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The Effect of Flexibility Exercises, Static Balance, Eye-Hand Coordination on Petanque Shooting Results

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Abstract

Several factors of the physical condition influence the given exercise, from various forms of flexibility training togok, static balance, and eye-hand coordination. These factors exist in the preparation of the given exercise program. This study aims to reveal the effect of togok flexibility exercises, static balance, and eye-hand coordination on the results of shooting petanque athletes in Riau province. This study found that eye-hand coordination was low, and the results of the petanque shooting of Riau province athletes were low. This research uses a quasi-experimental method using an experimental design of treatment by Level 2 x 2, a factorial experiment involving two factors. The sample of this research is 32 male petanque athletes from Riau Province. The distribution of the sample groups using the matching pairing method. This data is then continued with requirements testing and analysis of variance and variance data (ANAVA) 2 x 2. The data analysis results show no difference in the effect between togok flexibility and static balance on the shooting petanque results. There is no interaction between togok flexibility and eye coordination. Hands-on the results of the shooting. So it can be concluded that there is no significant interaction between togok flexibility exercises, static balance with eye-hand coordination on the shooting results of Petanque Riau athletes.

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INTRODUCTION

The development of sports achievement certainly needs a place to accommodate the seeds of athletes who will later be socialized in various circles as an introduction to sports achievements that have great potential. Sports achievements will develop with good coaching. One of them is petanque sport. In addition, the development of petanque sports can be seen in the many arrangements that

have begun to enter several provinces in Indonesia (Pelana, 2020). One of them is the management of petanque in Riau Province, which joined in 2018. Petanque is included in the sport of accuracy; in the sport of petanque, 11 numbers are officially contested, which makes the sport of petanque quite promising to achieve achievements (Laksana et al., 2017; Syafei et al., 2021).

In sports achievement, there are two main goals, the first is to improve individual abilities, and the second is to achieve the desired target Good (Cahyono & Nurkholis, 2018; Ramadan et al., 2021). Petanque sport is a sport that requires a high level of concentration and technique; this can be seen from the primary goal of its mechanics, which is to achieve maximum accuracy, meaning that an athlete must be able to throw bosi according to a predetermined target by throwing with techniques and procedures, which is already in the rules of the game (Gracia, 2019).

Gilles (2015) said that tactically, petanque is a simple game. Petanque is also a sport that can be played by all ages, from young to old, because in this sport it is not required to make complex movements that require much energy. Petanque games do not expend as much energy as other sports (Rosita, 2014). However, the petanque game drains much energy if you look at the matches' activities. After each match, athletes must pick up an iron ball thrown from various distances, starting from 6, 7, 8 and 9 meters. Then, to get to the final, you have to go through several matches, and the petanque match is held in an open space, giving the sun a chance to sting the skin. That petanque tends to experience minimal injury, so it will be safer to be played by small children and even people who are already elderly.

One of the benefits of playing petanque is that it contributes to the physical and mental well-being of those who practice it (Hernandez & DeLosFayosRuiz, 2009). In petanque sport, it can be considered a static sport, almost the same as archery, it does not require too much movement activity, and there is no body contact, so in this sport, the risk of injury is minimal. However, petanque athletes need several physical conditions such as strength, endurance, balance, coordination and focus on keeping performing optimally.

Iskandar et al., (2019) Shooting is a technique that aims to bring the opponent's metal ball away from the wooden ball (target ball). Shooting is an essential part of the petanque game. If the athlete's shooting ability is weak in a team, then the team will find it difficult to attack the opponent's ball to get the highest point. By shooting, you can add points (numbers) or make a series. In shooting, some components affect shooting: ball grip, body position towards the target, arm length, coordination, concentration, and ball release.

Techniques in shooting need to be trained gradually but with good, directed techniques so that they will affect the mastery of good movement processes and become automatic movements that are part of making shooting movements no longer making

mistakes in terms of technique (Rasyono et al., 2020). Shooting is a type of throw to repel the opponent's boss from the target box, throwing the boss to hit the target, namely the opponent's boss to keep away and the ball to make the game dead or the game over (Vernet, 2019; Ramadan & Iskandar, 2018).

Souef, (2015) Shooting is a technique of delivering the ball to keep the opponent's iron ball away from the target box as far as possible. The petanque game has three types of shooting: carreau, short shot, and ground shot. Hanief & Purnomo (2019) include height, arm length, palm length, arm muscle strength, flexibility, balance, arm muscle power, strength, concentration and hand-eye coordination. Some components of the physical condition are efforts that can be increased when shooting so that the results can be obtained optimally; the physical condition is one aspect that must be owned or fulfilled to achieve achievements.

