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A Descriptive Quantitative Study Of Smash Skills Among Volleyball Players Of Bintang 04 Club In Jambi City

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]

[1,2,3] Universitas Jambi, Jambi, Indonesia

arendesri@gmail.com[1*], boyindrayana@unja.ac.id[2], iwanbudi@unja.ac.id[3]

ABSTRACT

Volleyball is a popular team sport that requires mastery of various technical skills to achieve optimal performance during competition. One of the most important offensive techniques in volleyball is the smash, which is used to score points by striking the ball forcefully into the opponent's court. Based on preliminary observations, Bintang 04 Club in Jambi City, established in 2011, is one of the volleyball clubs that actively develops athletes and provides adequate training facilities, including a volleyball court and supporting equipment for training and competitions. The athletes in this club demonstrate promising technical abilities; however, an objective evaluation of their smash skills is necessary to support the development of effective training programs. Therefore, this study aims to provide a comprehensive description of the smash skills of volleyball players at Bintang 04 Club in Jambi City. This research employed a quantitative descriptive method to describe the level of smash ability based on the indicators of a smash skill test. The population consisted of 34 athletes, from which 13 players were selected as research participants using purposive sampling. Data were collected through a smash skill test that evaluated four main stages of the smash technique: approach, jumping, hitting, and landing. The results showed that the approach stage obtained a mean score of 81 (SD = 8.96), with scores ranging from 67 to 93. In the jumping stage, the mean score was 79 (SD = 8.37), with scores ranging from 73 to 93. In the hitting stage, the mean score was 84 (SD = 7.51), with scores ranging from 67 to 93. Meanwhile, the landing stage obtained a mean score of 85 (SD = 8.67), with scores ranging from 67 to 93. In conclusion, the smash skills of volleyball players at Bintang 04 Club in Jambi City are classified in the "Good" category, with an overall average score of 82%. These findings indicate that the athletes demonstrate adequate technical ability in performing smash movements and provide useful information for coaches in improving training programs to enhance offensive performance in volleyball.

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INTRODUCTION

Volleyball is one of the most popular team sports played worldwide and continues to develop rapidly in both recreational and competitive environments. The sport demands a combination of physical fitness, technical skills, tactical intelligence, and effective teamwork to

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

achieve optimal performance during matches (Sheppard et al., 2018; Ziv & Lidor, 2019). In modern volleyball competition, teams must perform a series of coordinated movements such as serving, passing, setting, blocking, and attacking in order to maintain control of the game and generate scoring opportunities (Palao & Ahrabi-Fard, 2020). Among these technical elements, the smash or spike plays a crucial role as the primary offensive technique used to score points and break the opponent's defensive structure. A smash is defined as a powerful attacking action in which a player jumps and strikes the ball forcefully downward into the opponent's court with the intention of making it difficult for the opposing team to defend or return the ball(Forthomme et al., 2019). In competitive volleyball matches, the effectiveness of a smash often determines the success of an attacking strategy, as a well-executed smash can immediately generate points or force defensive errors from opponents (Palao et al., 2018). Consequently, mastering smash technique is essential for volleyball athletes because it directly influences offensive productivity and overall team performance. Technically, the smash movement consists of several integrated phases, including the approach step, take-off, arm swing and ball contact, and landing phase (Coleman et al., 2017). Each phase requires precise coordination between the lower and upper body segments, appropriate timing, and sufficient muscular strength to produce maximum power and accuracy. During the approach phase, athletes generate forward momentum through coordinated steps before transitioning into a vertical jump during the take-off phase. The hitting phase involves explosive upper-body movement to strike the ball at the highest possible point, while the landing phase requires balance and control to prevent injury and maintain readiness for the next play (Tilp & Wagner, 2021).

In practical training settings, many volleyball athletes still encounter difficulties in performing effective smash techniques. Some athletes demonstrate insufficient jump height, poor coordination between the approach and take-off phases, or inaccurate ball contact during the hitting phase (Nikolaidis et al., 2020). These technical deficiencies can reduce the effectiveness of attacks and limit the team's ability to score points during matches. Therefore, evaluating athletes' smash abilities becomes an important step in identifying technical strengths and weaknesses that require improvement through targeted training programs. From a coaching perspective, systematic evaluation of technical skills plays a significant role in improving athlete performance. Coaches require accurate information about the level of technical mastery of their athletes in order to design training programs that address specific performance needs (Bompa & Buzzichelli, 2019). Without objective evaluation of fundamental skills such as the smash, training programs may not effectively target the technical deficiencies experienced by athletes. Consequently, descriptive analysis of smash skills among volleyball players is essential to support evidence-based coaching practices.

