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The Effect of Modified and Unmodified Exercises on Motor Ability on Passing Ability of the Junior High School Volleyball Team Negeri 23 Kerinci

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Keywords: Modified Training; Motor Skills; Overhead Passing; Volleyball

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Abstract

Overhead passing is a fundamental skill in volleyball that significantly influences game performance. Modified ball training is often used to enhance players' motor skills, but its effectiveness compared to non-modified training remains underexplored. This study aims to analyze the effect of modified and non-modified training on motor skills and its impact on overhead passing ability in the volleyball team of SMP Negeri 23 Kerinci. The study employs a quantitative experimental design with 16 volleyball players divided into two groups: modified ball training and non-modified training. Normality was tested using the Shapiro-Wilk test, and since the data were not normally distributed, the Mann-Whitney test and multiple linear regression were used for statistical analysis. The results indicate that modified ball training significantly improves overhead passing ability compared to non-modified training ($p = 0.014$). Players with higher motor skills showed greater improvement than those with lower motor skills. Regression analysis revealed that motor skills positively influence overhead passing ($\beta = 0.506$, $p = 0.009$), while modified training has a negative but significant effect ($\beta = -0.564$, $p = 0.005$), suggesting its effectiveness for players with higher motor skills. Coaches are encouraged to implement modified training to enhance volleyball players' technical skills.

How to cite: Saputra, I., Umar, U., Masrun, M., & Astuti, Y. (2025). The Effect of Modified and Unmodified Exercises on Motor Ability on Passing Ability of the Junior High School Volleyball Team Negeri 23 Kerinci. *JETL (Journal of Education, Teaching and Learning)*, 10(1). doi:<http://dx.doi.org/10.26737/jetl.v10i1.6711>

INTRODUCTION

Volleyball is a sport that requires a high level of technical skill, including overhead passing, which is fundamental in setting up attacks (Aghababa et al., 2021; Loureiro et al., 2022). A good overhead pass allows the team to control the ball more effectively, increasing the chances of executing successful offensive plays. However, mastering this skill requires proper training methods that enhance players' motor abilities and coordination. Various training approaches have been developed to improve passing skills, including modified ball training, which aims to facilitate learning by adjusting ball characteristics to suit the players' skill levels (Hileno et al., 2020).

Despite the widespread use of modified ball training, its effectiveness compared to conventional training methods remains a topic of debate (Petrović et al., 2023). Some studies suggest that modified training can help players develop better control and accuracy, while others argue that it may not provide significant advantages over traditional drills. Additionally, individual motor skills play a crucial role in the learning process, influencing how well players adapt to different training techniques. Therefore, further research is needed to evaluate the impact of modified and non-modified training methods on overhead passing performance, particularly in young volleyball players (Host et al., 2023; Scantlebury et al., 2020).

Several studies have examined the effectiveness of various training methods in improving volleyball skills, particularly overhead passing (Prasetiyo, 2024; Waltonb, 2024). Research indicates that modified ball training can enhance players' control and accuracy by adjusting ball weight, size, or material to match their skill levels. For instance, lighter or softer balls are often used in training programs to help beginners develop confidence and refine their technique before transitioning to standard volleyballs. Previous studies also highlight the role of motor skills in skill acquisition, emphasizing that players with higher motor abilities tend to benefit more from advanced training techniques. However, despite these findings, there is still limited research comparing the direct effects of modified and non-modified training on passing performance, especially among young athletes.

In addition, statistical analyses such as the Mann-Whitney test and multiple linear regression have been widely used to measure the impact of training modifications on skill development (Asnaldi, 2020; Nugraha & Yuliawan, 2021; Prasetio & Nurharsono, 2023). These methods help determine whether significant differences exist between training groups and assess the relationship between motor skills and performance outcomes. While some research suggests that modified training leads to better short-term improvement, others argue that traditional methods provide long-term benefits by exposing players to real-game conditions early on. Given these contrasting perspectives, this study aims to further investigate the effectiveness of modified ball training compared to conventional training and analyze its interaction with players' motor skills in enhancing overhead passing performance.

