

Analysis of Superior and Inferior Extremities on Forearm Pass in Volleyball

Fajar Wicaksono

*Department of Sports Science, Faculty of Sports Science
Universitas Negeri Malang
Malang, Indonesia*

Saichudin*

*Department of Sports Science, Faculty of Sports Science
Universitas Negeri Malang
Malang, Indonesia
saichudin.fik@um.ac.id*

Slamet Raharjo

*Department of Sports Science, Faculty of Sports Science
Universitas Negeri Malang
Malang, Indonesia*

Abstract— Analysis of superior and inferior extremity motion against passing down volleyball in extracurricular Senior High School I Bululawang, is a study that aims to know the truth of movement in accordance with the phases of passing down according to superior and inferior extremity movement in terms of biomechanics principles. This research uses quantitative-qualitative research type with descriptive analysis method. In his research the authors use the instrument in the form of: 1) leg angle, 2) arm angle, 3) body tendency angle, 4) ball speed and the target point on the volleyball field which is also assisted with the dartfish software. The results of the analysis show that the angle of the arm that is made close to 45 ° in the preparation attitude will result in maximum passing, because the positioning of the arm is optimal, so as to bounce the reflection 90o. Furthermore, the muscle strength of each player also affects the stability of ball passing. Also followed by arm strength to be flexed, knee joint extension strength.

Keywords— superior and inferior extremities, extracurricular, dartfish.

I. INTRODUCTION

Volleyball is a team sport. The game of volleyball combines offensive and defensive games that are used interchangeably depending on the situation. The principle of the game of volleyball is to play the ball using your hands and the target must be placed right on the opponent's field by crossing the ball over the net and maintaining that the ball does not fall on its own field. One technique that is in the game of volleyball is arm passes. This technique is also known as passing down. This technique is mostly only used to receive balls, so this technique is usually only referred to as operands. It is very important for each player to be able to dampen the strength of the hard-hit ball and direct the ball to a team's movement to be able to do overhead passes or feed the ball.

Mastery of volleyball playing techniques is one of the elements that determine, win or lose a team in a match besides the elements of physical, technical and mental conditions. Passing is an attempt by a player to use a certain technique to pass the ball using the inner side of the arm to play with teammates to play in the field.

Based on its movement the lower passing is divided into the superior and inferior extremities. The superstrems can include the clavicle, scapula, humerus, ulna, carpal, metacarpal, and

phalanx. The inferior limb involved consists of the pelvis, femur, tibia, fibula, tarsal, metatarsal, and phalangs bones [1].

Sports extracurricular activities are developing students' talents and interests towards achieving sports achievements [2]. Volleyball extracurricular activities at Bululawang State High School, Bululawang Subdistrict, various forms of training are given starting from the basic skills, tactics, and the actual technique of playing volleyball. there are some students who are still wrong in doing lower passing, both from the initial attitude, attitude, and final attitude. There are still many students who have not been able to do the basic movements of volleyball correctly, especially doing underhanded passing with mistakes that often occur, namely students do bottom passes with crooked arms because elbows are bent and errors in the prefix attitude, ie upright posture with the feet closed straddle too wide so that the attitude of the starting position of the feet is not horses [3]. The angle of the foot, the angle of the arm, the angle of leaning of the body phases that are not in accordance with when passing under [4]. Even though it matches the phase and produces the right angle it is not necessarily successful to do a good bottom pass. This is because they have to adjust to the momentum of the ball speed. Therefore, synchronization between all aspects must be good. Thus, the goal of passing below that matches the phases results in good passing.

In terms of the volleyball passing, the good moves determine the outcome of passing. The application of biomechanics to improve techniques can occur in two ways: teachers and trainers can use their knowledge of mechanics to improve the actions of students or athletes in order to improve skills, or do sports skills. Biomechanics is a combination of applied mechanics and biological and physiological disciplines, while mechanics is one branch of science from the field of physics that studies the movements and changes in the shape of matter caused by mechanical disturbances called styles. Because of the importance of biomechanical studies at the lower passing for the advancement of skills in volleyball extracurricular pesetas the author will conduct research in an extracurricular Bululawang State High School.

To assist in processing data using Dartfish this program makes it possible to make a decision that can improve the performance of athletes with analytical methods. Video analysis is commonly used in sports stars, which is to examine a movement and basic techniques in a sport that is assisted with features in the program. The purpose of this study was to

determine the analysis of the motion of superior and inferior extremities to lower volleyball passing in terms of biomechanical principles assisted by the dartfish program.

