

The Combination Effect of Quick Feet and Tuck Jump Exercise on Agility and Speed

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ABSTRACT

This study aims to reveal the effect of a combination of quick feet (ladder drill) and tuck jump (plyometric) exercises on agility and speed. Quantitative research methods were used in this study with a quasi-experimental research type. The population of this study was extracurricular badminton students at SMPN 1 Jorogoto Jombang, and the sampling technique used was the purposive sampling technique. There were 24 students, and the research sample was divided into two groups with the same number: the group that was given a combination of quick feet and tuck jump (QFTJ) exercises and the group that only did conventional exercises (LK). The treatment was conducted for 18 meetings with details thrice a week for six weeks. This study used an instrument like an agility T-test to measure agility and a 30-meter sprint to measure speed. Data collection was carried out twice, namely before treatment (pretest) and after treatment (post-test). This study used paired sample t-tests and independent sample t-tests as data analysis techniques. The results showed that each group significantly increased agility and speed ($p < 0.05$). However, based on the independent sample t-test, it showed that there was a significant difference between the QFTJ group and the LK group. The conclusion is that the combination of quick feet (ladder drill) and tuck jump (plyometric) exercises significantly increases agility and speed compared to conventional exercises.

Keywords: *Quick Feet; Tuck Jump; Agility; Speed.*

INTRODUCTION

Badminton is a competitive sport (Wijaya, 2017). This sport is contested in the Olympics and is among the most popular in the world (Deka et al., 2017). The development of competitive sports aims to increase athletes' sports achievement and physical fitness, which are the most basic aspects of improving athletic ability (Jiang et al., 2018).

Achieving optimal performance in competitive sports requires a mature coaching process, one of which is improving the physical condition of athletes. The physical condition is a unified whole of all components that cannot be separated from one component to another, both in maintaining and enhancing it (Ridwan, 2020). Physical condition is a basic need that cannot be negotiated and is needed to improve an athlete's performance (Badawi et al., 2021). Therefore, physical condition is a basic requirement in competitive sports and an important requirement in improving the performance of athletes (Azizah & Widodo, 2019; Prakoso et al., 2022; Satriya et al., 2014).

As a competitive sport, badminton requires much running, jumping, speed in changing directions, explosive movements, and good coordination between the eyes, legs, and hands (Karyono, 2016). In addition, some movement characteristics in badminton consist of repeated attempts, short duration, and movements with high frequency and intensity (Manrique & González-Badillo, 2003). Furthermore, Panuntun et al. (2022) stated that badminton is a sport that demands moving quickly and agilely. Then, Wismanadi et al. (2020) stated that the sport of badminton currently has dominant physical components in the form of speed and power. Therefore, agility and speed are components of the physical condition needed in badminton because players are encouraged to have the ability to change direction as quickly as possible well on the court (Frederick et al., 2020).

Agility is a component needed in various sports, as well as in badminton (Frederick et al., 2014), where agility is defined as the ability of an athlete to change direction quickly (Setiyawan, 2018; Sukadiyanto & Muluk, 2011). Meanwhile, speed is defined as the ability of an athlete to complete a certain distance as quickly as possible (Agus, 2016; Syafruddin, 2011); where speed is also needed in badminton because it is an important aspect in achieving victory (Guo et al., 2020; Xu, 2015). Knowing the needs of the two components of physical condition in badminton, a training method is needed to increase agility and speed.

Plyometric training is a type of repetitive, explosive rebound weight training that uses the muscle stretch reflex and stretch-shortening cycles to develop lower extremity muscles (Impellizzeri et al., 2008; Komi, 1992). Plyometric training aims to link the components of speed and strength to increase explosive movements (Bakar et al., 2021). Many studies have shown that plyometrics can increase agility and speed, one of which states that plyometric training methods can increase agility and speed, even power (Taheri et al., 2014). Meanwhile, the ladder drill training method is an exercise that uses a ladder-shaped tool placed on the ground or floor to train the leg muscles, especially agility, and

speed (F. S. Hadi et al., 2016). Generally, the tool in the form of a ladder is made from steps attached to a nylon rope to form a box or square, with the size of each box being around 30 – 46 cm or 12 – 18 inches (Rasyono & Zulmi, 2018).