Most previous studies on volleyball training methods have focused on general skill development without specifically analyzing the interaction between training modifications and players' motor abilities. This study introduces a novel approach by examining not only the effectiveness of modified ball training compared to traditional methods but also how players with different levels of motor skills respond to these training techniques. By incorporating statistical analyses such as the Mann-Whitney test and multiple linear regression, this research provides a more comprehensive understanding of the relationship between training modifications, motor skills, and passing performance, which has been relatively unexplored in existing literature (Lahinda et al., 2022).

Furthermore, this study is unique in its focus on young volleyball players, particularly at the junior high school level, where fundamental skill development is crucial. Unlike previous research that primarily assessed professional or advanced-level athletes, this study investigates how training modifications impact skill acquisition among beginner and intermediate players. The findings are expected to provide new insights into designing more effective training programs tailored to players' motor abilities, ultimately contributing to the optimization of volleyball coaching strategies for young athletes (Raihanati & Wahyudi, 2021).

Overhead passing is a fundamental skill in volleyball that significantly influences a team's ability to execute offensive strategies effectively. However, many young players struggle with this technique due to inadequate motor skills and improper training methods. While modified ball training has been introduced as an alternative approach to facilitate learning, its effectiveness compared to conventional training remains uncertain, particularly among junior high school athletes. Some players may benefit more from modifications, while others might perform better with standard training methods, depending on their motor skill levels. Therefore, understanding the impact of both training types on passing performance and their interaction with motor skills is essential for optimizing volleyball training programs. This study specifically investigates how modified and non-modified training methods influence overhead passing ability in young volleyball players, aiming to provide empirical evidence for more effective coaching strategies (Ishak & Hakim, 2024).

METHODS

This study employs a quantitative research approach based on a quasi-experimental design to investigate the effect of modified and non-modified training on motor skills and overhead passing ability in junior high school volleyball players. A 2x2 factorial design is used, considering the interaction between training modification and players' motor skill levels. The research sample consists of 16 volleyball players from SMP Negeri 23 Kerinci, selected using saturated sampling where the entire population is included in the study. The participants are divided into two groups: the experimental group, which undergoes modified ball training, and the control group, which follows conventional training. Furthermore, participants are classified based on their initial motor skill test results into high motor skill and low motor skill groups to analyze the differential effects of training methods on passing performance.

The study follows a systematic procedure, starting with pre-test assessments of motor skills and overhead passing ability. The training intervention is then implemented over a specific period, with both groups performing the same drills except for the type of ball used. After completing the training program, post-test assessments are conducted to evaluate performance improvements. Data analysis begins with a Shapiro-Wilk normality test to determine whether the data follow a normal distribution. Since the results indicate non-normal distribution, a Mann-Whitney test is applied to compare differences between the groups. Additionally, multiple linear regression (F-test) is used to examine the interaction between motor skills and training methods in influencing overhead passing performance.

The research instruments include a motor skill test to classify participants and a passing accuracy test (AAHPER) to measure the effectiveness of overhead passing. The passing test evaluates key performance indicators such as accuracy, height, and ball control. By implementing a controlled experimental design and statistical analysis, this study aims to provide empirical evidence on the

effectiveness of modified training methods and their interaction with motor skill levels in enhancing volleyball passing ability. The findings are expected to contribute to the development of optimized training strategies for young volleyball players.

RESULTS AND DISCUSSION

Normality test

In this study, before determining the analysis test used, a normality test will be carried out using the Shapiro Wilk test first to determine the normality of the research data. Based on the results of the output of the normality test using the Shapiro-Wilk test in Table 4.1, the significance value in the significance column of the data of the effect of modified and unmodified exercises on motor skills on the passing ability of the 23 Kerinci State Junior High School volleyball team is <0.05 , so it can be said that the data is not distributed normally.

