

# Ahimsa Raihan Alwikan Abhipraya

## The Effect of Agility Training on Underhand Passing Performance in Junior High School Volleyball Athletes

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## The Effect of Agility Training on Underhand Passing Performance in Junior High School Volleyball Athletes

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### Abstract

Underhand passing is one of the fundamental techniques in volleyball and plays an important role in maintaining ball control during a match. The effectiveness of underhand passing is strongly influenced by the athlete's physical condition, particularly agility. Low agility levels may reduce athletes' ability to move quickly toward the ball and perform accurate passes. This study aimed to determine the effect of agility training on underhand passing performance among junior high school volleyball athletes at the GIT Club and to identify the magnitude of its effect. This study employed a quantitative experimental method using a one-group pretest-posttest design. The sample consisted of 20 junior high school volleyball athletes selected through purposive sampling. The agility training program was conducted for 6 weeks with a frequency of 3 sessions per week, including shuttle runs, zig-zag runs, ladder drills, and cone drills. Data were collected using an underhand passing skill test administered before and after the intervention. The data were analyzed using homogeneity tests, paired sample t-tests, and the coefficient of determination (R-square) with the assistance of IBM SPSS Statistics software. The results showed a significant effect of agility training on underhand passing performance, with a significance value of 0.000 ( $p < 0.05$ ). The mean pretest score increased from 62.45 to 81.30 in the posttest, with a mean difference of 18.85. The paired sample t-test revealed a t-value of 8.742, indicating a statistically significant improvement after the training program. Furthermore, the R-square value showed that agility training contributed 70.7% to the improvement in underhand passing performance. These findings indicate that agility training is an effective method for improving underhand passing skills in junior high school volleyball athletes.

**Keywords:** junior high school athlete; motor coordination; physical exercise; sports performance; volleyball.

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## A. Introduction

Volleyball is one of the most popular sports widely played in schools and sports clubs because it promotes teamwork, coordination, and physical fitness. In volleyball, mastery of basic techniques is essential for achieving optimal performance during matches. One of the fundamental techniques that determines the continuity of play is underhand passing, also known as forearm passing. Underhand passing is used to receive serves, defend against attacks, and initiate offensive plays. Therefore, players are required to perform accurate and controlled passing to maintain ball possession and support team coordination.

The success of underhand passing is influenced not only by technical mastery but also by the athlete's physical condition. One of the most important physical components supporting volleyball performance is agility. Agility refers to the ability to change body position quickly and accurately while maintaining balance and coordination during movement. In volleyball, agility enables players to react rapidly to the direction and speed of the ball, move efficiently on the court, and perform passing techniques effectively. Athletes with poor agility often experience difficulty reaching the ball on time, resulting in inaccurate passes and decreased game performance.

Several studies have shown that agility contributes significantly to technical skills in volleyball, particularly defensive movements and ball control. Agility training programs such as ladder drills, shuttle runs, zig-zag runs, and cone drills are commonly used to improve movement speed, coordination, and reaction ability. These exercises help athletes develop faster footwork and better body control, which are essential for performing effective underhand passing during dynamic game situations.

Although previous studies have discussed the relationship between

physical condition and volleyball performance, most research has focused on general physical fitness components or overall playing ability. Only limited studies have specifically examined the effect of structured agility training programs on underhand passing performance among junior high school volleyball athletes. In addition, previous studies rarely explained the magnitude of the contribution of agility training to improvements in passing skills. Therefore, a more focused investigation is needed to provide empirical evidence regarding the effectiveness of agility training in improving underhand passing ability in adolescent volleyball players.

This study offers novelty by specifically analyzing the effect of a structured agility training program on underhand passing performance among junior high school athletes at the GIT Volleyball Club. The training program emphasizes agility-based exercises designed to improve movement efficiency and passing accuracy. Furthermore, this study not only examines whether agility training significantly affects underhand passing ability but also measures the magnitude of its contribution to skill improvement.

