



Analysis of Open Smash Techniques in Volleyball Coaching College Students

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ABSTRACT

This study aims to determine how the open smash technique in volleyball students. This study aims to obtain information about the series of motion of the open smash technique and to analyze the open smash technique. This type of research is a descriptive quantitative survey method. The sample in this study consisted of 7 volleyball coaching students who had the following criteria: (1) Tanjungpura University PKO men's volleyball core team, (2) had participated in competitions according to PBVSI rules. The data analysis technique used in this research is descriptive statistics. The results showed that the average volleyball coaching student took the prefix stage where the distance from the net was 3.47 m, with a 3-step approach, swing angle 87°, repulsion angle 149°, elbow angle 80°, back angle 162°, jump height 53 cm, the distance between ball and hand about 35 cm, and landing using 2 feet.

Keywords: Open Smash; Volleyball.

INTRODUCTION

Volleyball is a sport that requires good motor skills and functional abilities, this can be seen in terms of tactics and techniques (Rohendi, A., & Suwamdar, 2017). The technique is the most important factor in the movement skills of an athlete because mastery of technique will determine success in a match. (Nasution, 2015) states that "the volleyball game has several basic techniques that must be improved and mastered, including service (service), passing, bait (set up), smash, dam (block)." From several forms of basic techniques. One of the most important techniques for volleyball players to master in attacking and getting points is the basic smash technique. (Saputra, 2016) states that, "smash is an essential skill, having the agility and good at jumping and the ability to hit the ball is one of the most dominant forms of attack used to attack to get points". Therefore, this technique is most dominantly used as an attack to gain points and win.

According to Winarno (2013) states, "there are several types of smash according to the bait, namely: 1) quick smash pool, 2) semi smash, and 3) normal smash/open smash." One of the most dominant types of smash and often used to attack is the open smash technique.

The open smash is a type of hit that is easy and basic because the ball is relatively high, but can be a very deadly shot. Open smash has a characteristic that the ball is quite high, namely 3-4 meters in the sense that a spiker must have a high jump quality so that the results of his strokes are maximized (Achmad, 2016). In the open smash movement there are several stages, namely: prefix, take off, imposition, and follow-through. The process of this stage also greatly affects the results of the smash movement. If the speaker does not perform the technique properly and correctly, a failure will occur (Sahabuddin, 2019).

This failure occurs because the spiker starts the approach too fast, the jump height is not maximal, the wrist is stiff and the arm is bent during the smash. This can be seen from research (Santoso, 2015) which states that "there are still errors in the smash technique performed by the smasher, (1) at the start of the smash with a percentage of 36.36%, (2) errors when going to jump 25.76%, (3) mistakes made when flying hit the ball 33.33%, and (4) mistakes made when landing 4.55%." Volleyball coaching students often make mistakes by approaching too fast, jumping height that is not maximal, wrist stiffness and arms bent when they are about to hit the ball. So these mistakes will result in injury, the ball gets stuck in the net or the ball will move out over the backline. So coaches and athletes must understand the concept of motion to minimize mistakes that occur when doing a smash. However, the smasher must have a good start and good jump quality as stated by (Tri Qomariyah & Herdyanto, 2019) that the height of the jump and the weight of the body mass greatly affect the results of the power open spike. Meanwhile (D. A. S. Santoso & Irwanto, 2018) stated that the more footwork steps the average power tends to increase. So to maximize the open smash technique, it can be done by undergoing continuous training and with the help of biomechanical analysis.

In the world of sports, analyzing movement is very important and needs to be done by both coaches and biomechanics experts, to correct inappropriate movements. So that it can minimize the occurrence of injuries, do not waste energy, and can maximize the open smash movement properly and correctly. With this analysis, it will be easier for the trainers to know the right and wrong movements. So that coaches and athletes can fix if errors are found during the movement.

From the description of the background above, it can be concluded that many factors influence the smash movement. Among them are the explosive power of the leg muscles, the flexibility of the trunk and the strength of the arm muscles. In addition, the process of stages starting from the prefix, taking off, hitting (hitting), and landing also affects the results in performing the open smash technique. Therefore, the researcher wants to analyze the basic open smash technique in the hope that the trainers can improve and fix the open smash technique if errors are still found when carrying out the movement.

