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DIRECTION OF PLAY AND ACCURACY OF EXECUTION IN VOLLEYBALL PLAYERS

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Abstract

Introduction. A volleyball game involves scoring a direct point during a sports match, so the players should be able to accurately send the ball to the selected area of the opponent's playing field. The aim of the study was to determine the relationship between the accuracy of the upper serve and the direction of its execution in female volleyball players aged 15 to 18.
Materials and methods. 30 female volleyball players aged 15 to 18 participated in the study. A test was used to assess the level of accuracy of the upper serve in three directions of its execution.
Results. The study group presented an average level of accuracy of the upper serve. A higher level of service accuracy was observed when serving near 9 meters from the pitch than around 3 meters of both side lines and when serving in a straight line to around 3 meters of the side of the pitch than diagonally.
Conclusion. The direction of the upper serve determines the accuracy of its execution. It is reasonable to introduce specific exercises to improve the accuracy of the service in the training of young female volleyball players.

Key words: volleyball, accuracy of serve, sport training, secondary school students

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Introduction

Volleyball is a sport with a high level of difficulty, in which the players must have a high level of physical fitness, as well as technical and tactical skills [1-2]. During a volleyball match, players repetitively use technical elements that they perfect during the training process, i.e. serve, receive serve, attack, block, and defence [3]. The use of measurements assessing the accuracy of individual technical elements in volleyball is useful in monitoring the development of young players [4]. In volleyball, accuracy means successfully hitting the ball to a teammate or sending the ball to a selected area of the opponent's field of play. The ability to accurately send the ball to a specific place on the opponent's field of play plays an important role in the team's success [5].

Among the actions of the final games in volleyball, the serve is the second action that is most associated with scoring a point, the first being the attack, and the third the block [6-8] . A serve is the only time during a match when a player has the chance to play the ball individually and score a point. The rules of volleyball have changed over the years. Previously, the serve was perceived only as a start, an introduction to the game, but with the development of techniques, it began to be perceived as an offensive play [9]. Serving to the side and back zones of the opponent's field of play is significantly related to the direct scoring of a point and preventing the opposing team from launching an attack [10]. Performing such actions requires complex technical and tactical skills, high accuracy and experience in the game from the player. A precisely executed serve can surprise the opponent and thus contribute to the direct scoring of a point. In female volleyball players aged 14 to 15, the importance of the serve during a sports competition was confirmed, because by analysing the matches played in the women's youth game, it was proved that the winning teams scored points mainly from an effective attack and accurate service [11]. Accurate technical execution of the serve is one of the best predictors of the final result of the match in young female volleyball matches [12]. Therefore, the ability to combine strong and accurate serves can be considered one of the team's most powerful „weapons" [13]. The aim of the study was to determine the relationship between the accuracy of the upper serve and the direction of its execution in female volleyball players aged 15 to 18.

Material and methods

Thirty female volleyball players (n = 30; age 16.6 ± 1.2 years, body mass 57.9 ± 10.6 kg, height 168.8 ± 9.8 cm, training internship 4.6 ± 1.1 year) participated in the study. Most of the respondents were right-handed (27 people), a minority of the group (3 people) were left-handed. None of the participants

had musculoskeletal disorders. The research project received a positive opinion of the Senate Research Ethics Committee of the Academy of Applied Sciences in Łomża on the compliance of the research project with ethical principles.

The accuracy level of the upper serve was assessed for three directions of its execution using a modified test developed by Manseca et al. (2016) [14]. The technical parameters of the test have been adapted to the conditions in force in volleyball. After conducting a general warm-up (general development exercises on the move and in place /10 min) and specialist warm-up (using balls /10 min), the players were asked to perform a top tennis serve from the designated field into 3 indicated targets placed on the field. The test consisted of 3 series. In each series, the players performed 10 repetitions of the service. There was a 1-minute break between sets. In the first series, the players performed 10 repetitions of the top serve on the target No. 1. In the second series, the service was performed on target No. 2, and in the third series, on target No. 3. All the players performed the upper service from the same designated place, which was located behind the end line of the court - directly behind zone 1, in a field measuring 2m x 2m. This field was marked with tape (Fig. 1).

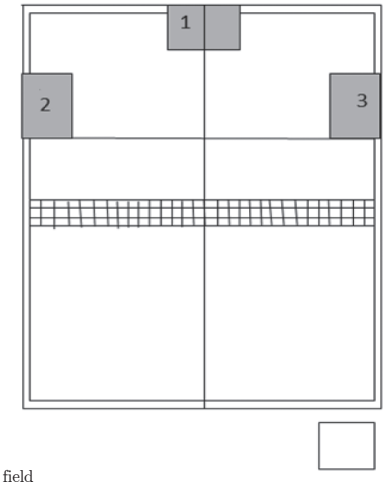

Fig. 1. : Volleyball field

The assessment of hitting the ball at a given target was made by a volleyball player with 9 years of training experience. This person was at the height of the midfield line on a raised platform. The entire scoring procedure was explained to the subjects before the test. During the tests, no feedback was provided to the players regarding the task performed, but through their own visual observation, the players knew their results. The accuracy of the upper serve was directly assessed during the task. The following procedure was used: when the ball hit the designated target, 2 points were awarded; when the ball was in the field of play, but did not touch the designated target - 1 point was awarded; if the ball did not pass to the other side of the court or went out - no points were awarded. If the ball even slightly touched the designated target - a higher point was calculated. Therefore, the competitor could obtain a score from 0 to 20 points for each of the 3 series, i.e. the total pool of maximum points to be scored during the test was 60 points.

