



Effects of Service Distance on Overhead Serve Accuracy in Junior High School Volleyball Players

Anton Sembiring¹, Gita Nurgaya Br Targan^{2*}

¹ Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

² Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Medan, Indonesia

Corresponding Author: sembiringanton683@gmail.com

Abstract

Objectives:

This study aimed to determine the effect of service distance variation training on the service accuracy of volleyball extracurricular participants at SMP Negeri 45 Medan.

Materials and Methods:

This study employed a quasi-experimental method using a One-Group Pretest-Posttest Design. The population consisted of 40 volleyball extracurricular participants from SMP Negeri 45 Medan. Purposive sampling was used to select the sample based on the following criteria: (1) beginner volleyball extracurricular participants aged 13–15 years, and (2) female gender. Sixteen participants met these criteria.

Results:

The results indicate a significant effect of service distance variation training on the overhand service accuracy of the volleyball extracurricular participants at SMP Negeri 45 Medan, with a calculated t-value of 6.245 (exceeding the t-table value of 2.131) and a significance value of 0.000 (less than 0.05).

Conclusions:

Based on the data analysis, description, research results, and discussion, it can be concluded that serving distance variation training has a significant effect on the overhead serve accuracy of the volleyball extracurricular participants at SMP Negeri 45 Medan, with a calculated t-value of 6.245 (exceeding the t-table value of 2.131) and a significance value of 0.000 (less than 0.05).

Keywords: Service Distance Variation; Overhead Serve Accuracy; Volleyball.

Introduction

One of the physical activities that can improve an individual's health and prevent various diseases is exercise. Lack of physical activity is the fourth leading risk factor for mortality worldwide. Exercise affects the respiratory, circulatory, neuromuscular, endocrine, and muscular systems, as well as physical fitness (Katch, 2021). In addition, exercise can promote social, mental, and physical development (Yuliatin, 2022). Seno Gumira Ajidarma defines exercise as an activity that promotes physical health while providing a competitive environment for identifying an individual's athletic potential (Ibeng, 2021). Volleyball is a complex team sport that requires players to meet high technical, tactical, and physical demands, beginning with the serve as the starting action of the game (Duzgun et al., 2021: 184).

The serve is one of the fundamental techniques in volleyball. To increase the opportunity to score points, the serve must be performed with power, consistency, and accuracy so that the opponent has difficulty returning the ball. According to Yunus (2022: 109), there are several types of serves, including the underhand serve, sidearm serve, overhand serve, and jump serve, each of which has its own advantages and disadvantages. The underhand serve and overhand float serve are two basic types of serves that every player should master. According to Wahyu (2023: 24), the purpose of serving is to send the ball over the net with a success rate approaching 100% throughout the match.

Currently, the serve is no longer merely a means of hitting the ball over the net. It is also used as an attacking strategy to gain points. Therefore, the serve must be performed confidently, powerfully, accurately, and in a way that makes it difficult for the opponent



to receive the ball, as it plays an important role in scoring (Ahmadi, 2020: 20). Tactically, the serve has evolved from simply being the initial action to start the game into an opening attack intended to score points and achieve victory. Every player must master serving techniques because the serve serves as the team's opening attack and marks the beginning of play. This is consistent with Clemens and McDowell (2022: 6), who state that the serve is the first weapon in volleyball for scoring points, in addition to serving as a means of starting the game.

Accuracy is an important component of serving. Serve accuracy greatly influences the course of a match. When serving, players must demonstrate a high level of concentration, adequate preparation, and careful execution. Controlling the direction of the ball is also essential because a powerful and accurate serve can penetrate the opponent's defense. Beutelstahl (2023: 65) states that the objectives of serving are: (1) to score points directly; and (2) to disrupt the opponent's offensive formation. Given these benefits, serving techniques need to be practiced regularly and systematically.

An accurate serve directed toward a difficult area can serve as an initial attack that disrupts the opponent, although the primary function of the serve is to initiate play. This can be achieved when players have a good mastery of serving techniques. In modern volleyball, the serve has become an important factor in determining team success, particularly with the implementation of the rally-point scoring system. As volleyball has evolved, the serve is no longer merely a signal to start the game or put the ball into play; it has become the first attack for the serving team. The primary objective of the serve today is to make it difficult for the opponent to receive the ball and even to score points directly. Although a team may have players who are proficient in passing, spiking, and blocking, the team can still lose if it does not master serving techniques effectively.

Materials and Methods

Study Design

This study employs a quantitative research approach. Specifically, it utilizes the experimental method, which is defined as a systematic approach to establishing cause-and-effect relationships. The design used in this study is the One-Group Pretest-Posttest Design.

