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The comparison of elbow extension and elbow flexion movement toward forehand accuracy of court tennis

Fajar Ari Widiyatmoko*, Buyung Kusumawardhana, Muhammad Nur Ali Imran

Universitas PGRI Semarang, Indonesia

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ABSTRACT

Some of the beginner athletes in UKM of court tennis in UPGRIS conduct swing on the forehand, striking slightly. Some when swinging with entirely straight arms, some are slightly bent. The study aims to investigate the differences between elbow extension and elbow flexion toward the accuracy level of forehand striking of court tennis. This research method uses a comparative design. The sample of this study is the tennis players of the students in PGRI University Semarang; the total is 7 people. The Hewitt Tennis Achievement Test is used for forehand striking instruments and dartfish software to determine the differences between the elbow movements and the analysis. An Independent t-test is used to find out the differences of the striking accuracy result. The results show the significant differences between elbow extension and elbow flexion with an average score of 22 and 63, with the significance value of a difference of 0.001. The conclusion is elbow flexion movement in the forwardswing step is better than elbow extension movement.

Keywords: Elbow extension; elbow flexion; forehand; tennis

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Corresponding author: Fajar Widiyatmoko, Physical Education Health and Recreation, Universitas PGRI Semarang, Semarang, Jawa Tengah, Indonesia
Email: fajarariwidiyatmoko@upgris.ac.id

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INTRODUCTION

Many types of research are conducted to get empirical information about the increase of adult tennis players' stroke technique. Research about stroke generally tries to stimulate playing situations in labor conditions or find out any solution to collect experimental data in the tennis field (Lanka, Vagin, & Cicchella, 2014). Nonetheless, research still seldom tries to analyze the tennis stroke movement in detail, especially the difference between forwarding swing and the influence towards the accuracy of the stroke result, mainly towards the beginner athletes.

In the sports branch of tennis, the dominant aspect is on physical and psychomotor movement ability. There are three steps in the learning process of motor ability; those are (1) cognitive phase, (2) associative step, and (3) autonomy step (Sawali, 2018). The forehand is one of a kind basic striking technique in the field of tennis that has an important role. Palmizal (2011) mentions that average of players doing forehand during playing around 35-45% from the whole of the striking. The case proves that forehand striking gives the biggest contribution in every playing than another kind of striking.

As for the technique of forehand, according to groundstroke is striking after a bounced ball from the field and stroke from the forehand side. Striking of forehand groundstroke has several steps: movement swings racket to back, the swing of striking in front of and advanced movement after approval between racket and ball. The movement arrangement step moves weight in front of swing racket parallel with the field, does not move the wrist, focuses on the ball, and immediately hits it. For the advanced movement is; continue the swing after striking, swing the racket crosswise and go up, and direct the racket toward the target.

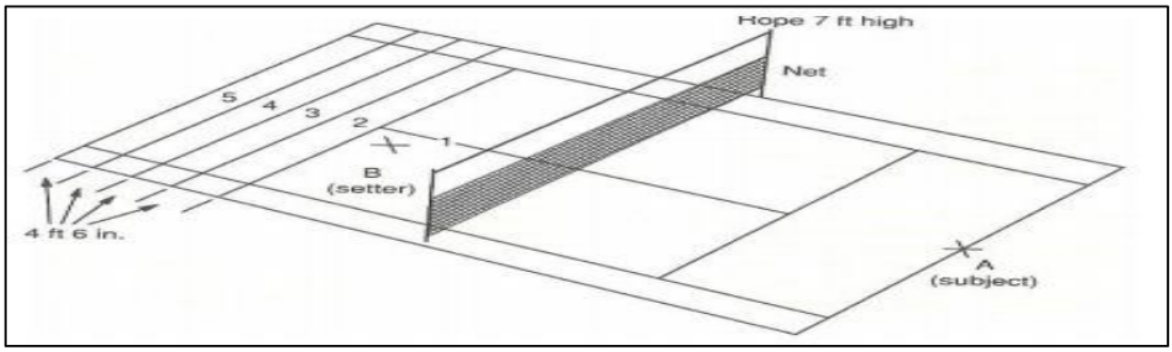
The movement of forehand striking in tennis is a combination of the movement of extension-abduction. When conducted forehand drive, the most contracting muscle is the arm muscle because it functions to hold racket (Sawali, 2018). When there is a ball with high speed, so there is a faster and sharper movement of the ball. Thus, the efficacy of arm muscle is significant for the forehand in tennis. The efficacy of racket during the follow-through forehand phase is higher on adult players compared with kids because adult athletes have a higher factor x score that shows that they are more effective in applying the pre-stretching principle of complex tendon muscle during the backswing and forward swing phase (Lanka et al., 2014).

