



Ladder Drill Training Improves Lower-Limb Power and Agility in Junior Badminton Players

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Abstract

Objectives: This study aimed to determine the effect of ladder drill training variations on lower limb power and agility among junior badminton players in Batukuta Village, Narmada District, West Lombok Regency.

Materials and Methods: This study used a quantitative experimental method with a one-group pretest-posttest design. The participants were 17 junior badminton players. The independent variable was ladder drill training variation, while the dependent variables were lower limb power and agility. Lower limb power was measured using the vertical jump test, while agility was measured using the badminton court agility test. Data were analyzed using descriptive statistics, the Shapiro-Wilk normality test, and the paired sample t-test.

Results: The results showed an improvement in lower limb power, with the mean pretest score increasing from 41.94 to 48.06 in the posttest. Agility also improved, as indicated by a decrease in average test time from 18.37 seconds to 16.36 seconds. The paired sample t-test showed significant differences between pretest and posttest scores for both lower limb power and agility, with $p = 0.000$.

Conclusions: Ladder drill training variations significantly improved lower limb power and agility among junior badminton players. These findings indicate that ladder drill exercises can be used as an effective training method to improve explosive movement, footwork, and directional change ability in badminton.

Keywords: ladder drill; lower limb power; agility; badminton; junior athletes

Introduction

Badminton is a popular sport played by various age groups, from children and beginners to adults and veteran players. In Indonesia, badminton has a strong sporting tradition and continues to receive attention because of its contribution to national and international achievements. As a competitive sport, badminton requires technical skill, tactical awareness, speed, endurance, lower limb power, and agility.

Agility is one of the most important physical components in badminton. Players must move quickly in multiple directions to reach the shuttlecock, maintain balance, and return to the ready position. Karyono (2016) stated that agility plays an important role in badminton because players need rapid and efficient directional changes during rallies. Afrizal (2019) also explained that agility contributes to badminton footwork, which supports both attacking and defensive movements.

Lower limb power is also essential in badminton. Strong and explosive leg muscles help athletes



perform jumps, lunges, quick starts, and rapid recovery movements. In badminton, explosive lower limb movement allows players to reach the shuttlecock faster and execute strokes more effectively.

Ladder drill is a training method designed to improve foot speed, coordination, balance, motor control, and movement rhythm. Dharmadi et al. (2024) reported that ladder drill training can improve agility, explosive power, and athlete movement performance. Junpalee et al. (2023) also described ladder drill as an innovative training technique for improving motor skills, balance, and cognitive response in young athletes.

Based on field observations, junior badminton players in Batukuta Village still needed improvement in lower limb power and agility. Therefore, this study aimed to determine the effect of ladder drill training variations on lower limb power and agility among junior badminton players.

Materials and Methods

Study Design

This study used a quantitative experimental method with a one-group pretest-posttest design. The design was used to compare lower limb power and agility before and after ladder drill training variations.

Study Participants

The participants were 17 junior badminton players in Batukuta Village, Narmada District, West Lombok Regency. All participants were involved in the pretest, treatment, and posttest stages.

Study Organization

The training program consisted of ladder drill variations, including lateral quick steps, hopscotch drill, and crossover steps. The exercises were designed to improve foot speed, coordination, lower limb explosive power, and agility.

Lower limb power was measured using the vertical jump test. Agility was measured using the badminton court agility test. Measurements were conducted before and after the ladder drill training program.

Statistical Analysis

Data were analyzed using SPSS. Descriptive statistics were used to describe minimum score, maximum score, mean, and standard deviation. The Shapiro-Wilk test was used to examine data normality because the sample size was less than 50. The paired sample t-test was used to examine differences between pretest and posttest scores.

Results

Descriptive Statistics

The descriptive results showed that lower limb power improved after ladder drill training. The mean vertical jump score increased from 41.94 in the pretest to 48.06 in the posttest. Agility also improved, shown by a decrease in average time from 18.37 seconds in the pretest to 16.36 seconds in the posttest.

Table 1. Descriptive Statistics of Lower Limb Power and Agility

Variable	Test	Minimum	Maximum	Mean	SD
Lower limb power	Pretest	25	49	41.94	6.995
Lower limb power	Posttest	39	57	48.06	5.214
Agility	Pretest	17.59	18.90	18.37	0.376
Agility	Posttest	14.96	17.57	16.36	0.740

Normality Test

The Shapiro-Wilk normality test showed that the pretest and posttest scores of lower limb power were normally distributed. The agility posttest was also normally distributed, while the agility pretest showed a significance value below 0.05.

Table 2. Shapiro-Wilk Normality Test

Variable	Test	Sig.	Interpretation
Lower limb power	Pretest	0.417	Normal
Lower limb power	Posttest	0.955	Normal
Agility	Pretest	0.040	Not normal
Agility	Posttest	0.618	Normal

Paired Sample t-Test

The paired sample t-test showed significant differences between pretest and posttest scores for both lower limb power and agility. Lower limb power showed a mean difference of -6.11765, with $t = -7.884$ and $p = 0.000$. Agility showed a mean difference of 2.01235 seconds, with $t = 11.672$ and $p = 0.000$.

Table 3. Paired Sample t-Test Results

Variable	Mean Difference	SD	t	df	Sig.
Lower limb power	-6.11765	3.19926	-7.884	16	0.000
Agility	2.01235	0.71086	11.672	16	0.000

These results indicate that ladder drill training variations significantly improved lower limb



power and agility among junior badminton players.

Discussion

The findings showed that ladder drill training variations significantly improved lower limb power. The mean vertical jump score increased from 41.94 to 48.06 after the training program. This improvement indicates that ladder drill exercises can stimulate lower limb muscles, especially through repeated explosive movements, quick stepping patterns, and coordinated footwork. Exercises such as hopscotch drill and crossover steps require rapid muscle contractions that support the development of explosive power.

The result is consistent with Dharmadi et al. (2024), who reported that ladder drill training can improve agility, explosive power, and athlete movement performance. In badminton, lower limb power is important because players must perform quick jumps, lunges, and recovery movements during rallies.

The study also found a significant improvement in agility. The average agility test time decreased from 18.37 seconds to 16.36 seconds. In agility tests, a lower time indicates better performance. This improvement suggests that ladder drill training helped players move faster, change direction more efficiently, and control body movement more effectively.

This finding supports Karyono (2016), who emphasized that agility is essential in badminton because players must move quickly in different directions. Afrizal (2019) also stated that agility contributes to badminton footwork, which is crucial for both attacking and defensive play. The present findings strengthen the view that footwork-based training can improve badminton-specific movement performance.

Ladder drill training also improves coordination, balance, and movement rhythm. Junpalee et al. (2023) explained that ladder drill is an innovative training technique for improving motor skills, balance, and cognitive response in young athletes. These elements are important in badminton because athletes must react quickly to the shuttlecock while maintaining body control.

Overall, the results indicate that ladder drill training variations can improve two important physical components at the same time: lower limb power and agility. This supports Zhannisa and Royana (2018), who stated that lower limb power is related to agility performance in badminton athletes. Therefore, ladder drill exercises can be recommended for junior badminton training programs, especially to improve footwork, explosive movement, and directional change ability.



Conclusions

This study concluded that ladder drill training variations significantly improved lower limb power and agility among junior badminton players in Batukuta Village, Narmada District, West Lombok Regency.

Lower limb power increased after the training program, as shown by the improvement in vertical jump scores. Agility also improved, as indicated by the reduced time in the badminton court agility test. Therefore, ladder drill training variations, including lateral quick steps, hopscotch drill, and crossover steps, can be used as an effective training method for developing junior badminton players' physical performance.

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