Study Participants

The population for this study consisted of 40 participants in the volleyball extracurricular program at SMP Negeri 45 Medan. A sample represents a subset of the population possessing its characteristics selected through specific procedures to ensure it is representative of the entire population. Purposive sampling is a technique used to select a sample based on specific criteria; based on the established criteria, 16 individuals met the requirements.

Study Organization

The instrument to be used is the AAHPER overhead service accuracy test, with the requirement that the serve must be executed from behind position one.

Statistical Analysis

Testing the measurement data associated with the research results aims to facilitate a more robust analysis. Therefore, this study will conduct tests for data normality and homogeneity.

Results

The pretest and posttest results for overhead serve accuracy among volleyball extracurricular participants at SMP Negeri 45 Medan are as follows:

Table 1. Pretest and Posttest Results for Overhead Serve Accuracy

No Subject	<i>Pretest</i>	<i>Posttest</i>	Difference
1	21	22	1

2	12	24	12
3	22	24	2
4	19	26	7
5	18	25	7
6	21	22	1
7	16	26	10
8	21	24	3
9	22	25	3
10	22	25	3
11	26	31	5
12	19	26	7
13	20	26	6
14	20	28	8
15	12	26	14
16	18	24	6

The results of the descriptive statistical analysis of the pretest and posttest for overhead serve accuracy among volleyball extracurricular participants at SMP Negeri 45 Medan are as follows:

Table 2. Descriptive Statistics for Pretest and Posttest Overhead Serve Accuracy

Statistics	Pretest	Posttest
<i>N</i>	16	16
<i>Mean</i>	19.31	25.25
<i>Media</i>	20.00	25.00
<i>Mode</i>	21.00 ^a	26.00
<i>Std. Deviation</i>	3.63	2.18
<i>Minimum</i>	12.00	22.00
<i>Maximum</i>	26.00	31.00
<i>Sum</i>	309.00	404.00

Based on the data in Table 3 above, the pretest and posttest results regarding the overhead serve accuracy of the SMP Negeri 45 Medan volleyball extracurricular participants are presented in Figure 1 below:

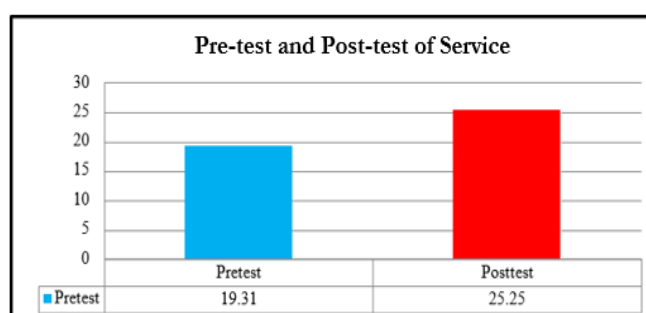


Figure 1. Bar Chart of Pretest and Posttest Overhead Serve Accuracy for SMP Negeri 45 Medan Volleyball Extracurricular Participants

The diagram above shows that the average accuracy of the overhand serve was 19.31 during the pre-test and increased to 25.25 following serve-distance variation training conducted over 16 sessions.

The normality test was conducted to determine whether the research variables followed a normal distribution. The calculation utilized the Kolmogorov-Smirnov Z formula, processed using the SPSS 16 software program. The results are presented in Table 3 below.

Table 3. Summary of Normality Test Results

Group	<i>p</i>	Sig.	Information
<i>Pretest</i>	0,736	0,05	Normal
<i>Posttest</i>	0,315	0,05	Normal

Based on the results in Table 3 above, it can be seen that all data have *p*-values (Sig.) > 0.05; therefore, the variables are normally distributed. Since all data are normally distributed, the analysis can proceed using parametric statistics.

The homogeneity test is used to assess sample similarity specifically, whether the variances of samples drawn from the population are uniform. The criterion for homogeneity is that if $p > 0.05$, the samples are considered homogeneous, whereas if $p < 0.05$, they are considered non-homogeneous. The results of the homogeneity test for this study are presented in Table 5 below:

Table 4. Summary of Homogeneity Test Results

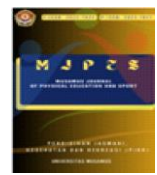
Group	df1	df2	Sig.	Information
<i>Pretest-Posttest</i>	1	30	0,123	Homogen

Table 4 above shows that the significance (*p*-value) for the pretest and posttest is greater than 0.05, indicating that the data are homogeneous. Given this homogeneity, the data analysis could proceed using parametric statistics.

The first hypothesis states: There is a significant effect of service distance variation training on the overhead serve accuracy of the volleyball extracurricular participants at SMP Negeri 45 Medan. The research conclusion is deemed significant if the calculated *t*-value exceeds the *t*-table value and the significance value is less than 0.05 (Sig < 0.05). The analysis yielded the following data.

