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Exploring the impact of targeted overhand serve practice intervention: An approach to improve volleyball players' overhand serving skills

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ABSTRACT

Background Problems: The precision of serves in volleyball plays a crucial role in shaping the outcome of a match, potentially altering the game's dynamics, scoring points, and elevating the overall team performance. **Research Objectives:** This study was conducted to assess the impact of targeted overhand serve drill exercises on overhand serve accuracy. **Methods:** This study employed a quasi-experimental approach, utilizing a one-group pretest-posttest design, with 30 volleyball extracurricular participants engaging in targeted overhand service drill exercises over 6 weeks. Data were collected using the AAHPER overhand serve accuracy test, followed by analysis through a paired-sample t-test to assess the effectiveness of the training and determine if there were any differences in outcomes between the two groups, with a significance level set at 5%. Before conducting parametric tests, data normality is examined using the Shapiro-Wilk test, and homogeneity is assessed using Levene's test. **Findings and Results:** In summary, the finding of this study showed that targeted overhand serve drill exercises have a positive effect on enhancing the accuracy of overhand serves in volleyball extracurricular participants. **Conclusion:** In addition, this intervention can be a valuable training method and reference for designing training programs aims at improving overhand serve accuracy in volleyball matches. Future research should implement stricter controls throughout the experimental process.

Keywords: Targeted drills; overhand serve accuracy; volleyball



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INTRODUCTION

Sport has evolved into a lifestyle and has even become a fundamental requirement for the general population in developing a robust body and mind (Malm et al., 2019). People who engage in regular physical activity typically experience better mental and physical health than those who seldom or never exercise (Howie et al., 2016; Nowak, 2014; Rice et al., 2016). Sport fundamentally comprises a sequence of organized and

planned workouts designed to preserve and enhance mobility, fulfill the need for physical activity, and ultimately enhance the overall quality of life (Holt et al., 2017; Jackson et al., 2016).

In the school setting, sports are typically considered extracurricular activities. According to Steinmann et al. (2019), extracurricular activities encompass a series of educational programs conducted outside regular class hours. These programs are designed to address the unique requirements of the school, focusing on fostering the development of students' abilities and passions. Additionally, they strive to encourage a commitment to community involvement, expand perspectives, and enrich values, expertise, and proficiencies across diverse areas such as athletics and creative pursuits (Christison, 2013). Extracurricular activities represent one of the school's strategies for nurturing and enhancing students' abilities (Anjum, 2021). These activities involve specialized training based on students' interests, with the goal of promoting sports development and achieving optimal outcomes (Buckley & Lee, 2021).

Volleyball is a sport that plays a significant role in physical education (Özgül et al., 2019). Engaging in volleyball offers a multitude of benefits, which encompass the development of proper posture involving elements of anatomy, physiology, health, and physical abilities (Devlin, 2022). Moreover, beyond the physical advantages, volleyball also contributes to spiritual growth, fosters personality development, and builds character, thereby enhancing overall quality of life. It is noteworthy that volleyball is a complex sport, and mastering it can be challenging due to the requirement for precise coordination in every facet of the game (Kozina et al., 2018). Volleyball involves several fundamental techniques that players need to become proficient in, including serving, passing, spiking, setting, and blocking (Pellett & Lox, 2017; Qurbanov & Mamatov, 2023). Service plays a fundamental role in the sport of volleyball and can be practiced under conditions that closely simulate actual match situations, without the disruption of the opposing team's defense. These fundamental skills, theoretically, have the greatest potential for efficiency. Consequently, it is crucial to identify the specific training methods that lead to optimal performance (D'Isanto et al., 2017).

The act of serving is a pivotal moment that signals the commencement of a volleyball game. There are several methods of serving, including the underhand serve, overhead serve, and jump serve (Rababah, 2018). According to Stamm et al. (2016), in the early days of volleyball, serving was primarily a means to initiate the game. However, as the sport has evolved, serving has become a strategic attack aimed at earning points. As a result, the techniques and variations of serving in volleyball have significantly progressed. As per Destriana et al. (2020), serving in volleyball is considered one of the fundamental skills that every player should master. A sound volleyball serving technique has a considerable impact on both the offensive and defensive aspects of the game. Hence, dedicated practice is crucial for improving one's top-notch serving skills in volleyball.

