Journal of Advanced Sport Technology 5(1):74- 80

Received: April. 24, 2021 *Accepted: June. 22, 2021*

Journal of Advanced Sport Technology

Original Research

Developing Special Badminton Agility Test and Evaluating Its Convergence with Standardized Agility Tests in Trained Young Men

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ABSTRACT

Sport-specific test protocols to measure the ability of different sports athletes are of great importance. The present study aimed to develop an agility test in badminton and evaluate the developed test using the standardized agility tests in trained young men. To this end, 30 trained young men participated in this study with the mean age of 21.56±1.61 years, the mean height of 173.56 ±3.82 cm, BMI of 22.46 ± 2.78 kg/m2, and fat percentage of 7.30±2.70. The participants performed all of the agility tests in one session with the 10 min rest intervals, and their performance was recorded immediately after the test administrations. Descriptive statistics were used to classify the collected data. Shapiro-Wilk test was used to check the normality of the data, and the Pearson correlation coefficient test was run to analyze research hypotheses. The study's finding showed a significant correlation between the X agility test and tests of agility (Simo, two diagonal Illinois, 4*9m shuttle run, Compass Drill) T-test), indicating a high correlation coefficient. Therefore, this study indicated that the developed X agility test is valid and can be used as a measure to evaluate agility in badminton.

Keywords: Agility, Badminton, Test

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INTRODUCTION

Suppose the test development is associated with a particular sport. In that case, the test items should include as much as possible the actual situations of that specific sport to provide more appropriate information about the athlete's condition (1). The development of sports tests, specific to each sport, requires knowledge of the motor factors involved in that particular sport, which educators and researchers must consider when making tests, the accuracy and delicacy of the work, and the three conditions for the test. That is, consider the objectivity, validity, and reliability that underlie the construction of sports tests (2, 3). On the other hand, when performing special tests in each sport, the use of related profiles is highly significant in developing special exercises and evaluating the progress of athletes (4). Much research has shown that agility is one of the most valuable factors in physical fitness and athletic ability and is recognized as an essential competency for performing sports skills (5). Although agility is an essential element of physical fitness in badminton, there is no specific test of agility in badminton in the literature review (6, 7). Each sport requires a specific type of agility, and the measurement of agility varies from sport to sport. However, existing tools for measuring agility in badminton are not valid (8). In general, the tests used to assess a person's fitness status should be exclusively related to the movement patterns and abilities of the sport in question, as well as showing differences in athletes (9). Developing a particular test related to sports will cause more accurate knowledge of the performance status, avoid wasting time, energy and ultimately discover the talents of athletes (10, 11).

Agility is a complex skill that allows the athlete to react quickly to a stimulus, start promptly and efficiently in the right direction, and be prepared to change direction and stop quickly intermittently (12). In most sports, the ability to stop abruptly, change direction, and accelerate again is often more important than gaining and maintaining speed. Some tests used to measure and estimate agility are the Illinois Agility Test, the Simo Test, the 4*9 test, and the T-Test (13). Although these tests have high validity in estimating agility, on the other hand, due to the difference in movement pattern in a particular discipline, these tests show the athlete's capacity, ability, or performance in agility in the desired discipline (14). Do not give. For example, in the field of badminton, an open badminton player must have a high quality of step, which is a side foot or cross foot. For this purpose, tests developed for agility in badminton should be developed in a way that is closely related to the movement pattern performed in this field (4, 15). According to the appropriate movement pattern for measuring and measuring agility in badminton, a particular test was developed, and its relationship with standard tests was considered. Due to the proposed cases and the lack of a specific agility test in badminton, the purpose of this study is to develop a particular badminton agility test and investigate the relationship between the developed test and standard agility tests.

METHODOLOGY

According to the objectives of the research, the method of the present study was correlational and field.

Research sample

The statistical population of the present study consists of young boys of Payame Noor University, including 30 active students, who are healthy in terms of general health and physical activity based on completing a questionnaire and the conditions for participating in the study, were randomly selected. According to the particular requirements and characteristics in this study, the inclusion criteria were as follows: age group 18-28 years, a minimum cardio-respiratory readiness of 30 ml / kg / minute, homogeneity in body height, weight, and composition, non-smoking, no consumption of alcohol, no participation in strenuous activities 48 hours before the test, non-use of drugs and ergogenic substances and illegal doping, no history of heart and lung diseases or acute and chronic respiratory diseases, no surgical history during the last two years, and poor orthopedic condition.

Research method

The exams were introduced to the test implementation process, and the health questionnaire, physical activity questionnaire (PAR-Q), and consent forms were completed to collect the required data in the first stage, during a test briefing. Then, physical variables such as height, weight, and subcutaneous fat of the subjects were measured. Then, the day after measuring the physical variables in the gymnasium at the Payame Noor University, the record of agility for each of the tests in this research was estimated by experts.