METHOD

This research is a descriptive quantitative type. The research method used in this study is a survey method. The sampling technique used in this research is purposive sampling to determine the sample with certain considerations. Thus the researcher has several criteria for sample selection, criteria, namely: (1) the men's core volleyball team PKO Tanjungpura University, (2) have participated in a championship based on PBVSI rules. The instruments used in this study were recording devices such as cameras/handycams, kinovea software applications, laptops and manuals.

Data collection techniques in this study using survey methods with observation techniques. The technique of observation or observation in this case is taking data in the form of recordings or videotapes which are then processed into the kinovea software application for analysis. Data analysis in this study, using the Kinovea Software application to analyze the video. Thus, the image of the Smash Open movement is obtained. The results of the images analyzed are the process of the prefix stage, the take-off stage, the hit stage, and the landing stage. Based on data analysis, this study using descriptive statistics.

RESULTS AND DISCUSSION

The data in this study are the results of the analysis of the smash open technique on volleyball coaching students. The data from this study are a series of volleyball open smash movements obtained from the research subjects, namely volleyball coaching students.

Tabel 1.
The results of the analysis of the open smash technique

Phase	Smash Open Movement Type	Initials name							Average
		F	H	B	D	DW	R	U	
Early Phase	Prefix distance from net	3.84	3.55	3.58	3.07	2.80	3.61	3.81 m	3.47 m
	step	m	m	m	m	m	m		
Rejection Phase	The magnitude of arm swing angle	4	3	4	3	3	3	4	3
	The magnitude of the angle of repulsion	91°	94°	104°	52°	101°	56°	108°	87°
Hitting phase	The measure of the angle	154°	117°	153°	183°	136°	151°	147°	149°
	Magnitude angle backs	81°	76°	66°	81°	83°	87°	84°	80°
Final Phase	jump height	155°	175°	162°	173°	158°	162°	151°	162°
	Ball and hand distance	59 cm	52 cm	54 cm	45 cm	61 cm	45 cm	58 cm	53 cm
Final Phase	Landing with both legs	40 cm	47 cm	74 cm	36 cm	35 cm	77 cm	35 cm	49 cm
	flexed (floating)	1 feet	1 feet	1 feet	2 feet	1 feet	1 feet	2 feet	1 feet

Discussion

Smash Open is a technique of hitting the ball into the opponent's field where this ball has the characteristics of being quite high, calm, and parabolic. Based on the results of data analysis that have been described research on the analysis of open smash techniques on volleyball coaching students is divided into 4 stages, namely, the prefix, repulsion, hit, and landing stages.

Judging from the prefix phase where DW students took the initial distance from the net about 2.80 meters and student D took the initial distance from the net, which was 3.07 meters. In the taking steps (steps) can be grouped into two groups, where the first group 3 students use a 4-step approach (step), namely students F, B, and U and the second group 4 students use a 3-step approach (step), namely students H, D, DW, R. According to Santoso & Irwanto (2018), the more the number of prefixes, the higher the average power tends to be. This can be seen from the DW students who took the initial distance of 2.80 meters and produced a jump height of 61 cm. however, it is different for some students, this is due to a change in the direction of movement or a turn in the steps, causing a lack of power produced by students.

(Cecile 2011) states that: "both arms swing from behind the body to lift forward to help make the jump as high as possible." In the arm swing, the two students are different, where the DW student produces an arm swing angle of 101° while the student arm swing angle is 52°. When doing a repulsion, DW students produce a repulsion angle of about 136°, with a repulsion angle of 136° DW produces a jump height of 61 cm. Meanwhile, student D made a repulsion resulting in a repulsion angle of 183°, with a repulsion angle of D producing a jump height of 45 cm.

It can be seen from the data that DW students have more maximal jumps than D students. This is because the momentum on the arm swing and the moment of inertia on the D repulsion is less than optimal. According to (Sari, 2015) "Momentum is the strength of motion possessed by the body as a result of weight and speed at which the magnitude of the force will provide a boost to the body". It can be interpreted that with a large arm swing angle of 52° in student D, the amount of force given is less than optimal so that the arms swing strength to push the body up is very less than that of DW students. Qomariyah & Herdyanto (2019) stated that the magnitude of the angle of the foot when doing repulsion is around 123° with the resulting jump height of about 73 centimetres. As for taking the repulsion stage when the leg is in a bent position with the axis of rotation of the articulation joint (knee) to obtain the force of repulsion, this is similar to the principle of minimizing the moment of inertia in leg movement (Winarno, 2013). The moment of inertia can also be interpreted as inertia (Sari, 2015).