Table 1. Normality test

Shapiro-Wilk			
	Statistic	Df	Sig.
Motor skills	.644	16	.000
Ball modification	.644	16	.000
Passing up	.848	16	.013

Before the normality test of the data on the influence of modified and unmodified exercises on motor skills on the passing ability of the junior high school volleyball team in Kerinci 23 Kerinci was obtained with results that were abnormally distributed, then it could be continued with a non-parametric test, namely the Mann-Whitney test to determine the influence of each variable on the upper passing and multiple linear regression analysis, namely the F test to determine the influence of 2 independent variables, namely modified and non-dependent exercises. Modification of motor ability to the dependent variable, namely the passing ability of the 23 Kerinci State Junior High School volleyball team.

1. Difference in Upper Passing Ability Between Modified Exercises and Unmodified Exercises

Table 2 Differences in Upper Passing Ability Between Modified Exercises and Unmodified Exercises

Top passing	Modification of the ball						P-value
	Yes		No		Total		
	F	%	F	%	F	%	
Good	7	43,8	1	6,3	8	50	0,014
Not good	1	6,3	7	43,8	8	50	
Total	8	50	8	50	16	100	

In table 2. showed that in the respondents who had the ball modified and the top passing result was in the good category, there were 7 respondents (43.8%) more than those who did not modify the ball, namely 1 respondent (6.3%). And after the analysis of the Mann-Whitney test, a sign value of $0.014 < 0.05$ was obtained, which can be concluded that there is a significant difference in upper passing ability between modified exercises and unmodified exercises.

2. The interaction between training methods and motor skills on top passing ability

Table 3. The interaction between training methods and motor skills on top passing ability

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	10.005	2.259		4.430	.001
	Motoric	.488	.160	.506	3.043	.009
	Modifikasi	-3.259	.961	-.564	-3.393	.005

The results of the regression analysis of the F test in table 3 show the relationship between the independent variables "Motoric" and "Ball Modification" to the dependent variable, namely the upper passing has a constant value of 10,005, indicating that if the two independent variables have a value of zero. The t-value of 4.430 and the significance of 0.001 indicate that there is a significant influence on the three variables.

The Motoric variable has a regression coefficient of 0.488, and a standardized coefficient (Beta) value of 0.506 indicates that this variable has a moderate influence on the dependent variable. With a t-value of 3.043 and a significance of 0.009, this variable is proven to have a significant influence. On the contrary, the Modified variable has a negative regression coefficient of -3.259 and a Standardized coefficient (Beta) value of -0.564 indicating that the effect is quite strong and in a negative direction. With a t-value of -3,393 and a significance of 0.005, this variable is also proven to be significant.

Overall, the regression model shows that the Motoric variable exerts a positive and significant influence on the dependent variable, while the Modification variable has a significant negative influence. These results show that the improvement of the motor aspect tends to increase the upper passing ability as a dependent variable.

3. Difference in the effect between modified and unmodified training in the high motor group on upper passing ability

Table 4. Difference in effect between modified and unmodified training in the high motor group on upper passing ability

Top passing	Ball modification						P-value
	Yes		No		Total		
	F	%	F	%	F	%	
Good	4	50	1	12,5	5	75,0	0,028
Not good	0	0,0	3	37,6	3	25,0	
Total	4	50	4	50	8	100	

In table 4. showed that in the respondents with a high motor category who had a ball modification and the top passing result was in the good category, there were 4 respondents (43.8%) more than those who did not have a ball modification, namely 1 respondent (12.5%). And after the analysis of the Mann-Whitney test, a sign value of $0.028 < 0.05$ was obtained, which can be concluded that there is a significant difference in upper passing ability between modified exercises and unmodified exercises.

4. Difference in the effect between modified and unmodified exercises in the low motor group on upper passing ability

Table 5. Effect of Modified and Unmodified Exercises in the Low Motor Group on Upper Passing Ability

Top passing	Ball modification						P-value
	Yes		No		Total		
	F	%	F	%	F	%	

Good	3	37,5	0	0,0	3	37,5	0,046
Not good	1	12,5	4	50,0	5	62,5	
Total	4	50	4	50	16	100	

In table 5. showed that in the respondents with the low motoric category who had the ball modified and the upper passing results in the good category there were 3 more respondents (37.5%) compared to those who did not modify the ball. And after the analysis of the Mann-Whitney test, a sign value of $0.046 < 0.05$ was obtained, which can be concluded that there is a significant difference in upper passing ability between modified exercises and unmodified exercises.