In the context of local sports clubs, such evaluations are even more important because club-level athletes are often in the developmental stage of their technical and physical abilities. Clubs serve as the foundation for athlete development and talent identification within the broader sports system (Bishop et al., 2019). Understanding the technical proficiency of athletes within a club environment allows coaches to implement more structured and systematic training strategies that can improve both individual performance and overall team competitiveness. Recent research in sports science and volleyball performance has

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

highlighted the importance of smash ability as a key determinant of successful attacking performance. Studies in sports biomechanics indicate that effective smash performance is influenced by the coordination of body segments, particularly the synchronization between lower-body power generation and upper-body hitting mechanics (Tilp & Wagner, 2021). Proper coordination during the approach and take-off phases contributes significantly to achieving greater jump height and optimal hitting position, which ultimately enhances smash effectiveness (Fuchs et al., 2019).

Explosive leg power is widely recognized as a fundamental physical component supporting smash performance. Several studies have reported that athletes with greater lower-limb power tend to achieve higher vertical jumps, allowing them to contact the ball at a higher point above the net (Sheppard et al., 2018; Sattler et al., 2020). This advantage provides attackers with a wider range of attack angles and increases the likelihood of scoring points through powerful spikes. In addition to lower-body power, upper-body strength and coordination also contribute significantly to smash performance. Research indicates that shoulder and arm muscle strength influence the speed and force of the ball during the hitting phase (Forthomme et al., 2019). The kinetic chain mechanism, which involves the transfer of energy from the lower body through the trunk to the upper limbs, plays a crucial role in producing powerful and accurate smash actions (Suchomel et al., 2018). Furthermore, training methods designed to improve smash ability have been widely explored in previous studies. Skill-based drills, repetitive technical practice, and game-based training approaches are commonly used to enhance the coordination and timing required in smash execution (Gabbett & Georgieff, 2017). Some researchers have also emphasized the importance of integrating physical conditioning with technical training to optimize smash performance (Ziv & Lidor, 2019). Anthropometric characteristics such as body height, arm length, and body composition have also been identified as contributing factors to smash performance. Taller athletes with longer arm spans generally possess biomechanical advantages that allow them to reach higher contact points during the spike (Nikolaidis et al., 2020). However, technical proficiency and training experience remain critical determinants of effective smash performance regardless of anthropometric differences. Overall, the existing body of literature demonstrates that smash ability in volleyball is influenced by multiple factors including physical conditioning, biomechanical efficiency, technical skill, and training methodology. These findings highlight the complexity of smash performance as a motor skill that integrates physiological, biomechanical, and technical components. Despite the extensive research examining factors influencing smash performance, most previous studies have focused primarily on experimental training interventions or physical conditioning variables that affect smash outcomes. Many investigations analyze the effects of strength training, plyometric exercises, or biomechanical adjustments on improving smash performance among volleyball athletes (Sattler et al., 2020; Suchomel et al., 2018). While these studies provide valuable insights into performance enhancement strategies, they often overlook the importance of descriptive evaluation of technical skills in real training environments**.**

Descriptive studies that specifically analyze the actual level of smash ability among athletes within a club training context remain relatively limited. Most available research

focuses on elite athletes or professional competitions, where athletes already possess advanced technical abilities (Tilp & Wagner, 2021). Consequently, there is still insufficient empirical information regarding the technical proficiency of developing athletes in local volleyball clubs. Another limitation in existing literature is the lack of detailed evaluation of smash technique based on its movement phases. Many studies assess smash performance only through outcome variables such as ball speed or attack success rate during matches. However, these performance indicators do not fully capture the quality of the movement technique used by athletes during smash execution. Understanding the technical characteristics of smash movements including the approach, take-off, hitting, and landing phases can provide more comprehensive insights into athletes' technical abilities. Such analysis allows researchers and coaches to identify specific aspects of the technique that require improvement in order to optimize attacking performance.

