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The Level of Mastery of Basic Volleyball Skills: An Empirical Study of the Women's Volleyball Team at Universitas Muhammadiyah Surakarta

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]

[1,2,3,4] Universitas Muhammadiyah Surakarta, Jawa Tengah, Indonesia

a810200123@student.ums.ac.id*, gj969@ums.ac.id[2], vss538@ums.ac.id[3], es348@ums.ac.id[4]

ABSTRACT

This study aims to evaluate the level of mastery of basic volleyball skills among members of the women's volleyball team of the Student Activity Unit (UKM) at Universitas Muhammadiyah Surakarta. The skills assessed include underhand passing, overhand passing, overhand serving, and smashing, which represent the core technical components determining game effectiveness. A quantitative descriptive approach was employed, using standardized volleyball skill tests as the primary data collection method. All 20 female athletes registered as active team members were involved as research participants through a total sampling technique. The measurement instruments used in this study had previously undergone validity and reliability testing, ensuring the accuracy and objectivity of the data obtained. Data were analyzed using descriptive statistical techniques to provide a comprehensive profile of the athletes' technical abilities. The results indicate that the overall level of mastery of basic volleyball skills among the participants predominantly falls within the moderate to poor categories, with noticeable variations between individuals. Underhand passing and overhand passing showed limitations in ball control, accuracy, and consistency, which potentially hinder effective transition from defense to attack. Overhand serving skills were characterized by unstable execution, reflecting inconsistencies in coordination and contact accuracy. Meanwhile, smashing skills, although generally classified at an intermediate level, revealed deficiencies in the integration of power, jump timing, and hitting precision. These findings demonstrate that mastery of basic volleyball techniques at the university level is not solely influenced by training frequency but is strongly determined by the quality of structured training, technical feedback, and movement coordination. This study provides empirical evidence that can serve as a foundation for systematic evaluation and the development of more focused, evidence-based coaching programs aimed at improving individual skills and overall team performance in higher education volleyball settings.

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B. Acquisition of data;
C. Analysis and interpretation of data;
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INTRODUCTION

Volleyball is a team sport that demands the integration of technical mastery, physical conditioning, and coordinated teamwork to achieve optimal performance. Fundamental techniques such as serving, passing, spiking, and blocking serve as the

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

structural foundation of the game and directly determine the quality of play and match outcomes. Mastery of these techniques is not merely procedural but represents a complex interaction between motor control, decision-making, and consistency under competitive pressure. Previous studies have consistently emphasized that weaknesses in basic technical skills often translate into ineffective team strategies and suboptimal performance, regardless of tactical planning or physical preparedness.

At the higher education level, volleyball development is commonly facilitated through Student Activity Units (UKM), which function as semi-formal coaching environments aimed at fostering students' technical skills, physical fitness, competitive mentality, and character development. Within this context, university volleyball teams often serve as a bridge between recreational participation and competitive sport. However, unlike professional or elite youth training systems, UKM-based coaching structures frequently face limitations related to training periodization, systematic evaluation, and evidence-based program design.

Preliminary observations of the women's volleyball UKM team at Universitas Muhammadiyah Surakarta reveal recurring inconsistencies in the execution of basic techniques, particularly in forearm passing and overhand serving. These inconsistencies manifest as unstable ball control, inaccurate service placement, and frequent technical errors during both training sessions and competitive matches. Such errors not only disrupt team rhythm but also reduce scoring opportunities and increase opponents' tactical advantages. The persistence of these issues indicates that the athletes' technical mastery may not yet be at an optimal or standardized level.

Despite regular training schedules, the absence of structured and objective technical evaluation makes it difficult for coaches to accurately identify specific skill deficiencies and to align training content with athletes' actual needs. Consequently, training programs may rely heavily on routine drills without sufficient diagnostic feedback, limiting their effectiveness. This situation underscores a critical practical problem: without empirical data on athletes' basic technical mastery, coaching interventions risk becoming inefficient, unsystematic, and less sustainable.

Contemporary volleyball coaching literature emphasizes that performance excellence is strongly associated with the quality of basic technical execution rather than tactical complexity alone. Recent studies have demonstrated that consistent and accurate performance of fundamental skills forms the backbone of successful gameplay, particularly at the developmental and semi-competitive levels. Research in the last decade has shown that athletes with higher levels of technical mastery display better game efficiency, reduced error rates, and greater adaptability during rallies.