The overhand serve is the initial offensive move in a volleyball game, requiring the player to hit the ball over the net into the opponent's territory with increased ball speed and force, aiming to terminate the ball and gain points (Hanifa et al., 2018). This overhand serve proves highly efficient as the first attack, given that the resulting ball poses a challenge for opposing players to handle, offering a significant advantage when executed proficiently (de Oliveira Castro et al., 2021). Nevertheless, mastering the overhand serve tends to be more challenging compared to other serving techniques, thereby elevating the likelihood of service errors such as serving outside the boundaries or falling short (Zhou & Saeed, 2022). Athletes can achieve peak performance through systematically designed training programs (Haugen et al., 2019).

Utilising appropriate training methods for athletes who are learning to serve plays a crucial role in facilitating the teaching and learning process to achieve set goals (Lola & Tzetzis, 2020). One effective approach involves integrating real-game scenarios into training sessions to enhance skill transfer and decision-making capabilities. Additionally, incorporating feedback mechanisms during drill practice sessions can further accelerate skill development and refine technique. Drill practice is recognised as the ideal exercise for enhancing volleyball serving skills, as the method involves repetitive and dedicated practice of the same skill to strengthen and refine it to a point of mastery (Ruslan et al., 2021).

The primary objective of this study is to investigate the potential effectiveness of drill exercises in volleyball for improving the technical skills of athletes. While earlier studies have attempted to analyze exercises designed to enhance the precision of overhand serves (Destriana, et al., 2020; Maldini et al., 2023; Hanifa et al., 2018), none have specifically delved into refining this precision through one-handed ball

throwing drills and targeted overhand serve exercises, particularly in the context of volleyball. This research aims to bridge this knowledge gap, aspiring to offer novel perspectives and meaningful contributions to the field of sports. Additionally, it seeks to enhance the overall performance of volleyball athletes, who frequently face intense pressure and competition that can impact their capabilities (Liu, 2023).

Considering the challenges observed at Vocational High School 8 Palembang related to the ineffectiveness of current volleyball extracurricular activities, numerous students encounter difficulties in mastering fundamental volleyball skills, particularly the overhand serve, which remains underutilized as an offensive strategy (Astuti, 2019). The overhand serve, a critical element for launching attacks, frequently lacks precision, leading to misdirected shots, out-of-bounds serves, and easy interceptions by opponents (Dao & Nguyen, 2021). Additionally, the existing training regimen lacks diversity in enhancing overhand serve accuracy among extracurricular participants. To address these issues, innovative alterations within the volleyball extracurricular program are imperative. Implementing a training approach that places a stronger emphasis on improving overhand serve accuracy can empower students to develop this skill more effectively (Lazunina & Kosheleva, 2020).

Consequently, the researchers propose a study to investigate and evaluate the potential impact of targeted overhand serve drill exercises. These exercises are intended to address the issues surrounding overhand serve accuracy among students actively participating in volleyball extracurricular activities. The research aims to provide valuable insights into the effectiveness of this innovative approach and its potential to rectify the identified problems within the program. The primary research question guiding this study is: "What is the impact of targeted overhand serve drill exercises on overhand serve accuracy among participants in volleyball extracurricular activities?"

METHOD

This study employed a quantitative method that involved a quasi-experimental pretest-posttest group design (Reichardt, 2019; Rogers & Révész, 2019). The design had been customized to assess how the process impacted the desired outcomes. The tasks included gathering data before and after the intervention, specifically focused on the accuracy of overhand service levels among participants in volleyball extracurricular activities. Table 1, which illustrates the pretest-posttest group design, can be found below.

Table 1. Pretest-Posttest Group Design

Sample	Pretest	Treatment	Posttest
N	Y1	X	Y2

Notes:

N = Total sampling; X = Treatment; Y1 = AAHPER serving accuracy test group pretest; Y2 = AAHPER serving accuracy test group posttest (Siyoto & Sodik, 2015).

The study's population consists of 30 participants from the volleyball extracurricular program at State Vocational High School 8 Palembang. The research used a total sampling method, including all 30 participants (Etikan, 2016). The research activities spanned 18 sessions, comprising one session for the initial test, 16 sessions for treatment, and one session for the final assessment. The accuracy of overhand service levels was measured using the AAHPER serving accuracy test, with a validity of 0.92 and a reliability of 0.69 (Badami, 2020). The test score total represents the cumulative score achieved during ten repetitions of the service (Hardiyansyah et al., 2023). Training took place over six weeks, with a total of sixteen training sessions held three times a week, all conducted on the volleyball court at State Vocational High School 8 Palembang. Each session had a duration of 120 minutes and consisted of three parts: warm-up, intervention involving one-handed ball throwing and targeted overhand service drills (intensity ranging from 50% to 80%), and cool-down. The program was designed based on the principles of overload and exercise variation (Bompa & Buzzichelli, 2021). Table 2, depicting the training program, can be found below.

