

The Effect of Plyometric Training on the Rebound Ability of Basketball Club Members at SD Katolik Sang Timur in Semarang

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Abstract

This research aims to find out the effect of plyometric exercise on improving rebound ability in basketball extracurricular students at SD Katolik Sang Timur in Semarang. The method used is an experiment with a one group pretest-posttest design. A sample of 15 students was taken using the total sampling technique. The instrument used is in the form of vertical jump test carried out before and after treatment. Plyometric exercises are given as many as 12 sessions for 4 weeks. The data was analyzed using the paired sample t-test with the help of SPSS software version 26. The analysis result show that there is a significant increase in vertical jump ability, with an average pretest value of 24,00 cm and posttest 29,60 cm. The statistical test showed a significance value of 0,000 ($<0,05$) and a calculated t of -20,546, which means there was a significant difference before and after the exercise. Thus, plyometric exercise is proven to be effective in increasing the explosive power of the leg muscles which plays an important role in rebound movement in basketball.

Keywords: plyometric; rebound ability; vertical jump; basketball; primary school

1. Introduction

One way to maintain physical fitness is through exercise. Nowadays, sporting activities can be undertaken anywhere and at any time, even within the school environment. In the school environment, pupils can take part in sporting activities both during lessons and outside of lessons, or as part of extracurricular activities.

Generally, sports-related extracurricular activities are very popular among students. Extracurricular activities provide a means for students to develop their interests and talents outside of school hours (Wisnu et al., 2024). One of the most popular extracurricular activities is basketball. Basketball is a ball game played by two teams, each consisting of five players, with the aim of each team being to score points in the opponent's basket whilst attempting to prevent the opposing team from scoring (FIBA-International Basketball Federation, 2024).

Basketball is a sport characterised by spontaneous movements and fast-paced attacks, both in scoring attempts and in on-court movement (Figueira et al., 2022). In basketball, solid teamwork is essential, and athletes' skills improve when they train consistently and repeatedly (F. T., Rahman et al., 2021). Mastering the basic techniques of basketball is crucial for improving individual skills, thereby supporting team performance (Altavilla et al., 2020). In basketball, there are several fundamental techniques that players must master to enhance their individual abilities, such as dribbling, passing, shooting, rebounding, and pivoting (Temmassonge, 2020). In addition to

mastering basic techniques, basketball also requires the ability to move and change direction quickly (ability), agility, and jumping ability (Scanlan, 2021).

Furthermore, basketball demands optimal body movement, particularly in jumping ability. Jumping movements are required in various directions, both vertically and horizontally, such as upwards, sideways, backwards, and forwards (Wang & Zhang, 2016). Optimal jumping ability enables players to score points more effectively, win the ball from opponents, and pass to teammates more effectively (Siahaan et al., 2020). Therefore, it is important for basketball players to train their jumping skills through an intensive, targeted, and systematically structured training programme (F. , Rahman et al., 2023). To achieve an optimal jump, good support from the components of strength, speed, and power is required (Karatrantou, 2019). Good jumping ability can enhance a basketball player's performance. This ability is crucial when performing movements such as slam dunks, lay-ups, shooting, blocking, and rebounding, all of which play a role in scoring points and securing victory in a match (DiFiori, 2018).

Players with maximum lower-body muscle strength will find it easier to perform explosive and rapid movements (Sin et al., 2020). Various methods can be used to train and improve lower-body muscle strength, one of which is through plyometric training (Pratama & Erawan, 2019). According to Puspita (2020), plyometric training is one of the most commonly used training methods to improve athletic performance.

Plyometric training is a form of exercise in which muscles work at maximum strength, characterised by rapid muscle stretching prior to contraction (Mahindra & Masrun, 2019). Plyometric training is carried out progressively, starting at low intensity, then moderate, and finally high. In the initial stage, movements are kept as simple as possible to help the body warm up and adapt. Subsequently, at moderate intensity, the exercises become more complex with the aim of improving physical ability and stimulating the progressive development of body tissues. High-intensity training is carried out in the final stage with the aim of increasing explosive power to achieve maximum jump height (Bouteraa, 2020).

2. Method

This study is a quantitative study employing an experimental approach. The research design utilises a one-group pretest-posttest design, which aims to determine and identify the effect of plyometric training on the vertical jump ability of students participating in the extracurricular programme.

This study employed a total sampling technique, with a total population of 15 students from the basketball extracurricular group at SD Katolik Sang Timur in Semarang; the entire population was subsequently used as the sample for this study.

Both the pre-test and post-test utilised a vertical jump test. In this study, the same test was used for both the pre-test and post-test, with the aim of observing the impact of plyometric training. The first vertical jump measurement was conducted to assess the height of the students' jumps by applying chalk powder or magnesium carbonate to the tips of their fingers. Participants stood upright close to a wall, feet together, with the measuring device positioned to the left or right of

the participant. They then raised the hand closest to the wall straight upwards, pressing the palm against the wall to leave a mark, and the reach was recorded.