The explanation above shows that ladder drills and plyometrics are training methods needed in badminton because they can increase agility and speed. The ladder drill and plyometric training methods have many variations of the exercise. In this study, the variation of the ladder drill exercise used was quick feet, while the variation of the plyometric exercise used in this study was the tuck jump. Quick feet ladder drills can increase agility (Puriana & Suryansah, 2019) and speed (Nuryadi & Firmansyah, 2018). Meanwhile, as a variation of plyometric training, the tuck jump also increases agility (Purnomo et al., 2015) and speed (Abduh & Lahai, 2020).

The ladder drill and plyometric training methods have been known to positively impact improving physical condition, including speed and agility. However, until now, no research still reveals the effect of a combination of ladder drills and plyometric exercises, especially quick feet and tuck jump exercises, in increasing agility and speed in badminton athletes. Considering that the components of agility and speed are very much needed in badminton, the results of this study will be able to assist in developing sport science, especially in the dimensions of coaching in badminton. Therefore, researchers researched the effect of a combination of quick feet and tuck jump exercises on agility and speed.

METHOD

This research is quantitative research with the type of quasi-experimental research. Quasi-experiments are studies close to pure or real experiments (Sugiyono, 2015). The research design used was a two-group pretest-posttest design. The research design is a design that has an initial test (pretest) before being given treatment and a final test (post-test) after the treatment is given to two different groups so that it can be known more accurately (Sugiyono, 2017).

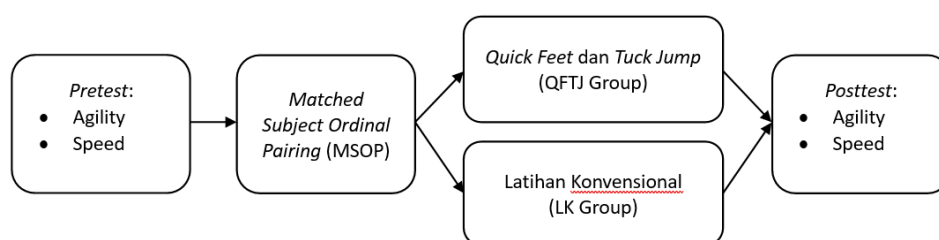


Image 1.
 Research Design

The population in this study were extracurricular badminton students at SMP Negeri 1 Jogoroto, Jombang Regency. To determine the subject of research using the purposive sampling technique of selecting samples. The criteria needed are: aged 12 to 16 years, male sex, in good physical and mental health, and willing to participate in the research and its regulations until it is completed. The research subjects obtained were 24 badminton, extracurricular students. The research instruments used in this study were the agility T-test to measure agility (Ucan, 2020) and the 30-meter sprint to measure speed (Darrall-Jones et al., 2016).

Data collection begins with measuring height and weight, then continues with the main data collection, namely the initial test (pretest) using the agility T-test and 30-meter sprint. After the pretest, matched subject ordinal pairing (MSOP) (S. Hadi, 2015) was used to divide the research subjects into two groups, each consisting of 12 students. The first group was given treatment in the form of a combination of tuck jump (plyometric) and quick feet (ladder drill) exercises (QFTJ Group). In contrast, the second group was not given special treatment or did conventional training (LK Group). The treatment was given for six weeks and three days each week with a total of 18 meetings (Barber-Westin et al., 2010). After 18 meetings, all research subjects did agility and speed post-tests with the same instrument during the pretest.

Table 1.
Exercise Program

Week	Exercise	Frequency	Intensity	Recovery	Interval
1 – 2	Quick Feet and Tuck Jump	Three days a week	50% RM	2 minute	3 minute
3 – 4	Quick Feet and Tuck Jump	Three days a week	60% RM	2 minute	3 minute
5 – 6	Quick Feet and Tuck Jump	Three days a week	70% RM	2 minute	3 minute

Description: RM is Repetition Maximum.

Data analysis techniques using descriptive and inferential statistical tests. In descriptive statistics, the data used are the mean and standard deviation, while inferential statistics use paired sample t-tests and independent sample t-tests. Statistical analysis in this study used Microsoft Excel and SPSS applications.

