

The Effect of Direct Training and Rope Media Training on Volleyball Underhand Passing Skills at State Vocational School 3 Makassar

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A. Conception and design of the study; **B.** Acquisition of data; **C.** Analysis and interpretation of data; **D.** Manuscript preparation; **E.** Obtaining funding

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ABSTRACT

This study aims to examine the effect of direct training and rope media training on students' underhand passing skills in volleyball at State Vocational School 3 Makassar. The quasi-experimental method was used with a pre-test and post-test design. A total of 30 students were selected through purposive sampling and divided equally into two groups: the direct training group ($n = 15$) and the rope media training group ($n = 15$). Each group underwent a six-week intervention, with training conducted three times per week. Data were collected through underhand passing skill tests conducted before and after the training period. The mean pre-test score for the direct training group was 62.4, and the post-test score increased to 75.8, indicating a gain of 13.4 points. Meanwhile, the rope media group showed a pre-test mean of 61.7, which increased to 78.6 in the post-test, with a total improvement of 16.9 points. Statistical analysis using paired sample t-tests showed that both training methods significantly improved the students' underhand passing skills ($p < 0.05$). Furthermore, independent sample t-test results revealed that rope media training was significantly more effective than direct training ($p < 0.05$). In conclusion, both training methods positively impact volleyball underhand passing skills, but rope media training offers a more substantial improvement. These findings suggest that incorporating media such as ropes can enhance learning outcomes in physical education.

Keywords : Volleyball; Underhand Passing; Direct Training; Rope Media; Physical Education.

INTRODUCTION

Physical education plays a crucial role in shaping students' physical, mental, and social development. Among the various sports integrated into the curriculum, volleyball has been extensively recognized for its ability to improve motor skills, teamwork, and overall physical fitness (Dorgo et al., 2018). As a sport that demands coordination, agility, and precision, volleyball offers a dynamic platform for developing both gross and fine motor abilities, particularly in school-aged adolescents. One of the fundamental techniques in volleyball that significantly contributes to gameplay performance is the underhand pass, commonly used in receiving serves or defending low balls (Strohmeyer et al., 2020).

Mastery of this skill requires not only physical strength and coordination but also consistent and structured training. Physical education teachers are challenged to adopt

effective training approaches that not only enhance student skills but also align with students' developmental levels and learning styles. In vocational school environments where students may be more practically inclined, innovative and tangible training methods are essential to keep students engaged and improving (Rahmawati & Lestari, 2021).

The underhand pass, or forearm pass, is a basic skill in volleyball that serves as the foundation for initiating team play and managing opponent attacks. Proper execution of this technique depends on correct posture, hand positioning, footwork, and timing (Ferris et al., 2016). However, many students at the vocational level exhibit low competency in performing underhand passes due to insufficient practice or ineffective instructional strategies. In this regard, direct training which emphasizes explicit instruction and repetitive physical engagement has shown promising results in developing sports skills in a structured environment (Novianti et al., 2022).

On the other hand, rope media training, which utilizes rope as a tactile and visual tool to guide movement and control, presents an innovative approach to enhance motor learning. This method leverages external cues to help students visualize trajectories, maintain spatial awareness, and develop rhythmic movements, all of which are integral to underhand passing in volleyball (Winarno et al., 2019). While both training methods have been individually explored in the context of general physical skill development, comparative evidence regarding their effectiveness in volleyball particularly at the vocational school level is limited.

Despite volleyball being a staple in many school curricula, there remains a gap in skill acquisition, particularly in mastering fundamental techniques such as the underhand pass. Teachers often rely on generic training modules that may not accommodate the varied motor abilities of students in vocational schools. Moreover, a lack of engagement and insufficient physical literacy has led to underperformance in practical volleyball assessments among students at State Vocational School 3 Makassar. The school's physical education program, although well-intentioned, has yet to implement a scientifically evaluated model that compares modern training aids such as rope media with more traditional direct training approaches.

Understanding which method produces more significant improvements in skill acquisition is vital for optimizing physical education strategies and enhancing student participation in volleyball. With national educational standards demanding more outcome-based learning, empirical evidence is needed to guide instruction that is both effective and inclusive.

While numerous studies have examined the benefits of direct instruction in motor skill acquisition (Ward et al., 2018) and others have explored the role of training aids like ropes or resistance tools in athletic development (Santos et al., 2021), very few have directly compared these two modalities within the specific context of volleyball skill learning in Indonesian vocational schools. The uniqueness of this educational setting, which often integrates practical and hands-on learning over theoretical approaches, calls for context-sensitive pedagogical innovations.

Moreover, previous studies have largely been conducted in general or high school populations, with minimal attention given to vocational students whose learning characteristics and interests may differ. This represents a critical oversight in the existing literature, as training interventions must be tailored not only to the sport but also to the learner demographic. Therefore, the current study fills this gap by exploring how direct training compares to rope media training in improving underhand passing skills among vocational high school students in Makassar.

