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The Effect of Triceps Strength Training and Pull-Over Training on Volleyball Smash Ability

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ABSTRACT

To improve smash ability in volleyball, it is necessary to provide a form of physical training with weights to increase the performance of arm muscle strength to support success in smashing. The important components in muscles are actin and myosin, which are attracted into a single bond, causing muscle contraction. To increase arm muscle strength, the ability of the arm muscles used when executing a smash is a fast activity. To improve your smash shot ability in volleyball, habits that are often done with the wrong technique need to be corrected. One thing that must be paid attention to is the movement pattern of the smash shot and apart from that, there must be more forms of physical training to improve performance. Arm muscle strength to support success in smashing. This study aims to determine the effect of triceps strength training and pull-over training on smash ability in volleyball. By using field experimental methods. The population used was students of SMK Negeri 5 Makassar with a sample of 20 male students taken by random sampling. The data analysis technique used is the t-test at a significance level of 95%. The research results show that; (1) There is a significant effect of triceps strength training on smash ability in volleyball, proven $t_0 = 9.635 > t_t = 2.262$, (2) There is a significant effect of pull-over training on smash ability in volleyball, proven $t_0 = 8.143 > t_t = 2.262$, and (3) There is a significant difference in influence between triceps strength training and pull-over training on smash ability in volleyball, proven $t_0 = 4.939 > t_t = 2.101$.

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INTRODUCTION

The game of volleyball adheres to technical and psychological principles (Marsiyem et al., 2018). The principle of the technique means the player volleys the ball with part of



the body. The psychological principle is that players play happily (Vai et al., 2018). In the game of volleyball there are several basic technical elements, such as; serve, pass, smash and block (block) (Wahyuni & Kurdi, 2018). Volleyball is a fast-paced game, so the time to play the ball is very limited and if you don't master perfect basic techniques, big technical mistakes will occur (Hidayat & Iskandar, 2019).

The technique is a process of generating physical activity and proving a practice as best as possible to complete a definite task in the sport of volleyball (Widyanto & Djawa, 2019). Techniques are procedures that have been developed based on practice and aim to find adjustments to a particular movement problem in the most economical and useful way (Hambali & Rohedi, 2019). In the field of sports, the term technique is defined as a way of doing or carrying out something to achieve certain goals effectively and efficiently (Herman, 2019). Technique in volleyball can be interpreted as a way of playing the ball effectively and efficiently by the applicable game rules to achieve optimal results (Adha, 2019).

The basic techniques of playing volleyball must be studied first to develop the game (Satria, 2019; Suprianto et al., 2020). Mastery of the basic techniques of playing volleyball is one of the elements that determine whether a team wins or loses in a match (Jusran, 2019; Jahrir, 2019), in addition to other elements such as physical, mental and other conditions (Nasriani & Mardela, 2019; Asnaldi, 2020).

The smash is one of the techniques in volleyball (Zakaria et al., 2018a). The smash technique determines the direction and target of the attack (Hermansyah & Permadi, 2018). The basic smash technique in volleyball must be thoroughly studied to develop volleyball quality and performance (Sahabuddin et al., 2023). Smash is a hard, straight and diving blow. Usually a deadly program, smash aims to kill and is considered the most prominent and most interesting part of the game (Indrayana, 2018). In a dynamic part, a player jumps high, hits a moving object with the right force and direction and goes beyond the net. The definition of a smash is that the third and final attack in a volleyball game is known as a spike/smash and usually attracts attention and is very important in the match (Indrayana, 2018). Smash is the main blow in an attack to achieve victory. To achieve brilliant success in doing this smash requires high achievement and the ability to jump as well (Indrayana, 2018).

In general, the smash is the most important and final work movement in the attack work movement (Hermansyah & Permadi, 2018). The service ball and the feints performed do not meet the target or are easily controlled by the defending opponent so the opportunity to receive the ball is good (Sahabuddin et al., 2022). Next, the recipient goes to the tosser (feeder) passes the ball to the smasher and launches an attack or smash. This means that an attack is carried out on the third touch of the ball (Aulia & Hermanzoni, 2018). However, in modern volleyball games, direct attacks on the first ball (made when serving) or the second ball are often carried out depending on the presence of the ball or position of the ball at that time as well as the ability and readiness of the hitter (Zakaria et al., 2018b).