Based on the background above, this study aims to determine the effect of agility training on the underhand passing ability of junior high school volleyball athletes at the GIT Volleyball Club and to identify the extent of its contribution to improving passing performance. The findings of this study are expected to provide scientific contributions to sports training research and practical references for coaches and physical education teachers in designing more effective volleyball training programs.

## B. Methods

This study employed a quantitative experimental approach using a one-group pretest-posttest design to examine the effect of agility training on underhand passing

performance among junior high school athletes at the GIT Volleyball Club. In this design, participants completed a pretest before receiving the intervention and a posttest after the completion of the agility training program. The difference between pretest and posttest scores was used to evaluate the effectiveness of the training intervention.

The agility training program was conducted for six weeks with a frequency of three sessions per week. Each training session lasted approximately 60 minutes and consisted of warm-up activities, core agility exercises, and cooldown activities. The agility exercises included ladder drills, shuttle runs, zig-zag runs, and cone drills designed to improve movement speed, coordination, balance, and reaction ability during volleyball play.

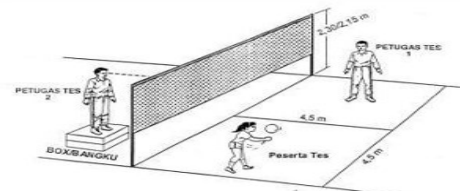
The population of this study consisted of all junior high school athletes who actively participated in training activities at the GIT Volleyball Club. The sample was selected using purposive sampling based on several criteria: athletes had to be actively involved in regular training sessions, belong to the junior high school age category, and be willing to participate throughout the entire research process. A total of 20 athletes met these criteria and participated in the study.

Data collection was carried out using a standardized underhand passing skill test to measure athletes' passing performance before and after the intervention. The tests were administered on a volleyball court using standard volleyball equipment under the same testing conditions for both pretest and posttest sessions. The assessment focused on the accuracy and control of underhand passing performance.

The collected data were analyzed using descriptive and inferential statistical methods with the assistance of IBM SPSS Statistics software. Descriptive statistics were used to present the mean, minimum score, maximum score, and standard deviation of the pretest and posttest results. Prior to hypothesis testing, a homogeneity

test was conducted to ensure data consistency. Furthermore, a paired sample t-test was used to determine whether there was a significant difference between pretest and posttest scores. The coefficient of determination (R-square) analysis was also conducted to measure the magnitude of the contribution of agility training to the improvement of underhand passing performance. The significance level applied in this study was  $p < 0.05$ .

Although this study demonstrated improvements in underhand passing performance after the agility training program, the use of a one-group pretest-posttest design without a control group represents a limitation of the study. The absence of a control group reduces internal validity because improvements in performance may also be influenced by other factors such as regular volleyball practice, athlete maturation, playing experience, or external training activities outside the intervention program. Therefore, future studies are recommended to use a true experimental design involving control and experimental groups to obtain stronger evidence regarding the effectiveness of agility training on volleyball passing performance.



Gambar 1. Instrumen Tes Passing Bawah (Sumber: Marasati (2022: 27))

Data was collected through the volleyball bottom passing skill test method which was used to measure athletes' bottom passing ability before and after being given an agility training program. The test instruments used have been adjusted to the standard of assessment of basic volleyball skills so that they can be used to obtain objective data. The data collection procedure was carried out at the GIT volleyball club training field within a predetermined research period of several

weeks according to the given training program. The test was carried out twice, namely the initial test (pretest) before treatment and the final test (posttest) after the agility training program was completed. The test is carried out using standard volleyball equipment and volleyball courts that are in accordance with the provisions of the volleyball game.