Shooting in petanque involves the role of flexibility, balance and good eye-hand coordination. However, it still needs to be empirically proven whether physical condition factors such as flexibility, balance, and coordination affect shooting accuracy.

Flexibility is one type of exercise used in rehabilitation and sports training; the goal is to minimize pain, reduce the risk of injury and improve muscle performance (Abdel-aziem et al., 2013). Then the research conducted by Simao et al. (2011) said that flexibility could be determined by strength training as an integration carried out to increase flexibility to a greater level. Body flexibility is the ability to openly experience thoughts or feelings about the body without acting or changing them. Body flexibility is connected to various adaptive processes, sensitive to changes in movement (Caldeira et al., 2022).

Nurfatoni (2020) the flexibility of the togok is a new finding in his research. The role of the togok flexibility is not very important when shooting because the position of the waist to the shoulders does not move; the only thing that moves is the arm to swing. Warta (2019) shows that balance is not a factor in the success of shooting accuracy. Meanwhile, (Hanief, 2020) Balance is a variable that can reduce shooting accuracy. Furthermore, Widodo & Hafidz (2018) concluded that hand-eye coordination affects the accuracy of shooting results.

Balance is the dominant part of all parts of the body. The balance will look good when playing the game (Iswoyo & Junaidi, 2015). Good eye-hand coordination will result in a precise throw. Good eye-hand coordination will result in a precise throw. The eyes are the holder of the primary function, and the hands are the function of carrying out movements on the orders of the nerves of the brain. The success of the two organs also cannot be separated from the condition of the dominant hand (Verhoeven & Newell, 2016).

Kaluga et al. (2020) perform competitive sports, especially disciplines that involve the upper limbs in movement, develop physical fitness and unique characteristics of hand-eye coordination. Some sports rules

require object manipulation. Using sports equipment every day, several times, during training and matches affects the characteristics of the skin of the palms. Furthermore, in the study of Lee et al. (2019), static balance can help improve athlete performance in maintaining balance when carrying out activities. Therefore, balance training can prevent and overcome severe injuries during the game.

Eye-hand coordination is a practical and efficient movement of the combination of eyes and hands in making movements, the eyes as a sense of sight to see height, size, distance and target, then the hand as a controller of the given force (Subarna et al., 2021). Then according to (Burhaein et al., 2020), Eye-hand coordination is essential in the overall physical development of movements, such as throwing, hitting, pushing and pulling skills that require good eye-hand coordination. Hand coordination is the centre of treatment-experienced to perform well in all field activities during the match. Eye-hand coordination is a systematic method of coordinating information received through the eyes to guide and direct the hands in completing the given task (Rudzitis et al., 2014).

Shandiz (2018) says eye-hand coordination is defined as the use in guiding the vision of hand movements such as grasping and reaching to increase dexterity. Furthermore, Nayak (2015) defines hand-eye coordination as a motor skill that involves processing in the central nervous system, visual input and the touch of directed motor movements.

Many factors are suspected of causing the non-optimal achievement of petanque sports in Riau Province, including the physical components of accuracy, strength, flexibility, balance, endurance, and strength. coordination (coordination). Physical condition has an important role and is a requirement that must be owned by an athlete in improving and developing optimal sports performance so that all physical conditions must be developed and improved according to the character and needs of the sport. Of the many factors included in the components of the physical condition, it is suspected that the togok flexibility factor, static balance and eye-hand coordination have a role in mastering shooting techniques in petanque athletes. This study aims to see the effect of togok flexibility exercises, static balance, and eye-hand coordination on the shooting results of Riau athletes.

METHODS

This study aims to see the effect of togok flexibility, static balance, and eye-hand coordination on the shooting results of Riau athletes. This type of research uses a quasi-experimental method using a treatment by Level 2 x 2 design, a factorial experiment involving two factors (Ramadan & Juniarti, 2020).