Empirical evidence also highlights the importance of structured training intensity and systematic skill repetition in enhancing technical proficiency. Planned technical training programs, when combined with appropriate feedback mechanisms, have been shown to significantly improve serving accuracy, passing consistency, and overall match performance. Moreover, several studies emphasize that periodic technical evaluation is a critical component of athlete development, enabling coaches to monitor progress, adjust training loads, and prevent the stagnation of skill acquisition.

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

In the university sport context, previous research has explored various aspects of volleyball development, including the relationship between training intensity and technical skill improvement, the effectiveness of drill-based training models, and the role of physical conditioning in supporting technical execution. Some studies have also investigated psychological and motivational factors influencing student-athletes' performance in campus-based teams. Collectively, these studies provide a strong theoretical and empirical foundation indicating that technical mastery remains a central determinant of volleyball performance.

However, much of the existing literature focuses on male athletes, elite youth players, or club-level teams, where training environments tend to be more structured and resources more abundant. Studies examining female university athletes, particularly those participating in UKM-based programs, are comparatively fewer. Furthermore, available studies often emphasize intervention outcomes (e.g., training effects) rather than baseline assessments of athletes' existing technical competence.

Although previous studies have established the importance of basic technical mastery in volleyball performance, several gaps remain evident. First, there is a lack of empirical research specifically mapping the level of basic technical skills among female university volleyball athletes within UKM settings. Most studies prioritize experimental designs that test training interventions without sufficiently documenting athletes' initial technical profiles.

Second, limited attention has been given to the contextual characteristics of higher education volleyball programs, where athletes often balance academic demands with training commitments. This context may influence training consistency, skill acquisition rates, and overall performance development, yet it is rarely addressed explicitly in the literature.

Third, existing research tends to generalize findings across populations without considering gender-specific or institutional differences. Female volleyball athletes may exhibit distinct technical patterns, learning trajectories, and performance challenges that warrant independent investigation. Without such focused analysis, coaching strategies risk being based on assumptions rather than evidence.

Therefore, there is a clear need for a descriptive empirical study that systematically evaluates the level of mastery of basic volleyball techniques among female UKM athletes. Such research would fill an important gap by providing objective data that can inform coaching decisions, support program evaluation, and contribute to the refinement of training models tailored to the university context.

Based on the identified problems and research gaps, the primary objective of this study is to empirically assess the level of mastery of basic volleyball technical skills, specifically serving and forearm passing, among the women's volleyball UKM team at Universitas Muhammadiyah Surakarta. This study aims to provide a comprehensive technical profile that reflects the athletes' current competence levels and highlights specific areas requiring improvement.

The findings of this research are expected to serve as a practical foundation for coaches in designing more targeted, effective, and evidence-based training programs. Additionally, the results can support periodic evaluation mechanisms within UKM

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

coaching systems, promoting continuous improvement and sustainability in athlete development.

In terms of novelty, this study offers a focused examination of female university volleyball athletes within a UKM framework, an area that remains underrepresented in existing literature. By emphasizing baseline technical assessment rather than intervention outcomes, this research contributes a diagnostic perspective that complements prior experimental studies. Furthermore, the study contextualises technical mastery within the higher education environment, thereby enriching the discourse on volleyball coaching and athlete development at the university level.

Overall, this research not only advances empirical understanding of basic technical skill mastery among female student-athletes but also provides actionable insights for improving volleyball coaching practices in higher education institutions.

METHODS

Type of Research

This study employed a quantitative approach focusing on the collection and analysis of numerical data with the assistance of statistical software (Sutama et al., 2022). This approach was selected because it is capable of producing objective, measurable, and empirically testable data. Data were collected using a survey method to obtain information related to respondents' perceptions and views in accordance with the research variables. In addition, a review of relevant previous studies was utilized as a basis for instrument development and data analysis. Therefore, a survey-based quantitative approach is considered effective in generating systematic and accurate data to support scientifically grounded conclusions (Jariono et al., 2025).

Time and Place of Research

This study was conducted at the Sports Hall (GOR) of Campus 2, Universitas Muhammadiyah Surakarta, located at Jalan Garuda Mas No. 6, Mendungan, Pabelan, Kartasura District, Sukoharjo Regency, Central Java Province. The research was carried out in November 2025.