II. METHODOLOGY

Research with an analysis of the lower passing motion variables towards superior and inferior extremities will be solved using qualitative quantitative research methods. The data obtained in the form of the amount of the angle of the foot, the angle of the arm (elbow), the angle of leanness of the body and the speed of the ball included in the nature of quantitative data, and qualitative data because it is described by the arrangement of sentences that are clear and clear so that the solution to the problem is drawn. in body position in shooting and ball speed and the factors that influence it.

III. RESULT

In the first sample of the first to third-to-third movement can be explained one of them was attained a 133.6o foot angle, 95.1o arm angle, 52.7o body tilt, and produced a ball speed of 0.617 m / s. Exercise attitude with foot angle 131.2o, arm angle 96.2o, body tilt 51.1o, and yield ball speed 1,234 m / s. Advanced attitude with 131,2o feet, arm angle 96.2o, body tilt 51.1o, and yield ball speed 1,234m / s, and score accuracy at target 1/3, 0, 0 so it is very good value and bad value.

In the second sample of the first to third-to-third movement can be explained one of them was obtained preparations with foot angle 143.9o, arm angle 46.8o, body tilt 51.0o and produced ball speed 0,701 m / s. Exercise attitude with 138.2o foot angle, 87.7o arm angle, 50.4o body tilt yields 1.068 m / s ball speed. The advanced attitude with foot angle 152.4o, arm angle 46.0o, body tilt 46.0o and yield ball speed 1,435 m / s, and score accuracy at target 1 / 2.1 / 3.1 / 2 so it is very good value and well.



Figure 1. The 2nd Sample Preparation Phase

In the third sample of the first to third-to-third movement can be explained one of them was obtained preparations with foot angle 113.8o, arm angle 82.8o, body tilt 47.7o and produced ball speed 0.601 m / s. Exercise attitude with 121.2o foot angle, 76.9o arm angle, 49.3o body tilt and yield ball speed 1.135 m / s. Advanced attitude with 162.5o foot angle, 168.6o arm angle, 53.2o body tilt and yield ball speed of 1,552 m / s, and accuracy score at target 0, 0, 0 so bad value.

In the fourth sample of the first to third-to-third movement can be explained one of them is obtained the preparation attitude with foot angle 136.6o, arm angle 98.4o, body tilt 41.6o, and yield ball speed of 0.534 m / s. Exercise attitude

with foot angle 122.0o, arm angle 77.9o, body tilt 46.9o and yield ball speed 1.151 m / s. Advanced attitude with 144.5o foot angle, 98.5o arm angle, 47.9o body tilt and yield ball speed 1,852 m / s and the accuracy score at target 1/2, 0, 0 so it's worth enough good and bad.

In the fifth sample of the first to third-to-third movement can be explained one of them is obtained preparations with foot angle 147.8o, arm angle 36.1o, body tilt 51.4o and produce ball speed 0,567 m / s. Exercise attitudes with 154.6o foot angle, 105.8o arm angle, 59.7o body tilt and yield ball speed 1,118 m / s. Advanced attitude with 143.9o foot angle, 64.8o arm angle, ball speed tilt 1,785 m / s and accuracy score at target 1/2, 1/3, 1/2 so good and good value.

In the sixth sample of the first to third-to-third movement can be explained one of them is obtained preparatory attitude with

foot angle 145.1o, arm angle 46.7o, body tilt 49.7o and produce ball speed 0,484 m / s. Exercise attitudes with 138.8o foot angle, arm angle 90.2o, body tilt 59.0o and produce ball speed 1.051 m / s. Advanced attitude with 164.0o foot angle, arm angle 107.3o, body tilt 58.4o and produce ball speed 1,685 m / s and accuracy score at target 0, 0, 0 so bad value.

In the seventh sample of the first to third-to-third movement can be explained one of them is obtained preparation attitude with foot angle 137.2o, arm angle 43.1o, body tilt 50.4o and yield ball speed 0,501 m / s. Exercise attitude with 141.3o foot angle, 81.6o arm angle, 50.9o body tilt and yield ball speed 1,018 m / s. Advanced attitude with 145.8o foot angle, 116.8o arm angle, 50.9o body tilt and yield ball speed 1,401 m / s and accuracy score at target 0, 1/3, 0 so bad and very good value.