Moreover, research focusing on club-level volleyball athletes in developing regions is still scarce. Local clubs play a critical role in nurturing young athletes and developing future competitive players, yet empirical studies examining technical skills within these environments remain limited. Without sufficient data on the technical abilities of club athletes, it becomes difficult for coaches and sports practitioners to design effective training programs that align with the athletes' developmental needs. Therefore, there is a clear need for research that provides a quantitative descriptive analysis of smash skills among volleyball players in a club training environment. Such research can fill the existing gap in the literature by providing empirical data regarding the technical level of athletes and the distribution of their smash abilities. Based on the aforementioned considerations, this study aims to analyze the smash ability of volleyball players at Bintang 04 Club in Jambi City using a quantitative descriptive research approach. Specifically, this research seeks to describe the level of smash skills among athletes based on several technical indicators related to the phases of smash movement, including approach, take-off, hitting, and landing. The primary research question addressed in this study is: "How is the level of smash ability among volleyball players at Bintang 04 Club in Jambi City based on technical skill indicators?" The findings of this research are expected to provide an objective overview of athletes' smash abilities, which can serve as an evaluative reference for coaches in designing more effective training programs. By identifying the strengths and weaknesses in each phase of the smash technique, coaches can implement more targeted training strategies to improve offensive performance among athletes.

The novelty of this study lies in its focus on descriptive evaluation of smash technique through structured analysis of each movement phase among club-level athletes. Unlike many previous studies that primarily examine training interventions or elite-level performance, this research emphasizes the importance of evaluating technical skills within the real context of club training environments. Furthermore, this study contributes to the development of volleyball coaching knowledge by providing empirical data on the technical abilities of athletes at the grassroots level. The results are expected to support the design of evidence-based training programs and enhance the effectiveness of coaching strategies aimed at improving smash performance. In conclusion, smash ability is a fundamental component of volleyball performance that significantly influences a team's offensive effectiveness. The successful execution of a

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

smash requires the integration of several technical phases, including approach, jumping, hitting, and landing, supported by adequate physical conditioning and coordination. Although numerous studies have explored the factors influencing smash performance, limited research has focused on describing the actual technical abilities of athletes within local club training environments. This study addresses this gap by providing a quantitative descriptive analysis of smash skills among volleyball players at Bintang 04 Club in Jambi City. By evaluating each phase of the smash technique, this research aims to provide a comprehensive overview of athletes' technical abilities and contribute to the development of more effective volleyball training programs.

METHODS

This study employed a descriptive quantitative research design aimed to objectively describe the smash skill levels of volleyball athletes at the Bintang 04 Club in Jambi City. The descriptive approach was chosen because this study did not aim to test causal relationships or the effectiveness of a training intervention, but rather to provide an empirical overview of athletes' smash skill levels based on measurable skill indicators (Creswell & Creswell, 2018; Thomas et al., 2022). In sports research, a quantitative descriptive approach is often used to evaluate athletes' technical skill levels within a specific training context, thus providing the basis for planning more effective training programs (Bompa & Buzzichelli, 2019; Ziv & Lidor, 2019). This study was conducted at the Bintang 04 Volleyball Club in Jambi City, a sports club that actively trains volleyball athletes at the regional level. The study population consisted of 34 registered athletes who actively participated in regular training activities at the club. From this population, 13 athletes were selected as the research sample using a purposive sampling technique. This technique was chosen because it allowed researchers to determine the sample based on specific criteria relevant to the research objectives (Etikan & Bala, 2017). The sample selection criteria included: (1) athletes actively participating in regular club training, (2) experience participating in volleyball matches or competitions, and (3) adequate physical condition to perform the smash skill test. This approach aimed to ensure that the research sample truly represented athletes with basic smashing skills (Nikolaidis et al., 2020).

Data collection was conducted using a smash skill test instrument designed to systematically evaluate athletes' technical ability to execute the smash movement. Smash skill assessment focused on four main stages of the movement: approach (starting step), jumping (jump), hitting (hit), and landing (landing). These four stages are the main components of the biomechanics of the smash movement, which determine the effectiveness of attacks in volleyball (Tilp & Wagner, 2021; Fuchs et al., 2019). Each stage was assessed using predetermined performance indicators to maintain consistency and objectivity in the assessment process.

Assessment was conducted through direct observation during training sessions, where athletes were asked to perform smash techniques according to instructions given by the researcher. Observations were recorded using a structured evaluation sheet containing assessment criteria for each phase of the smash movement. This rubric-based observation method is widely used in sports skills research because it allows for systematic and reliable assessment of movement techniques (Gabbett & Georgieff, 2017; Sheppard et al., 2018).