Volleyball is a game that demands a lot of physical readiness and mental stability from each player, especially when applying the skills they have (Hermansyah & Permadi, 2018). In particular, when doing a smash, this must be supported by excellent physical condition.

However, this physical condition cannot be achieved just like that but must be accompanied by systematic training according to the training program. Because if physical conditions are not specifically prepared beforehand, it will be difficult and take too long for players to master the techniques and tactics in playing. So physical conditioning training aims to improve the functional quality of the body's equipment to the needs and demands to achieve optimal performance in a sport.

The focus of this research only focuses on one basic technique, namely the smash. Smash is a form of attack that can kill the opponent's defence and at the same time gain points (Wismiarti & Hermanzoni, 2020). In the game of volleyball, smashing is a technique that plays a very important role. The failure and success of a team in a game or match are largely determined by the player's skill in smashing (Nasriani & Mardela, 2019). By mastering good smash techniques, a team will easily win a match.

Achieving good smashing ability requires mastery of the smashing technique itself, as well as training patterns which must be varied to improve the technique (Wahyu Cirana et al., 2021). So the ability to smash automatically and effectively must be supported by several appropriate and appropriate training methods. To improve the Smash movement, it is necessary to have rational thoughts by providing a training program system. Therefore, it is specifically necessary to provide physical training that is oriented to the arm muscles. Based on this, by looking at the reality of the students at SMK Negeri 5 Makassar, the existing players still have many shortcomings, especially in the performance of the arm muscles in smashing. Smash is the most important and final movement in an attack. Failure to smash the ball into the opponent's area will allow the opposing party to counterattack or retaliate. Therefore, players must be skilled at smashing. Looking at the smash movement, it can be said that it is difficult without support such as physical condition. To obtain these physical abilities, it is necessary to carry out systematic and programmed training.

Exercise is a systematic activity to increase physical functional capacity and exercise endurance, and the ultimate goal is to improve sports performance (Sahabuddin, 2019a). Apart from that, training can also be interpreted as a learning condition necessary for efforts to improve performance and complex abilities. Training is a process of improving sports that is carried out regularly and systematically based on training principles whose aim is to increase performance capacity. Training is a systematic process of practising or working, which is carried out repeatedly, increasing the amount of training or workload day by day. Systematic and well-organized training will improve the body's physical abilities and physiology so that you can easily learn technical movements in various sports and ultimately improve the player's performance. Physical exercise is the application of pressure or physical load to the body regularly, systematically, and continuously so that it can improve performance. In principle, physical exercise will also provide adaptation and facilitation in the functional structure of tissue cells of the body's organ systems when stimulated (Ishak et al., 2023).

Weight training is a form of isotonic resistance training that is popular in sports. Systematic training where weights are only used as a tool to increase muscle strength to

achieve various specific goals (Hammado et al., 2020), such as improving physical condition, health, strength, performance in a sport and so on (Anggreni et al., 2022). What needs to be paid attention to in the implementation and application of weight training or weight training is that it must be carried out correctly and fulfil the training principles and provisions that have been outlined, so that the objectives and goals of weight training are truly achieved (Sahabuddin, 2020). This will provide better confidence to coaches, sports coaches and players about the true use of weight training.

Exercises aimed at achieving muscle performance to contract when moving to smash in volleyball (Sahabuddin, 2019b), as well as observations in the research, are triceps strength training and pull-over training.

Triceps strength training is a form of weight training that aims to increase muscle strength and endurance in the arms. When doing triceps strength training, it is recommended to do no more than 12 and no less than 8 RM (maximum repetitions) for each form of exercise. This means that at the start of training, a load is determined that is heavy enough so that 8 repetitions is the maximum number that can be done to lift that weight. It should be noted that these 8 repetitions must be carried out without excessive tension. Determining the 8 RM is done through trial and error. However, to make it easier to determine the starting load, a benchmark according to Harsono (1988) can be used, namely: "For triceps strength, a load of 5 kg heavier than a quarter of body weight can be used."