If the resistance is minimized by bending the knee when doing the stepping foot, the resistance to the jump movement will be small so that it can produce maximum repulsion (Winarno, 2013). In the magnitude of the angle of repulsion of DW and D students, where the magnitude of the angle of repulsion of DW students is 136° and 183° . thus, resulting in different leg strength. This can be seen in the jump height results, where DW has a jump height of 61 cm while D has a jump height of 45 cm. Although DW students took a distance of 2.80 meters, using a 3-step approach, the leg strength and arm swing of DW students were more maximal than DW students. This can be seen in the jump results given by DW students, which was about 61 cm.

At the back angles of DW and D students, where D students with a back angle of 173° and DW students with a back angle of 158° . with different back angles for each student produces different back flexures so that this affects the results of the smash performed. According to Qomariyah & Herdyanto (2019) that with a back angle of 132° , it produces a sharp dip. (Chandra & Mariati, 2020) stated that the flexibility of the waist muscles contributed to the ability of volleyball smash results by 41%. The magnitude of the right angles for DW and D students has differences, where student D makes the magnitude of the angle of 81° , DW students make the magnitude of the angle of 83° . With an angle below 90° students, DW and D produce a shot that slightly dives and extends to the backline. This is advantageous for students to direct the ball to areas where there are opportunities to generate points and avoid dams from opponents.

The distance between the hands and the ball for DW and D students are different, it

can be seen from the results of the analysis, where the distance between the hands and the ball for D students is about 36 cm, for DW students the distance between the hands and the ball is 35 cm. According to (Winarno, 2013) "the distance between the arm and the ball is approximately as far as the reach of the batting arm". At a distance of the ball and arm which is approximately the reach of the batting arm, it will make a large enough impact, this will make it easier for students to direct the ball when the whip hits the ball to produce great power. Where Adnan (2019) states that "the explosive power of the arm muscles contributes to the smash ability of 21.60%. the hand reach on the ball is the greatest momentum when it is about to hit the ball, and the highest reach is at the end of the arm that is not used to hit. This can be profitable and can maximize momentum.

At the time of landing, the knee joint will support the weight of the body with a heavyweight. when landing you must support your body weight and the speed at which your body falls to the ground (weight x speed = momentum) so that the legs and feet will receive a high load. Pedestal using one foot will get more than twice the weight of landing on two feet.

Landing with one leg on an incline will result in injury to the knee. It is recommended that at the time of landing, students land with both feet not stiff with a bent body to minimize the pounding of the ground when landing so that there is an impact. In landing both legs must be bent, this is very important to avoid injury that will occur. the function of bending the knee/ankle is as a shock absorber or shock (Sudarmada & Wijaya, 2015). By bending the knee will reduce the force, this is done to minimize the injury that occurs. On the landing, they can be grouped into two groups where the first group of students consists of two students, namely U and D landing with both legs flexible (spreading) while the second group consists of five students, namely F, H, B, DW and R landing using one foot followed by one other leg. So that students F, H, B, DW and R are easier to get injured when landing using one foot.

With a starting distance of 2.80 m and with a 3-step approach, this will cause a lack of acceleration in the taking of the prefix phase, to reduce power when taking off. However, this can be helped by the arm swing angle of 101° and the repulsion angle of 136°. Where there is momentum when swinging the arm that helps lift the body, while at the angle of repulsion there is a moment of inertia force and a shock absorber force. Where the moment of inertia forces as an obstacle and the shock absorber force acts as a spring or spring so that this force adds power to help push the body up, this can be seen with a higher jump result of 61 cm. With an angle of 83°, less than 90° can produce a

shot that dives slightly and extends to the back of the court. This can happen because it has a higher jump so that it is advantageous to have a right angle of less than 90°.

CONCLUSIONS AND SUGGESTIONS

Based on the results of data analysis and discussion, it can be concluded that the Open Smash technique is on average in the early stages of taking where the starting distance from the net is 3.47 m, using a 3-step approach, the arm swing angle is 87°, the leg angle is 149°, elbow angle 80°, back angle 162°, jump height 53 cm, at a distance of ball and hand which is about 35 cm and landed on 2 feet.

Based on the results of research on volleyball coaching education students, several suggestions need to be conveyed in connection with this research, namely: (1) For coaches to make athletes' techniques more effective and efficient they can use various kinds of kinesiology applications periodically to analyze Open Smash movements, (2) Trainers can practice Open Smash movements according to biomechanics theory, (3) For researchers, this research is developed and continued on aspects related to the open smash movement.

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