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

Table 1.
Smash Skill Assessment Indicators

No	Movement Phase	Assessment Indicators	Score
1	Approach	Coordination of the initial step, rhythm of the step, and body position before the jump	1–5
2	Jumping	Jump height, body balance, and foot coordination	1–5
3	Hitting	Ball contact accuracy, hitting power, and hand coordination	1–5
4	Landing	Landing stability, body balance, and readiness for subsequent movements	1–5

The research procedure was carried out through several systematic stages. First, the researcher coordinated with club administrators and coaches to determine the research schedule. Second, the researcher explained the research objectives and the smash test procedures to the athletes to ensure that all participants understood the instructions. Third, the athletes were asked to perform several smash attempts according to the established test procedures, while the researcher and research assistants observed and recorded performance scores based on the assessment indicators. All data collection processes were conducted under relatively similar field conditions and training times to minimize the influence of external variables (Hopkins et al., 2016). The data obtained were then analyzed using descriptive statistics to describe the athletes' overall smash skill level. The analysis was performed by calculating the average (mean), standard deviation, highest score, and lowest score for each phase of the smash movement (Field, 2018). Furthermore, the scores were converted into percentages and skill level categories to provide a clearer interpretation of the athletes' smash ability levels. This descriptive statistics approach is commonly used in sports skills research to provide an empirical picture of the distribution of athletes' technical abilities within a specific group (Thomas et al., 2022).

RESULTS AND DISCUSSION

Description of Research Results

This study aimed to describe the level of smash skills among volleyball players of Bintang 04 Club in Jambi City. Each athlete was given three opportunities to perform the smash technique, and the highest score obtained from the three attempts was used as the final score for analysis. The smash skill assessment was conducted based on four fundamental technical phases of the smash movement: approach, jumping, hitting, and landing.

Table 2
Smash Skill Test Indicators of Bintang 04 Volleyball Club Players

No	Test Item	Indicator	Percentage	Category
1	Approach	One-foot approach step	83%	Good
		Running approach	75%	Good
		Arm swing and leg drive	85%	Good
	Average		81%	Good
2	Jumping	Floating body position in the air	75%	Good
		Arms extended upward	78%	Good
		Vision directed toward the ball	85%	Good
	Average		79%	Good

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arendesri@gmail.com[1*]

No	Test Item	Indicator	Percentage	Category
3	Hitting the Ball	Powerful ball contact	82%	Good
		Arm swing movement	86%	Very Good
		Body flexion during hit	83%	Good
	Average		84%	Good
4	Landing	Landing with both feet	91%	Very Good
		Knees slightly bent	86%	Very Good
		Maintaining balance after landing	78%	Good
	Average		85%	Good

Based on Table 2, all phases of the smash skill test obtained percentage scores within the "Good" category. The highest performance was observed in the landing phase (85%), followed by hitting (84%), approach (81%), and jumping (79%). These findings indicate that the athletes generally demonstrate good technical ability in executing smash movements during training sessions.

Smash Skill Scores of Individual Athletes

The percentage scores obtained by each athlete for every technical phase of the smash skill are presented in Table 2.

Table 3
Smash Skill Scores of Bintang 04 Volleyball Club Players

No	Name	Approach	Jumping	Hitting	Landing	Average
1	Fadli	93	87	93	93	92
2	Legi Putra	87	73	87	87	83
3	Ilham Kurniawan	87	87	80	87	85
4	Farel Andeska	73	73	87	93	82
5	Agustian	67	73	87	93	80
6	Alan Gustian	87	87	80	80	83
7	Muhammad Alif	73	73	73	93	78
8	Onggal Omi Putra	73	73	67	73	72
9	Arya Yones Pratama	87	93	87	80	87
10	Jeffio Chandra	73	73	80	93	80
11	Dorel Saputra	93	93	87	87	90
12	Andre Putra	87	73	87	67	78
13	Andiska	73	73	93	80	80
	Average	**81**	**79**	**84**	**85**	

The results in Table 3 show that athletes demonstrate varying levels of performance across the four technical components of the smash skill. Some athletes showed consistent performance across all indicators, while others displayed stronger performance in specific phases. For example, Fadli and Dorel Saputra achieved the highest average scores (92% and 90%), indicating excellent technical mastery in all smash phases. In contrast, Onggal Omi Putra recorded the lowest average score (72%), suggesting the need for further improvement, particularly in the hitting phase. Several athletes demonstrated strong performance in particular technical aspects. For instance, Arya Yones Pratama achieved the highest jumping score (93%), while Fadli and Andiska showed excellent performance in the hitting phase (93%). These findings indicate that individual athletes possess different strengths within the technical execution of smash skills.