Data collection tools

The following tools were used to collect the required data: Seca gauge and weight gauge, model 220, made in Germany to measure the height and weight of the subjects, Harpenden caliper (fat gauge) with 0.2 mm accuracy, made in England to measure fat thickness, was used.

Measuring contextual variables

The participants' age was recorded as the year/ month/day based on their identity card and their self-reports. To measure height, subjects were placed on a scalar scale without shoes and with minimal clothing as they were looking straight, and their heads were straight as well. In front of them, there was a graduated bar on which the moving bar was placed vertically. The movable bar was adjusted on the calibrated bar to be exactly above the participants' heads. However, the number on the calibrated bar indicated the subject's height in centimeters. To measure the weight, the subjects were placed on the scales without shoes and with minimal clothing so that both feet were on the scales and the hands were free on the sides. In this position, the person was standing to divide the body weight between the two legs, and the scale showed the person's weight in kilograms and grams.

Statistical method

The statistical method of the present study was used in two parts:

A. First, descriptive statistics were measured using data classification, mean, standard deviation, minimum and maximum variables.

B. Inferential statistics: The Shapiro-Wilk test was performed to distribute the normality of the data. The Pearson correlation method was also used to analyze the research hypotheses. SPSS software version 23 was used for statistical analysis, and Excel 2013 was used to draw graphs. In this study, $p< 0.05$ was set as the significance level.

RESULTS

Table 1 presents the personal characteristics of the subjects, including age (year), height (cm), weight (kg), fat (percentage), body mass index (kg/m2), and the number of subjects in each group.

Table 1: Descriptive characteristics of the subjects

Variable	N	Minimum	Maximum	Mean+SD
Weight (Kg)	30	56	84	67.5±1.39
Height (Cm)	30	165	184	173.56±3.82
Age (Year)	30	20	25	21.56±1.61
Fat (%)	30	4	14/2	7.30±2.70
BMI (kg/m2)	30	18.60	29.10	22.46±2.78

Table 2 shows the mean and standard deviation of the agility records in the X, Run, Diagonal, Illinois, Star, 4*9, Star, and T tests. The X test was used as a benchmark test in this study.

Table 2 - Mean and standard deviation of agility in different tests

Sports test	Mean+SD
X (standard)	10.74+ 0.931
Illinois	15.83+ 0.582
Running oblique	11.20+ 0.547
Star	11.37+ 0.779
4*9	9.28+ 0.794
Simo	11.91+ 0.770
T Test	10.23+ 0.580

Inferential findings

First, to test the hypotheses, the normality of the data distribution was checked. Since the sample had a smaller number, the Shapiro-Wilk test was used, and the results of this test showed that the data were normal ($p \leq 0.05$). Next, the Pearson correlation coefficient was used to determine the correlation between protocols (Table 3).

Table 3 - Shapiro-Wilk test results to evaluate the normality of data distribution

Sports test	P Value
X (standard)	0.204
Illinois	0.313
Running oblique	0.773
Star	0.722
4*9	0.418
Simo	0.88
T Test	0.773

Table 4. Mean and standard deviation and agility correlation coefficient in research tests

Test	Mean±SD	P Value	Correlation Coefficient
X	10.74±0.931	0.001	0.760
Simo	11.91±0.770		
X	10.74±0.931	0.001	0.710
T teast	10.23±0.580		
X	10.74±0.931	0.001	0.727
Illinois	15.83±0.582		
X	10.74±0.931	0.001	0.579
Star	15.83±0.582		
X	10.74±0.931	0.010	0.463
Running Oblique	11.20±0.547		
X	10.74±0.931	0.001	0.865
4*9	9.28±0.794		

The study revealed a significant correlation between the X agility test and tests of agility (Simo, Two diagonal, Illinois, 4*9m shuttle run, Compass Drill) T-test), indicating a significantly strong correlation.

DISCUSSION

This study aimed to develop and construct a special badminton agility test and evaluate its correlation with standard agility tests in active young men. The results showed that the X test developed by the researcher was successful. The X test, developed by the researcher to assess the agility of badminton players, had a close and significant relationship with other standard agility tests that have been previously developed, and their validity

and reliability have been proven (7). This relationship was significant in all positive respects. Given the correlation multiplication between the two diagonal run tests and the developed X test (r = 0.463), there was a moderate positive correlation between these two tests. This relationship was significant in all positive respects. Considering the correlation multiplication between the two diagonal run tests and the developed X test (r =0.463), there was a moderate positive correlation between these two tests. The correlation coefficient of two-star tests and developed X test was 0.579, which indicates a moderate to a high positive correlation. In other tests (Simo and X with a correlation coefficient of 0.706, T and X with 0.710, Illinois and X with 0.727, 4 9 9, and X with 0.865), the relationship and correlation were high and remarkably high. These results indicate that the test is well developed and can be used to assess agility in badminton and other sports.