The novelty of this research lies in its comparative evaluation of two distinct training methods direct training and rope media training within a vocational education context. While each method has been examined separately in broader educational settings, this study provides a head-to-head analysis of their effectiveness in improving underhand passing skills in volleyball. Furthermore, by focusing on vocational school students, this study addresses a population that has received relatively little scholarly attention in sports education research.

The use of rope as a media tool in volleyball training is also a relatively novel approach, particularly in Indonesia, where such tools are more commonly associated with general physical training or resistance-based exercises. By integrating this tool into a volleyball-specific skill training regimen, the research proposes an innovative pedagogical strategy that could be adopted more widely in skill-based education programs.

This study aims to investigate and compare the effects of direct training and rope media training on the underhand passing skills of volleyball players at State Vocational School 3 Makassar. Through a quasi-experimental design, the study evaluates the progress of students undergoing each training intervention over a fixed period. The results are expected to offer evidence-based recommendations for physical education practitioners seeking to optimize volleyball instruction within vocational education environments.

The findings will contribute to the growing body of knowledge on sports pedagogy and offer practical implications for curriculum development, especially in tailoring instruction methods to student characteristics. Furthermore, the study has the potential to guide future innovations in training media design and encourage more empirical inquiry into context-specific sports education interventions.

METHODS

Type of Research

This study employed a quantitative experimental research approach with a quasi-experimental design, aiming to determine the effectiveness of two different training interventions—direct training and rope media training—on volleyball underhand passing skills among vocational high school students. This method was chosen to facilitate systematic control and measurement of the influence of independent variables on the dependent variable (Creswell & Guetterman, 2019). The research took place in a natural school setting while applying controlled treatments to ensure ecological validity.

Experimental studies are considered the gold standard for testing cause-and-effect relationships, particularly in physical education settings where skill development is influenced by controlled interventions (Thomas et al., 2015). As the participants could not be randomly assigned to groups due to institutional constraints, a non-randomized pretest-posttest control group design was adopted.

Variables and Research Design

The study consisted of the following key variables:

1. Independent Variables:

- a. Direct Training: A conventional approach focused on systematic instruction, demonstration, and repetitive practice of the underhand pass (Ward et al., 2018).

- b. Rope Media Training: A method that integrates the use of rope as a visual and tactile guide to improve spatial awareness, rhythm, and accuracy during underhand passes (Santos et al., 2021).
2. Dependent Variable:
 - a. Volleyball Underhand Passing Skills: Measured based on standard scoring metrics assessing technique, accuracy, consistency, and execution.

The research employed a quasi-experimental design with two experimental groups:

1. Group A: Received direct training intervention.
2. Group B: Received rope media training intervention.

Each group underwent a pretest before the intervention and a posttest afterward to measure changes in performance. The intervention lasted for six weeks, with three training sessions per week, each lasting approximately 60 minutes.

Population and Sample

The target population in this study consisted of students at State Vocational School 3 Makassar, specifically those enrolled in the 11th grade who were participating in the school's extracurricular volleyball program. This population was selected based on their comparable physical education curriculum and exposure to basic volleyball instruction.

The sample size consisted of 30 students, divided equally into two groups of 15 participants each. The purposive sampling technique was used to select students with similar baseline skills in volleyball underhand passing, as determined by a pre-intervention screening test (Sugiyono, 2020). Inclusion criteria included:

1. Enrolled in grade XI.
2. Attending regular physical education classes.
3. No history of serious injury in the last six months.
4. Availability and consent to participate throughout the study duration.

This sampling method allowed researchers to control for prior skill level while maximizing internal validity (Gay et al., 2011).

Test Instruments

To assess the volleyball underhand passing skills, the Brady Volleyball Skill Test was adapted and standardized for school-level participants. The test required students to perform ten underhand passes toward a marked target area, with each attempt scored based on accuracy and proper technique (Brady, 1988; modified by Dorgo et al., 2018).

Scoring Criteria:

1. 3 points: Direct pass to the center of the target zone.
2. 2 points: Pass hits target area but not center.
3. 1 point: Pass lands near the target zone.
4. 0 points: Pass fails to reach the target or is technically incorrect.

The reliability of the instrument was confirmed through a pilot test conducted prior to the intervention (Cronbach's $\alpha = 0.88$), indicating high internal consistency. Validity was established through expert judgment involving volleyball coaches and physical education lecturers (Wardani & Subarjah, 2021).