The pull-over exercise is one of the reverse triceps exercises. Can use an EZ bar or straight bar. Lean on a bench parallel to the floor, with your arms straight. Bend your elbows and lower the weight slowly and under control until the weight approaches your head. Return the bar to the starting position (arms completely straight) and contract the triceps. This exercise can be done in various variations, namely with dumbbells, EZ bars, or straight bars. On the straight bar, there are also two types of palm position, namely overhand grip or underhand grip. How to do it: 1) Lie on your back on a bench, and hold the weight with straight arms so that your arms are slightly lower than the height of the bench. 2) Lift the weight until the middle arm is perpendicular to the body. 3) This exercise can also be done with bent elbows. 4) Trained muscles: especially chest muscles, latissimus, dorsi, teres major, pectoralis major, triceps rhomboids, coracobrachialis, and upper biceps.

Triceps strength training and pull-over training is a form of training that uses external weights (barbells) and aims to improve or develop physical elements, especially arm muscle strength, which plays an important role in doing smashes. It's just that the implementation is almost the same. Triceps strength training is carried out in a standing position with both hands behind the head holding a barbell and lifting it over the head. Meanwhile, pull-over exercises involve lifting the barbell with your arms straight above your head.

METHODS

In experimental research, it is necessary to choose an appropriate design according to the demands of the variables contained in the research objectives. The design in this research is: "Randomized Sample Pretest and Posttest Group Design". The

population in this study were all students of SMK Negeri 5 Makassar. Moving on from that, the samples in this research were male students at SMK Negeri 5 Makassar who were skilled at volleyball. Sampling is a sampling technique, where the sample consists of several classes, and then students are selected for each class by random sampling or by lottery. After 20 people have been selected as objects, a smash ability test in volleyball is held. The way the groups are divided is based on the results of the smash test in volleyball which is then divided into two groups for the same training using the machid ordinate technique.

Research data on smash ability in volleyball, both initial and final tests, were analyzed using statistical calculations, in the form of:

To calculate the difference in the mean of the initial test and the final test, a paired t-test was used for each group. With the following formula:

$$t_o = \frac{\overline{xd}}{\sqrt{\frac{\sum xd^2}{n(n-1)}}}$$

The calculation of differences in the influence of the two groups was analyzed using the unpaired t-test with the following formula:

$$t_o = \frac{\overline{XA} - \overline{XB}}{\sqrt{\left[\frac{SdA^2 + SdB^2}{nA + nB - 2} \right] \left[\frac{nA + nB}{nA.nB} \right]}}$$

RESULTS AND DISCUSSION

Result

Descriptive data analysis

The results of descriptive data analysis, the calculations of which are listed in the attachment, can be described as follows:

Table 4.

Descriptive data analysis

Training	Descriptive	Pre-Test	Post-Test
Triceps Strength (Group A)	N	10	10
	$\sum X$	40,00	68,00
	$\sum X^2$	178,00	478,00
	\overline{X}	4,00	6,80
	Sd	1,41421	1,31656
	Min	1,00	5,00
	Max	6,00	9,00
Pull-over (Group B)	N	10	10
	$\sum X$	39,00	58,00
	$\sum X^2$	163,00	354,00
	\overline{X}	3,90	5,80
	Sd	1,10050	1,39841
	Min	2,00	4,00
	Max	5,00	8,00

Sample normality testing

The results of the sample normality test in this study used the Lilifors method at a significance level of 95%. Group A, which was given triceps strength training, obtained an observed Lilifors value = 0.139 which was smaller than the table Lilifors value at the 95% significance level = 0.258. So it can be concluded that the data in group A is normally distributed. Meanwhile, the results of the normality test for samples in group B who were given pull-over training obtained an observation lilifors value = 0.194 which was smaller than the table lilifors value at the 95% significance level = 0.258. So it can be concluded that the data in group B is normally distributed.

Sample homogeneity testing

In testing sample homogeneity, the calculations which are listed in the attachment, use the F-test at a significance level of 95%. From the results of these calculations, the observed F value = 1.651 is smaller than the table F value at the 95% significance level = 2.19. Therefore, from the results of these calculations, it can be concluded that the two training groups, namely triceps strength training and pull-over training, are homogeneous.

Hypothesis testing results

There is an influence of triceps strength training on volleyball smash ability.

The results of data analysis in the attachment show that the observation t value = 9.635 is greater than the t table value at the 95% significance level = 2.262. So H_0 is rejected and H_1 is accepted, meaning there is a difference between the initial test and the final test. Thus, it can be concluded that there is a significant influence of triceps strength training on smash ability in volleyball among students at SMK Negeri 5 Makassar.

