



**THE CORRELATION AMONG EYE-HANDLING COORDINATION,  
ARM POWER AND LENGTH ARM TOWARDS GROUNDSTROKE  
FOREHAND ABILITY ON TENNIS OF PMBO PHYSICAL  
EDUCATION IN UMPP, INDONESIA**

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**Abstract:**

This study was conducted to find out eye-hand coordination, arm power and arm length towards groundstroke forehand ability on tennis of PMBO physical education in UMPP. This study uses a correlational research method. The sample of this study were male and female students who attended the PMBO UMPP Physical Education Study Program, totaling 15 people. Data collection procedures include licensing, sampling and data processing. The results of data collection will be processed by the following stages: editing, coding, processing, and cleaning. Data analysis in this study uses univariate analysis and bivariate analysis. The results showed that there was a relationship between hand eye coordination and the forehand groundstroke ability of 0.561 and a relative contribution of 19.83% and an effective contribution of 14.87%. There is a relationship between arm power to the results of groundstroke forehand capability of 0.765 and a relative contribution of 39.68% and an effective contribution of 29.76%. There is a relationship between arm length and the result of forehand groundstroke ability of 0.645 and a relative contribution of 25.93% and an effective contribution of 19.45%. There is a relationship among eye hand coordination, arm power and arm length on the results of the forehand groundstroke ability of 0.812 and an effective contribution of 81.20%. The

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value of F among hand eye coordination, arm power, and arm length on the ability of forehand ground tennis stroke (Y) is 15,804. The conclusions of this study are: (1) There is a relationship between hand eye coordination and the ability of the forehand groundstroke. (2) There is a relationship between arm power and forehand groundstroke ability. (3) There is a relationship between arm length and forehand groundstroke ability. (4) There is a relationship between hand eye coordination, arm power and arm length on the ability of the forehand groundstroke. The value of F among hand eye coordination, arm power, and arm length on the ability towards groundstroke forehand ability on tennis (Y) is 15,804. The conclusions of this study are: (1) There is a relationship between hand eye coordination and forehand groundstroke ability. (2) There is a relationship between arm power and forehand groundstroke ability. (3) There is a relationship between arm length and forehand groundstroke ability. (4) There is a relationship among hand eye coordination, arm power and arm length towards forehand groundstroke ability.

**Keywords:** hand eye coordination, arm power, arm length, forehand groundstroke ability

## 1. Introduction

Tennis is one of sport branches that uses small balls and each player uses a racket as a ball hitter. This game is done on a rectangular square made of cement, soil with fine sand (gravel), also played on grass. There is divided by two equal by a net. In tennis, the ball is hit after bouncing once and may not bounce more than once. It is also permissible to release the ball when flying before bouncing off the ground. In the game of tennis, there are several types of tennis known, namely: backhand, forehand groundstroke, volleyball, forehand, smash, drop shot, and lob.

Groundstroke Forehand is a type of stroke in the tennis sport that is often used as one of the shots which can release the opponent. By being able to master the basic techniques of forehand groundstroke and forehand groundstroke, players can contribute to participating in the game. For beginners, the basic technique of forehand groundstroke and forehand must first be mastered before training and mastering other types of shots because this basic technique is the basic stroke in playing tennis.

Eye-hand coordination is one of the physical condition abilities that plays an important role in forehand groundstroke, because in tennis relies on the ability to move quickly, the maximum of a sudden nature requires good coordination to hit the ball properly. Good eye-hand coordination will make it easier to determine the direction of the ball and the target the player will aim for. Muscle power is the ability of muscles to move strength maximally in a fast time. Arm power is needed to hit the ball into the opponent's area quickly and hard. A forehand groundstroke can be used for weapons after making an initial forehand groundstroke in a tennis game, so this stroke requires

good arm power. At the time of the ball, the arm power should be used maximally. If the arm power is good then the ball that is hit will go fast, hard and directed, so that the ball resulting from a forehand is difficult to return and reach by the opponent. Meanwhile, the arm is the distance measured from the acromion point on the *humerus* to the *styloid* point on the *ulna*. Arm length is one of the abilities of physical condition that affects the good and bad of a forehand. The length of the arm will affect when the player is going to backswing, impose the ball with the racket and also follow the throw in a series of basic forehand groundstroke techniques. By looking at the physical condition of eye-hand coordination, arm power and arm length these factors are not yet known with certainty because measurements have never been made in the PMBO tennis of Physical Education Study Program UMPP. It is also unknown the relationship between eye-hand coordination, arm power and arm length on the results of forehand groundstroke.