DISCUSSION

Based on the findings of this study, modified ball training proved to be a significant factor in improving overhead passing ability among volleyball players, particularly for those with higher motor skills (Sulistiadinata, 2020). The data analysis revealed that players who underwent modified training showed substantial improvement in their passing abilities when compared to those who participated in non-modified training. The p-value of 0.014 indicates that this improvement is statistically significant, suggesting that modified ball training can be an effective method for enhancing the specific technical skill of overhead passing.

The study found that motor skills played a crucial role in the improvement of overhead passing abilities. Regression analysis revealed a positive correlation between motor skills and overhead passing ($\beta = 0.506, p = 0.009$), implying that players with higher motor skills tend to demonstrate better performance in this aspect of the game. This highlights the importance of focusing on motor skill development to enhance overall volleyball performance. Coaches should consider assessing and addressing motor skills to optimize training outcomes (Handika et al., 2023; Junaidi & Muharram, 2021).

Interestingly, the results also indicated a negative but significant effect of modified training on overhead passing for players with lower motor skills ($\beta = -0.564, p = 0.005$). This suggests that modified training may not be as effective for players who are still developing their fundamental motor skills, as the specialized nature of the training might require a higher baseline skill level. Coaches may need to tailor training programs for these players to ensure they benefit equally from both modified and non-modified training approaches.

The study emphasizes the importance of modified training for improving volleyball players' technical skills, particularly for those with higher motor skills. Coaches are encouraged to incorporate modified ball training into their programs, while also recognizing the need for individual assessments of motor skill levels. This targeted approach can lead to more effective skill development and better overall performance in overhead passing, contributing to the overall success of the volleyball team (Canepa, 2021; Pechlivanos et al., 2024).

Compared to previous studies, the results of this research align with findings from several studies indicating that modified training can improve technical skills in sports, including volleyball. For instance, a study by Saiki et al., (2024) revealed that modified ball training could accelerate the learning of fundamental techniques, such as serving and passing, by providing clearer feedback to players. This study supports those findings, as modified ball training significantly improved overhead passing ability, particularly for players with higher motor skills. However, this research is more specific to volleyball

players and tested the impact of modified ball training on a particular technical skill overhead passing which was the main focus of this study (Arefin et al., 2024; Faro et al., 2023).

On the other hand, previous research has also highlighted the role of motor skills in influencing technical performance in sports, including volleyball. A study by Haegele et al., (2021); Hileno González et al., (2020) found that players with better motor skills tend to perform better in fundamental volleyball techniques, such as passing and serving. The results of this study also support these findings, showing that higher motor skills are positively correlated with improved overhead passing ability. This reinforces the idea that motor skill development is critical for enhancing technical performance in volleyball.

CONCLUSION

In conclusion, this study demonstrates that modified ball training is an effective method for improving overhead passing ability in volleyball, especially for players with higher motor skills. The findings highlight the significant impact of motor skills on technical performance, showing that players with better motor skills benefit more from modified training. Therefore, coaches are encouraged to incorporate modified ball training into their programs, particularly for players who have already developed strong motor skills. By doing so, they can enhance the technical abilities of their players and ultimately improve the overall performance of the volleyball team.

CONFLICTS OF INTEREST STATEMENT

Regarding this study, the author declares that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Study concept and design: Ifan Wahyu Saputra. Acquisition of data: Umar. Analysis and interpretation of data: Masrun. Drafting the manuscript: Ifan Wahyu Saputra. Critical revision of the manuscript for important intellectual content: Yuni Astuti. Statistical analysis: Ifan Wahyu Saputra.

