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THE INFLUENCE OF EYE COORDINATION AND SHOULDER JOINT FLEXIBILITY ON SHOOTING ACCURACY IN THE AIR OF HANDBALL ATHLETES

Dwi Indra Kurniawan [1], Slamet Sukriadi[2], Muhamad Arif [3], Harry Syahputra Nasution[4]

[123]Fakultas Ilmu Keolahragaan Universitas Negeri Jakarta, Rawamangun, Kec. Pulo Gadung, Kota Jakarta Timur, Daerah Khusus Ibukota Jakarta, Indonesia
[4]Physical Education, Faculty of Teaching and Education, Pamulang University, South Tangerang City, Banten, Indonesia

Correspondiing author. Email **:** dwiindrakurniawan@unj.ac.id

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Abstract The aim of this research is to prove the direct influence of hand eye coordination, shoulder joint flexibility, on shooting accuracy in the air. This research is a quantitative research with a correlational method. This research will be carried out in the Multipurpose Building and Laboratory, Jakarta State University from April-September 2023. The population in this research is all athletes from the FIK UNJ handball club, with the designated population being athletes. There are 24 male and female athletes from the FIK UNJ handball club. The data collection technique in this research is through research instruments used for data collection which are first tested to obtain validity and reliability. For 1) aerial shooting test. 2) eye-hand coordination test using hand and eye coordination. 3) shoulder joint flexibility test using a goniometer. From the analysis results in the table, the statistics for the variable coefficient X1 are thit = 1.796 and p. value 0.007/2=0.0035 < 0.05 or ho is rejected, which means hand eye coordination has a positive effect on shooting accuracy. Next, the value for the variable coefficient. Based on the results of the data analysis above, it can be concluded that the multiple correlation coefficient between X1 and X2 and Y is meaningful or significant

Keywords: hand eye coordination and shoulder joint flexibility, handball, multiple correlation

INTRODUCTION

The game of handball is a sports game, just like sports games such as football, basketball and others. Because this game relies on almost all physical components such as Strength, Speed, Endurance, Flexibility and Coordination. Of these five components, handball also has combined components such as power, reaction, agility, hand eye coordination, accuracy and others.

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Meanwhile, according to the rules, handball is a sport that uses a ball as a tool with the aim of putting as many balls into the opponent's goal as possible and preventing the opposing team from being able to put the ball into their own goal.

Handball is a sport that is a combination of basketball and football. Where the basic technique of playing handball is bouncing and passing the ball using the hands, just like playing basketball. Meanwhile, in terms of rules, handball is almost the same as soccer on the field and uses the same goal as soccer.

Nowadays, handball is starting to develop little by little in Indonesia. This can be seen from the existence of the organization that oversees the sport of handball, namely the Indonesian Handball Association (ABTI). And this was followed by the establishment of the Handball Club, Faculty of Sports Science, Jakarta State University.

This sport was officially competed for the first time in Indonesia at the sand handball championship which was one of the branches of the First Asian Beach Games in Bali in 2008. Then it developed with the annual Indoor Handball Student Championship which was initially held at the Jakarta State University in 2009. And the Jakarta State University Faculty of Sports Sciences handball club competed in the championship. Then the following year it was held at the Indonesian Education University (Bandung) in 2010 and finally held again at the Jakarta State University in 2013.

Accuracy relates to a person's desire to give direction to the target with

certain aims and objectives, (Paulus et al, 2021). Accuracy is one of the physical components required in sports games. Because in this branch of the game there is usually a goal to be achieved in order to win a match. Therefore, accuracy must also be considered in selecting an exercise program.

Accuracy in the ability to shoot the ball in handball greatly influences the direction of the shot that goes into the goal. Shooting the ball while jumping is something that is difficult to do, because while in the air we have to shoot the ball as quickly as possible into the opponent's goal. And this is where precision functions in adding points in the game of handball.

Coordination is a very complex biomotor ability. Adil, tangkudung, hanif (2018) says that "coordination is the ability to simultaneously perform various tasks of motion smoothly and accurately (appropriately) (Adil et al., 2018). According to (Nugraheni, 2017) states "that coordination is the ability to carry out movements by combining several abilities precisely and with a controlled rhythm so as to produce effective and efficient movements".