The data collected was analyzed using descriptive statistical methods and inferential statistics to determine the effect of agility training on volleyball's underpass ability. Descriptive statistical analysis is used to describe the average score, maximum score, minimum score, and standard deviation of pretest and posttest test results. Furthermore, inferential

statistical analysis was carried out using a paired sample t-test to determine the difference in lower passing ability before and after being given an agility training program. Data analysis is carried out with the help of IBM SPSS Statistics software to ensure the accuracy of the research results. The significance level used in this study is  $p < 0.05$  so that the results of the analysis can show whether or not there is an effect of agility training on the ability to pass under volleyballs in junior high school GIT club athletes.

### C. Result and Discussion Result

Table 1. Normality Test Results

Variable	N	Mean	Std. Deviation	Kolmogorov-Smirnov Z	Sig.
Pretest Underhand Passing	20	21.70	2.86	0.775	0.585
Posttest Underhand Passing	20	25.20	3.10	0.719	0.680

Based on Table 1, the significance values for the pretest (0.585) and posttest (0.680) were greater than 0.05. These findings indicate that both datasets were normally distributed. Therefore, the assumption of normality was fulfilled, and the data were appropriate for further

parametric statistical analysis using a paired sample t-test.

A homogeneity test was performed using Levene's Test to examine whether the data variances were homogeneous. The results are shown in Table 2.

Table 2. Homogeneity Test Results

Levene Statistic	df1	df2	Sig.
0.178	1	38	0.675

The significance value obtained from Levene's Test was 0.675, which was greater than 0.05 ( $0.675 > 0.05$ ). This result indicates that the variances of the pretest and posttest data were homogeneous. Thus,

the data met the requirements for conducting inferential statistical analysis.

The paired sample t-test was used to determine whether there was a significant difference between pretest and posttest scores after the agility training intervention.

Table 3. Paired Sample t-Test Results

Variable	Mean Difference	Std. Deviation	t	df	Sig. (2-tailed)
Pretest – Posttest	-3.500	1.701	-9.200	19	0.000

The results showed a significance value of 0.000, which was lower than 0.05 ( $p < 0.05$ ). Therefore, there was a statistically significant improvement in underhand passing performance after the agility training program. The mean score increased from 21.70 in the pretest to 25.20 in the posttest, indicating that the athletes demonstrated better passing performance following the intervention.

To determine the practical significance of the intervention, the effect size was calculated using Cohen's *d*. The calculation produced a Cohen's *d* value of 2.05, which is categorized as a very large effect size. This finding indicates that the agility training program had a strong practical impact on improving underhand passing performance among junior high school volleyball athletes.

The findings of this study indicate that agility training significantly improved the underhand passing performance of junior high school athletes at the GIT Volleyball Club. The improvement can be observed from the increase in the mean posttest score compared to the pretest score, as well as the significant paired sample *t*-test result. These findings support the view that agility is an important physical component in volleyball performance, particularly in defensive techniques and ball control.

Agility training programs such as ladder drills, shuttle runs, zig-zag runs, and cone drills contribute to improving footwork speed, movement coordination, balance, and reaction time. These physical improvements enable athletes to move more efficiently toward the ball and perform underhand passing with greater accuracy and control during game situations. Faster directional changes and improved body positioning are essential factors supporting successful passing performance in volleyball.

The large Cohen's *d* value obtained in this study demonstrates that agility training not only produced statistically significant results but also had substantial practical

significance. This suggests that agility exercises can be effectively integrated into volleyball training programs for adolescent athletes to improve technical performance.

The findings of this study are consistent with previous research indicating that agility contributes positively to volleyball technical skills and overall game performance. However, this study specifically emphasizes the effect of structured agility training on underhand passing ability among junior high school athletes, providing more focused evidence regarding the relationship between agility and volleyball passing performance.

Despite these positive findings, this study has several limitations. The use of a one-group pretest-posttest design without a control group limits the internal validity of the study. Improvements in performance may not be entirely caused by the agility training intervention alone, but could also be influenced by other factors such as regular volleyball practice, athlete maturation, increased playing experience, or external physical activities during the research period. Therefore, caution is needed when interpreting the causal relationship between agility training and passing improvement.