This study examines the effect of the independent variables on the dependent variable and attributes/moderator variables,

namely: the form of flexibility training and Static Balance (A) as the independent variable, shooting results (Y) as the dependent variable (dependent variable), and eye-hand coordination (B) as an attribute/moderator variable. Each independent variable is classified into 2 (two). The independent variable treatment was classified into two forms of exercise method (A), namely the form of togok flexibility exercise (A1) and the form of Static Balance exercise (A2). While the moderator variables are classified into two levels of Eye-Hand Coordination (B), High Eye-Hand Coordination (B1) and Low Eye-Hand Coordination (B2). The design in the study of togok flexibility, static balance, and eye-hand coordination can be explained in the table as follows:

Table 1. Design Treatment by level 2x2

Hand-Eye Coordination	Exercise Method		
	Skeleton Flexibility (A1)	>	Static Balance (A2)
Height (B1)	A_1B_1 (1)	>	A_2B_1 (3)
Low (B2)	A_1B_2 (2)	<	A_2B_2 (4)

The population is the entire research subject. According to Sugiyono (2015), the population is a generalization area consisting of subjects with specific qualities and characteristics determined by researchers to be studied and then drawn conclusions. The research implies that the population is the same trait. The characteristics of this population are that they are male, and all of them are Riau petanque athletes who have participated in several championships, totalling 32 people.

The sample is part of the number and characteristics possessed by the population (Arikunto, 2010) states that the sample is part or representative of the population being studied. The sample of this study was male athletes in the petanque sport of Riau Province. The researcher took the sample because the research sample was in the area. So the number of samples that will be examined is 32 male athletes. The sampling technique used was Total Sampling. Samples are obtained by determining the limitations of characteristics tailored to the needs. Because the research sample was only 30 people, the group division was divided into 50%. According to Yusuf (2005), 27% of participants can be modified to 25% if the group of examinees is large or 50% or 100% if the group is small. Then, the groups were divided using the matching-pair technique. The data collection technique used in this study is a test to measure the shooting results of petanque athletes, eye-hand coordination data is taken using a baseball throw, and catch test and a shooting test is taken from the results of

petanque shooting at a distance of 6 meters. This data is then continued with requirements testing, analysis of variance and analysis of variance data (ANAVA) 2 x 2.

Table 2. The distribution of sample groups using the matching ordinal pairing method

Stubborn Flexibility Exercise Group (A1)	Static Balance Exercise Group (A2)
1	2
4	3
5	6
8	7
9	etc

The data obtained from the data collection analysis gradually by the study's objectives. To analyze the data in this study is the Factorial by Level 2 x 2 design; according to Irianto and Agus (2004), if the interaction of the two factors is not significant (accepting the null hypothesis), then there is no need to take further action (analysis). Then it was strengthened by Ismail and Fajri (2018:295) in ANOVA with a 2 x 2 design; four main effect hypotheses can be proposed. The requirements of the simple effect test can be carried out if, in testing the interaction effect hypothesis, it is found that there is an interaction or H0 is rejected. On the other hand, if the hypothesis testing of the interaction effect is concluded that there is no interaction or H0 is accepted, then the simple effect analysis test is recommended not to be carried out. Before the data was processed using the Anava analysis technique, the Anova requirements test was first carried out, namely the Normality test using Liliefors and the homogeneity test of variance using the Bartlet test with a significant level of = 0.05.

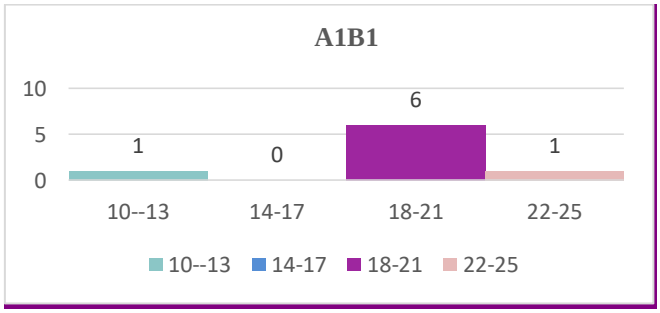
FINDINGS AND DISCUSSION

Findings

There is no difference in the effect between togok flexibility and static balance on the results of petanque shooting, and there is no interaction between togok flexibility and eye-hand coordination on the shooting results of petanque athletes in Riau Province.

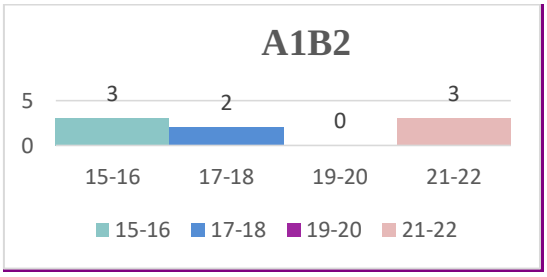
The results of the research and discussion of experimental research conducted there are several data groups that are described separately. The following is a description of the eye-hand coordination data, togok flexibility and static balance on the shooting results of Riau Pentaque athletes.