Population and Sample

The population of this study included all 20 members of the Muhammadiyah University Surakarta women's volleyball team. This population comprised all subjects with relevant characteristics who were specifically selected for systematic analysis (Jariono et al., 2025). Given the relatively limited number of research subjects, the total sampling technique was applied by involving all members of the population as samples (Sugiyono, 2019). This approach allows for comprehensive and representative data to be obtained, while reducing the potential for bias in the sample selection process. Thus, the number of samples used in this study was 20 respondents.

Operational Definition of Variables

Operational definitions of variables are used to convert research concepts into concrete and measurable indicators so that the data obtained can be scientifically analyzed (Jariono et al., 2025). This study focuses on a single variable, namely basic volleyball playing skills, which are defined as the level of a player's success in applying

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

game techniques consistently, effectively, and efficiently. These skills encompass aspects of speed, accuracy, movement appropriateness, and self-control, which are measured through volleyball skill tests administered to the women's UKM team at Universitas Muhammadiyah Surakarta, including forearm passing, overhead passing, overhand serving, and spiking (Jariono et al., 2023).

Research Procedure

Research instruments serve as the primary means of obtaining objective, accurate data that is relevant to the research objectives. In this study, data collection was conducted using tests and measurements of volleyball skills, utilising instruments that had been developed and validated by Jariono et al. (2023). The use of these instruments was intended to empirically measure the level of mastery of basic volleyball skills in the research subjects.

The research instruments included a series of skill tests covering underhand passing, overhand passing, overhand serving, and smashing. Each type of test was carried out according to standard procedures involving two officers, one of whom was tasked with observing the results of the movements and the other with recording and calculating the scores obtained by the participants. Before the test, participants were allowed to practise as a form of adaptation to the instrument, then carried out the test according to the predetermined duration or number of repetitions. Assessment was based on the accuracy of the ball hitting the target area using a scoring system that had been determined for each test.

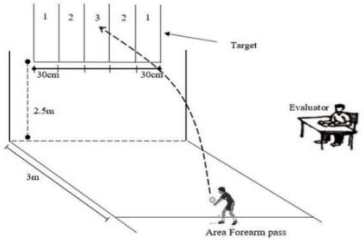

Figure 1.
Underpass Test Instrument

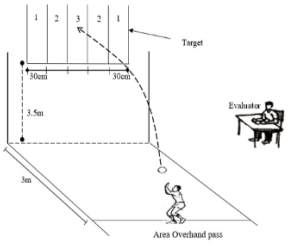

Figure 2.
The Overhead Passing Test Instrument

The underhand and overhand passing skills tests were conducted within one minute, with assessment based on the number and accuracy of passes that successfully reached the target (Jariono et al., 2023).

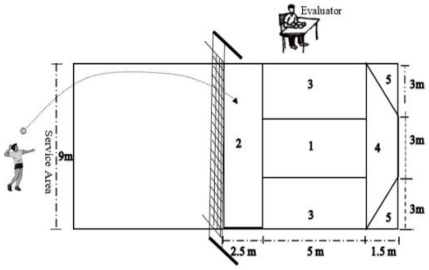

Figure 3.
The Overhand Serve Test Instrument

Meanwhile, the overhand serve test was conducted through ten service attempts directed at target areas with different score weights (Jariono et al., 2023).

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

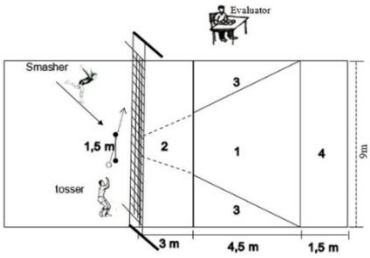

Figure 4.
The Smash Test Instrument

The smash skill test was also conducted through ten attempts, with assessment based on the accuracy of the smash hits toward predetermined target areas. Each participant's final score was obtained from the accumulation of all scores across each type of test (Jariono et al., 2023).

Through the use of these volleyball skill test instruments, this study is expected to generate objective and comprehensive data regarding the level of mastery of basic volleyball skills, particularly in forearm passing, overhead passing, overhand serving, and spiking, as a basis for evaluating technical coaching and development within the volleyball UKM activities.

