Concept Of Development Model Training Forehand Drive Table Tennis 6-9 Years

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Abstract: This research aims to develop a model of forehand drive training in drill-based table tennis for ages 6-8 years. Objective this study aims to increase the accuracy of the pattern and results of the forehand drive in table tennis for athletes. The research methods used are 9 phases of research: research and information collecting, planning, development of the form of a product, preliminary field testing, main product revision, main field testing, operational product revision, final field testing, and final product. The number of participants was 20 South Sulawesi table tennis athletes and the research was conducted at the table tennis building in the Gowa district, South Sulawesi. The data collection technique is done by recording the forehand drive using a camera. The data analysis technique was carried out using Kinovea motion analysis and table tennis forehand drive movement pattern parameters which were analyzed consisting of; the first phase, the backswing phase, the impact phase, and the follow-through, while the motion results obtained from table tennis forehand driveability in the medium category. the researcher used statistical parametric arithmetic descriptive quantitative and qualitative tools. Results: the results of the study were that the mastery of the initial phase obtained moderate results, the backswing phase was low, the impact was low, the follow-through was also low, and the motion results were in the moderate category. Conclusion: the conclusion of this study is that table tennis athletes' forehand driveability is still low which is caused on average by less than optimal trunk rotation, strength on the legs, hand-eye coordination, and the accuracy of hitting the bat with the ball.

Keywords: table tennis, forehand drive, exercise model

INTRODUCTION

Table tennis is a sport that is familiar to the community. This sport is very popular and popular since the XIX century in Europe and England and the United States. In Indonesia, this table tennis sport was known in 1930, and in 1960 the Indonesian table tennis association (PTMSI) officially became a member of the Table Tennis Federation of Asia (TTFA), and 1961 Indonesia officially became a member of the International Table Tennis Federation (ITTF).(David Aprianto, 2012). The sport of table tennis is growing rapidly and is increasingly popular in Indonesia from the

general public to entering the world of students by holding it at student sports events. Table tennis is famous for its game characteristics that can be played by all ages (Mahendra et al., 2012).

To play table tennis is very easy, a ping pong ball is hit on a table measuring 274 cm long and 152.5 cm wide, and has a height of 76 cm. The length of the table court is limited by a net as high as 15.25 cm, and the table is separated by the center line to divide the right and left players (Subakti & Iksan, 2018). The ball is hit alternately into the opponent's area. This game to become a champion in every official match event must have a proper hitting technique according to the theory of motion in table tennis. The types of strokes in question are drives, forehands, backhands, pushes, chops, blocks, serves, and spins (Yulianto, 2015).

Various types of strokes in table tennis that can be used as attacking strokes are forehand drive (righthanded). The shot is executed by swinging the arm from behind the bottom up diagonally following the direction of the ball, followed by a rotation of the waist and transferring the body weight to the other leg. The characteristic of this punch results in a very hard hit aimed at the baseline or side line which can make it difficult for the opponent to return (Lubrica et al., 2013).

Forehand drive is supported by several motor components to produce a forehand drive that is deadly and can be used as a weapon in competition, including hand reaction speed, flexibility, arm muscle power, eye-hand coordination, and agility (Kamalussadad et al., 2022). Efforts to improve table tennis forehand drive have been carried out by many previous model development studies including; practice using multiball models and hand-eye coordination exercises (Asri et al., 2017); development of a forehand drive exercise using a Robot drill (Asri et al., 2017); Development of a drill-based training model (Pane et al., 2020); Kinematic analysis on the lower limb during forehand drive (He et al., 2021); Table tennis forehand drive biomechanical analysis using economical capture software (Lubrica et al., 2013); forehand drive training model using sensors (Sanusi et al., 2021); assessment in shadow practice in forehand and backhand drives (Babar et al., 2021); assessment through inertial measurement units in table tennis training (Lim et al., 2018).

The development of this exercise model is table tennis forehand drive which has been carried out using Kinovea as a motion pattern analysis tool as a step for evaluating the resulting motion patterns. For this reason, the appearance of the expected movement pattern will be obtained based on the table tennis forehand drive motion pattern. The advantage of Kinovea as a motion evaluation tool is that it can determine real movement patterns based on body segment angles, movement speed, and projectile motion, and can even recognize the speed of the ball

resulting from a forehand drive in table tennis. Kinovea has been widely used in several previous studies including (Sharifnezhad et al., 2021);(Pueo et al., 2020) Kinovea-based tennis spin service analysis(Aprilo, 2022); The effectiveness of spin serve training in Kinovea-based tennis(Aprilo, 2021); Analysis of the physical condition of taekwondo athletes using Kinovea (Jariono et al., 2020); Biomechanical Analysis using Kinovea for sports applications (Nor Adnan et al., 2018);

The Kinovea application is already very popular for use in a study with many advantages over other motion analysis applications, it is more economical and very easy to use. The purpose of this study, namely to develop a table tennis forehand drive training model at the age of 6-9 years with the help of the Kinovea motion analysis tool, which combines various existing training models, but in this study there is a novelty that has, namely using base drilling with a combination of shadow, dynamic ball, sensory tools, and game methods.

METHOD

This study uses a qualitative descriptive method to describe the phases of the forehand drive concept in table tennis. Data collection started by recording the forehand drive of professional athletes to obtain patterns of movement of the forehand drive, and research subjects to obtain information on weaknesses and difficulties in the training process. Qualitative data analysis using motion analysis by applying Kinovea. Researchers collaborated with South Sulawesi table tennis trainers and coaches to get sharing and input in determining the concept of a model for table tennis forehand drive training in children aged 6-9 years. A total of twenty young athletes from South Sulawesi composed the study's participants.