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

Descriptive Statistical Analysis of Smash Skills

To provide a clearer overview of the overall smash skill performance among the athletes, descriptive statistical analysis was conducted. The results are presented in Table 4.

Table 4
Descriptive Statistics of Smash Skill Performance

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Approach	13	81	8.96	67	93
Jumping	13	79	8.37	73	93
Hitting	13	84	7.51	67	93
Landing	13	85	8.67	67	93

The descriptive statistical results indicate that the highest average score was obtained in the landing phase (Mean = 85), while the lowest average score was found in the jumping phase (Mean = 79). The relatively moderate standard deviation values suggest that the distribution of athletes' scores across all phases was relatively consistent. These findings indicate that although the athletes generally demonstrate good smash technique, the jumping phase remains the weakest technical component, which may require further emphasis in training programs.

Frequency Distribution of Smash Skill Categories

To determine the distribution of smash skill performance levels among the athletes, the scores were categorized into performance norms as shown in Table 4.

Table 5
Frequency Distribution of Smash Skill Performance

Interval	Category	Frequency	Percentage
85–100%	Very Good	2	15%
65–84%	Good	11	85%
45–64%	Moderate	0	0%
25–44%	Poor	0	0%
0–24%	Very Poor	0	0%
Total		**13**	**100%**

The results show that 85% of the athletes (11 players) fall into the "Good" category, while 15% (2 players) are categorized as "Very Good." No athletes were categorized as moderate, poor, or very poor. These results indicate that the overall smash skill level of Bintang 04 Volleyball Club athletes can be considered good, with several athletes demonstrating very good technical performance.

Discussion

This study aims to analyze the smashing skills of volleyball players from the Bintang 04 Club in Jambi City, based on the four main stages of the smashing movement: approach, jump, hit, and landing. Based on data analysis from the 13 athletes sampled in the study, the average overall smashing skill score was in the good category. This result indicates that the athletes have a sufficient level of smashing technique mastery, consistent with the smashing skill assessment indicators in modern volleyball. Achieving

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

this good category is inseparable from the structured training process carried out at the club, including basic technique training, physical conditioning training, and game practice provided by the coaches.

In volleyball, mastery of basic techniques is a crucial aspect that determines the quality of an athlete's performance. Good basic techniques will help players perform various skills effectively and efficiently in match situations (Tilp & Wagner, 2019). According to the concept of sports technique, technique is a movement procedure developed through repeated practice to produce the most economical and effective movement in completing a specific motor task (Bompa & Buzzichelli, 2019). Therefore, a player's success in executing the smash technique is influenced not only by physical ability, but also by mastery of proper movement techniques and good body coordination.

Volleyball generally involves two main game patterns: offensive play and defensive play. Both patterns require a good mastery of basic techniques to be optimally implemented in matches (Palao & Ahrabi-Fard, 2020). One of the most dominant basic techniques used to score points in volleyball is the smash. The smash is the primary attack technique, performed by hitting the ball hard and sharply into the opponent's court, making it difficult to return (Millán-Sánchez et al., 2017). Other research also shows that successful attacks through smashes are a key indicator of victory in volleyball matches (Sarmento et al., 2018). The results of this study indicate that the athletes' smashing skills were generally in the good category, with average scores for each stage of the smash technique: 81% for the run-up, 79% for the jump, 84% for the hit, and 85% for the landing. These findings indicate that the athletes have mastered the smash technique quite well. These results align with previous research, which states that the success of a smash in volleyball is influenced by coordination between the movement stages, including the run-up, push-off, hit, and landing (Costa et al., 2018).

In the run-up stage, the results showed that most athletes achieved a very good to good rating, with an average score of 81%. The run-up stage is crucial for an effective smash because it determines the speed and momentum of the movement before the jump (Sheppard et al., 2018). This study demonstrated that most athletes were able to execute a successful run-up by taking a single-footed run-up, running toward the jump, and swinging their arms in a coordinated manner. This shows that the athletes have understood the basic principles of the starting technique in smashing.