Data Analysis Techniques

Data analysis in this study employed a quantitative descriptive statistical approach. The data obtained from the tests and measurements were first selected and systematically grouped to ensure they were more focused and easier to analyze (Sutama et al., 2022). Furthermore, the data were presented in the form of tables and percentages to provide a clear overview of the level of mastery of basic volleyball skills.

Data calculations were performed using percentage formulas $P = \frac{F}{N} \times 100$, where F is the frequency, and N is the number of research subjects (Jariono et al., 2025). The results of the analysis were then interpreted based on assessment criteria referring to the mean value and standard deviation, so that the players' skills could be classified into the categories of very high, high, moderate, low, and very low in the basic volleyball skills test (Jariono et al., 2023). Through this analysis technique, an objective and comprehensive picture of the level of mastery of basic volleyball skills in the research subjects was obtained.

RESULTS AND DISCUSSION

Result

The results of this study were obtained through a series of basic volleyball skills tests covering underhand passing, overhand passing, overhand serving, and smashing, which were conducted on the women's volleyball team of Muhammadiyah University Surakarta. The collected data were then analysed using a quantitative descriptive statistical approach to obtain an objective picture of the players' level of mastery of basic techniques. Based on the results of this analysis, basic volleyball technical skills were classified into several categories, namely very high, high, moderate, low, and very low, thus providing a clear and systematic mapping of the players' skill mastery levels in each of the technical aspects tested.

Based on the results of underhand passing skill measurements of 20 female students who are members of the Muhammadiyah University Surakarta Volleyball

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

Student Activity Unit (UKM) team, data were obtained showing differences in skill levels among players. The highest score achieved in the underhand passing test was 96, while the lowest score was 79. The results of descriptive statistical analysis showed an average score of 85.10 with a standard deviation of 4.89, indicating that the participants' abilities varied around the average score. This underhand passing skill measurement was conducted using a test instrument that had been developed and validated by Jariono et al. (2023), so that the results obtained have a good level of validity in representing the players' mastery of basic techniques. To clarify the distribution of the measurement results, the following table shows the distribution of underhand passing skills, which describes each player's achievements in more detail.

Table 1.
Underhand Passing Test Results

Class Interval	Description	Frequency	Percentage
≥92	Verry Good	2	10%
88-91	Good	4	20%
83-87	Currently	6	30%
79-82	Low	8	40%
≤78	Very Low	0	0%
Total		**20**	**100%**

Based on the results of the passing skills test taken by 20 female students who are members of the Muhammadiyah University Surakarta Volleyball Student Activity Unit (UKM) team, data were obtained showing variations in skill levels among players. The highest score achieved in the overhead passing test was 89, while the lowest score was 65. Descriptive statistical analysis produced an average score of 74.53 with a standard deviation of 7.12, reflecting a fairly diverse spread of participants' abilities around the average score. The overhand passing skill was measured using a test instrument adapted from the method developed by Jariono et al (2023), so that the test results were considered valid and able to represent the level of mastery of the overhand passing technique objectively. To provide a clearer picture of the distribution of these skill achievements, a table containing the overhand passing test results for each player is presented below.

Table 2.
Upper Passing Test Results

Class Interval	Description	Frequency	Percentage
≥87	Verry Good	2	10%
79-86	Good	5	25%
72-78	Currently	5	25%
65-71	Low	8	40%
≤64	Very Low	0	0%
Total		**20**	**100%**

The results of the upper service skill measurements of 20 students who are members of the Women's Volleyball Student Activity Unit (UKM) Team at Muhammadiyah University Surakarta show differences in skill levels among players. In this test, the highest score achieved was 35, while the lowest score recorded was 21. Descriptive statistical analysis produced an average value of 25.75 with a standard deviation of 3.99, which illustrates the variation in the participants' mastery of the overhand serve

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

technique around that average value. Data collection was conducted using a test instrument developed by Jariono et al (2023) so that the measurement results obtained had an adequate level of validity and reliability in representing the players' overhand serve skills. To clarify the distribution pattern of the test results, a table containing the overhand serve skill achievements of each research participant is presented below;