Although having high aerobic and anaerobic capacity, strength, power, agility, and flexibility in the upper and lower body are among the factors of physical fitness required to succeed in sports activities, this set agility has been receiving less consideration. Yet, many studies have shown that agility is one of the most valuable factors in physical fitness and athletic ability and is recognized as one of the basic competencies for performing sports skills(5, 11). Agility is a combination of speed, power, and coordination, and when combined with flexibility, the result is the quality of fast movement execution, with proper timing and coordination, throughout the range of motion. Thus, agility is a complex trait that allows the athlete to react quickly to the stimulus, start promptly and efficiently in the right direction, and alternate between changing direction and stopping quickly (12).

Agility has always been a problem area for testing and testing. The need for agility for different sports can be very specific in terms of speed and direction of rotation. On the other hand, it can address additional factors such as controlling the ball or holding a rocket or other tools. Many tests involve complex movements; what is measured may not give an evident result, and even a good score may not show some weaknesses in agility. At the time of the test, you have to decide what aspect of the exercise you want to check. So you have to be careful in interpreting the results because you have to know precisely what you are measuring (16, 17) .

Limited studies have been conducted on developing sports tests to assess specific agility in the same field, and except for a few particular cases, no research was found. In the study, Frederick et al. (2014) aimed to develop a specific agility test for badminton. One group performed the developed test as a predetermined agility program, and another group performed the test randomly (18). According to the results, there was a significant difference between the two groups in terms of performance. Furthermore, the group that performed the test in a predetermined manner had a faster record than the group that performed the test randomly. Kasuma et al. (2015) aimed at developing a special badminton agility (BAT) test that included turning on the lights and moving the player towards the lamps, showing that this test has high validity and reliability to measure the agility of badminton players (8). However, in the present study, the results were not compared with the results of these two studies to determine their relationship. The results were compared with highly popular and widely-used agility tests, which showed a very high correlation between the newly developed X test and these tests. Therefore, with very high reliability and with a low and negligible error rate, this test can be used to measure the levels of agility in individuals. Moreover, the X test is developed according to the performance in the game of badminton, and the manner of movements in this test is very similar to badminton movements and has a significant relationship and high correlation with the agility tests used in badminton, so specifically, among badminton players, this new test can be used to measure agility with high confidence.

CONCLUSION

Although agility is an essential element of physical fitness in badminton, there is no specific test of agility in badminton in the literature review. Each sport requires its agility, and the measurement of agility in different sports varies. However, the existing tools measuring agility in badminton are not valid (8). In general, the tests used to estimate the physical condition of individuals should be exclusively and closely related to the movement patterns and abilities of the sport in question and present the differences between athletes (9). In the present study, there was an attempt to develop a test according to the movements and rhythm of the badminton game, which is considered as the basis for constructing sports tests (i.e., objectivity, validity, and reliability).

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چکیده

طراحی و ساخت آزمون چابکی ویژه بدمینتون و ارزیابی همگرایی آن با آزمون‌های استاندارد چابکی در مردان جوان فعال

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پروتکل‌های ورزشی برای اندازه گیری توانایی ورزشکاران مختلف رشته‌های ورزشی از اهمیت زیادی برخوردار است. هدف از پژوهش حاضر طراحی و ساخت آزمون چابکی ویژه بدمینتون و ارزیابی همگرایی آن با آزمون های استاندارد چابکی در مردان جوان فعال بود. برای این منظور تعداد ۳۰ نفر از مردان جوان فعال (میانگین ± انحراف معیار سنی ۱/۶۱±۲۱/۵۶ سال، قد ۳/۸۲±۱۷۳/۵۶ سانتی‌متر، BMI: ۲/۷۸±۲۲/۴۶ کیلوگرم/مترمربع، چربی (درصد): ۲/۷۰±۷/۳۰) بودند. آزمودنی‌ها در یک جلسه تمامی تست ها را اجرا کرده و رکوردها ثبت شدند. از آمار توصیفی برای دسته بندی داده های جمع آوری شده، برای بررسی نرمال بودن داده ها از شاپیرو-ویلک، و برای تجزیه و تحلیل فرضیه های تحقیق از ضریب همبستگی پیرسون استفاده شد. نتایج نشان داد که آزمون طراحی شده ایکس با آزمون های سیمو، دوی مورب، ایلینوئیز، ۹*۴، ستاره و آزمون تی ارتباط معناداری دارد و از ضریب همبستگی بالایی برخوردار می باشد. این نتایج بیانگر آن هستند که آزمون به درستی طراحی شده و می توان از آن به عنوان یک آزمون برای ارزیابی چابکی در بدمینتون و رشته های ورزشی دیگر بهره برد.

واژه‌های کلیدی: چابکی، بدمینتون، آزمون.