Syafruddin (2011) Coordination is the ability to complete motor tasks quickly and purposefully which is determined by the process of controlling and regulating movements as well as the cooperation of the central nervous system. Furthermore (Ahwadi & Kusmaedi, 2016) said that "the higher a person's level of coordination, the easier it is to learn new and complex techniques and tactics." Coordination is the ability to combine perception or understanding obtained in interpreting stimuli by several perceptual abilities into certain movement patterns that are synchronous and integrated, which is a function of the central nervous system and the body's motor system and is useful for combining the responses of the body's organs in anticipating the stimulus received, thus allowing a person to develop their movement skills. Coordination is a very important thing for an athlete to have, because coordination is often associated with the quality of movement (Silaban et al., 2019).

Hand eye coordination or hand-eye coordination is the coordinated control of eye movements with hand movements, and the processing of visual input for guiding, reaching and grasping

along with the use of the hand's initial perception to guide the eyes.

Flexibility is the body's ability to perform exercises with large or broad amplitudes of movement. *Flexibility is the ability of possessing full range of motion around joints in the body* (Pandey & Chaubey, 2015). Flexibility is the ability of a joint to perform a wide range of motion (Bafirman & Wahyuri, 2018). Flexibility is the body's ability to stretch itself as wide as possible which is supported by the wide range of movement in the joints. The ability to move the body and limbs as widely as possible is closely related to the movement ability of large muscle groups and their performance capacity. This ability is also related to the ability to stretch the muscles and tissue around the joints.

Flexibility is a person's ability to make movements with the broadest possible range of motion in the joints, factors are the shape of the joints, muscle elasticity, and ligaments, flexibility is not only needed by athletes but it is important for everyone to facilitate daily activities (Paramitha et al., 2020). Flexibility is the ability to utilize the width of the swing movements in the joints to maximum ability, where the swing movements in the joints must be trained in all possible directions according to the human anatomical structure.

Flexibility improvements associated with muscle elongation have an additional effect on muscle performance (Alipasali et al., 2019). Flexibility is the ability to display joint movement over a distance during a movement. Because naturally the movement of the human body's muscles depends on the arrangement of tendons, ligaments, and connections with muscles and tissues.

So from the statements above it can be seen that accuracy in shooting in the air is closely related to hand eye coordination and flexibility of the shoulder joints and achievement motivation. Hand eye coordination can be used to direct the ball precisely. Hand-eye coordination can be determined using the hand-eye coordination test. Then, to see the results of shoulder flexibility, use a tool, namely a Flexometer (Geniometer). And to measure motivation, statements related to motivation can be made. And to find out the accuracy of shooting in the air, an air shooting test will also be given.

Later the test given is a shooting test by jumping in the air and shooting straight at the goal, and the goal is scored according to the direction of the ball. For example, if the direction of the ball is towards a narrow corner of the goal, you will get a good score. This test will be given with five shots.

METHOD

This research is quantitative research with a correlational method. According to Creswell (2014), quantitative correlational research is research using statistical methods that measure the influence between two or more variables. This research wants to test the influence of each component of eye-hand coordination and flexibility on shooting accuracy in the air, therefore this research is a quantitative research with correlational methods.

This research will be carried out in the Multipurpose and Laboratory Building, Jakarta State University from April-September 2023.

Population is defined as a group of subjects who wish to generalize research results (Azwar, 2013). The population in this study were all athletes from the FIK UNJ handball club, with the target population being 24 male and female athletes from the FIK UNJ handball club.

Sampling in this study used total sampling, namely using the entire population as a sample, Suharsimi Arikunto, explained that in sampling, if there are less than 100 subjects, it is better to take all of them so that the research is population research.

The data collection technique in this research is through research instruments used for data collection which are first tested to obtain validity and reliability. Research instruments are the breath of research and are research tools for collecting data. The quality of the instrument also determines the quality of the data collected (Riduwan, 2015).

For 1) the shooting test uses a shooting test in the air. 2) eye-hand coordination test using hand and eye coordination. 3) shoulder joint flexibility test using a geniometer.