Table 3.
Servis Test Results

Class Interval	Description	Frequency	Percentage
≥31	Verry Good	3	15%
28-30	Good	4	20%
24-27	Currently	7	35%
21-23	Low	6	30%
≤20	Very Low	0	0%
Total		**20**	**100%**

The results of smash skill testing on 20 female students who are members of the Muhammadiyah University Surakarta Volleyball Student Activity Unit (UKM) showed variations in technical ability among players. In this test, the highest score achieved was 34, while the lowest score was 21, indicating differences in the level of smash technique mastery among participants. Descriptive statistical analysis yielded an average score of 26.10 with a standard deviation of 3.78, reflecting the distribution of players' smash abilities around the average score. Smash skills were measured using a test instrument developed and validated by Jariono et al. (2023), so that the results obtained have an adequate level of validity and reliability in representing the players' smash technique abilities. To provide a more comprehensive picture of the distribution of test results, the following table shows the smash skill achievements of each participant:

Table 4.
Smash Test Results

Class Interval	Description	Frequency	Percentage
≥32	Verry Good	3	15%
28-31	Good	1	5%
24-27	Currently	11	55%
20-23	Low	5	25%
≤19	Very Low	0	0%
Total		**20**	**100%**

In general, the results of the study show that the level of mastery of basic volleyball skills in the women's volleyball team of the Muhammadiyah University of Surakarta shows variations in achievement in each technical component tested. Underhand and overhand passing skills are still dominated by the moderate to poor categories, indicating that consistency and accuracy in executing basic techniques, especially in the early stages of mastering the game, still need to be improved. In terms of overhand serving, the majority of players are in the moderate category, although there are several players who demonstrate suboptimal technical mastery. Meanwhile, smash skills tended to be in the moderate category, indicating that the players' attacking abilities had developed but still needed strengthening to be performed more effectively and efficiently in match

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

situations. Overall, these findings provide an objective picture that the mastery of basic volleyball techniques among players still requires more structured coaching and continuous evaluation of training programmes to improve individual performance quality and contribute to overall team performance.

Discussion

The findings of this study reveal substantial variability in the level of mastery of basic volleyball skills, namely underhand passing, overhand passing, overhand serving, and smashing, among members of the women's volleyball team at Universitas Muhammadiyah Surakarta. These variations indicate that technical proficiency among university-level female athletes remains uneven across skill components, despite regular participation in structured training activities. Importantly, all skills were assessed using instruments that had undergone rigorous validity and reliability testing, ensuring that the results accurately reflect the athletes' actual technical competence rather than measurement bias (Jariono et al., 2023).

Underhand Passing

Underhand passing, which functions as the primary skill for serve reception and initial ball control, was predominantly classified in the moderate to poor category. This finding suggests that fundamental biomechanical elements such as lower body stability, forearm angle alignment, and directional control have not yet been mastered optimally. In game situations, deficiencies in underhand passing often disrupt the transition from defence to offence, limiting the team's ability to organize effective attacks.

These results are consistent with Ilham et al. (2019), who reported that underhand passing ability among high school extracurricular volleyball participants generally fell within the moderate category due to inconsistent execution of basic movement patterns. However, the present findings are more critical, given that the participants are university students who theoretically possess greater physical maturity, neuromuscular coordination, and training experience. This discrepancy indicates that age and training duration alone do not guarantee technical mastery if training quality and evaluation mechanisms are insufficient.

In contrast to intervention-based studies by Driptiano and Indahwati (2018) and Faozi et al. (2019), which demonstrated improvements in underhand passing through specific instructional and drill-based approaches, this study provides a baseline technical profile without the influence of targeted interventions. As such, the findings highlight that underhand passing remains a persistent technical challenge even at the university level and reinforce the need for structured, feedback-oriented training that emphasizes movement precision rather than repetitive volume alone.

Overhand Passing

The results for overhand passing similarly indicate that most players fall within the moderate to poor category. This reflects shortcomings in coordination between footwork and hand positioning, timing of finger contact, body alignment, and force regulation during ball propulsion. Overhand passing is a critical determinant of offensive

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

variability, as the quality of the set directly affects the effectiveness and predictability of attacking plays. When this skill is underdeveloped, offensive strategies become limited and easier for opponents to anticipate.

