

# Motion Analysis of Forehand Drive Strokes in Table Tennis Athletes at PTM Club South Bengkulu

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Abstract. The forehand drive technique is the most important in a table tennis game, to be able to hit a forehand drive well and correctly you must understand and master the forehand drive technique. This study aims to determine the motion analysis of forehand drive shots on PTM club athletes South Bengkulu. The type of research used is descriptive quantitative using the test survey method. The sample in this study were South Bengkulu PTM club men's table tennis athletes who were able to hit forehand drives totaling 20 athletes. This study uses data analysis techniques using video recordings that are entered into the kinovea application. The results of data analysis in terms of biomechanics of each phase of the forehand drive stroke with a total of 20 athletes with an average value of each phase, namely 1) the initial phase has an average value of 3.8 suitable criteria, 2) the backswing phase has an average value of 3.7 suitable criteria, 3) the imposition phase has an average value of 4.0 suitable criteria, 4) the continuation phase has an average value of 4.5 very suitable criteria. The overall average value of 20 athletes is 4.1 included in the appropriate criteria. So it is necessary to improve the motion of the forehand drive shot at the South Bengkulu PTM club athlete.

Keywords: Table tennis, Forehand drive, Technique.

## 1 Introduction

Table tennis sport is one of the game sports, where in this table tennis game requires high concentration and also perseverance to continue practicing. Table tennis is one of the community sports that can be played by all groups. According to (1) table tennis is a fairly popular sport, both as a health sport, recreational sport, achievement sport and as an educational sport, even in certain countries table tennis has become a sport that can be used as a livelihood or professional sport, as in several European countries such as Sweden and England. We can see this game in match events held by educational institutions and regional to national championships (2). Based on the description above, it can be concluded that table tennis is one of the popular sports and can be played by all groups, both early childhood, adolescence, and adulthood.

Technique is one of the important elements in achieving achievement for a table tennis athlete. Every table tennis athlete is required to have techniques that must be mastered by each player, one of which is basic techniques, skill techniques in table tennis, including techniques for holding bet (grip), stroke techniques (stroke), and

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footwork techniques (footwork) (3). There are several basic strokes in table tennis such as: drive, push, block, and serve. The drive stroke is a basic stroke that must be mastered by all table tennis athletes. The importance of the drive stroke is mastered by all table tennis athletes inseparable from the role of the drive stroke which can be used to attack the opponent or to return the ball to the opponent. Drive is a stroke technique that is carried out with a bet movement from the bottom up with the bet in a closed position. When hitting a drive shot it is important to keep the wrist motionless so that the resulting ball has minimal rotation or no rotation at all so as to produce a good and correct drive shot. Drive is a shot with a long swing so as to produce a flat and hard shot (4).

In the game of table tennis the drive consists of: A good player in a table tennis game is a player who understands and can perform the techniques of the table tennis game itself (5). Meanwhile, according to (6) forehand drive is a movement skill followed by a forward rotation of the body. So it can be concluded that the forehand drive is one of the strokes of the basic technique of hitting the ball with the position of the palm holding the bet facing forward with a fast movement and followed by a body rotation of about 30 degrees. Analysis of movement techniques in table tennis needs to be done to find out the truth of the movement in the forehand drive technique.

Based on observations while at the South Bengkulu PTM club, players sometimes make mistakes in hitting the ball, unprepared body position and often make mistakes when hitting a forehand drive, so that when making these movements the ball often concerns the net, and also comes out of the table and the punch is less directed and inaccurate in hitting the forehand drive. Another problem is that there has never been a biomechanical analysis of the forehand drive movement that can be used by the coach so far in evaluating the movements of table tennis athletes at the South Bengkulu PTM Club.

From the above problems, the researcher is interested in conducting a study that leads to a picture or description of motion skills as a support for athlete achievement in table tennis, with this research it is hoped that the ability and achievement of table tennis athletes can be further improved by correcting the deficiencies possessed by athletes. This study aims to determine the Motion Analysis of Forehand Drive Punches on table tennis athletes at the South Bengkulu PTM club..

## 2 Method

This study uses descriptive quantitative research, in this study the method used is survey research, which is generally carried out to take a generalization from observations that are not in-depth (7,8). In conducting the forehand drive test and assessed using a biomechanics questionnaire that has been compiled on the recommendation of experts. This study aims to examine the motion of the forehand drive to get a systematic, factual and accurate description of the facts, nature, symptoms, and the relationship between the analysis of the motion of the forehand drive in table tennis. This study uses purposive sampling technique is a sampling technique with certain considerations (8). The sample used in this study were male athletes of the South Bengkulu PTM club table tennis totaling 20 athletes who had good ability and mastery of the forehand drive technique according to the coach.

