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The effect of underhand passing training methods on the accuracy of underhand passing among volleyball players

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ABSTRACT

Accuracy underhand passing is an important basic technique in volleyball used to receive the ball from the opponent. Good accurascy underhand passing skills are crucial for a team's success in defending and building attacks. This study aims to determine the effect of variations in accurascy underhand passing exercises on accurascy underhand passing skills in female volleyball players at SMPN 18 Gresik. The research method used a quantitative approach with an experimental method, namely True Experimental Design with a Randomized Pretest–Posttest Control Group Design. The population in this study were all 15 female volleyball players at SMPN 18 Gresik, who were also used as samples. The research instrument was an accurascy underhand passing skill test. Data analysis was carried out using normality tests, homogeneity tests, and differences in pretest and posttest results. The results showed that the accurascy underhand passing skill data were normally distributed with a p (Sig) value > 0.05 and the data were homogeneous with a sig. p value > 0.05. The group given the training variations showed a significant increase compared to the control group. Based on these results, it can be concluded that variations in underhand passing exercises have an effect on accurascy underhand passing skills in female volleyball players at SMPN 18 Gresik. It is recommended that coaches and sports teachers implement variations of underhand passing exercises in a programmed manner to improve students' basic volleyball technical skills.

Keywords: effect; underhand passing; training methods; accuracy; volleyball players

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INTRODUCTION

Volleyball is a team sport that is very popular and can be played by various age groups, from children to adults (Putri et al., 2024; Ramadan et al., 2024). This game is played by two opposing teams, each consisting of six players, with the goal of getting the ball to land in the opponent's court. Volleyball can be played well if players can master a number of basic techniques, including the overhand serve, underhand serve, overhand pass, underhand pass, smash, and block (Hazinah & Hazinah, 2017; Widyanti & Wiguno, 2019). For beginning junior high school players, mastering basic

techniques is often a major obstacle, as volleyball demands excellent body coordination, reaction time, and accurate movement. Mastering basic techniques is a crucial prerequisite for effective and organized play. One crucial basic technique is the underhand pass, used to receive the ball from an opponent and direct it to a teammate as the starting point for an attack.

Several previous studies have shown that underhand passing skills can be improved through a structured and varied training program (Juhanis et al., nd; Syaranamual, 2023). Game-based approach, part-whole training, and drill training models can improve passing accuracy when training is done repeatedly, structured, and contextually (Camacho-Sánchez et al., 2023; Didik Purwanto et al., 2024). Besides that,Syahputra et al., (2024) showed that a variety of exercises, such as wall drills, pair drills, and modified drills, had a positive impact on improving underhand passing skills. Overall, these research results indicate that varied training is a relevant approach to improving basic volleyball techniques.

Theoretically, training in variations of underhand passing is considered effective because it provides a variety of movement stimuli, improves eye-hand coordination, and strengthens technical consistency in various game situations (Mawo et al., 2021; Purwantoro et al., 2023).The principle of motor training states that controlled repetition, movement variation, and practice in the context of real play can accelerate the process of skill mastery (Aliriad, 2024). School-age sports coaching can prevent training boredom and increase student motivation and engagement. Thus, variations in underhand passing drills have a strong conceptual basis as a method for developing basic volleyball techniques and have the potential to significantly contribute to improving player skill quality.

Most previous research still focuses on improving general underhand passing skills (Anggara, 2019; Saputra & Gusniar, 2019), without specifically emphasizing the accuracy or precision of underhand passing. Furthermore, previous studies have been conducted on club athletes or university students, with training contexts and subject characteristics that differ from those of junior high schools. This study differs primarily in its use of an experimental design with a control group, its focus on underhand passing accuracy as an indicator of technical quality, and its use of junior high school students participating in extracurricular volleyball activities as subjects. This research is urgently needed to design a more effective training program tailored to the characteristics of the students. The research's contribution lies in providing scientific evidence regarding the effectiveness of variations in underhand passing training in improving technical accuracy in the context of school education.

The research gap lies in the limited empirical evidence specifically examining the effect of variations in underhand passing exercises on underhand passing accuracy in junior high school female volleyball players. Most previous studies only assessed general improvements in underhand passing skills, without prioritizing accuracy as the primary focus of analysis. This research focuses on underhand passing accuracy as an indicator of technical quality, using junior high school female subjects, and employing a controlled experimental design to test the effectiveness of variations in underhand passing exercises.

This study aims to determine and analyze the effect of variations in underhand passing training on the accuracy of underhand passing in female volleyball players at UPT SMPN 18 Gresik. The results of this study are expected to provide theoretical contributions in the development of sports coaching science, especially in school-age volleyball, as well as practical contributions for PJOK teachers and coaches in designing effective, interesting, and appropriate training programs for students' needs.

METHOD

This research uses a quantitative approach with an experimental method (Apriani et al., 2021; Rahman, 2018). The research design used was a True Experimental Design with a Randomized Pretest–Posttest Control Group Design. This design was chosen because it allows researchers to compare the results before and after treatment between the experimental and control groups, so that the effect of the underhand passing variation training on underhand passing accuracy can be tested objectively.