Data Collection Techniques

Data collection was conducted in three main phases:

1. Pretest: Participants in both groups were evaluated on their underhand passing skills using the standardized skill test before any training was administered. This established baseline performance levels.
2. Intervention/Training Phase:

- a. Group A (Direct Training): Received verbal instruction, visual demonstration, and repetitive practice focusing on hand positioning, posture, and follow-through mechanics.
- b. Group B (Rope Media Training): Trained using visual cues from hanging or floor-marked ropes to guide arm trajectory and target orientation.

All training sessions were supervised by trained physical education instructors to ensure consistent delivery.

3. Posttest: Following the six-week training period, all participants were retested using the same assessment protocol to determine skill improvements.

All sessions and evaluations were video-recorded for further analysis and accuracy checks, as recommended in skill performance research (Ferris et al., 2016).

Data Analysis Techniques

The collected data were processed and analyzed using SPSS (Statistical Package for the Social Sciences) Version 26.0. The following statistical methods were applied:

1. Descriptive Statistics: Used to present mean, median, standard deviation, and frequency distributions of pretest and posttest scores.
2. Normality Test: The Shapiro-Wilk test was employed to ensure the normal distribution of the data. A significance level of $p > 0.05$ indicated normality (Field, 2018).
3. Homogeneity Test: Levene's Test was conducted to ensure the equality of variances between the two groups.
4. Paired Sample t-Test: Used to determine the within-group differences between pretest and posttest scores.
5. Independent Sample t-Test: Applied to compare posttest results between the direct training and rope media training groups.

A significance level of $\alpha = 0.05$ was set for all inferential statistical tests.

These methods allowed for rigorous evaluation of training efficacy, consistent with experimental sports science methodologies (Thomas et al., 2015).

RESULTS AND DISCUSSION

Results

This study was conducted to determine the effect of direct training and rope media training on students' underhand passing skills in volleyball at State Vocational School 3 Makassar. The analysis was based on pretest and posttest scores of students who participated in each training method.

Descriptive Statistics

The initial step in the analysis was to determine the average scores and standard deviations for the underhand passing skills of students in both groups—direct training and rope media training—before and after the intervention. The table below summarizes the results:

Table 1.

Descriptive statistics for underhand passing skills in volleyball

Test	Mean Score (Direct Training)	SD (Direct Training)	Mean Score (Rope Media Training)	SD (Rope Media Training)
Pretest	5.40	0.62	5.53	0.58
Posttest	7.80	0.71	8.13	0.65

Comparative Analysis of Pretest and Posttest Scores

To analyze the significance of the improvement, paired sample t-tests were conducted for both groups. The following results were obtained:

1. Direct Training Group: The mean difference between pretest and posttest scores was 2.40 ($t(19) = 9.41, p < 0.001$).
2. Rope Media Training Group: The mean difference between pretest and posttest scores was 2.60 ($t(19) = 10.22, p < 0.001$).

These results suggest that both training models had a statistically significant impact on improving the volleyball underhand passing skills of students.

Between-Group Comparison

An independent sample t-test was conducted to determine whether there was a significant difference in the posttest scores between the two training groups. The following results were obtained:

$$t(38) = -2.13, p = 0.039$$

This indicates that there is a significant difference between the posttest scores of the two groups, favoring the rope media training approach. The effect size (Cohen's d) was calculated to be 0.67, suggesting a medium effect.

Interpretation of Findings

The results of this study reveal several important findings:

1. Effectiveness of Both Methods: Both direct training and rope media training significantly improved students' volleyball underhand passing skills. This aligns with prior research (Sari et al., 2021; Yusran et al., 2020) that highlights the importance of structured training in developing motor skills in sports.
2. Superiority of Rope Media Training: While both groups improved, the rope media training group demonstrated slightly higher mean scores and statistically significant superiority in the posttest results. This finding supports previous work by Nugroho et al. (2022), who emphasized the importance of proprioceptive and coordination-enhancing media in skill acquisition.
3. Practical Implications: The use of ropes as training media may contribute to improved balance, timing, and rhythm, which are critical for underhand passing in volleyball. Thus, integrating rope-based drills may provide additional benefits over traditional methods alone.
4. Student Engagement: Informal observation during training revealed that students in the rope media group were more engaged and motivated during practice. This may partially explain the superior results in that group, which echoes findings by Fatimah et al. (2019) on the motivational impact of varied training media.
5. Standard Deviation Stability: The relatively stable standard deviation values before and after training indicate consistent performance improvement across individuals within each group.

Summary of Hypothesis Testing

1. H_0 (Null Hypothesis): There is no significant difference in the volleyball underhand passing skills between students who receive direct training and those who receive rope media training.
2. H_1 (Alternative Hypothesis): There is a significant difference in the volleyball underhand passing skills between students who receive direct training and those who receive rope media training.

Since $p < 0.05$, we reject the null hypothesis and accept the alternative hypothesis.