These findings align with Pamungkas et al. (2024), who observed significant variability in passing abilities among junior volleyball players based on age and developmental characteristics. However, unlike junior athletes, the subjects of the present study represent a women's university team with greater physical readiness, suggesting that technical inefficiencies are more likely attributable to training structure and technical emphasis rather than developmental constraints.

While Fanani (2020) reported notable improvements in overhand passing following structured drill-based interventions, the current study emphasizes real-condition technical mapping without experimental manipulation. Despite methodological differences, both lines of evidence converge on the conclusion that improvements in coordination, timing, and force control through systematic and progressive training are essential for enhancing team offensive effectiveness.

Overhand Serving

The assessment of overhand serving revealed that most athletes were classified at an intermediate level, with a proportion still demonstrating low proficiency. This pattern indicates instability in serve mechanics, including inconsistencies in ball toss, arm swing synchronization, trunk involvement, and point of contact. In competitive volleyball, serving is not merely a means of initiating play but also a strategic opportunity to score direct points or disrupt the opponent's offensive organization.

The present findings corroborate those of Setiawan (2022), who reported similar inconsistencies in serve execution among extracurricular students. However, they contrast with the results of Ramara et al. (2025), who found higher levels of serve control among male club players, attributable to superior physical conditioning and more advanced training experience. This comparison underscores the influence of training intensity, biomechanical refinement, and contextual exposure to competitive demands on serving performance.

Overall, the results confirm that serving effectiveness is strongly dependent on technical stability and accuracy, and that inconsistent mechanics can significantly reduce a team's competitive advantage. Consequently, serving training at the university level should incorporate biomechanical feedback, accuracy-based targets, and pressure-simulated conditions to enhance consistency.

Smashing

The results related to smash skills indicate that although most athletes reached an intermediate level, their attacking effectiveness remains suboptimal. Smashing is a complex skill requiring precise integration of lower limb power, core stability, arm swing coordination, jump timing, and directional accuracy. Weakness in any of these components can markedly diminish attack success.

These findings are consistent with Fauzi and Jariono (2022), who identified variability in smash performance among female volleyball players due to limitations in coordination and timing. Conversely, Yoga et al. (2025) reported higher smash accuracy

Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

among male club players, highlighting the role of advanced physical conditioning and mature training exposure. The contrast reinforces the notion that effective smashing is contingent upon the synchronization of physical and technical elements rather than technical execution alone.

Accordingly, the present findings emphasize that smash development should be supported by integrated training approaches combining strength, plyometrics, coordination drills, and technique refinement to ensure efficient energy transfer and movement timing.

Overall Interpretation and Implications

The predominance of moderate to poor performance across most technical components indicates that regular training participation alone is insufficient to ensure optimal technical development. These results align with previous descriptive studies reporting wide variations in volleyball skill mastery across educational levels (Hanafi, 2025; Rahmi, 2025). However, unlike most prior research focusing on secondary school populations, this study highlights the technical realities of female university athletes, who possess distinct physical, motor, and contextual characteristics (Marpaung et al., 2025).

By separately and systematically mapping each basic skill using standardized instruments, this study provides a detailed diagnostic profile of technical strengths and weaknesses. The findings further support the argument that technical mastery is influenced not only by training frequency but also by movement quality, motor control, and the extent to which training conditions resemble actual match demands—particularly for complex skills such as smashing that require precise coordination of power, accuracy, and timing (Palinata, 2023).

CONCLUSION

The results of the study indicate that the basic volleyball skills of the women's team at the Muhammadiyah University of Surakarta, UKM, including underhand passing, overhand passing, overhand serving, and smashing, are still dominated by the moderate to poor categories. This indicates that although regular training has been carried out, aspects of movement coordination, technical stability, and hitting accuracy are not yet fully optimal, which can affect the effectiveness of the team's attack patterns. These findings confirm that skill development depends not only on the frequency of training but also on the quality of structured training, focus on technique, and simulation of match conditions. This study provides a comprehensive overview of the strengths and weaknesses of each technical aspect, thus serving as an important foundation for more systematic coaching, individual performance development, and overall team performance improvement at the university level.

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Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

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Sae Dikdaya Nyatara[1A-E*], Gatot Jariono[2A-C], Vera Septi Sistiasih[3A-C], Eko Sudarmanto[4B-D]
a810200123@student.ums.ac.id*

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