From the kind aspect of the eastern handle is better than the western handle toward forehand groundstroke accuracy (Nugroho, 2016). While from the movement aspect to improve ability striking forehand can be conducted with horizontal swing training and training of side lateral raise (Siahaan, 2017). Both of the training are the same to train the power of forwardswing that is very needed when striking the forehand. Nonetheless, when conducting forwardswing step, especially when elbow biomechanically, there is a difference in a movement pattern conducted by the tennis club player UPGRIS. There is an athlete or player that doing forwardswing with elbow flexion, there is doing forwardswing with elbow extension. Generally, it does not look too distinguished from the striking result from both of elbow movements. Nevertheless, which one is better accuracy between elbow flexion or elbow extension?

METHODS

This research uses the causal-comparative or ex-post-facto method because the researcher efforts to determine cause or consequence from the difference that there have been between individual groups without conducting manipulation (Fraenkel, Wallen, & Hyun, 2012). The sample in this research is field tennis player UPGRIS in 2019 amounts to 7 people. The collecting of data of this research is conducted with The Hewit's Tennis Achievement Test (Hewitt, 2013).

Test of forehand striking from Hewit's is designed to be used as a determination of striking accuracy level. The test is done with the way the players stand on the position in the baseline, then striking the baited ball from in front of with forehand striking amount 4 times, then the fall of ball is noted as a result with scoring based on test norm furthermore it is searched the scoring average. This test has a coefficient of the validity of 0,63 and reliability of 0,75. In analyzing, it is the movement of forehand striking by using the facility of analyzing performance software dartfish. Dartfish version 4.5.2.0 is to identify forehand movement. Analysis of forehand striking is conducted to determine whether use elbow flexion or elbow extension. While the difference of accuracy result of the striking forehand is computed with T-test.



Picture 1. The Hewitt Tennis Achievement Test
(Hewitt, 2013)

Table 1. Observation Analysis Guide of Forehand on Forwardswing Step

Steps of Forwardswing Striking	Assessed Aspects
Back-leg drive	Right foot in a straight position and rotation hip for conducting movement towards the ball
Hip and Shoulder Rotation	Hip rotates ahead then followed by shoulder rotation ahead for the next conducting impact with the ball
Racket Pulling	Arm pulls racket by stretching shoulder muscles.
Weight Moving	The weight of the body is moved ahead
Elbow Moving	Movement of elbow corner is relatively near with torso
Shoulder Moving	Internal rotation efficacy happened on fowardswing end
Wrist	Wrist muscles stretch and movement of writs follow racket direction
Kinetic Sequence	Movement is started from the ankle, flowing until impact

(Nugroho, 2015)

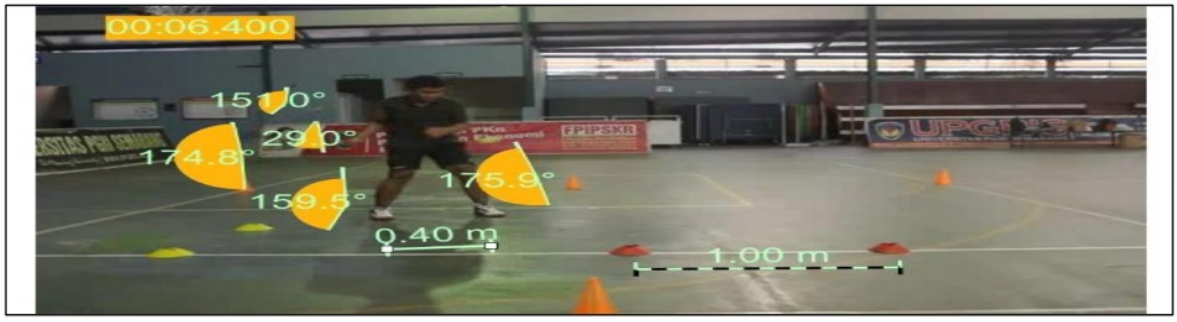
RESULTS AND DISCUSSIONS

This research aims to detect the difference of influence of forwardswing elbow extension and elbow flexion steps toward accuracy level of forehand striking of field tennis. The following accuracy level of forehand striking that measured with the Hewitt tennis achievement test toward 7 tennis players UPGRIS.