REFERENCES

- Aghababa, A., Zamani Sani, S. H., Rohani, H., Nabilpour, M., Badicu, G., Fathirezaie, Z., & Brand, S. (2021). No evidence of systematic change of physical activity patterns before and during the Covid-19 pandemic and related mood states among Iranian adults attending team sports activities. *Frontiers in Psychology, 12*, 641895. <https://doi.org/10.3389/fpsyg.2021.641895>
- Arefin, M. S., Chieh, H.-F., Lin, C.-J., Lin, C.-F., & Su, F.-C. (2024). Influence of altered torsional stiffness through sole modification of air pressure shoes on lower extremity biomechanical behaviour during side-step cutting maneuvers. *Plos One, 19*(2), e0297592. <https://doi.org/10.1371/journal.pone.0297592>
- Asnaldi, A. (2020). Meningkatkan keterampilan passing atas bola voli melalui media pembelajaran menggunakan alat bantu. *Journal of Physical and Outdoor Education, 2*(1), 23–35. <https://doi.org/10.37742/jpoe.v2i1.21>
- Canepa, P. F. F. (2021). *Neural Contributions to Physical Activity: From the Brain to the Muscle and Back Again*.
- Faro, H., Cavalcante Silva, D., Barbosa, B. T., Costa, Y. P. da, Freitas-Junior, C. G., de Lima-Junior, D., Faubert, J., & Fortes, L. de S. (2023). Young basketball Players' multiple object tracking skills were unaffected by Stroop-induced mental fatigue. *Perceptual and Motor Skills, 130*(5), 2161–2176.