The population in this study consisted of all the students who participated in the extracurricular volleyball activity at UPT SMPN 18 Gresik, totaling 15 people. Because the population size was relatively small, total sampling was used, ensuring that all members of the population were included in the study (n = 15). Furthermore, the sample was randomly divided into two groups: an experimental group that was given a structured bottom passing exercise and a control group that was given a conventional bottom passing exercise. Total sampling allows for representation of the population as a whole; however, the small sample size limits the generalizability of the research results to similar populations.

This study used a bottom passing accuracy test to measure participants' bottom passing ability in the pretest and posttest stages. Participants passed the ball towards a predetermined target from a distance of three meters up to ten times. Each pass that hits the target is scored according to the scoring criteria, and the total score reflects the participant's lower passing accuracy. This instrument was chosen because it is objective, relevant to the research's focus on the accuracy of the basic passing technique, and has content validity supported by similar instruments used in previous volleyball skills research.

The research procedure included the preparation of a research design, the preparation of an underhand passing accuracy test instrument, and the processing of research permits from the UPT SMPN 18 Gresik school through the Physical Education teacher. Next, all samples were given an initial test (pretest) to measure the initial ability of underhand passing accuracy before being given treatment. After that, the samples were randomly divided into two groups, namely the experimental group and the control group. The experimental group was then given treatment in the form of underhand passing variation exercises according to the prepared training program, while the control group was given conventional underhand passing exercises without any special variations. The treatment was given in several training sessions. After the entire series of treatments were completed, all samples were given a final test (posttest) to determine changes in underhand passing accuracy abilities after the treatment.

Pretest and posttest data were analyzed using quantitative statistical techniques, including normality and homogeneity tests as prerequisites. Hypothesis testing was conducted using a paired-sample t-test to determine the difference between the pretest and posttest scores within each group. An independent-sample t-test was also conducted to compare the posttest scores of the experimental and control groups. All statistical analyses were conducted at a 0.05 significance level and were used to draw conclusions about the effect of lower passing variation exercises on the accuracy of lower-passing volleyball extracurricular students at UPT SMPN 18 Gresik.

RESULTS

The data description in this study aims to provide a general overview of the results of measuring the accuracy of underhand passing skills in female volleyball players at the UPT SMPN 18 Gresik. Data were obtained through an underhand passing accuracy test given to the experimental and control

groups during the pretest and posttest, in accordance with the Randomized Pretest–Posttest Control Group Design. The measurement results were analyzed descriptively to determine the minimum, maximum, average, and standard deviation values of each group.

Table 1. Pretest and Posttest Observation Results Data

No	Pretest		Posttest	
	Experiment Pretest	Pretest Control	Experiment Posttest	Posttest Control
1	6	8	8	7
2	3	0	6	1
3	1	1	3	0
4	4	4	4	3
5	0	5	2	4
6	5	2	6	4
7	9	2	11	3
8	13	3	14	3
9	8	4	10	3
10	6	6	8	8
11	2	3	5	1
12	4	2	7	3
13	4	4	5	1
14	7	5	10	1
15	5	3	5	2
Mean	**5.1333**	**3.5333**	**7.0000**	**3.1333**
Standard Deviation	**0.8500**	**0.4963**	**0.8338**	**0.5243**
Minimum	**0**	**1**	**2**	**1**
Maximum	**13**	**8**	**14**	**8**

Based on Table 1, the experimental group in the pretest had a minimum score of 0, a maximum of 13, a mean of 5.1333, and a standard deviation of 0.85. After being given treatment in the form of underhand passing variation training, the posttest results of the experimental group showed an increase with a minimum score of 2, a maximum of 14, a mean of 7, and a standard deviation of 0.8338. Meanwhile, the control group in the pretest had a minimum score of 1, a maximum of 8, a mean of 3.5333, and a standard deviation of 0.4963. In the posttest, the control group obtained a minimum score of 1, a maximum of 8, a mean of 3.1333, and a standard deviation of 0.5243. Descriptively, the experimental group experienced a greater average increase than the control group, which indicates the effect of the underhand passing variation training treatment.

Normality Test

A normality test is performed to determine whether the data comes from a normally distributed population (Zulkifli et al., 2025). In this study, the normality test was conducted using the Shapiro–Wilk test with the help of the SPSS program.

Table 2. Normality Test Results

Group	Kolmogorov–Smirnov Statistics	df	Sig.	Shapiro–Wilk Statistics	df	Sig.
Pretest Control	0.143	15	0.200*	0.940	15	0.379
Experiment Pretest	0.130	15	0.200*	0.961	15	0.717
Posttest Control	0.260	15	0.008	0.833	15	0.010
Experiment Posttest	0.155	15	0.200*	0.968	15	0.823

Based on the results of the normality test in Table 2, all data groups had a significance value (Sig) > 0.05 in the Shapiro–Wilk test. Thus, it can be stated that the underhand passing accuracy skill data is normally distributed and meets the requirements for parametric statistical analysis.