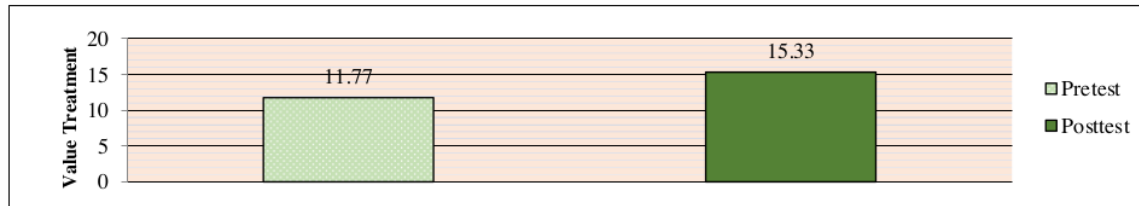
Table 2. 6 Weeks Drill Training Program on Volleyball Extracurricular Participants

No	Exercise	Repetitions			Sets	Total Duration (Including warming up and cooling down)
		1-2 weeks	3-4 weeks	5-6 weeks		
1	One-handed ball throwing drill	20-22	24-26	28-32	3	120 min
2	Targeted overhand serve drill (static & dynamic)	20-22	24-26	28-32	3	

To assess whether there was an enhancement in the effectiveness of targeted overhand serve drill exercises on overhand serve accuracy, the gathered data underwent analysis via a Paired Sample T-test. Initially, the data were subjected to normality testing using the Shapiro-Wilk test and data homogeneity evaluation through Levene's test. Statistical significance was determined at $p < 0.05$ for all analyses. The analysis was executed using SPSS software (version 26.0).

RESULTS AND DISCUSSION

The purpose of this study is to examine the impact of targeted overhand serve drill exercises on improving overhand serve accuracy among participants in the volleyball extracurricular program. Based on the results of the descriptive data, the means for the pretest and posttest groups are presented in Graph 1.



Graph 1. The Average Pretest-Posttest Result

The data in Graph 1 above reveals that the pretest results had an average of 11.77, while the posttest results had an average of 15.33. Furthermore, the table 3 and table 4 below presents the sequential results of data normality and data homogeneity, which are prerequisites before conducting parametric tests. Based on the data display, it can be observed that the data is normally distributed because the significance value (sig.) > 0.05 , and it is homogenous because the significance value (sig.) > 0.05 .

Table 3. Tests of Normality

Group	Shapiro-Wilk		
	Statistic	Df	Sig.
Pretest	0.964	30	0.4
Posttest	0.937	30	0.078

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 4. Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Overhand Serve Accuracy	Based on Mean	1.924	1	58	.171
	Based on Median	1.784	1	58	.187
	Based on Median and with adjusted df	1.784	1	57.849	.187
	Based on trimmed mean	1.924	1	58	.171

Once the data has been established as normally distributed and homogenous, the results of the difference test using the paired sample t-test are presented in Table 5 below.

Table 5. Paired Sample Test

t-test for Equality of means								
Group	Mean	T	t-table	Sig. (2-tailed)	Mean Difference	Percentage Increase (%)	95 % Confidence Interval of the Difference	
							Lower	Upper
Pretest	11.77	13.216	2.0452	0	3.56	30.25	-4.119	-3.015
Posttest	15.33							

Based on the data in Table 5, there was an improvement in overhand serve accuracy among the samples. This is evident from the Sig. (2-tailed) value of $0.000 < 0.05$ and t_{count} value of 13.216 was $>$ than the t_{table} value of 2.0452, which indicates a significant difference between the pretest and posttest results after the participants received one-handed ball throwing and targeted overhand service drill exercises in all groups with a percentage increase of 32.25%.

The commencement of a volleyball game is typically signaled by the overhand serve, which can be viewed as the initial offensive action within a match. This serve is employed to initiate an attack and is a skill that every volleyball player should strive to excel at (Hardiyansyah et al., 2023). During a competitive volleyball match, it is imperative that players deliver potent and accurate serves while sustaining their performance intensity throughout the game (Farhan, 2023). Thus, the ability to consistently and accurately perform overhand serves without significant fatigue is crucial (Idrizovic et al., 2018). Drill exercises provide a concentrated method for improving skills by targeting specific aspects of the game (Alsaudi, 2020). The outcomes of this study may contribute to a more profound comprehension of the efficacy of specialized drill exercises in improving overhand serve accuracy, ultimately benefiting both volleyball players and coaches.

