be conducted using the hill football held instead of using the penalty area only, as done by Zelenka *et al.* All the players in modern football game excepting goal keeper cover equal distance during the game and hence the distance covered by the players in the modified test was increased, as compared to the distance covered in Zelenka's test by using the full football field.

In the modified test, the subject will start from right side of the centre line and sprint forward, slide under a hurdle placed at a distance of 10 meters from centre line and will get up and sprint forward and jump over another hurdle placed in front of the first hurdle at a distance of six meters from the first hurdle and carry the football placed on the ground at a distance of three meters froth the second hurdle by dribbling around seven gates (flages) in a zigzag manner, the first gate starting at a distance of five meters and the distance between the gates being one meter, and reach the penalty line in front by continuing the dribble and shoot the football into goal (specific target created by fixing two flags on the goal line) and then sprint back to the centre line and continue moving forward in the other slide under the hurdle in the same manner as done earlier and get up and run forward and jump over the second hurdle and carry the football placed on the ground by foot, dribbling around seven gates (flags) and upon reaching the penalty line, shoot the football into the target (goal) and sprint back towards the starting point at the centre line. The ball skills on right side will be performed with the right foot and on the left side with the left foot wearing football shoes. The time taken to complete one round will be measured and also the pulse frequency immediately on completion of the round. The second repetition (round) of the test will be performed after the rest interval of one minute. The time taken for the second repetition along with the pulse frequency will be noted and also the recovery pulsre after first minute, fifth minute and tenth minute on completion of the second repetition. The purpose of current study was to examine firstly, the reliability of the modified specific fitness test and secondly to examine the construct and concurrent validity of the modified specific fitness test for University level soccer players.

Materials and Methods

Subjects

Thirty eight football players (20 University level players, who were considered as elite players and 18 School level players, who were considered as non-elite players) were selected to be subjects in this study. University players who are regarded as top level players who have at least 5 or above years on planning soccer, some. of them are Panjab University team members. The elite subjects were aged between 19 to 24 years. The School level players who are regarded as intermediate level players or non-elite players were aged between 16 to 19 years.

Research Design

To examine the reliability and construct and concurrent validity of the modified specific fitness test, all the subjects were made to perform the specific function test developed by Zelenka *et al.* (1964) and also the modified specific fitness test. The construct validity of the modified specific fitness test. The construct validity of the modified test was assessed by two distinct groups, that is one University level soccer players and the other school level players, as it was expected that the group consisted of University level players will posses a higher score in the test and the other a lower score while the concurrent validity was assessed by analyzing the relationship between Zelenka's specific function test and Modified specific fitness test. The reliability of the modified test was assessed by measuring the consistency or repeatability of the modified test.

Procedure

All the subjects were administered both the tests, i.e. the test constructed by Zelenka *et al.* and the modified test on two occasions, with 15 days gap between the days of testing.

Result and Discussion

Data collected on both the tests were analysed through computer and descriptive statistics are presented vide descriptive data, such as mean, standard deviation and all data were described in mean ± SD. The physical characteristics of the subjects, both University level players (elite) and school level (sub-elite), are shown in the following table 1&2.

Table 1: Physical characteristics of the elite group (University level players) (N=20)

Sl. No.	Characteristic item	Mean	Standard Deviation
1	Age	20.52	± 0.98
2	Height (in Cms)	176.74	± 1.96
3	Weight (in kgs)	70.32	± 3.68
4	Playing Experience (Years)	5.13	± 1.89

Table 2: Physical characteristics of non-elite group (University level players) (N=18)

Sl. No.	Characteristic item	Mean	Standard Deviation
1	Age	18.62	± 0.85
2	Height (in Cms)	171.57	± 1.63
3	Weight (in kgs)	65.23	± 3.31
4	Playing Experience (Years)	2.87	± 0.86

The descriptive data of Specific data of Specific Functional Fitness test constructed by Zelenka *et al.* and the modified Specific fitness test are presented vide Table 3 below.

Table 3: Descriptive Statistics of Specific Functional Fitness Test constructed by Zelenka *et al.* and Modified Specific Fitness test

Sl. No.	Name of Test	University Level (N=20) Mean ± S.D.	School level (N=18) Mean ± S.D.
1	Specific Functional Fitness test developed by Zelenka (in sec)	39.60 ± 1.64	42.42 ±. 05
2	Modified specific fitness Test (in sec.)	55.48 ± 2.02	56.58±2.09

The reliability of Specific functional fitness test developed by Zelenka *et al.* and also the modified specific fitness was evaluated by computing the correlation coefficient between initial test score and retest score conducted after a break of 15 days and the result obtained is presented vide Table 4 below:

Table 4: Correlation coefficient between test and re-test of Specific functional test developed by Zelenka *et al.* and modified specific fitness test

Name of the Test	First Test	Re-Test	Value of "r"
Zelenka Test	41.52 ± 13.64	41.42±2.05	0.67 (P<0.05)
Modified Test	55.48 ± 2.023	55.58±2.09	0.79 (P<0.05)

The results presented on the Table 4 reveal that the value of "r" was 0.67, and 0.79, which were statistically significant, P<0.05. Since the value of correlation coefficient was statistically significant, it can be construed that the specific functional fitness test constructed by Zelenka *et al* and the modified specific fitness test are reliable.

Construct Validity of the modified specific Functional Fitness Test

The construct validity of the modified test was evaluated by finding out the statistical significance of difference in means in the modified specific fitness test between University level players and School level players and the results obtained are presented in Table-5.

Table 5: Significance of difference in mean in Modified specific fitness test between university and school label players

Level of Subjects	Mean ±	Difference in Mean	Value of "t"
University Level Players (N=20)	53.25 ± 0.46	4.88 ± 0.82	7.81 (P<0.05)
School level Players (N=18)	58.13 ± 1.28		

Since the mean difference in performance in the modified specific between University level players and School level players was significant, it can be safely concluded that the modified specific fitness construct validity.

Concurrent validity of the modified specific fitness test

The concurrent validity of the modified specific fitness test was evaluated by finding out the relation between the performance of the subjects in the Original Zelenka test and the Modified specific fitness test the results Obtained are presented in Table-6.

Table 6: Correlation between Zelenka Test and Modified Test

Name of Test	Mean ± S.D.	Value of "t"
Zelenka Test (N=20)	42.4185 ± 2.0501	0.41
Modified Test (N=18)	56.5785 ± 2.0867	P<0.05

Since the relationship between the subjects' performance in the specific functional fitness test constructed by Zelenka *et al.* (Test 1) and the modified specific fitness test (Test 2) showed a positive relationship (r=0.41), which is found to be significant (p<0.05), the concurrent validity of the modified test is proved to be valid as its validity has been scientifically analysed and reported in literature and the test was extensively used by experts in Western countries.

Conclusion

The analysis of the results indicate that modified specific functional fitness test has a high construct validity and concurrent validity. It can be safely concluded that the modified specific functional fitness test is valid for examining the performance of University level football players and it is also a reliable test for measuring the physical and technical performance of the University level football players.

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