In addition, the study involved a relatively small sample size from a single volleyball club, which may limit the generalizability of the findings. Future studies are recommended to use a true experimental design involving control and experimental groups, larger sample sizes, and longer intervention periods to obtain stronger empirical evidence regarding the effectiveness of agility training in improving volleyball technical skills.

## Discussion

The results of this study demonstrated that agility training had a significant effect on underhand passing performance among junior high school athletes at the GIT Volleyball Club. This finding was supported by the paired sample *t*-test

15 analysis, which showed a significance value of 0.000 ( $p < 0.05$ ). In addition, the mean difference value of -3.500 indicated a substantial improvement in underhand passing performance after the athletes participated in the agility training program. These findings answer the first research question, confirming that agility training significantly improves underhand passing ability in adolescent volleyball athletes.

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3 From a theoretical perspective, the improvement in underhand passing performance can be explained through the concept of physical conditioning, particularly agility. Agility is defined as the ability to move quickly and change body direction accurately while maintaining balance and body control. In volleyball, agility is an essential physical component because players are required to react rapidly to the movement and direction of the ball during play. Athletes with better agility are able to position themselves more effectively, allowing them to execute underhand passing techniques with greater accuracy and control.

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1 Furthermore, motor learning theory explains that repetitive and structured training can improve neuromuscular coordination and movement efficiency. The agility training program implemented in this study involved repeated movement patterns that enhanced coordination between footwork, body positioning, and arm movement during underhand passing execution. Improved coordination contributes to better ball control and passing accuracy during volleyball performance. Therefore, agility training not only enhances physical fitness but also supports the development of fundamental volleyball techniques.

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11  
7 The findings of this study are consistent with previous studies indicating that agility contributes positively to volleyball performance, particularly defensive movement and passing skills. Previous research has shown that athletes with higher agility levels tend to demonstrate better movement efficiency

and technical execution during volleyball games. These findings reinforce the idea that agility training is an important component of volleyball training programs, especially for adolescent athletes who are still developing their technical and physical abilities.

In addition to statistical significance, the large effect size obtained in this study indicates that agility training also had meaningful practical significance. This suggests that the implementation of structured agility exercises such as ladder drills, shuttle runs, zig-zag runs, and cone drills can effectively improve underhand passing performance in junior high school volleyball athletes.

However, this study has several limitations that should be considered when interpreting the findings. The use of a one-group pretest-posttest design without a control group limits the internal validity of the study. Improvements in underhand passing performance may not be solely caused by the agility training intervention, but could also be influenced by other factors such as regular volleyball practice, athlete maturation, playing experience, or external physical activities during the study period. Therefore, future research is recommended to apply a true experimental design involving both experimental and control groups to provide stronger evidence regarding the effectiveness of agility training on volleyball technical performance.

Overall, the results of this study indicate that agility training provides a positive contribution to improving underhand passing performance among junior high school volleyball athletes. Therefore, agility-based exercises can be recommended as an effective training method for improving fundamental volleyball skills, particularly underhand passing techniques in adolescent athletes.

#### D. Conclusion

Based on the results of the study, it can be concluded that agility training has a

significant influence on the ability to pass under volleyball in junior high school GIT club athletes. The results of the analysis showed an increase in lower passing ability after being given an agility training program with a significance value of  $p < 0.05$  and an influence contribution of 70.7% based on the results of the R-square test. These findings show that the better the level of agility of athletes, the better the lower passing ability of athletes in volleyball. This research provides important implications in the field of sports coaching, particularly as a reference for physical education coaches and teachers in developing more effective training programs to improve basic volleyball technique skills. However, this study still has limitations in the number of samples and does not use a control group, so further research is recommended to use a wider sample and develop a variety of exercise methods to obtain more comprehensive research results.

### E. Acknowledgments

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### F. Conflict of Interest

The author declares that there is no conflict of interest in this study.

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