RESULTS

The following are the results of a study involving 20 athletes aged 6-9 years:

Table 1. Statistical Analysis of Forehand Drive Capability

N	Maximal	Minimal	Range	SD	Mean
20	16	4	12	2	10

Table 1 indicates that the number of research participants or N is 20 individuals, with a maximum score of 16, a minimum score of 4, a range of 12, a standard deviation of 2, and a mean of 10.

Table 2. Category of Forehand Drive Capability

Motion Result	Category		
	High	**Medium (%)**	**Low (%)**
Forehand Drive Capability	0	6 (30)	14 (70)

Table 2. to explain the moderate category of forehand driveability consists of 6 individuals, or 30%, while the low category consists of 14 individuals or 70%.

Tabel 3. Statistics Analysis Phases of Forehand Drive

N	Nilai Maksimal	Nilai Minimal	Range	SD	Mean
20	4	1	3	0.5	2.5

There are as many as 20 individuals in the sample size N, the maximum value is 4, the minimum value is 1, the range is 3, the standard deviation is 0.5, and the mean is 2.5.

Table 4. Classification of Phases of Forehand Drive

Phases of a forehand drive	Kategori		
	High	**Medium (%)**	**Low (%)**
First phase	0	14 (70)	6 (30)
Backswing	0	8 (40)	12 (60)
Impact	0	7 (35)	13 (65)
Follow through	0	7 (35)	13 (65)

Table 4 explains that at each phase of forehand drive which consists of the first phase in the medium category with the rate reaching 70% or 14 people, the backswing phase is in a low category with the number reaching 60% or 12 people, while the impact and follow through are the same, namely reaching lift 65% or 13 people.

DISCUSSION

Based on the research results that have been obtained, it is explained that the forehand driveability of South Sulawesi athletes is still low. They seem to lack movement technique training so each phase of the forehand drive motion pattern is still not good and it is very important to improve it with various learning methods for the forehand drive motion technique. The ability to hit a good forehand drive is largely determined by good motion technique and applying the laws of biomechanics (Munivrana et al., 2015). The results of previous studies also explained that the athlete's forehand driveability was not good (Nugroho & Hafidz, 2021). Forehand drive skills are

very important for athletes because forehand drive is an attacking shot to gain points, and forehand drive is most often used by table tennis players (Yulianto, 2015). Improve the forehand drive technique, it can be done by practicing using various methods including; multiple balls (Asri et al., 2017; Babar et al., 2021); drilling based (Pane et al., 2020); using a low-cost motion analysis application (Lubrica et al., 2013); use the media to the wall (As, 2020).

Movement analysis that can help in correcting weaknesses and motion errors is very helpful for trainers and coaches. Digital-based biomechanical analysis using a recording camera can be used to improve the results of motion evaluation and will get the right solution handling according to the constraints faced. Kinovea applications that have been used in previous studies include: The findings of this study regarding the concept of forehand drive movement patterns based on video recordings of professional athletes are useful as a basis for developing the right training model according to the weaknesses of table tennis forehand drive patterns. The forehand drive concept is as follows:

Tabel 5. Concept of Table Tennis Forehand Drive (Pattern of Movement Forehand Drive for Table Tennis)

No	Phases of a forehand drive	Biomechanical Analysis	Information
1.	First phase		
		Foot stance: - The stance's feet are shoulder-width apart (450), and both feet are parallel (straight line) facing the ping pong table - Knee bent 1350 Posture: - Body leans forward 1350 - Point of weight between the two legs - Look straight ahead Arm stance - The bat arm is bent 900 - Position the upper arm straight beside the body - Forearms straight forward - The other arm is relaxed 90° and the hand is positioned in front of the stomach	
2.	Hits the ball phase: a. backswing b. Hitting pattern c. impact	Backswings: Foot : - Knee bent approximately 600 Body :	

No	Phases of a forehand drive	Biomechanical Analysis	Information
		- The point of weight is on the right foot (righthanded) - Trunk rotation clockwise - Body leaning to the right Arm : - The elbow angle of the hitting arm is approximately 1650 - The other arm is relaxed Movement pattern: - The swing pattern of the diagonal hitting arm towards the left shoulder (righthanded) impact : - Bat position facing down (300)	
3.	Ending phases:	Arm : - Position the arms diagonally in front of the body, and elbows 900. Body : - The point of weight shifts to the left foot (righthanded) - Trunk rotation anti-clockwise - Body leaning to the left Foot : - Knee angle 900	

Tabel 6. Variation Of Table Tennis Forehand Drive Training Model 6-9 Years

No	Exercise variations	Objective	Implementation	Information
1.	Shading practice	To increase understanding and habituation of the correct basic movement patterns which are practiced without using a ping pong ball.	Athletes do shadow forehand drive exercises with instructions from the coach. In this exercise, the athlete performs a freehand drive practice behind a table. Technically it can be done face-to-face and in groups.	
2.	Dynamic ball practice	To increase agility in forehand drives with different points of impact and targets	This exercise uses a dynamic ball tool, which is a ball tool that is on a support and can be hit repeatedly.	

No	Exercise variations	Objective	Implementation	Information
3.	Sensory tools	To increase the ability of speed and accuracy of motion through sensory code.	This drill uses a colored light sensor to signal the target forehand drive	
4.	Games	To improve the ability to apply forehand drive in games	In this exercise athletes play in groups in a balanced manner, and evaluate forehand drive during the game (errors and weaknesses that occur)	

CONCLUSION

The conclusion of the study is table tennis athletes' forehand drive skills are in the low category. The effort that can be offered is the concept of developing a forehand drive exercise that is by biomechanical analysis. The main thing that can be used as material for consideration conceptually is the result of technical weakness data for the forehand drive movement patterns analyzed using Kinovea.

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