The tests were carried out on a standard volleyball court (18m x 9m). A 9.5 m x 1 m Huck net was used, which was suspended at a height of 2.24 m. The upper service was performed with 10 Molten balls with a circumference of 65-67 cm and weighing 260-280 g. Three strategic goals placed on the pitch on the other side of the net were Comfort Line mattresses with dimensions of 200cm x 120cm. Mattress No. 1 was located on 9 meters on the pitch, placed in a horizontal position in the middle of the end line of the pitch. Mattress No. 2 was located on line 3 of the pitch, arranged vertically in relation to the side line of the pitch. Similarly, mattress No. 3 was located on the second side line of the pitch. No mattress crossed the designated court lines.

Statistical analysis

For the graphical presentation of the results, the arithmetic mean value and the standard deviation of the points obtained during the measurements for each of the 3 designated goals were used. The level of accuracy of the upper serve was assessed on the basis of the percentage of points scored in relation to the maximum that could be obtained. The normality of distribution of variables in the group was tested using the Shapiro-Wilk test. In order to determine the statistical significance of the differences between the means, the Student's T-test for related samples was used. When conducting statistical analyses, the level was considered significant $p < 0.05$. STATISTICA 12 (StatSoft, USA) was used.

Results

Figure 2 presents the arithmetic mean and standard deviation of the points scored by the subjects for each of the three series separately.

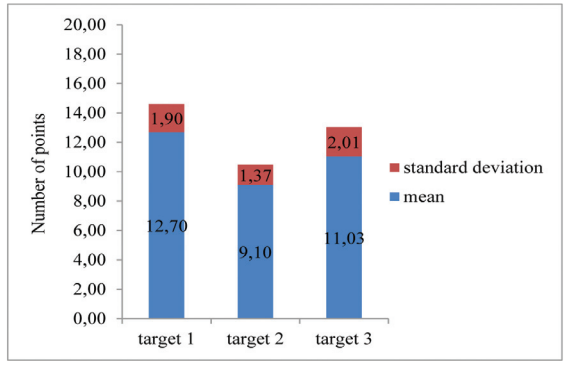

Fig. 2. : The values of the arithmetic mean and standard deviation of the points scored for each of the 3 objectives

The subjects obtained the average highest score in the 1st series, i.e. by directing the ball to target No. 1; then in series 3 - by directing the ball to target No. 3, while the lowest average score was recorded in the 2nd series - by directing the ball to target No. 2. Table 1 shows the percentage of points scored by the subjects in each of the 3 series and for the entire test.

Tab. 1: The percentage of points scored by the subjects in each of the 3 series and for the entire test

	target 1	target 2	target 3
Percentage of points scored in a series	64%	46%	55%
Percentage of points scored in the test	55%		

The subjects in the 1st series achieved 64% effectiveness in hitting the ball at target No. 1, then in the 2nd series - 46% effectiveness in hitting the ball at target No. 2 and in the 3rd series - 55% effectiveness in hitting the ball at target No. 3. The average percentage of points, which proves the level of accuracy of the upper serve presented by the research group, was 55%. Using the Shapiro-Wilk test, it was determined that the distribution of the analysed variables in individual series is consistent with the normal distribution ($p > 0.05$). Using the Student's T-test for dependent samples, the statistical significance of mean differences between 2 measurements was assessed (1st series with 2nd series, 1st series with 3rd series and 2nd series with 3rd series). The difference between series 1 and series 2 is shown in Figure 3.

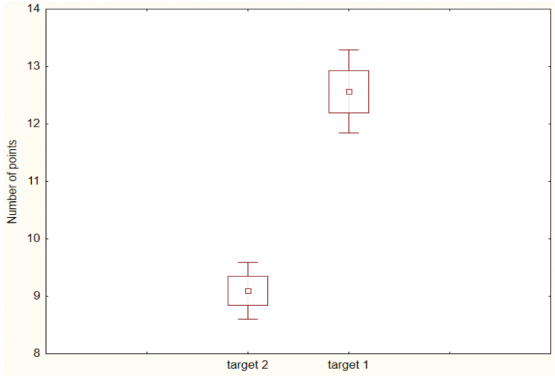

Fig. 3. : Difference between the mean of series 1 and 2

Based on the results of the test, it was found that the means in series 1 and 2 differ statistically significantly [$t(29) = 8.97$; $p < 0.05$]. The difference between series 1 and series 3 is shown in Figure 4.