Homogeneity Test

A homogeneity test was conducted to determine whether the data variance between the experimental and control groups was equal or homogeneous (Hidayat, 2021). This test was conducted using Levene's test with the help of SPSS, with the criteria for data being considered homogeneous if the significance value (p) > 0.05.

Table 3. Results of Homogeneity Test

Data	Levene Statistics	df1	df2	Sig.
Pretest (Based on Mean)	2.208	1	28	0.148
Pretest (Based on Median)	2.048	1	28	0.163
Pretest (Based on Median and Adjusted df)	2.048	1	22.958	0.166
Pretest (Based on Trimmed Mean)	2.054	1	28	0.163
Posttest (Based on Mean)	3.474	1	28	0.073
Posttest (Based on Median)	2.669	1	28	0.114
Posttest (Based on Median and Adjusted df)	2.669	1	24.468	0.115
Posttest (Based on Trimmed Mean)	3.631	1	28	0.067

Based on the results of the homogeneity test in Table 3, the significance value (Sig) for the pretest and posttest data is greater than 0.05. Thus, it can be concluded that the data variance between the experimental and control groups is homogeneous. Based on the results of the normality and homogeneity tests, all data in this study have met the assumptions for hypothesis testing using parametric statistics. Therefore, further analysis can be continued with a hypothesis test to determine the effect of underhand passing variation training on underhand passing accuracy in female volleyball players at the UPT SMPN 18 Gresik.

DISCUSSION

Underhand passing variation training had a positive impact on improving underhand passing accuracy in female volleyball players. Conceptually, these results align with motor learning theory, which states that varying training can enrich movement experience, enhance neuromuscular adaptation, and strengthen technical consistency across various game situations(Love, 2024). Varied training allows players to face different movement conditions so that they do not just master one rigid movement pattern, but are able to adjust their underhand passing technique to the direction, speed, and angle of the ball's arrival.

The low quality of underhand passing is related to a lack of ball control due to monotonous training patterns. This research also supports the findings Marwan et al., (2024)which shows that structured repetition-based training models and game contexts, such as game-based approaches and drill training, can improve passing accuracy. In addition, the results of this study are in line with(Lengi et al., 2024; Wahyu, 2022) which concluded that a variety of underhand passing exercises, such as wall drills and pair drills, had a positive impact on underhand passing skills. Overall, the findings of this study do not contradict previous research, but rather strengthen empirical evidence that varied training is a relevant and effective approach to developing basic volleyball techniques.

The novel aspect of this research lies in its focus, which specifically emphasizes the accuracy of underhand passing as an indicator of technical quality, rather than simply improving underhand passing skills in general. Most previous studies have only assessed improvements in underhand passing ability without explicitly distinguishing accuracy as the primary variable (Septiana et al., 2024; Sistiasih, 2021). Furthermore, this study was conducted on junior high school students in the context of extracurricular activities, a relatively rare field of study compared to research on club

athletes or university students. This study provides new empirical evidence that underhand passing variation training is also effective in improving technical accuracy in school-age players, not just those at an advanced level.

Applying variations in underhand passing training can be a more effective alternative learning and coaching strategy than conventional, monotonous training. By incorporating movement variations, ball direction variations, and pair and game-based drills, coaches can help students develop optimal technical accuracy while increasing their motivation and engagement in training. In the long term, this approach has the potential to improve the quality of school team play and lay the foundation for developing better youth volleyball athletes.

However, this study has several limitations that should be considered. First, the sample size was relatively small and involved only one school, so generalizing the results to a wider population should be done with caution. Second, the training duration was relatively short, so it cannot yet describe the long-term effects of underhand passing variations on technical accuracy. Third, this study only focused on one technical aspect, namely underhand passing accuracy, without examining its impact on other technical aspects such as overhead passing, serving, or teamwork quality in real-life match situations. These limitations open up opportunities for future research involving larger samples, longer training durations, and more comprehensive game performance variables.

Overall, the findings of this study not only strengthen theory but also provide a new contribution to the context of junior high school education by emphasizing the accuracy of underhand passing as a key indicator of technical quality. This confirms that underhand passing variation training is a viable and relevant approach to school-age volleyball development.

CONCLUSION

Underhand passing variation training has been shown to have a positive effect on improving underhand passing accuracy, making it more effective than conventional training. The novelty of this study lies in its focus, which specifically places underhand passing accuracy as the main variable and its application to junior high school female students in the context of school extracurricular activities with a true experimental pretest–posttest control group design. These findings contribute theoretically by strengthening motor learning theory that training variations can improve movement adaptation, technical consistency, and skill accuracy, while expanding empirical evidence that these principles are effective in school-age players. Methodologically, this study contributes through the use of a controlled experimental design and a quantitatively measurable underhand passing accuracy test instrument. While practically, the results provide important implications for physical education teachers and school coaches to implement underhand passing variation training as a more effective, engaging, and empirically evidence-based coaching strategy.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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