In the second trial, participants began in a crouched position with both hands swung backwards; they then jumped as high as possible whilst clapping their hands against the wall to leave a mark. The initial reach and the vertical jump height were recorded in centimetres (cm).

The treatment was administered three times a week over 12 sessions, held on the basketball court at SD Katolik Sang Timur in Semarang on Tuesdays, Thursdays and Saturdays. The pre-test was conducted on 10 June 2025, whilst the post-test took place on 5 July 2025.

In this study, the researcher used the vertical jump test, which has a validity coefficient of 0.989 (high validity) and a reliability coefficient of 0.99 (high reliability) (Bagaskara & Suharjana, 2019). Once the data had been collected, the next step was to analyse the data. To facilitate this analysis, the author employed statistical calculation methods using SPSS software version 26.

Data processing included descriptive statistical analysis, which provided information on the number of research subjects, the mean values, and the standard deviation of the obtained data. Data normality was tested using the Shapiro-Wilk test, whilst homogeneity was assessed using the Levene's test. For hypothesis testing, a Paired-sample t-test was used. Conclusions were drawn based on the significance level (Sig.) (two-tailed), whereby if the value was <0.05 , this indicated a significant difference. Conversely, if the value was >0.05 , no significant difference could be concluded. Furthermore, the results of the pre-test and post-test data will be explained to demonstrate the influence or impact of plyometric training on the rebound ability of students in the basketball extracurricular activity at SD Katolik Sang Timur in Semarang.

3. Result

The data obtained from the pre-test and post-test showed that in the pre-test, the minimum score was 17, the maximum score was 31, the average pre-test score for the 15 students was 24.00, and the standard deviation was 4.440. In the post-test, the minimum score was 22, the maximum score was 37, the average post-test score was 29.60, and the standard deviation was 4.763.

Table 1. Statistical description of the pre-test and post-test vertical jump test

Test	N	Min	Max	Mean	SD
Pretest	.15	17	31	24,00	4,440
Posttest	.15	22	37	29,60	4,763

Table 2 shows the results of the normality test, indicating that the significance values are normally distributed, as the significance values for the pre-test (0.053) and post-test (0.064) are both greater than 0.05. Therefore, the next step is to use a paired-sample t-test.

Table 2. Shapiro-wilk normality test

Test	Statistic	df	Sig.
Pretest	.883	15	.053
Posttest	.889	15	.064

Table 3 shows that, based on the mean and a significance level of 0.198 (which is >0.05), the values for both the pre-test and post-test vertical jump data are considered homogeneous.

Table 3. Homogeneity test

Value	Levene statistic	Df1	Df2	Sig.
Based on Mean	2,281	2	5	.198

Based on the results of the t-test for the pre-test and post-test, the significance value (Sig.) (two-tailed) was 0.000, which is less than the threshold value of 0.05. This is supported by the calculated t-value of -20.546, which is lower than the critical t-value of 2.145 for a sample of 15 pupils. Therefore, it can be concluded that plyometric training has a significant effect on the rebound ability of pupils at SD Katolik Sang Timur in Semarang.

Table 4. Paired samples test

T	Df	Sig.(2-tailed)	Mean Diff	Std. Error Diff
-20.546	14	.000	-5.600	.273

4. Discussion

Based on the calculations and data analysis carried out, it was found that there was a significant improvement in the students' vertical jump ability following the plyometric training intervention. The average vertical jump result at the pre-test was 24.00 cm, whilst at the post-test it increased to 29.60 cm, representing an average increase of 5.60 cm. These figures indicate a fairly significant improvement in the students' vertical jump ability.

The results of the normality test using the Shapiro-Wilk test showed that the pre-test and post-test data were normally distributed, as the significance values were 0.053 and 0.064 respectively, both greater than 0.05. Furthermore, the Levene Test for homogeneity also showed that the data were homogeneous (sig. 0.198 > 0.05), so the Paired Sample t-test could be applied.

The results of the Paired Sample t-test showed a significance value (two-tailed) of 0.000, which is smaller than the significance threshold of 0.05. This is reinforced by the calculated t-value of -20.546, which is significantly larger (in absolute terms) than the table t-value of 2.145. It can therefore be concluded that there is a significant difference between the pre-test and post-test results, and that plyometric training has an effect on improving vertical jump performance.

Consequently, the results of this study support previous theories and findings stating that plyometric training can improve athletes' physical performance, particularly in terms of vertical jumping ability. This 4-week training programme has been shown to have a significant effect on the improvement of skills related to basketball.

5. Conclusion and Recommendation

Based on the results of the analysis of pre-test and post-test data on students' vertical jumps, it can be concluded that plyometric training has a significant effect on improving the rebound ability of students in the basketball extracurricular activity at SD Katolik Sang Timur in Semarang. The

results of the statistical test showed a significance value of $0.000 < 0.05$ with a t-value of -20.546, indicating a significant difference before and after the intervention. Thus, plyometric training has been proven effective in improving lower limb muscle power, which plays a crucial role in rebounding during basketball matches.

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