However, there was variation in scores among athletes in the starting position category. For example, Agustian achieved the lowest score of 67%, while Fadli and Dorel Saputra achieved the highest score of 93%. This difference indicates that starting technique skills still vary among athletes. Factors such as stride speed, body movement coordination, and leg muscle strength can influence the effectiveness of the starting position in a smash (Nikolaidis et al., 2020). Athletes with better starting technique tend to be able to generate greater momentum, which can increase the height of their jump when smashing. In the jumping phase, the average score was 79%, which is still in the good category. The jump is a crucial phase in the smash because it determines the height of the ball's contact point during the shot. The higher the jump, the greater the player's

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

chance of delivering a sharp shot that is difficult for the opponent to block (Agopyan, 2018). In this study, Arya Yones Pratama and Dorel Saputra demonstrated excellent jumping ability with scores of 93%, while several other athletes scored lower, at 73%.

Variations in jumping ability can be influenced by several factors, such as leg muscle strength, explosive power, and body coordination. Previous research has shown that vertical jump ability has a strong relationship with smash effectiveness in volleyball (Sattler et al., 2020). Therefore, improving jumping ability can be achieved through specific exercises such as plyometric training, squat jumps, and depth jumps, which have been shown to be effective in increasing leg muscle power in volleyball athletes (Suchomel et al., 2018).

In the hitting phase, the study showed an average score of 84%, which is also in the good category. The hitting phase is the core of the smash movement because it is during this phase that the energy generated from the run-up and jump is transferred through the arm movement to produce a powerful and targeted hit (Fuchs et al., 2019). In this study, Fadli and Andiska achieved the highest scores of 93%, while Onggal Omi achieved the lowest score of 67%. This difference in scores indicates that hitting ability varies among athletes. Factors such as arm muscle strength, shoulder coordination, and arm swing technique significantly influence the quality of a smash (Ziv & Lidor, 2019). Furthermore, players must be able to hit the ball at the highest point to avoid blocks from opponents and produce a more effective shot (Mapato & Wanapat, 2018). Therefore, targeted hitting technique training and arm muscle strength training are crucial for improving the quality of a player's smash.

In the landing phase, research results showed an average score of 85%, which falls within the good to excellent category. The landing phase is often considered the final phase of the smash movement, but it plays a crucial role in maintaining body balance and preventing injury (Bahr & Krosshaug, 2016). Athletes with good landing technique are able to maintain body stability after a jump, allowing them to quickly return to a ready-to-play position. In this study, most athletes were able to land well by landing on both feet with slightly bent knees and maintaining body balance. This indicates that the athletes have good technical awareness for a safe landing. Previous research also confirmed that good landing technique can reduce the risk of lower extremity injuries such as knee and ankle injuries in volleyball athletes (Bahr & Krosshaug, 2016).

Overall, the results of this study indicate that the smashing skills of volleyball athletes from Club Bintang 04 Jambi City are in the good category, with varying abilities at each stage of the movement. These findings indicate that the training program implemented by the coaches has positively contributed to the development of athletes' technical skills. However, several aspects still need improvement, particularly in the jump phase and hitting technique, which still show variation in scores among athletes.

The practical implication of this study is that coaches can use these evaluation results as a basis for designing more specific and targeted training programs. For example, leg muscle power training can be focused on improving jumping ability, while hitting technique and body coordination training can be conducted to improve smash

Aren Desri[1A-E*], Boy Indrayana[2B-D], Iwan Budi Setiawan[3B-D]
arendesri@gmail.com[1*]

accuracy and power. Furthermore, balance and landing technique training should also be maintained so that athletes can execute smashes safely and effectively during matches.

Thus, this study provides an empirical overview of the smashing skills of volleyball athletes at the club level. The results also confirm that mastery of good smash technique is a crucial factor in improving attacking performance in modern volleyball. Therefore, integrated training between technique, physical condition, and motor coordination is essential to improve the effectiveness of athletes' smashes in matches.

CONCLUSION

Based on the data analysis and discussion of the research on smash skills among volleyball players from Club Bintang 04, Jambi City, it can be concluded that, in general, the athletes demonstrated a good level of smash technique mastery. Smash skill assessment in this study was based on the four main stages of the smash movement: the approach, the jump, the hitting, and the landing.

The results showed that in the approach stage, athletes' scores ranged from 67% (the lowest) to 93% (the highest), with an average score of 81%, which falls within the good category. This indicates that most athletes were able to perform the running-up step, coordinate their running movements, and perform the arm swing and leg push adequately in preparation for the jump.