There is an influence of pull-over training on volleyball smash ability.

The results of data analysis in the attachment show that the observation t value = 8.143 is greater than the t table value at the 95% significance level = 2.262. So H_0 is rejected and H_1 is accepted, meaning there is a difference between the initial test and the final test. Thus, it can be concluded that there is a significant influence of pull-over training on smash ability in volleyball among students at SMK Negeri 5 Makassar.

There is a difference in the influence between triceps strength training and pull-over training on volleyball smash ability.

The results of data analysis in the attachment show that the observation t value = 4.939 is greater than the t table value at the 95% significance level = 2.101. So H_0 is rejected and H_1 is accepted, meaning there is a difference in the influence of smash ability in volleyball between triceps strength training and pull-over training. The group that received triceps strength training was more effective and efficient in improving their smash ability in volleyball compared to the pull-over training group. Thus, it can be concluded that there is a significant difference in influence between triceps strength

training and pull-over training on smash ability in volleyball among students at SMK Negeri 5 Makassar.

Discussion

The first hypothesis is accepted: there is a significant effect of triceps strength training on smash ability in volleyball for students at SMK Negeri 5 Makassar. According to the t-test results of the initial test data and final test data on smash ability in volleyball in the triceps strength training group, it turns out that from the calculation results, it was obtained that the observed t-value was greater than the t-table value at the 95% significance level. This proves that the first hypothesis proposed is accepted at a significance level of 95%. The prediction that can be made is that by providing triceps strength training in a systematic, programmed manner for 24 meetings with a breakdown of three times a week, players will be able to improve their smash ability in volleyball. It can be explained that doing this triceps strength exercise is effective when implementing it. This exercise is aimed at the performance ability of muscle contractions for both arms to generate maximum automatic movement. This means that the performance of the arm muscles contracts accurately so that they can form the arm muscle strength needed to smash in volleyball.

The second hypothesis is accepted; There is a significant effect of pull-over training on smash ability in volleyball among students at SMK Negeri 5 Makassar. According to the t-test results of the initial test data and final test data of smash ability in volleyball in the pull-over training group, it turns out that from the calculation results, it was obtained that the observed t-value was greater than the t-table value at the 95% significance level. This proves that the second hypothesis proposed is accepted at a significance level of 95%. The prediction that can be made is that by providing systematically programmed pull-over training for 24 meetings with a breakdown of three times a week, players will be able to improve their smash ability in volleyball. It can be explained that when doing pull-over exercises, muscle contact performance is more focused on effective movements in smashes in volleyball. The muscle performance that occurs can contract to be able to hit the ball over the net when smashing in volleyball. The third hypothesis is accepted; There is a significant difference in influence between triceps strength training and pull-over training on smash ability in volleyball for students at SMK Negeri 5 Makassar. According to the results of the t-test data from the final test of smash ability in volleyball in group A for triceps strength training and group B for pull-over training, it turns out that from the calculation results, it was obtained that the observation t value was greater than the t table value at the 95% significance level. This proves that the third hypothesis proposed is accepted at a significance level of 95%. Predictions that can be made are that these two forms of training provide a positive influence or improvement on smash ability in volleyball, but when compared to looking at the results obtained on the average of the final test and statistical testing of the unpaired t-test, triceps strength training is better. effective and efficient. Because doing this exercise focuses more on the ability of the arm muscles to contract better, which is aimed at maximizing the ability of the elbow joint by building the physical condition of the arm muscle strength. These results provide maximum influence for smashing the ball above. Compared to pull-over exercises which focus on the physical condition of the upper arm or shoulder muscle strength, because the implementation process only relies on the shoulder joint. So in the process of implementing the smash results are less than optimal.

However, in principle, these two exercises, namely triceps strength training and pull-over training, are forms of training that can provide a positive contribution to directing players to push themselves both in terms of improving basic techniques and achieving achievements. Therefore, it is hoped that future researchers will look for other forms of training to better improve their smashing ability in volleyball.

CONCLUSION

Based on the data analysis and discussion that has been presented, it can be stated that:

1. There is a significant effect of triceps strength training on volleyball smash ability.
2. There is a significant effect of pull-over training on volleyball smash ability.
3. There is a significant difference in influence between triceps strength training and pull-over training on volleyball smash ability.

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