In the eighth sample of the first to third-to-third movement can be explained one of them is obtained preparations with foot angle 156.4o, arm angle 24.2o, body tilt 43.5o and yield ball speed 0,484 m / s. Exercise attitudes with 158.9o foot angle, arm angle of 48.8o, body tilt 45.0o and produce ball speed of 0.884 m / s. Advanced attitude with foot angle 158.5o, arm angle 60.3o, body tilt 45.8o and yield ball speed 1,218 m / s and score accuracy at target 0, 0, 0 so bad value.

In the ninth sample of the first to third-to-third movement can be explained one of them is obtained preparation attitude with foot angle 136.5o, arm angle 40.6o, body tilt 49.2o and yield ball speed 0,467 m / s. Exercise attitude with foot angle 153.9o, arm angle 60.1o, body tilt 46.9o and produce ball speed 1,001 m / s. Advanced attitude with foot angle 139.5o, arm angle 56.7o, body tilt 45.3o and produce ball speed 1,384 m / s and score accuracy at target 1/2, 0, 1/2 so good and bad value.

In the tenth sample of first to third-to-third movement can be explained one of them is obtained preparations with foot angle 158.3o, arm angle 55.7o, body tilt 45.7o and yield ball speed of 0.55 m / s. Exercise attitude with 150.9o foot angle, 91.7o arm angle, 54.9o body tilt and yield ball speed 1,034 m / s. Advanced attitude with foot angle 133.7o, arm angle 17.5o, body tilt 54.9o and produce ball speed 1,586 m / s and score accuracy at target 1/2, 1/1, 1/1 so good value and good enough .

Identify applicable funding agency here. If none, delete this text box.



Figure 2. Sample Phase Storage Sample

In the eleventh sample of the first to third-to-third movement can be explained one of them is obtained the attitude of preparation with foot angle 142.0o, arm angle 36.2o, body tilt 43.6o and yield ball speed 0,451 m / s. Exercise attitudes with 155.9o foot angle, 74.7o arm angle, 48.4o body tilt and yield ball speed 0,901 m / s. Advanced attitude with 153.9o foot angle, 140.3o arm angle, 50.8o body tilt and yield ball speed 1,185 m / s and score accuracy at target 0, 0, 1/3 so it is bad and very good.

In the twelfth sample of the first to third-to-third movement can be explained one of them was obtained preparations with foot angle 132.3o, arm angle 43.5o, body tilt 42.4o and yielded ball speed 0.517 m / s. Exercise attenuation with foot angle of 157.0o, arm angle of 75.4o, body tilt 41.6o and produce ball speed of 1,001 m / s. Advanced attitude with 159.1o foot angle, 127.8o arm angle, 40.0o body tilt and yield ball speed of 1.335 m / s and precision score at target 1/3, 0, 1/3 so it is very good and bad.

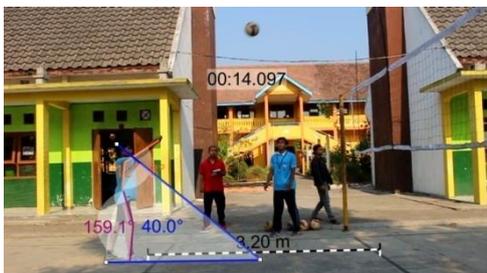


Figure 3. 12th Sample Advanced Phase

IV. DISCUSSION

In the sample that made a lower passing movement with the first sequence number had a relatively good shot. This is evidenced by the overall shot coming from three attempts just two times the ball fell in the target box. According to Yulias [5], "accepting the ball using both arms straight in front of the hand must be as flat as possible, hands parallel to the thighs, and legs slightly squat, the body slightly leaning forward". In the sample that made a low passing motion with the 2nd sequence number had a very good shot. Three consecutive samples are able to pass the ball right on the target. the position of the arm according to the phases then when meeting the ball so that a perfect return of the ball occurs. This is not in line with opinion [6], "try to bounce the ball on the widest part

of the arm between the wrist and elbow with a reflection angle of ± 900 (angle of arrival = angle of reflection). In the sample that made a low passing motion with the 3rd sequence number had a very bad shot. The main obstacle actually lies in the angle of the foot that is too bent forward, and makes the body's burden will be held longer so that when releasing the ball is affected by normal force. This corresponds to a number of points of passing error such as the overall swing motion is too explosive, so the running ball is far deviated and the batter's arm is swung higher than the shoulder (Ahmadi, 2007: 24-25).