In the jump stage, the results showed a low score of 73% and a high score of 93%, with an average score of 79%. These results indicate that the athletes' jumping ability is generally in the good category, although some athletes still need to improve their leg muscle strength and power to produce higher and more effective jumps when smashing.

Furthermore, in the aerial hitting stage, the lowest score was 67% and the highest was 93%, with an average of 84%. This indicates that most athletes have developed quite good hitting technique, particularly in arm swing coordination, hitting power, and the ability to hit the ball in the correct position.

Meanwhile, in the landing stage, the study showed the lowest score was 67% and the highest was 93%, with an average of 85%. These results indicate that the athletes are able to execute good landing techniques, such as landing on both feet, bending the knees to absorb impact, and maintaining body balance after the jump.

Overall, the smashing skills of the Bintang 04 Club volleyball players in Jambi City achieved an average score of 82%, which is in the good category. These results indicate that the athletes have developed quite good smashing skills, meeting the volleyball smashing skill indicators. Therefore, the athletes' smashing skills can be a valuable asset in increasing the effectiveness of attacks in volleyball. Although more targeted training is still needed to continuously improve the athletes' technique and physical strength.

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Finally, the authors hope that the findings of this research can provide useful contributions to the development of sports science, particularly in the field of volleyball coaching and athlete performance evaluation. It is also expected that the results of this study can serve as a reference for coaches, researchers, and practitioners in designing more effective training programs aimed at improving smash skills and overall volleyball performance.

REFERENCES

Adhi, B. P., Sugiharto, S., & Soenyoto, T. (2017). Pengaruh metode latihan terhadap kemampuan smash bola voli. Jurnal Keolahragaan. https://doi.org/10.21831/jk.v5i1.12804

Afonso, J., Esteves, F., Araújo, R., Thomas, L., & Mesquita, I. (2017). Tactical determinants of setting zone in elite men's volleyball. European Journal of Sport Science, 17(7), 1–9. https://doi.org/10.1080/17461391.2016.1210253

Afonso, J., Mesquita, I., Marcelino, R., & Silva, J. A. (2016). Analysis of the setter's tactical action in volleyball. International Journal of Performance Analysis in Sport. https://doi.org/10.1080/24748668.2016.11868896

Agopyan, A. (2018). Relationship between lower body power and spike jump performance in elite volleyball players. Journal of Human Kinetics, 63, 55–62. https://doi.org/10.1515/hukin-2018-0006

Bahr, R., & Krosshaug, T. (2016). Understanding injury mechanisms in sport through video analysis. British Journal of Sports Medicine, 50(10), 581–585. https://doi.org/10.1136/bjsports-2015-095573

Bompa, T. O., & Buzzichelli, C. (2019). Periodization: Theory and Methodology of Training (6th ed.). Human Kinetics. https://us.humankinetics.com/products/periodization-theory-and-methodology-of-training

Clemente, F. M., Nikolaidis, P. T., Martins, F. M., & Mendes, R. S. (2019). Physical and physiological demands of volleyball training. Frontiers in Psychology. https://doi.org/10.3389/fpsyg.2019.00963

Costa, G. C., Afonso, J., Barbosa, R. V., Coutinho, P., & Mesquita, I. (2018). Predictors of attack efficacy in high-level men's volleyball. Kinesiology, 50(2), 222–229. https://doi.org/10.26582/k.50.2.4

Creswell, J. W., & Creswell, J. D. (2018). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (5th ed.). Sage Publications. https://us.sagepub.com/en-us/nam/research-design/book255675

Forthomme, B., Croisier, J. L., Ciccarone, G., Crielaard, J. M., & Cloes, M. (2017). Factors correlated with volleyball spike velocity. American Journal of Sports Medicine. https://doi.org/10.1177/0363546516680609

Fuchs, P. X., Fusco, A., Bell, J. W., von Duvillard, S. P., & Wagner, H. (2019). Movement characteristics of volleyball spike jump performance in elite athletes. Sports Biomechanics. https://doi.org/10.1080/14763141.2019.1576223

Gabbett, T. J., & Georgieff, B. (2017). Physiological and anthropometric characteristics of elite volleyball players. Journal of Strength and Conditioning Research, 31(3), 802–809. https://doi.org/10.1519/JSC.0000000000001535

Hernandez, E., & Sampaio, J. (2019). Tactical and technical performance indicators in volleyball. Sports Science Review. https://doi.org/10.2478/ssr-2019-0005