RESULTS AND DISCUSSION

Results

The results of the descriptive statistical analysis of the characteristics of the research subjects in the form of height, weight, and age using the mean (mean) and standard deviation (SD) are presented in the table below.

Table 2.
Research subject characteristics

Variable	Mean \pm SD	
	QFTJ Group	LK Group
Height (meter)	1.598 \pm 0.083	1.577 \pm 0.134
Weight (kilogram)	43.92 \pm 9.746	45.75 \pm 12.871
Age (years)	13.58 \pm 1.240	13.75 \pm 1.360

The first assumption test to be carried out is the normality test using the Kolmogorov-Smirnov normality test, which is presented in the table below.

Table 3.
Normality Test

Variable	<i>p-value</i>
Pretest of Agility	0.752
Pretest of speed	0.808
Posttest of agility	0.811
Posttest of speed	0.815
Δ Agility	0.283
Δ Speed	0.639

Note: *p-value* > 0.05 data is normally distributed

From the table above, from the results of the Kolmogorov-Smirnov normality test, it is obtained that all data variables used have normally distributed data. Then, to test the second assumption, do a homogeneity test which can be seen in the table below.

Table 4.
Homogeneity Test

Variable	<i>p-value</i>
Δ Agility	0.255
Δ Speed	0.408

According to the results of the homogeneity test in the table above, it can be seen that all data variants were used to analyze the differences between the two groups in the agility and speed variables. Furthermore, the paired sample t-test results were carried out to determine the changes in both groups in each variable, agility, and speed.

Table 5.
Paired Sample T-test

Variable	Sig.	
	QFTJ Group	LK Group
Agility	0.000	0.008
Speed	0.000	0.001

Note: sig. < 0.05 There is a significant difference between the post-test and pretest

Based on the table above, each group experienced a change in the form of a significant increase (sig. value < 0.05). To make it easier to see the changes that occurred

in the two groups in each variable, namely agility, and speed, they have been presented in the diagram below.

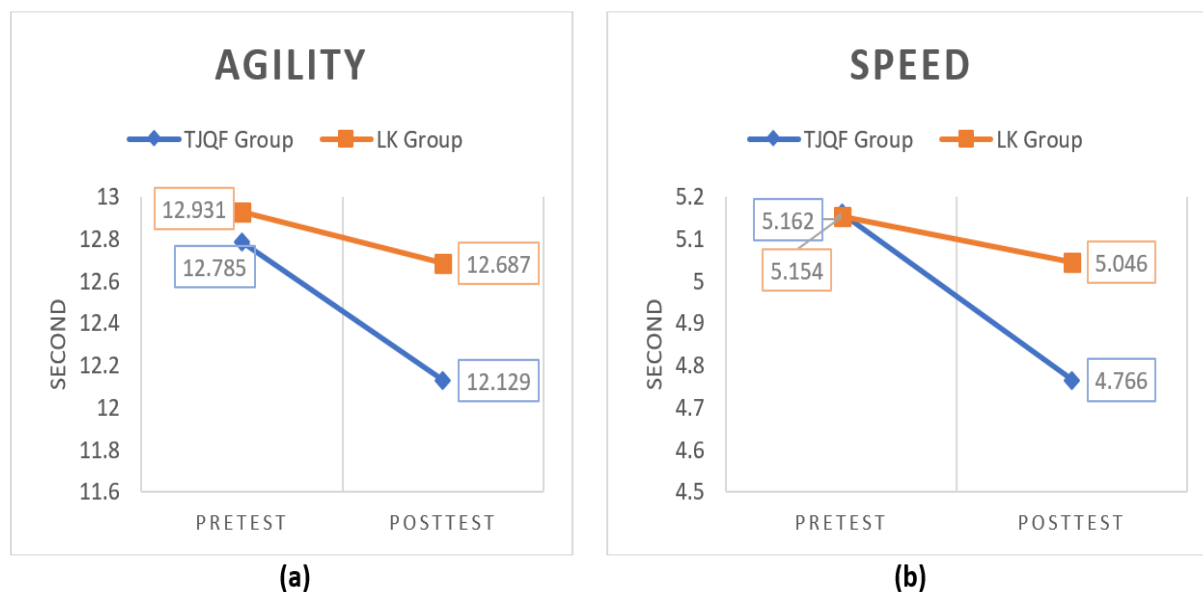


Image 2

(a) Changes from the pretest to post-test on agility variables; (b) Changes from the pretest to post-test on the speed variable.