RESULT AND DISCUSSION

Based on data obtained from data processing using descriptive statistical techniques, data descriptions were obtained in the form of minimum value, maximum value, mean, median, mode, standard deviation and variance. From this data, a frequency distribution table

for each research variable was created and a histogram graph was created.

In this section, research data is presented using descriptive statistics to provide an overview of the data description of each variable which can be seen from the lowest value, highest value, average value (mean), frequently occurring value (mode) and standard deviation, variance, frequency distribution and histogram of each research variable of shooting accuracy, eye-hand coordination, and shoulder joint flexibility. Table 4.1 summarizes the overall description of research data.

Table 1.
Description of shooting accuracy (Y), hand-eye coordination (X^1), shoulder joint flexibility (X^2)

Data Description	Shooting Accuracy	Eye-Hand Coordination	Shoulder Joint Flexibility
Average	8,04	46,00	55,13
The highest score	12	56	65
Lowest Value	5	40	48
Standard Deviation	2,16	4,51	5,24
Varians	4,65	20,35	27,51
Modus	6	41	50
Median	8	46,5	55

1. Description of Shooting Accuracy Variable Data (Y)

   The results of the research variable: Junior athlete achievement results (Y) have an average value of 8.04, the highest value is 12 and the lowest value is 5, the standard deviation is 2.16, the variance is 4.65, the mode is 6, the median is 8.

2. Data Description Eye-hand coordination variables (X^1)

   The research results of the eye-hand coordination variable (X^1) have an average value of 4.6, the highest value is 56 and the lowest value is 40, the standard deviation is 4.51, the variance is 20.35, the mode is 41, the median is 46 .5.

3. 3. Description of Shoulder Joint Flexibility Variable Data (X^2)

   The research results for the Shoulder Joint Flexibility variable (X^2) have an average value of 55.13, the highest value is 65 and the lowest value is 48, the standard deviation is 5.24, the variance is 27.51, the mode is 50, the median is 55.

Discussion

1. The influence of eye-hand coordination on shooting accuracy in the air at the UNJ handball club

   Based on the results of the analysis in the table, the statistics for the variable coefficient X1 are thit = 1.796 and p. value 0.007/2=0.0035 < 0.05 or ho is rejected, which means hand eye

coordination has a positive effect on shooting accuracy. Research conducted by (Rahardjo Poernomo, 2015) shows that there is a relationship between hand-eye coordination and flying shot results of 16.59%. Research results: Another study conducted by (Saputra, 2012), the results showed that hand-eye coordination contributed to jump shooting by 25.96%. Throwing ability is determined by ball speed which is influenced by upper body strength and strength and optimal coordination movements (Wagner, et al., 2014).

2. The influence of shoulder joint flexibility on shooting accuracy in the air at the UNJ handball club

   Based on the results of the analysis in the table, the statistics for the variable coefficient Flexibility is a person's ability to move as widely as possible in the joints (Iwan Setiawan; Septiana, K. G. 2015). Good flexibility will prevent the possibility of injury (Ego Tedda Pamungkas & Abdul Aziz Hakim, 2021).

3. The influence of eye-hand coordination and shoulder joint flexibility on shooting accuracy in the air at the UNJ handball club

   Based on the results of the analysis of the coefficient of determination shown by Rsquare = 0.787 which means that 78.7% of the variability in shooting accuracy variables can be explained by eye-hand coordination and shoulder joint flexibility, so it can be concluded that the influence of eye-hand coordination and shoulder joint flexibility are together for shooting accuracy of 78.7%. Based on the results of the research conducted, it can be concluded that this research can be accepted empirically as true. The basic thinking that has been explained in the conceptual framework can be tested in reality.

CONCLUSION

Based on the results of the data analysis above, it can be concluded that the multiple correlation coefficient between X1 and X2 and Y is meaningful or significant. Meanwhile, the coefficient of determination is shown by Rsquare = 0.787, which means that 78.7% of the variability in the shooting accuracy variable can be explained by eye-hand coordination and shoulder joint flexibility, so it can be concluded that the influence of eye-hand coordination and shoulder joint flexibility together towards shooting accuracy of 78.7%.

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