This study uses data analysis techniques using the kinovea application to facilitate the process of analyzing the forehand drive stroke movement which is analyzed into several stages of motion that can be seen clearly and in detail. The data that has been taken in the form of video recordings is then entered into a laptop and opened with the kinovea application to be assessed with biomechanical motion analysis indicators that have been made by a table tennis coach who already has a coaching license in table tennis. The assessment indicators that have been made are as follows: Test instruments and questionnaires, assessors from trainers who already have a license, the equipment needed includes laptops, tripods, stationery and handphone cameras. After preparing the research instrument the next step is the data collection phase. In this study there are three phases for data collection, namely the preparation stage, video capture, and data analysis. The assessor conducts an assessment using the recorded video that has been taken and opened through the kinovea application. The scores that have been obtained are then summed up and entered into the formula, the results obtained are then entered into the criteria. The assessment indicators that have been made are as follows Table .

No.	Movement Analysis Indicator	Criteria and Pictures			
	Initial Phase	BS	В	HS	KS
1.	Phase 1				
	Shoulder-width or wider leg po- sition				
2.	Right foot slightly backward				
3.	Our body is about one step closer to the table and facing to- wards the front of the table, both hands are in front of the body with				
	elbows forming an angle of about 90 degrees.				
4.	Both knees are slightly bent and the body leans forward				
5.	Backswing Phase (Phase II) Weight shifted to the right foot				
6.	The upper body rotates to the right and the arms move backward until the arms are at the beside the body				
7.	The wrist is straight with the arm open, the elbow bent to an angle of about 90 and the bet slight- ly closed.				

Tabel 1. Movement Analysis Indicator Kinovea

0	Defense Dhase (Dhase III)	
δ.	Defence Phase (Phase III)	
	Weight shifts from the rear foot	
	to the front foot	
9.	Rotate the hips to the left and	
	rotate the upper body back into the	
	table	
10	The ball is hit at the peak of the	
	highest bounce	
11	<b>Continuation Phase (Phase IV)</b>	
	Follow-up movement of the bet	
	moving forward and in the direction	
	of the ball	
12	Bet position at the end of the	
	movement on the left	
	body, and in front of the fore-	
	head	

## 3 Results

Based on the description and results of the research, the researcher can use the results of the analysis of the motion of the forehand drive shot on table tennis athletes in the South Bengkulu PTM club in terms of biomechanics which can be seen in the following table 2 gives a summary of all heading levels.

Name	Average	Average Value of Each Stage of Forehand			Score
		Drive Stroke			
	T., :4: -1	Back-	Imposi-	A .l	011
	Initial	swing	tion	Advance	Overall
Nando	4.5	4	4.3	5	4.4
Fajri	3	3.3	3.6	4	3.5
Akbar	3.5	3.6	4	5	4
Edho	4.5	4.3	4.3	5	4.5
Dani	4.25	4.3	4.6	5	4.5
Yosep	3.25	3.3	4	5	3.9
Zaki	4	4.3	4.3	5	4.4
Dena	4	4	4.6	5	4.4
Rizki	3.5	3	3.6	4.5	3.6
Rey	3.75	4	4.3	5	4.3
Elan	3	3.3	3.6	4	3.5
Dafi	4	3.3	3.6	4	3.7
Feby	4.5	4	4	4	4.1

**Table 2.** Table captions should be placed above the tables.

Category	Good	Good	Good	Very Good	Good
Average Score	3.8	3.7	4.0	4.5	4.1
Govi	5	4	4	5	4.5
Ikbal	4	4	4.3	4.5	4.2
Azeban	3	3.6	3.6	4	3.5
Lengga	4	3	3.6	4	3.6
Awang	4	4.3	4	5	4.3
Joni	3.75	4	3.6	4	3.8
Daris	3	3.3	3.3	3	3.1

Based on the results of the analysis of the motion of the forehand drive in table tennis athletes at the South Bengkulu PTM club, it is included in the appropriate criteria with an overall average value of 4.1. Table tennis athletes at the South Bengkulu PTM club in terms of the biomechanics of each phase, namely: 1) the initial phase with an average value of 3.8 is included in the appropriate criteria, 2) the initial backswing phase with an average value of 3.7 is included in the appropriate criteria, 3) the initial imposition phase with an average value of 4.0 is included in the appropriate criteria, 4) the initial continuation phase with an average value of 4.5 is included in the very appropriate criteria.