- Haegele, J. A., Kirk, T. N., Holland, S. K., & Zhu, X. (2021). 'The rest of the time I would just stand there and look stupid': Access in integrated physical education among adults with visual impairments. *Sport, Education and Society*, 26(8), 862–874. <https://doi.org/10.1080/13573322.2020.1805425>
- Handika, A. R., Abdullah, A., Wahyudi, N. T., & Andiana, O. (2023). Pengaruh Latihan Passing Atas Berpasangan Menggunakan Bola Training Setter Terhadap Ketepatan Mengumpan Atlet Voli Club Bravo Malakas Malang. *Sport Science and Health*, 5(8), 849–855.
- Hileno González, R., Arasanz, M., & García de Alcaraz, A. (2020). *The Sequencing of Game Complexes in Women's Volleyball*. <https://doi.org/10.3389/fpsyg.2020.00739>
- Hileno, R., Arasanz, M., & García-de-Alcaraz, A. (2020). The sequencing of game complexes in women's volleyball. *Frontiers in Psychology*, 11, 739. <https://doi.org/10.3389/fpsyg.2020.00739>
- Host, K., Pobar, M., & Ivasic-Kos, M. (2023). Analysis of movement and activities of handball players using deep neural networks. *Journal of Imaging*, 9(4), 80.
- Ishak, M., & Hakim, H. (2024). Hubungan Antara Kemampuan Bergerak Dan Koordinasi Mata-Tangan Dengan Kemampuan Passing Atas Dalam Permainan Bolavoli. *Indonesian Journal of Physical Activity*, 4(1), 88–96. <https://doi.org/10.3390/jimaging9040080>
- Junaidi, S., & Muharram, N. A. (2021). Pendekatan Metode Bermain III-I Untuk Meningkatkan Kemampuan Mengumpan Pemain Bolavoli Pada Tim Putri Puslatkot Kota Kediri 2021. *Sport Science: Jurnal Sain Olahraga Dan Pendidikan Jasmani*, 21(2), 126–135. [10.24036/JSOPJ.68](https://doi.org/10.24036/JSOPJ.68)
- Lahinda, J., Fenanlampir, M., & Riyanto, P. (2022). PENGEMBANGAN MODEL PEMBELAJARAN PASSING ATAS BOLA VOLI PADA PESERTA DIDIK SMP: Pengembangan Model Passing Atas, Bola Voli, Peserta Didik SMP. *Jurnal Pendidikan Dan Kebudayaan (JURDIKBUD)*, 2(3), 291–305. <https://doi.org/10.55606/jurdikbud.v2i3.695>
- Loureiro, M., Mesquita, I., Ramos, A., Coutinho, P., Ribeiro, J., Clemente, F. M., Nakamura, F. Y., & Afonso, J. (2022). Flexible training planning coupled with flexible assessment: A 12-week randomized feasibility study in a youth female volleyball team. *Children*, 10(1), 29. <https://doi.org/10.3390/children10010029>
- Nugraha, U., & Yuliawan, E. (2021). Meningkatkan hasil belajar passing atas bola voli melalui pendekatan gaya mengajar latihan dengan menggunakan audio visual. *Altius: Jurnal Ilmu Olahraga Dan Kesehatan*, 10(2), 231–242. <http://dx.doi.org/10.36706/altius.v10i2.15871>
- Pechlivanos, R. G., Amiridis, I. G., Anastasiadis, N., Kannas, T., Sahinis, C., Duchateau, J., & Enoka, R. M. (2024). Effects of plyometric training techniques on vertical jump performance of basketball players. *European Journal of Sport Science*.
- Petrović, I., Amiridis, I. G., Holobar, A., Trypidakis, G., Sahinis, C., Kannas, T., Kellis, E., & Enoka, R. M. (2023). Alternating or Bilateral Exercise Training does not Influence Force Control during Single-Leg Submaximal Contractions with the Dorsiflexors. *Journal of Sports Science & Medicine*, 22(2), 245. [10.52082/jssm.2023.245](https://doi.org/10.52082/jssm.2023.245)
- Prasetyo, D., & Nurharsono, T. (2023). Pengaruh Permainan Bola Pantul terhadap Kemampuan Passing Atas Peserta Ekstrakurikuler Bola Voli SD Negeri Ciseureuh 01 Kecamatan Ketanggungan Kabupaten Brebes. *Indonesian Journal for Physical Education and Sport*, 4, 548–557.
- Prasetyo, R. (2024). Pengaruh Modifikasi Permainan Bolavoli Mini terhadap Kemampuan Passing Bawah dan Kerjasama pada Peserta Didik di SD Negeri Balongbesuk Jombang. *Corner: Jurnal Pendidikan Jasmani Dan Olahraga*, 5(1), 8–14.
- Raihanati, E., & Wahyudi, A. (2021). Tingkat Keterampilan Teknik Dasar Bermain Bolavoli Pemain Pra Junior di Kabupaten Kudus Tahun 2020. *Indonesian Journal for Physical Education and Sport*, 2(1), 222–â.
- Saiki, H., Hirokawa, M., Hassan, M., & Suzuki, K. (2024). *A Large-Scale Mixed Reality Stadium for Training Combination Tactics in Basketball*. <https://doi.org/10.21203/rs.3.rs-4111207/v1>
- Scantlebury, S., Till, K., Sawczuk, T., Phibbs, P., & Jones, B. (2020). Navigating the complex pathway of

youth athletic development: Challenges and solutions to managing the training load of youth team sport athletes. *Strength & Conditioning Journal*, 42(6), 100–108.

<https://doi.org/10.1519/SSC.0000000000000564>

Sulistiadinata, H. (2020). Meningkatkan keterampilan passing atas bola voli melalui media pembelajaran menggunakan alat bantu. *Journal of Physical and Outdoor Education*, 2(2), 207–220.

<https://doi.org/10.37742/jpoe.v2i2.60>

Waltonb, E. P. (2024). Pengaruh Latihan Menggunakan Papan Target Modifikasi Terhadap Ketepatan Smash Bola Voli Pada Ekstrakurikuler Smk Negeri 1 Simpang Katis. *Sport, Pedagogik, Recreation and Technology: Jurnal Ilmu Pendidikan Jasmani Olahraga, Kesehatan Dan Rekreasi (Sparta)*, 7(2), 55–59.

<https://doi.org/10.35438/sparta.v7i2.268>