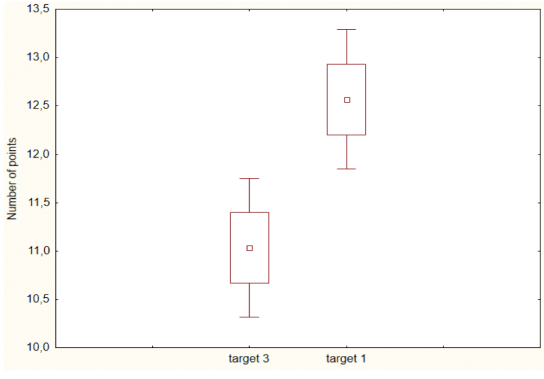

Fig. 4. : Difference between the mean of the 1st and 3rd series

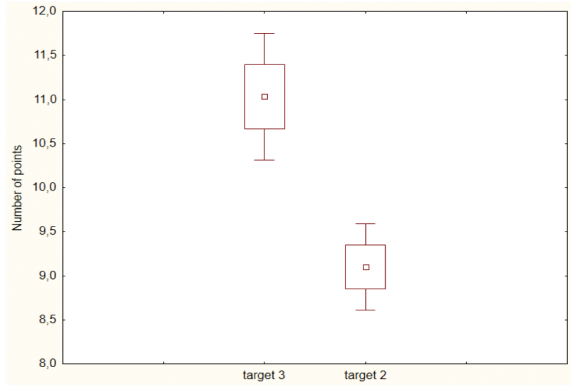

Fig. 5. : Difference between the mean of the 2nd and 3rd series

Based on the results of the test, it was found that the means in the 2nd and 3rd series differ statistically significantly [$t(29) = 5.49$; $p < 0.05$].

Discussion

It is important that physical education teachers, instructors and trainers measure the accuracy of athletes in terms of performed technical elements specific to a given discipline or sports competition. In volleyball, the serve is one of the activities that is most closely related to the direct scoring of a point during the match, and when performed effectively, the opposing team may have difficulties in launching an attack [15-19]. Therefore, players should be able to accurately send the ball to the selected area of the opponent's field of play. This skill is one of the best predictors of the final score in young female volleyball matches [12]. Knowledge of the predictors of sports performance in volleyball, when players learn and improve their skills in the early stages of training, can help coaches plan effective training programs, and this knowledge can be immediately put into practice during competitions [20].

Based on the analysis of the test results, it was shown that the average percentage of points scored during the test by the subjects was 55%, which proves the presented average level of accuracy of the upper serve. For each target, the accuracy of the upper serve was as follows: 1st target - 64%; 2nd target - 46%; 3rd goal - 55%. Stamm et al. [11], analysing the matches played by young women, proved that the winning teams scored points mainly from an effective attack and accurate service. Therefore, it is reasonable to introduce specific exercises to improve the accuracy of the service in the training of volleyball players. This may contribute to maximizing the sports results of the entire team during tournament competition, which is crucial in the complex process of training [21]. It was also shown that the direction of the upper serve significantly differentiates the result achieved by the study group. Comparing the differences between the average values of points scored in each series (i.e. 1st series with 2nd series; 1st series with 3rd series; 2nd series with 3rd series), it was proved that the averages differ statistically signi-

ficantly ($p < 0.05$). It was found that the service to target 1 - around 9 meters of the pitch was more accurate than the service to targets 2 and 3 - around 3 meters of both sides of the pitch. On the other hand, the execution of the service in the vicinity of 3 meters of the side line of the pitch towards goal no. 3 - in a straight line was more accurate than its execution at goal no. 2 - diagonally. These results could have been affected by the location of the serve performed by the study group. The serves were performed from behind the end line of the pitch behind zone 1. The results of the research presented by Stankovic et al. [22] show that players performing the service behind zone 1 of the pitch most often direct the ball to zone 6 of the opponent's field (objective No. 1 in this study), then towards the touchline in a straight line (target #3) and diagonally (target #2). Therefore, the results achieved by the study group could usually be influenced by the frequency of serving in particular directions. Valhondo et al. [10] claim that performing a service to the side zones and the back of the opponent's field of play is significantly related to the direct scoring of a point and preventing the opposing team from launching an attack. Therefore, it is reasonable to introduce exercises to improve the accuracy of the service near the side lines of the pitch - which is consistent with the results of our research.

The presented research results are a source of knowledge for coaches and instructors as well as physical education teachers who manage the process of teaching and improving the technical and tactical skills of volleyball players and students.

Conclusions

1. The direction of the upper serve determines the accuracy of its execution.
2. It is reasonable to introduce specific exercises to improve the accuracy of the service in the training of young female volleyball players, especially in the side and back areas of the opponent's fields.
3. We recommend coaches, instructors and physical education teachers to use accuracy measurements for athletes and students in terms of performed technical elements specific to a given discipline or sports competition.

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