Enhanced training outcomes can be achieved within a timeframe of 2 to 6 weeks when training occurs at a minimum of 3 times per week, and up to a maximum of 12 to 14 times per week (Bompa & Buzzichelli, 2021). The ability of participants to perform an overhand serve can gradually develop with continuous practice (Destriana, et al., 2020). This implies that targeted overhand serve drill exercises can be an effective tool for honing technical skills in volleyball (Forte et al., 2019). Consequently, the findings of this study provide substantial support for the notion that targeted overhand serve drill exercises are an effective method for enhancing the abilities of participants in volleyball extracurricular activities. Additionally, the research Pereira et al. (2015), suggest that one-handed ball throwing exercises are beneficial in improving arm muscle strength and serving abilities. These exercises also engage core muscles, vital for maintaining stability and power (Raeder et al., 2015), through consistent practice of one-handed ball throwing exercises, volleyball players can bolster arm muscle strength (Novianingsih & Irianto, 2019), and achieve greater precision and consistency when executing overhand serve (Yapıcı, 2019).

The research findings indicate that this training has a significant impact and exemplify the extent to which training plays a pivotal role in enhancing participants' ability to execute precise serves and direct the ball accurately. This is attributed to the fact that repetitive drill exercises afford participants opportunities to hone techniques and establish proper movement patterns (Yoke & Armbruster, 2020). In accordance with the viewpoint of Ruslan et al. (2021), target-oriented drill exercises set clear objectives for extracurricular participants, this aids participants in concentrating on specific areas requiring improvement, such as the accuracy of serves. Several studies, including Formenti et al. (2022), have aimed to assess the enhancement in accuracy of volleyball serves by employing modified targets in the learning process. These studies have shown significant improvements.

Systematic and structured overhand serve drill exercises have a significant impact on the accuracy of overhand serve in volleyball games, supported by research conducted by several experts in the field of sports. According to Destriana et al. (2020), systematic and structured overhand serve drill exercises can assist players in developing better overhand serve techniques, including precision in directing the ball to the desired point. Additionally, research conducted by Rifki & Ariston, (2020), also indicate that target-oriented serve drill

exercises can enhance the accuracy of volleyball players' serves. By focusing on specific targets during training, players can become more skilled in controlling the speed and direction of the ball when executing service (D'Isanto et al., 2017). These research results emphasize the significance of targeted drill exercises in enhancing overhand serve skills. Further research may be needed to fully explore the potential of these exercises and their impact on the overall performance of volleyball players.

CONCLUSION

The study's conclusion suggests that targeted overhand serve drill exercises prove to be an effective approach for enhancing overhand serve accuracy among participants engaged in volleyball extracurricular activities. Volleyball demands a combination of skill and strategic understanding, particularly in serving. The serve not only as the game's starting signal but also as an initial offensive move aimed at scoring points by placing the ball in a challenging-to-reach spot for the opponent. The research findings reveal that following a six-week training program, participants exhibited improved proficiency in executing overhand serves with greater precision.

Nonetheless, it is imperative to acknowledge that this study has several limitations. Firstly, the relatively modest sample size may limit the applicability of the study's findings to a broader population. Moreover, the research was confined to participants from a single school's volleyball extracurricular program, potentially rendering the outcomes less representative of diverse contexts and varying levels of volleyball players. Additionally, the study did not include a comparison between the group that underwent drill exercises and the group that did not, making it challenging to ascertain whether the improvements in serve accuracy are solely attributed to the drill exercises or influenced by other factors. Factors such as baseline fitness levels and prior training experiences can impact training outcomes and should be taken into consideration when interpreting the study's results.

For future research endeavors, it is advisable to implement more rigorous controls throughout the experimental process, involve a larger and more diverse sample, and explore variations in training regimens, encompassing aspects like intensity and duration. This would enable a more comprehensive understanding of the effects of overhand serve training on accuracy. A deeper investigation into other factors influencing overhand serve accuracy, including serving techniques, skill levels, and participant's psychological aspects, is warranted. The study's findings offer valuable insights into the significance of targeted and purpose-driven training in enhancing overhand serve proficiency among volleyball players. The results can be utilized as a guide for coaches and players striving to elevate overhand serve abilities. Furthermore, this study also lays the groundwork for future research that can delve more deeply into other aspects related to serve accuracy in volleyball.

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CONFLICT OF INTEREST

The authors do not possess any conflicts of interest to disclose.

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