In the sample that made a lower passing motion with the 4th sequence number had a relatively good shot. If viewed from the level of the initial motion video, the preparation stage carried out by the sample is still lacking in the pedestal of the two legs so that the leaning angle of the body is less so. As according to Winarno (2015: 70), "between the body and both arms form a $\pm 45o$ angle so that the ball bounces stably". In the sample that made a low passing motion with the 5th sequence number had a very good shot. From the results of the success of the sample in dropping the ball at the target reviewed from the stages of the passing movement down there are still many things that are not appropriate. However, the success of passing under this is due to the timeliness of meeting the forearm with the ball and the hand swing when passing according to the lower passing technique.

In the sample that made a low passing motion with the 6th sequence number had a relatively good shot. As was done by the sample when meeting the forearm with the ball, the sample did not adjust the position of the ball not really straight in front of the body. passing the ball to the side of the body.

In the sample that made a lower passing motion with the 7th sequence number had a relatively good shot. This is evidenced by the overall shot coming from three attempts only one time the ball fell in the target box. the position of the feet shoulder width apart and bent at the start, swing the hand too far so that the reflection of the ball is too high and cannot be turned on, in the continued motion there is no alert again.

In the sample that made a low passing motion with the 8th sequence number had relatively good shots. The psychological aspects that occur in students are the number of students who make mistakes, both from the initial attitude, the attitude of action, and the final attitude seen from the basic bottom-passing technique to the initial attitude of many students who bend their knees so that they are positioned the body is well-built and the body is not squattered, in the manner in which the ball is applied to the gate so that the direction of the ball is not regulated and when swinging the hand is bent and in the final attitude there is no continued movement or place and does not move so unstable.

In the sample who made a lower passing movement with the 9th sequence number had a good passing result. Based on the results of the success of the sample, reviewing from the stages of the passing movement there are still many things that are not appropriate. The position of the arm that is lifted is too high when meeting the ball. And there is no transfer of body balance in the sample. As one of the points in passing mistakes

according to Ahmadi [3], "it is less able to adjust the exact situation according to the arrival of the ball (fast, slow spinning)".

In the sample that made a low passing motion with the 10th sequence number had a very good shot. Of the three balls that enter the target if analyzed from the video and match with the techniques of the lower passing phases there is a movement in the implementation that is not appropriate. Once the ball is at the right distance, swing the straightened arms from the bottom upwards parallel to the thighs, and the legs squat slightly, the body slightly leaning forward [5].

In the sample that made a low passing motion with the 11th sequence number had a relatively good shot. Based on the sampel movement that can be analyzed, it can be explained when the prefix position of the sample is not slightly squat and the arm is less bent.

In the sample that made a lower passing motion with the 12th sequence number had a very good shot. If the sample movement in the video is analyzed it can be seen 3 times the sample shot falls on the target. And have made movements according to what is available. This is not in accordance with one of the points of passing error when Ahmadi [3] is unable to regulate the right meeting according to the arrival of the ball (fast, slow spinning).

V. CONCLUSION

The leaning angle of the body that is close to 45 ° has not produced a ball that falls on target, if it is not accompanied by

positioning the wrist and elbow body with a 90° reflection angle with the arrival of the ball to get the right results when the ball is released in a continued manner. The average arm angle of the three opportunities in the preparatory position is 55.10, 58.0, and 56.60, if seen from the whole sample there are still many that correspond to the lower passing phases. The need for synchronization in the passing between the motion of extremity inferior, namely the angle of the foot formed, with superior extremity that is at the angle of the arm and the leaning of the body so that the lower passing can be controlled properly.

REFERENCES

- [1] E Pierce, *Anatomi dan Fisiologi untuk Paramedis*. Jakarta: CV Prima Grafika, 2013.
- [2] F. Nurcahyo, "PENGELOLAAN DAN PENGEMBANGAN KEGIATAN SE-KABUPATEN SLEMAN," *J. Pendidik. Jasm. Indones.*, 2013.
- [3] N. Ahmadi, *Panduan Olahraga Bola Voli*. Surakarta: Era Pustaka Umum, 2007.
- [4] I. Iskandar, "Analisis gerakan passing bawah dalam permainan bola voli berdasarkan konsep biomekanika," *J. Pendidik. Olah Raga*, 2013.
- [5] I. Yulias and J. Budi, "Efektivitas Pembelajaran Passing Bawah Bolavoli Untuk Kelas X dengan Penggunaan Media Audio Visual," *J. Pendidik. Olahraga dan Kesehat.*, 2013.
- [6] P. S. Mustafa, M. E. Winarno, and Asim, "Pengembangan Variasi Latihan Service Atas untuk Peserta Ekstrakurikuler Bolavoli di SMK Negeri 4 Malang," *J. Pendidik. Jasm.*, 2016.