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Correlation between Hand-Eye Coordination and Wrist Flexibility on Short Service Ability in the PB Avanti Makassar Badminton Game

Suastika Nurafiati[1ABCD*], Tri Angriawan[2BD], Achmad Karim[3A-C], Herman[4A-C], Ariana Asri[5A-C], Andi Sahrul Jahrir[6A-C]

[1-6]Programs Studies Physical Education, Health and Recreation, STKIP YPUP Makassar
*Coresponding Author: suastikajuliani@yahoo.co.id

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ABSTRACT
The ability to serve short in badminton is one of the most important strokes. The game of badminton begins with a short serve, so it is necessary to master the skills and basic techniques of the underhand serve. The research method used is quantitative research with correlational research. This correlational study involved two independent variables, namely hand-eye coordination and wrist flexibility, while the dependent variable was short serve ability in badminton. The population in this study was PB Avanti Makassar, with a sample of 30 athletes taken by random sampling. The data analysis technique used is the correlation coefficient. The results of the research conducted show that: 1). There is a significant relationship between hand-eye coordination and short serve ability in badminton with a value of r = 0.755. 2). There is a significant relationship between wrist flexibility and short serve ability in badminton, with a value of r = 0.731. 3). There is a significant relationship between hand-eye coordination and wrist flexibility, together with the short serve ability in badminton games, with a value of R = 0.853.

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INTRODUCTION

Badminton is a popular sport that can penetrate ethnic boundaries in all walks of life. This sport does not set boundaries; it can be seen that each individual plays the game. Badminton in the wider community has become a sport to be played by every individual, regardless of any economic, social, cultural, or religious boundaries. Badminton itself can be a positive link in every sporting activity. In society, this game is played by social circles from anywhere and anytime. Sports, especially badminton, really need an element of physical condition.

Badminton is a game that is played using a tool called a racket and shuttlecock. Implementation in this game can be done one-on-one, which is calledImplementation in this game can be done one-on-one, which is called a "single game, or two-on-two, which is called a double game (Sugiyanto & Yuliawan, 2014).

The physical condition is a unified whole of components that cannot be separated, both for improvement and maintenance. That is, in an effort to improve the physical condition of all these components, they must also be developed. The components of the physical condition consist of strength, endurance, explosive power, speed, flexibility, agility, coordination, balance, accuracy, and reaction. According to Firmansyah (2013), the ability to play badminton in an excellent manner requires elements of physical condition. So the physical conditions needed in this study are hand-eye coordination and wrist flexibility. So the physical conditions needed in this study are hand-eye coordination and wrist flexibility.

According to Biwanto (2012), coordination is a very complex body movement ability that is closely related to speed, strength, endurance, and flexibility. Coordination is an important factor that determines not only the acquisition and perfection of techniques and tactics but also their application in unfavourable circumstances, such as field conditions, tools and equipment, lighting, climatic and weather conditions, and opponents. Flexibility is the joint's ability to perform movement within the joint's maximal range of motion. Flexibility refers to the maximum amount of joint movement in accordance with the possible range of motion (range of movement). People who have a wide range of motion in their joints and have elastic muscles

Playing badminton, especially in serving skills, has a relationship with physical ability factors including wrist flexibility, arm muscle explosive power, and even hand-eye coordination. The ball that is bounced to the opponent through the bat is rubbed by the arms and hands, so eye-hand coordination must be in line with the flexibility of the wrist in placing the ball on the opponent (Arifianto et al., 2021). In badminton, someone who will do a short serve must have good eye-hand coordination because the hands are used to hold the racket and hit. shuttle while the eyes are used to look ahead when shuttle to hit and see which way shuttle it will be directed will produce a movement that is in harmony with what is desired.

The flexibility of the wrist is very dominant when hitting a short serve. Flexibility can be said to be the maximum level of ability in the range of motion of the joints. A strong, flexible wrist makes for a good punch that can aim well in all directions. Having a wrist that is free, flexible, and strong is a prerequisite for a badminton player to do a short serve, namely the ability to make a punch. Shuttle in order to be able to fly over the net strongly and quickly so that it falls on the front service line with the centre line or the service line and the edge line.

Based on the results of observations during training 1). Some athletes do short serves (shuttlecocks), not over the net. 2) When some athletes do short serves, how come they still soar high, which causes the shuttlecock to be easily returned by the opponent? 3) When doing a short serve, how come it falls on the wrong field or goes outside the field line? 4) When doing a short serve, some students did not hit fast and strong, which resulted in the opponent still being able to return it.

The results of this research related to the problem of short serve in badminton games stated that physical components had an effect on short serve ability in badminton games (Kamaruddin, 2019). Influential physical components are components that play an important role in performing short serves, such as hand-eye coordination, hand flexibility, and arm muscle strength (Muliana et al., 2019). Based on the thoughts above, the writer

wants to know for certain about the short serve ability in badminton games associated with hand-eye coordination and wrist flexibility.

MATERIALS AND METHODS

The method used in this research is a quantitative one. According to Sugiyono (2018), quantitative research can be interpreted as a research method based on the philosophy of positivism used to research certain populations and samples. Sampling techniques are generally carried out randomly, data collection uses research instruments, and data analysis is quantitative with the aim of testing the hypotheses that have been set. Research on the relationship between hand-eye coordination and wrist flexibility and short serve ability in badminton games was analysed by looking at the level of correlation.