Best sports achievements are highly coveted, because achievements in the field of sports can lift the dignity of the Indonesian nation. The efforts to get high achievements in sports, especially in the country of Indonesia, are conducted from coaching in schools and sports clubs both in cities and villages. In this case, many UMPP Physical Education Study Programs try to foster tennis players' achievements at the Tennis Court of HW Sport Center of Pekalongan.

Based on the background stated above, the formulation of the problem that will be raised is: Is there any relationship between eye-hand coordination to the ability of the forehand groundstroke in PMBO tennis of Physical Education Study Program UMPP, is there any relationship between arm power and forehand groundstroke ability in tennis UMPP Physical Education Study Program, is there any long-term relationship among the ability of forehand groundstroke in the tennis forehand groundstroke UMPP Physical Education Study Program UMPP, is there any relationship among eye-hand coordination, arm power and arm length to the ability of the forehand groundstroke in PMBO tennis of Physical Education Study Program UMPP.

## 2. Literature Review

The research conducted by the author is entitled "The Correlation among Eye-Handling Coordination, Arm Power and Length Arm towards Groundstroke Forehand Ability on Tennis of PBMO Physical Education in UMPP" The similarity of the themes that the author read earlier is as follows: Title: "The Relation among eye-Hand Coordination, Arm Power and Grips Strength towards Groundstroke Forehand Learning Outcomes in Tennis to the male students of Tennis Achievement Development of JPOK, FKIP UNS in Academic Year 2013/2014", written by: Rizan Setyo Nugroho, University: Sebelas Maret University of Surakarta. The discussion in this study regarding the test and measurement of tennis groundstroke forehand viewed from the eye hand test, arm power and grip strength. The result shows that (1) There is a correlation between hand eye coordination on the learning outcomes of the forehand groundstroke in the students' achievement in

PJOK FKIP tennis in academic year 2013/2014 ( $r_{\text{count}} = 0.644 > r_{\text{table}} = 0.355$ ). (2) There is a relationship between arm power and the forehand groundstroke learning outcomes in the students of academic training for the achievement of JPOK FKIP UNS in academic year 2013/2014 ( $r_{\text{count}} = 0.404 > r_{\text{table}} = 0.355$ ), (3) There is a relationship between grip strength and forehand groundstroke learning outcomes in the student achievement training for JPOK FKIP UNS tennis in academic year 2013/2014 ( $r_{\text{count}} = 0.404 > r_{\text{table}} = 0.355$ ) (4) There is a relationship between hand eye coordination, arm power in the students training for JPOK FKIP UNS tennis achievement in 2013 / academic year 2014 ( $r_{\text{count}} = 0.795 > r_{\text{table}} = 0.355$ ).

### 3. Material and Methods

The research method used is a single or multiple correlation with three independent variables and one dependent variable. In this correlation, there are three independent variables, those are arm power (X1), grip strength (X2), hand eye coordination (X3) and one dependent variable that is the result of a groundstroke forehand on PMBO tennis of the Physical Education Study Program of UMPP total sampling(Y). The study design is as follows:

- 1)  $rx_{1y}$  = The relationship between arm power and groundstroke forehand results.
- 2)  $rx_{2y}$  = The Relationship between arm length and groundstroke forehand results
- 3)  $rx_{3y}$  = The relationship between hand eye coordination and groundstroke forehand results.
- 4)  $rx_{1.2y}$  = The relationship between arm power and arm length towards forehand groundstroke results.
- 5)  $rx_{1.3y}$  = The Relationship between arm power and hand eye coordination towards the forehand groundstroke results.

This research will be carried out at the HW Sport Center tennis court of Pekajangan, Pekalongan. The sampling technique used was purposive sampling that is sampling based on specific objectives and considerations. The data source in this study is the PMBO students of the UMPP Physical Education Study Program field.

Data collection procedures include licensing, sampling and data processing. The results of data collection will be processed by the following stages: editing, coding, processing, and cleaning. Data analysis in this study uses univariate analysis and bivariate analysis.

### 4. Results and Discussion

This study was conducted to determine eye-hand coordination, arm power and arm length on the ability of the groundstroke forehand tennis PMBO UMPP Physical Education. This research was conducted on male and female students who attended the

PMBO UMPP Physical Education Study Program. Here are the results of the data obtained from the data:

**A. The Contribution of Arm Length towards Tennis Groundstroke forehand Ability**

The length of a tennis player's arm is very helpful in the playing success, considering that in the basic motion of the groundstroke forehand of the ball is hit on the right of the body which means the longer the player's arm the success rate of the ball across the net will be greater because with a long arm the impact of the racket on the ball will be more right from the net. Moreover, the longer the arm, the greater the swinging force that will have an impact on the ball's speed. The variable of arm length test score 0.645 with probability =  $0.005 < 0.05$ , then  $H_0$  is rejected, which means there is a significant correlation between the arm length test score towards the forehand tennis groundstroke forehand value.