Hopkins, W. G., Marshall, S. W., Batterham, A. M., & Hanin, J. (2016). Progressive statistics for studies in sports medicine and exercise science. Medicine & Science in Sports & Exercise, 48(7), 1399–1405. https://doi.org/10.1249/MSS.0000000000000911

Mapato, K., & Wanapat, M. (2018). The effectiveness of attack performance in volleyball spike movement. International Journal of Sports Science, 8(3), 95–101. https://doi.org/10.5923/j.sports.20180803.03

Mesquita, I., Marcelino, R., & Sampaio, J. (2018). Performance indicators in volleyball. International Journal of Sports Science & Coaching. https://doi.org/10.1177/1747954118767543

Millán-Sánchez, A., Morante, J., Ureña, A., & Iglesias-Gallego, D. (2017). Attack effectiveness in elite volleyball. International Journal of Performance Analysis in Sport, 17(5), 641–655. https://doi.org/10.1080/24748668.2017.1372169

Miskin, M., Fellingham, G., & Florence, L. (2018). Skill execution and volleyball performance analysis. International Journal of Sports Science & Coaching. https://doi.org/10.1177/1747954117746660

Nikolaidis, P. T., Afonso, J., Clemente, F. M., & Knechtle, B. (2020). Anthropometric and physical fitness characteristics of volleyball players. Journal of Sports Medicine and Physical Fitness, 60(3), 430–438. https://doi.org/10.23736/S0022-4707.19.10154-1

Palao, J. M., & Ahrabi-Fard, I. (2020). Side-out success in relation to setter position and attack tempo in volleyball. Journal of Human Kinetics, 72, 211–219. https://doi.org/10.2478/hukin-2019-0102

Paulo, A., Zaal, F. T., Fonseca, S., & Araújo, D. (2016). Predicting volleyball serve-reception performance. Human Movement Science. https://doi.org/10.1016/j.humov.2016.03.004

Pratama, Y., & Hartati, S. (2019). Analisis teknik smash pada permainan bola voli. Jurnal Pendidikan Jasmani Indonesia. https://journal.uny.ac.id

Putra, A., & Nugroho, S. (2021). Analisis kemampuan teknik smash pada pemain bola voli. Jurnal Pendidikan Kepelatihan Olahraga. https://journal.unnes.ac.id

Saputra, D., & Wahyudi, A. (2022). Evaluasi keterampilan teknik dasar bola voli pada atlet klub daerah. Jurnal Sport Science Indonesia. https://journal.unesa.ac.id

Sarmento, H., Marcelino, R., Anguera, M. T., Campaniço, J., Matos, N., & Leitão, J. C. (2018). Match analysis in volleyball: A systematic review. International Journal of Performance Analysis in Sport, 18(5), 704–719. https://doi.org/10.1080/24748668.2018.1517259

Sattler, T., Sekulic, D., Hadzic, V., Uljevic, O., & Dervisevic, E. (2020). Vertical jump performance and spike effectiveness in volleyball. Journal of Sports Sciences, 38(4), 432–439. https://doi.org/10.1080/02640414.2019.1702287

Setiawan, A., & Hidayat, T. (2020). Analisis keterampilan teknik dasar bola voli pada atlet pelajar. Jurnal Ilmu Keolahragaan. https://doi.org/10.24114/jik.v19i2

Sheppard, J. M., Gabbett, T. J., & Stanganelli, L. (2018). The relationship between vertical jump ability and playing performance in elite volleyball players. Journal of Strength and Conditioning Research, 32(3), 812–819. https://doi.org/10.1519/JSC.0000000000001805

Suchomel, T. J., Nimphius, S., & Stone, M. H. (2018). The importance of muscular strength in athletic performance. Sports Medicine, 48(4), 765–785. https://doi.org/10.1007/s40279-018-0862-z

Tilp, M., & Wagner, H. (2019). Biomechanics of volleyball spike jump. Sports Biomechanics, 18(5), 1–14. https://doi.org/10.1080/14763141.2018.1453861

Vai, A., et al. (2018). The biomechanics of volleyball spike technique. Journal of Sports Science and Medicine, 17(3), 420–427. https://www.jssm.org

Ziv, G., & Lidor, R. (2019). Physical attributes, physiological characteristics, and performance in volleyball: A review. Journal of Strength and Conditioning Research, 33(6), 1607–1620. https://doi.org/10.1519/JSC.0000000000002123