Table 5. *t*-test Results for Pretest and Posttest Overhead Serve Accuracy of Volleyball Extracurricular Participants at SMP Negeri 45 Medan

Group	Average	<i>t</i> -test for Equality of means				
		<i>t</i> ht	<i>t</i> tb	Sig.	Selisih	%
<i>Pretest</i>	19,3125	6,245	2,131	0,000	5,9375	22,61%
<i>Posttest</i>	25,2500					



The t-test results show a calculated t-value of 6.245 and a t-table value (df 15) of 2.131, with a significance value (p) of 0.000. Since the calculated t-value (6.245) exceeds the t-table value (2.131) and the significance value (0.000) is less than 0.05, the results indicate a significant difference. The percentage increase in service accuracy was 30.74%. Consequently, the alternative hypothesis (H_a) stating that training involving variations in service distance has a significant effect on the overhead service accuracy of volleyball extracurricular participants at SMP Negeri 45 Medan is accepted.

Discussion

Based on the results of the t-test analysis, it can be concluded that varied service-distance training has a significant effect on the overhand service accuracy of participants in the volleyball extracurricular program at SMP Negeri 45 Medan. The percentage increase in overhand service accuracy before and after the implementation of varied service-distance training was 22.61%. This improvement occurred because the participants' ability to perform serves and direct the ball improved through repeated practice of the overhand service movement using gradually increasing distances. The participants also did not experience excessive difficulty because the training was conducted progressively, beginning with easier tasks and gradually moving to more difficult ones.

According to Suharno (1993: 32), accuracy is an individual's ability to direct a movement toward a target according to its intended purpose. Budiwanto (2012: 47) states that accuracy refers to performing movements without making errors. Accuracy is influenced by several factors, including movement coordination ability, sensory acuity, technical mastery, movement speed and strength, precision, the participant's sense of movement, and the distance and size of the target. Accuracy can be developed through repeated movement practice with a high frequency of repetitions, increasing movement speed, increasing the distance to the target, or reducing the size of the target. The purpose of technical training is to improve technical movement skills and achieve movement automatization in a particular sport. Movement automatization is characterized by stable and consistent performance, with very few or infrequent movement errors, even under different and changing situations and conditions.

These findings are consistent with the opinion of Bompa and Haff (2009: 51), who stated that regular training conducted for 6–8 weeks produces specific results as the body adapts to the training provided. Furthermore, Nala (2011: 37) stated that systematic, progressive, and repetitive training improves the functioning of the body's organ systems, thereby optimizing physical performance. Training conducted three times a week is considered appropriate for beginners and can produce meaningful improvements. Movements performed repeatedly during training contribute to the formation of conditioned reflexes, movement learning, and movement memorization processes (Nala, 2011: 39).

Movements that occur during sports activities result from stimuli processed by the brain and subsequently responded to through muscle contractions after receiving commands from the nervous system, particularly the brain. Therefore, motor skills are closely related to the human body's internal motor system, with the results observable as changes in the position of part of the body or its limbs (Schmidt & Lee, 2008: 334). Motor learning is a series of associations formed through practice or experience that can change an individual's movement abilities toward improved performance of specific motor skills. In this regard, changes in motor skills during motor learning indicate the occurrence of a motor learning process. Thus, acquired motor skills are influenced not only by motor maturation but also by the motor learning process. Repeated movements are subsequently stored in the performer's memory and may reappear when a similar stimulus occurs. Therefore, motor skills in sports must be practiced repeatedly so that



they are not easily lost from memory, enabling individuals to maintain proficiency whenever they perform the movement.

The improvement in ability occurred because of the association between knowledge acquired in previous sessions and newly acquired knowledge, with these associations becoming stronger through repetition. This is consistent with the law of exercise proposed by Rahyubi (2012: 164), which states that the fundamental principle of learning is repetition; the more frequently learning material is repeated, the more thoroughly it will be mastered.

Conclusions

Based on the data analysis, description, research results, and discussion, it can be concluded that serving distance variation training has a significant effect on the overhead serve accuracy of the volleyball extracurricular participants at SMP Negeri 45 Medan, with a calculated t-value of 6.245 (exceeding the t-table value of 2.131) and a significance value of 0.000 (less than 0.05).

Acknowledgments

The author extends their gratitude to SMP Negeri 45 Medan and the Bina Guna College of Sports and Health, as well as the researchers and writers who participated in and supported this research project.

Conflict of Interest

The authors declare no conflict of interest.

Funding

This research received no external funding.