Table 2. Accuracy Result of Forehand Striking

No	Player Name	Point	
		Elbow Extension	Elbow Flexion
1	Pradipta	70	80
2	Abdillah	10	60
3	Elang	15	70
4	Shafly	30	55
5	Anwar	10	45
6	Junaidi	10	70
7	Indra	10	60
Average		**22**	**63**
Normality		**0,2**	**0,67**
Homogeneity		**0**	
Independent t tes		**0,01**	

From table 2 the difference looks flashy enough between forehand striking on forwardswing with elbow extension and elbow flexion. The comparison number is average between 22 and 63. It is a really higher average of forehand striking on forwardswing step with elbow flexion. IN different test is gained result α 0,01 < 0,05. It means between the result of forehand on striking forwardswing step of elbow extension, and elbow flexion is significantly different. Therefore forehand striking on forwardswing step with elbow flexion has better accuracy.



Picture 2. Forehand Movement on Fordwardswing Step

Furthermore, it is also analyzed biomechanics using software dartfish, especially on forwardswing step to make it clear. Taking one sample on 1 forwardswing forehand step, eyes focus on impact zone, bend elbows corner of testy is on 134,50, the racket from low trajectory to the high trajectory, body inclination corner is on 166,70, body position obliques to right, corner of arm opening is on 45,60, travel time from backswing until the impact is 00:00:280 second.

This research focuses on elbow movement influence when forwardswing step on forehand striking. The main result shows that on forwardswing stage with elbow flexion has the more accurate striking result. The result of forehand performance analysis on forwardswing step with observation sheet is biomechanical with good enough category. This result is the same with the research of Nugroho (2015) that mentions that forehand performance of junior athlete field tennis DIY on forwardswing step biomechanically included with good enough category when elbow in position few bent and near with torso. Besides, forehand training for beginner steps is better also conducted step by step from a close distance until backline (Arifin, Soegiyanto & Nugroho, 2012).

On essential striking training step beside distance is also important to be paid attention the coming to the ball. Setyohardani (2015) calls that driveability that trained by using a right-left ball is better than the front-back ball. Furthermore, it is explained when will give drive training, players consider the goal of striking prioritized to be improved, if that want to improve is accuracy, power, forehand and backhand striking, use the training of right-left ball, if that want to be developed is the ability of service striking and lob and the increase of physical player, so use drive training direct the striking of front-back (Setyohardani, 2015).

Further research about the correlation of muscle and striking results has been much researched. Rogowski, Creveaux, and dan Rota (2009) investigate the correlation between muscle coordination and tennis racket wight in forehand striking and mentions that the racket's weight influences ball speed and muscle activity arrangement and suggests muscle activity study during tennis training is very required to determine the suitable racket weight. Rota, Hautier, Creveaux, Champely, Guillot, dan Rogowski (2012) also mentions that there is a correlation between muscle coordination toward the speed of striking result ball, where the muscle activity level is on the external oblique part, latissimus dorsi, middle deltoid, biceps brachii, and triceps brachii. While Rota, Morel, Saboul, Rogowski, dan Hautier (2013) mention that tiredness in tennis training in tennis training causes the slope of speed and accuracy of striking related to the change in the muscle activity level of pectoralis major and athletes to arm muscle.

Zuša (2011) explains the survey result about the shoulder and arm muscles, that domination of right side: internal rotation 29%, external rotation 25,4% and shoulder extension 19,4%. Therefore, from all the research results above, the trainer should pay attention more to the implementation of static and dynamic training and endurance of muscle in performance perspective and prophylaxis (procedure of injury prevention). Besides, the modification of tonnis can be used as an alternative to beginning step training or for those who are restricted on the field tennis with tonnis (Naim, 2013).

CONCLUSION

The results and analysis of movement show that elbow flexion movement on the forwardswing step is better than extension elbow movement. On another side, it can be in playing position, forwardswing step with elbow extension movement and elbow flexion stay same in accuracy and required. Limitedness in this research is too few samples, so for further can be added the sample number, besides it also needs to be taken sample variation from gender and age.

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