**B. The Contribution of the Arm Muscle Power towards Forehand Groundstroke Tennis Ability**

The arm that functions as the upper body movers, also functions as a source of initial driving force when performing a forehand tennis groundstroke. Strong arm power will produce a hard punch which is very important in tennis because a hard punch ball to the opponent will put pressure on the game since the game begins. In measuring arm muscle power, the medicine ball throw test is often used. From the data, it can be seen that medicine ball throw test score variable is 0.765 with probability =  $0.00 > 0.05$ , then  $H_0$  is accepted, which means there is a significant relationship / correlation between arm muscle power test scores towards the groundstroke forehand tennis values.

**C. The Contribution of Eye Hand Coordination towards Forehand Groundstroke Ability in Tennis**

In tennis, the ability of hand eye coordination is absolutely considered because tennis is very full of dexterity from eye coordination that our hands will respond to. The ability of the eye to read the direction of the ball, the speed of the ball spinning on the ball that is processed by the brain then instructs the arm to move to respond and pay attention to the angle of the blow, the subject of the racket on the ball and the estimated strength of the punch, all of which indirectly also affect the results of each stroke. Variable scores of tennis ball throwing / hand-eye coordination test is 0.561 with probability =  $0.015 < 0.05$ , then  $H_0$  is rejected, which means there is a significant correlation between tennis ball throwing / eye-hand coordination test scores and groundstroke forehand tennis test scores.

**D. Contribution of Arm Length, Arm Muscle Power, and Hand Eye Coordination towards Forehand Tennis Groundstroke Ability.**

Arm length and arm muscle power have a dominant factor in influencing the outcome of a blow. This is related to the amount of thrust on the ball produced when the racket is swung and hit the ball. In addition, eye hand coordination plays a role in players' success in conducting this forehand groundstroke technique. The contribution of these three independent variables to the dependent variable (groundstroke forehand tennis) was 81.20%.

## 5. Recommendations

Based on the results of data analysis and research conclusions, suggestions can be made as follows:

1. For the tennis trainer, to be able to control the behavior of students who generally behave as they pleased in order to get good learning outcomes. Especially, to get the right results in the intention of getting young seeds that have talent in terms of arm length, arm muscle power, and eye hand coordination.
2. Children sometimes do not want to care about the test results obtained, then it needs a very clear explanation to make children do the test seriously. So, the talent can be found by coaches and developed, and it is not in vain.

## 6. Conclusion

The conclusions of this research are: (1) There is a relationship between hand eye coordination and forehand groundstroke ability. (2) There is a relationship between arm power and forehand groundstroke ability. (3) There is a relationship between arm length and forehand groundstroke ability. (4) There is a relationship among hand eye coordination, arm power and arm length towards the ability of forehand groundstroke.

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The researchers realize that the writing of this research is still far from perfection so that constructive criticism and suggestions are highly expected by the researchers. May Allah always bestow His mercy and blessings on us all. *Aamiin* With all the shortcomings and limitations that exist, hopefully this research can provide benefits to science, especially fitness and sports science, and with all humility in the hearts, the researchers apologize profusely if there have been many mistakes and errors to relevant parties both intentional or unintentional.

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### References

Agus Salim (2008). *Buku Pintar Tennis*. Bandung, Nuansa.

<http://ejournal.unesa.id/index.php/jurnal-kesehatan-olahraga/article/view/8282>

Ismaryati (2006). *Tes Pengukuran Olahraga*. UNS, Surakarta.

Johnson Barry L. and Jack K. Nelson (1979). *Practical Measurements for Evaluation in Physical Education*. USA: Burgess Publishing Company.

Keith L. Moore (2014). *Anatomi Klinis*. Jakarta, EGC.

Sugiyono (2007). *Metode Penelitian Kuantitatif, Kualitatif dan R & D*. Bandung, Alfabet.

Suharsimi Arikunto Jakarta: Rineka Cipta. (2002). *Managemen Penelitian*. Jakarta, Rineka Cipta.

Sukadiyanto (2005). *Teori dan Metodologi Melatih Fisik Petenis*. Yogyakarta, Penerbit UNY.

Tim Anatomi. (2003). *Diklat Anatomi Manusia*. Yogyakarta, Laboratorium Anatomi FIK UNY.

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