References

- Agus Rohmadi. (2020). Perbedaan pengaruh latihan servis atas antara jarak dan tinggi net bertahap terhadap ketepatan servis atas bola voli pada siswa putra ekstrakurikuler SMP Negeri 1 Sidoharjo Kabupaten Sragen Tahun Ajaran 2019/2020. Skripsi sarjana, Universitas Negeri Yogyakarta, Yogyakarta.
- Ahmadi, N. (2020). Panduan olahraga bola voli. Solo: Era Pustaka Utama.
- Arikunto, S. (2019). Prosedur penelitian; suatu pendekatan praktik. (Edisi revisi) Jakarta: Rineka Cipta.
- Beutelstahl, D. (2023). Belajar bermain bola voli. Bandung: Pionir Jaya.
- Haff, G.G. (2022). Periodization training for sports: theory and methodology of training. Fifth Edition. United State of America: Human Kinetics.
- Budiwanto, S. (2019). Metodologi latihan olahraga. Malang: Penerbit Universitas Negeri Malang (UM PRESS).
- Clemens, T. & McDowell, J. (2022). The american volleyball coach (AVCA). Champaign: Human Kinetics.
- Durrwachter, G. (2020). Belajar dan berlatih sambil bermain bola voli. Jakarta: Gramedia.
- Edward, W.H. (2021). Motor learning and control: from theory to practice. Sacramento: California State University.
- Hadi, R. (2021). Ilmu kepelatihan dasar. Semarang: Rumah Indonesia.
- Harsono. (2019). Kepelatihan olahraga. (teori dan metodologi). Bandung: Remaja Rosdakarya.
- Irianto, D.P. (2022). Dasar kepelatihan. Yogyakarta: FIK UNY.
- Juanidi, S & Harmono, S. (2019). Servis melompat bolavoli pada final proliga tahun 2019 di Yogyakarta. Jurnal Sportif, Vol. 1 No. 1.



- MacKenzie, Susho, Kortegaard, Kyle, & LeVangie, Marc. (2022). Evaluation of two methods of the jump float serve in volleyball. *Journal of Applied Biomechanics*. 2B,579-586.
- Magill, A.R. (2021). *Motor learning and control: concepts and applications*. California: McGraw-Hill Companies, Inc.
- Mawarti, S. (2019). Permainan bolavoli mini untuk anak sekolah dasar. *Jurnal Pendidikan Jasmani Indonesia*. Volume 6, Nomor 2.
- Nala, N. (2021). *Prinsip pelatihan fisik olahraga*. Denpasar: Komite Olahraga Nasional Indonesia Daerah Bali.
- Nossek, Yoat. (2023). *Teori umum latihan*. (Terjemahan M. Furqon). Logos: Pan African Press Ltd.
- Palmizal, A. (2021). Pengaruh metode latihan global terhadap akurasi ground stroke forehand dalam permainan tenis. *Jurnal Media Ilmu Keolahragaan Indonesia*, Volume 1. Edisi 2. (pp.112-117).
- Pradhika Pintaloka. (2019). Pengaruh latihan variasi jarak servis terhadap hasil servis bawah bola voli mini peserta ekstrakurikuler SDN Gunturan. *Skripsi sarjana*, Universitas Negeri Yogyakarta, Yogyakarta.
- Reynaud, C. (2021). *Coaching volleyball technical and tactical skill*. Champaign: Human Kinetics.
- Rosyid, M.H & Wicaksono, D. (2019). Pengembangan buku saku teknik dasar bola voli sebagai sarana pembelajaran untuk atlet pemula. *Skripsi sarjana*, Universitas Negeri Yogyakarta, Yogyakarta.
- Schmidt, R.A & Lee, T.D. (2022). *Motor learning and performance* (5th ed). Champaign: Human Kinetics.
- Siyoto, S & Sodik, A. (2019). *Dasar metodologi penelitian*. Yogyakarta: Literasi Media Publishing.
- Sriwahyuniati, CH.F. (2019). *Perkembangan motorik*. Yogyakarta: UNY Press. Sugiyono. (2019). *Metode penelitian pendidikan: pendekatan kuantitatif, kualitatif, dan R & D*. Bandung: Alfabeta.
- Suhadi & Sujarwo. (2019). *Volleyball for all*. Yogyakarta: UNY Press Suharjana. (2019). *Kebugaran jasmani*. Yogyakarta. Jogja Global Media.
- Suharno. (2019). *Metodik melatih permainan bola volley*. Yogyakarta: Yayasan Sekolah Tinggi Olahraga Yogyakarta.
- Sukadiyanto. (2019). *Pengantar teori dan metodologi melatih fisik*. Bandung: CV Lubuk Agung.
- Sukardi. (2019). *Metodologi penelitian pendidikan. (kompetensi dan praktiknya)*. Yogyakarta: Bumi Aksara.
- Viera, B, & Ferguson, B.J. (2020). *Bola voli tingkat pemula*. Jakarta: Dahara Prize Semarang.
- Yunus. (2020). *Olahraga pilihan bola voli*. Jakarta: Depdikbud Direktorat Jendral Pendidikan Tinggi.