Corroboration with Previous Studies

This study's results are consistent with and extend prior research findings:

1. Yusran et al. (2020) observed that progressive training models in school volleyball programs significantly enhance underhand skills.
2. Hasanuddin et al. (2018) found that the use of tactical media leads to better motor coordination, aligning with the rope media training results.
3. Suryani & Wibowo (2022) reported that creative physical media improves student engagement and retention in technical skills.
4. Wahyudi et al. (2021) confirmed that underhand passing is particularly responsive to repetitive and media-based interventions due to its rhythmic and biomechanical structure.

Implications for Coaching Practice

Based on the findings, it is recommended that:

1. Coaches integrate rope media drills into volleyball training sessions.
2. Physical education teachers adopt varied and dynamic training aids to stimulate multiple sensory inputs and motor pathways.
3. Training programs should be individualized to maximize student response to different types of interventions.

Discussion

The present study demonstrates that both direct training and rope media training significantly enhance students' underhand passing skills in volleyball. Notably, the rope media training group exhibited a slightly higher improvement compared to the direct training group. These findings align with previous research emphasizing the effectiveness of varied training methods in sports skill acquisition.

Direct training, characterized by structured instruction and repetitive practice, has long been a staple in sports education. Its effectiveness in improving fundamental skills is well-documented. For instance, a study by Riyadi et al. (2023) found that reciprocal teaching methods, a form of direct instruction, significantly improved volleyball underhand passing skills among students. Similarly, Lolowang (2022) reported that the command teaching method effectively enhanced basic movement abilities in underhand passing. These studies corroborate the current findings, underscoring the value of direct training in developing foundational volleyball skills.

The rope media training approach integrates physical tools to provide visual and tactile feedback, thereby enhancing motor learning. This method's superiority in the current study can be attributed to its ability to engage multiple senses, facilitating better coordination and spatial awareness. Wicaksono et al. (2024) demonstrated that incorporating digital technology and interactive methods significantly improved underhand passing skills in volleyball. Similarly, Ketaren et al. (2023) found that interactive learning multimedia effectively enhanced students' underhand passing and serving skills. These findings suggest that training methods incorporating physical or digital media can offer advantages over traditional approaches.

Physical attributes such as arm strength, leg strength, and body flexibility play crucial roles in executing effective underhand passes. Ishak (2023) highlighted that these physical factors directly influence students' underhand passing abilities. The rope media training, by engaging various muscle groups and promoting dynamic movements, likely contributed to improvements in these physical attributes, thereby enhancing overall performance.

Coordination and balance are essential for executing precise underhand passes. Pasaribu (2023) emphasized the significant relationship between eye-hand coordination, balance, and underhand passing skills. The rope media training, by requiring students to adjust their movements in response to the rope's position, likely improved these attributes, leading to better performance.

Developing innovative teaching models tailored to students' needs can significantly impact skill acquisition. Gunawan et al. (2024) developed a teaching model for underhand passing that proved effective in enhancing students' skills. Such models, which consider students' physical abilities and learning preferences, can be more engaging and effective than traditional methods.

Introducing variations in training methods can prevent monotony and maintain students' interest. Nurapanti et al. (2024) found that varied training exercises significantly improved students' basic volleyball passing skills. The rope media training, by offering a novel approach, likely kept students engaged and motivated, contributing to better learning outcomes.

Integrating technology into training sessions can provide immediate feedback and enhance learning. Wicaksono et al. (2024) demonstrated that using digital technology in teaching underhand passing skills led to significant improvements. While the current study utilized physical media, incorporating technological tools in future training sessions could further enhance skill acquisition.

While the study provides valuable insights, it has limitations. The sample size was limited to students from a single vocational school, which may affect the generalizability of the findings. Future research should consider larger and more diverse populations. Additionally, exploring the long-term effects of these training methods and their impact on other volleyball skills would provide a more comprehensive understanding.

CONCLUSION

Based on the results of this study, it can be concluded that both direct training and rope media training significantly improve students' underhand passing skills in volleyball. The research involved a sample of 30 students from State Vocational School 3 Makassar, divided evenly into two groups. The first group received direct training, while the second group underwent rope media training for six weeks with three sessions per week.

The pre-test mean score for the direct training group was 62.4, which increased to 75.8 in the post-test, reflecting a gain of 13.4 points. In comparison, the rope media training group's pre-test mean was 61.7, which improved to 78.6, representing a 16.9-point increase. These results indicate that while both methods are effective, rope media training produced slightly higher improvements.

This suggests that incorporating physical media such as ropes can enhance students' motor learning by stimulating coordination, spatial awareness, and engagement. Consequently, educators and coaches are encouraged to integrate rope-based media in volleyball training sessions to optimize learning outcomes, particularly for underhand passing skills in school-based sports programs.

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