This is because the motion analysis of the forehand drive is a motion performed using a combination of hand swings and body rotation. If you hit a forehand drive with good technique, it will produce a good and correct and directed forehand drive. So that every athlete or sample can hit a forehand drive well, then every athlete must understand and understand the benefits of movement from each phase of motion in the forehand drive. By looking at this research, it is hoped that the coach will need to make improvements again in carrying out forehand drive movements on table tennis athletes at the South Bengkulu PTM club in order to produce forehand drive movements that are in accordance with the theory of the correct forehand drive movement technique so as to produce table tennis athletes who excel in the future.

## 4 Discussion

From the overall results of the analysis of the forehand drive stroke motion in table tennis athletes at the South Bengkulu PTM club conducted by 20 athletes consisting of 12 assessment indicators in terms of biomechanics which are divided into 4 phases, namely: the initial phase, the backswing phase, the imposition phase, and the continuation phase.

#### a. Initial phase

The initial phase in the forehand drive motion has 4 motion indicators, namely: 1) The position of the feet is shoulder-width apart, 2) Left foot slightly forward, 3) The body is about one step away from the table and facing the direction of the ball, then both hands are in front of the body with elbows forming an angle of about 90 degrees,

4) Both knees are slightly bent and the body leans forward. In the initial phase of this forehand drive 20 athletes produced an average of 3.8 included in the "Suitable" criteria. These athletes based on the results obtained have fulfilled a series of forehand drive shots with the starting position of both feet shoulder-width apart, the right foot slightly back, and both knees slightly this aims to help balance the position of the body when hitting the ball. These indicators are included in the biomechanical principle of balance. According to (9,10) Balance is an important ability because it is used in daily activities, such as walking, running, most sports and games.

#### **b.Backswing phase**

In the backswing phase, the forehand drive motion has 3 motion indicators, namely: 1) The weight point moves to the right leg, 2) The upper body will rotate to the right and the movement of the bet from behind until the arm is beside the body, 3) The wrist is straight with the arm open, the elbow is bent to form an angle of about 90 degrees and the position of the bet is slightly closed. In the backswing phase of the forehand drive motion using 20 athletes produced an average of 3.7 included in the "Appropriate" criteria. The athlete has fulfilled the series of movements in the backswing phase of the forehand drive.

#### c. Imposition phase

The imposition phase of the forehand drive has 3 motion indicators, namely:

1) The weight point moves from the back foot to the front foot, 2) Turn the hips to the left and turn the upper body back to the shirt, 3) The ball is hit at the peak of the bounce. In the imposition phase of this forehand drive using 20 athletes produced an average of 4.0 included in the "Appropriate" criteria. The athlete has fulfilled the series of movements in the forehand drive phase with the position when hitting the ball the weight point moves from the back foot forward, the hips rotate to the left then when hitting the upper body rotates back into the shirt, and the ball is hit at the peak of the bounce.

#### d.Advanced phase

The advanced phase of the forehand drive motion has 2 motion indicators, namely: 1) Continued motion of the bet moving forward and in the direction of the ball, 2) The position of the bet at the end of the movement to the left of the body at face level. In this advanced phase of the forehand drive stroke using 20 athletes produced an average of 4.5 including the criteria "Very Suitable". The athlete has fulfilled the series of movements in the advanced phase of the forehand drive.

## 5 Conclusion

Based on the results of the analysis of the motion of the forehand drive in table tennis athletes at the ptm club in south bengkulu, it is included in the "appropriate" criteria with an overall average value of 4.1. Then the results of the data analysis of the motion analysis of forehand drive punches on male table tennis athletes at the south bengkulu PTM club in terms of the biomechanics of each phase, namely: 1) the initial phase with an average value of 3.8 is included in the "appropriate" criteria, 2) the backswing phase with an average value of 3.7 is included in the "appropriate" criteria,

3) the imposition phase with an average value of 4.0 is included in the appropriate criteria, 4) the continuation phase with an average value of 4.5 is included in the "very appropriate" criteria. So it can be concluded that the motion of the forehand drive on table tennis athletes in the south bengkulu ptm club is included in the good / appropriate category. However, it is also necessary to improve the motion in improving the ability to hit forehand drives on male table tennis athletes at the south bengkulu ptm club by adding good and appropriate training methods to improve the ability of table tennis athletes in south bengkulu and and prevent injuries during training and matches.

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