An independent sample t-test was conducted to reveal the differences between the two groups in improving each variable, namely the agility and speed variables shown in the table below.

Table 6
Independent Sample T-test

Variable	Sig,
Δ Agility	0.003
Δ Speed	0.000

Sig. <0.05, there is a significant difference.

From the results of the independent sample t-test above, it can be interpreted that there is a significant difference between the QFTJ group (given the quick feet and tuck jump treatment) and the LK (Conventional Training) group which is shown in a sig. value <0.05. Furthermore, it is known that the QFTJ group has a better average score than the LK group (see image 2).

Discussion

The results of the data analysis stated that each group was able to increase agility and speed significantly ($p < 0.05$), both in the group that did the combination treatment of quick feet (ladder drill) and tuck jump (plyometric) (QFTJ Group) and in the group that was not given special treatment/ only doing conventional exercises (Group LK).

Conventional exercise groups can increase agility and speed, which is natural, even though they are not given special treatment. This is because badminton is a racquet sport that requires movements with high intensity and short duration, as well as relatively short rest periods (Manrique & González-Badillo, 2003). Badminton players must be able to move quickly and make many direction changes during the game (Patterson et al., 2017) so that someone who does badminton regularly can increase agility and speed. However, the independent sample t-test results revealed a significant difference between the QFTJ and the LK groups in increasing the agility and speed components ($p < 0.05$). This reinforces the theory that technical training alone is not enough to improve an athlete's performance, and physical training is needed by athletes in all sports, including badminton. In terms of achievement, some factors are interrelated to support athlete achievement, namely physical, technical, tactical, and mental conditions (Lawanis et al., 2019). Furthermore, Lawanis et al. (2019) state that if one of these factors is not fulfilled properly, an athlete will have great difficulty achieving the highest achievement.

The components of agility and speed are components that are needed in the game of badminton (Werkiani et al., 2012). Badminton is an intense sport requiring fast and sudden movements (Chen et al., 2015). Badminton players must be able to respond quickly and change direction quickly when these athletes move throughout the court area to make strokes and change their direction and body position as quickly as possible (Manikandan S, 2016). Therefore, agility and speed are very important for badminton players to win at the highest level (Batoool et al., 2022).

This study used two training methods, ladder drill (quick feet variation) and plyometric (tuck jump variation), to know the effect on increasing agility and speed in badminton players. The results of this study indicate that the combination of the two exercises can increase speed and agility. The ladder drill training method can be interpreted as a form of plyometric training in multi-directional leg muscles that can be used by athletes from various sports (Short et al., 2022). Many studies have shown that various ladder drill training model variations can increase agility and speed (F. S. Hadi et al., 2016; Pramod & Divya, 2019), likewise with the plyometric training method, where this exercise aims to increase explosive movements by connecting the two main components, namely speed and strength (Bakar et al., 2021). Various variations of plyometric training models are known to positively impact increasing agility and speed components, even power (Taheri et al., 2014). The results of the research that has been carried out and the discussion that has been mentioned previously reinforce the evidence that a combination of quick feet (ladder drill)

and tuck jump (plyometric) exercises can be recommended for use in the training process because it has a positive effect in increasing agility and speed, especially in badminton athlete.

CONCLUSIONS AND SUGGESTIONS

Conclusions

Both groups significantly increased the agility and speed components, both the QFTJ and the LK groups. However, there was a significant difference between the QFTJ and LK groups in increasing agility and speed. It can be concluded that the QFTJ group (combined quick feet and tuck jump training) was better than the LK group in increasing the agility and speed components.

Suggestions

The limitations of this study were the research subjects used, namely badminton extracurricular students at SMP Negeri 1 Jogoroto. The level of badminton ability in these subjects is still not at the level of elite athletes. Therefore, future research should compare the effects of a combination of quick feet (ladder drill) and tuck jump (plyometric) exercises on subjects with different ability levels.

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