This study used a sample of 30 PB Avanti Makassar athletes who were taken according to a random sampling technique. Probability sampling is a sampling technique that provides equal opportunities for each element that is a member of the sample (Ramadhani Khija, Ludovick Uttoh, 2015). The data collection technique uses eye-hand coordination tests, wrist flexibility tests, and underhand serve tests in badminton games. Test result data were analysed using the correlation analysis method, namely calculating the correlation of the eye coordination variable (X1) with the ability to serve short badminton games (Y), analysing the correlation test of wrist flexibility (X2) with the ability to serve short badminton games, analysing the correlation test of hand eye coordination variables (X1), and analysing the correlation test of wrist flexibility (X2) with short serve ability in badminton games (Y).

The eye-hand coordination variable test (X1) is carried out by throwing and catching the ball against the wall, paying attention to the time and score according to the existing test instruments. For wrist flexibility correlation tests (X2) using plexi and extension test instruments. The underserve ability test is carried out in badminton games by looking at the results or scores.

RESULTS AND DISCUSSION

Results and Discussion After all the research data has been collected, the next step is to analyse the data so that a conclusion can be drawn from it. In this study, statistical analysis was used with the help of a computer through the SPSS version 21 programme to find out whether there was a relationship between the independent variable and the dependent variable, short serve ability, and the two independent variables, hand-eye coordination and wrist flexibility. A descriptive analysis of research data consisting of hand-eye coordination test scores and wrist flexibility on short serve ability in badminton games

Based on Table 2 above, it can be seen that the physical conditions possessed by Pesawaran Regency PASI athletes, for female athletes who fall into the "very good" ability category 0.00% there are 0 people, the "good" ability category of 50.00% there are four people, the "enough" ability category of 25.00% there are two people, the "poor" ability category of 25.00% there are two people and the "very poor" ability category of 0.00% there are 0 people.

Table 1. Results of descriptive analysis of hand eye coordination and wrist flexibility on short serve ability.

Statistical Value	Hand Eye Coordination (Points)	Wrist flexibility (Degrees)	Short Service Ability (Score)
N	30	30	30
missing	0	0	0
Means	13.80	70.60	43.97

Median	14.00	70.00	44.00
Mode	15	70	44
SD	2,797	5,481	5,780
Variances	7,821	30,041	33,413
Range	9	18	20
Minimum	9	62	34
Maximum	18	80	54
Sum	414	2118	1319

In testing the normality of hand-eye coordination data, we obtained a KS-Z value of 0.727 and a P value of 0.666 greater than 0.05. With this data, hand-eye coordination is normally distributed. In testing the normality of the flexibility data, wrist _ obtained a KS-Z value of 0.727 and a P value of 0.666 more than 0.05. Thus, the wrist flexibility data obtained is normally distributed. In testing the normality of the short serviceability data, the values of KS-Z = 0.743 and P = 0.639 are greater than α = 0.05. Thus, the short-service ability data obtained is normally distributed.

Correlation Analysis

A correlation analysis was carried out to find out if there was any relationship between the independent variable and the dependent variable. The correlation analysis used is a single correlation (r) at a significant level of 95% or 0.05. The complete analysis results can be seen in the appendix, while the summary of the analysis results is listed in the following table:

Table 2. Summary of the results of the data correlation analysis of hand-eye coordination and wrist flexibility on short serve ability in badminton games

Hypothesis	N	r/r	R^2	Sig
Correlation of hand eye coordination to short serve ability	30	0.755	-	0.000
Correlation of wrist flexibility to short serve ability		0.731	-	0.000
Correlation of hand eye coordination and wrist flexibility on short serve ability		0.853	0.728	0.000

Discussion

From the results of testing the first hypothesis, the variable shows that there is a significant relationship between hand-eye coordination (X1) and short serve ability in badminton games (Y). Based on the calculation results obtained, the value of the correlation coefficient (r) is 0.755. Therefore, eye-hand coordination is very influential, where the eyes are used to see when the shuttlecock should be hit and in which direction the shuttlecock will be directed.

From the results of testing the two hypotheses, the variable shows that there is a significant relationship between wrist flexibility (X2) and short serve ability in badminton games (Y). Based on the calculation results obtained, the value of the correlation coefficient (r) is 0.731. So that can prove that flexibility is very influential because flexibility in the wrist plays a role in expanding motion joints and making motion elastic from hand muscles, so movements for blow service appear more supple and not stiff.

From the results of hypothesis testing, the two variables show that there is a significant relationship between hand-eye coordination (X1) and wrist flexibility (X2) and the ability to serve (Y). Based on the calculation results obtained, the value of the multiple correlation coefficient (R) is 0.853 with a coefficient of determination (R2) of 0.728, or 0.728 x 100% = 72.8%.

CONCLUSION

There is a significant relationship between hand-eye coordination and short serve ability in the PB Avanti Makassar badminton game. There is a significant relationship between wrist flexibility and short serve ability in the PB Avanti Makassar badminton game. There is a significant relationship between hand-eye coordination and wrist flexibility and short serve ability in the PB Avanti Makassar badminton game.

CONFLICT OF INTEREST

Author No conflict of interest to declare.

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