Graph 1 Shooting results data in the togok flexibility exercise group with high eye-hand coordination



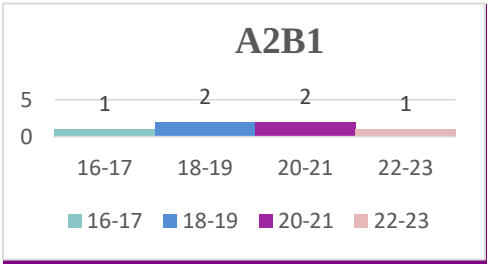
In general, it can be concluded that the petanque shooting data in the togok flexibility group with high eye-hand coordination consisted of 8 people with the highest score of 24, the lowest score of 10, and an average of 18.87. It can also be seen that one person in the 10-13 interval class, 0 people in the 14-17 interval class, six people in the 18-21 class interval and one person in the 22-25 interval class.

Graph 2 Shooting results data in the togok flexibility exercise group with low hand-eye coordination



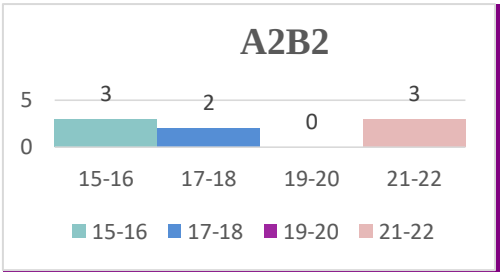
In the measurement results of shooting Petanque Riau, athletes in the togok flexibility training group with low eye-hand coordination had the highest score of 22, the lowest score of 15, and an average of 18.25. Moreover, it can also be seen that there are three people in the 15-16 interval class, two people in the 17-18 interval class, 0 people in the 19-20 interval class and three people in the 21-22 interval class.

Graph 3 Shooting results data in the exercise group Static balance with high eye-hand coordination



In the measurement results in this exercise group, there were eight people with the highest score of 23, the lowest score of 16, and an average of 20.37. The results in this group were one player in the 16-17 interval class, two people in the 18-19 interval class, two people in the 20-21 interval class, and three people in the 22-23 interval class.

Graph 4 Shooting results data in the static balance exercise group with high eye-hand coordination



In the data from the measurement results of the shooting results of Petanque Riau athletes in this group consisting of 8 people, the maximum score was 22; the lowest score was 16, and the average was 19.25. Moreover, it can also be seen that there are three people in the 15-16 interval class, two people in the 17-18 interval class, 0 players in the 19-20 interval class and three players in the 21-22 interval class. Tests were carried out for each data group in each research design cell. Based on the results of the calculation of the normality test of the research design group, it was found that the observation price (L0) obtained was smaller than the Ltable (Lt) value at the 0.05 level; it can be concluded that all data groups in this study were taken from a normally distributed population so that it can be used for hypothesis testing. . In the homogeneity test data, the criteria are Accept and accept H0 if X2count < X2table at a significant level = 0.05. Thus it can be concluded that the data is homogeneous.

Table 3 Calculation Results (ANOVA)

Variant Source	JK	Db	RJK	Fhitung	Ftabel
Among	-5,89	1	-5,89	-0,599	4,20
BETWEEN B	-5,88	1	-5,88	-0,598	4,20
AB Interaksi					
Interaction	3,46	1	3,46	0,35	4,20
In (Error)	275,31	28	9,83		
Total	267	31			

It can be concluded that there is no effect of the togok flexibility training group and the form of static balance training on the shooting results or Fcount (A) = -0.599 < Ftable = 4.20, then Ha is accepted. There is no significant difference to high eye-hand coordination and low eye-hand coordination in the shooting results of Riau petanque athletes Fcount (B) -0.598 < Ftable 4.20 then Ha is accepted, there is no interaction between the form of exercise and eye-hand coordination on the shooting results in Riau petanque athlete Fcount (AB) 0.35 < Ftable 4.20 then Ho is accepted Ha is rejected so that it can be concluded that there is no significant overall interaction between togok flexibility exercises

and static balance with eye-hand coordination on the shooting results of Riau Petanque athletes.

Discussion

The study was designed to determine the improvement of Riau petanque shooting results by using togok flexibility exercises, static balance and eye-hand coordination as moderator variables. After analyzing the data using the two-way ANOVA approach and not continuing with the Tukey test because, in this study, the hypothesis testing was rejected

The research findings, as found in the previous section, are the results of statistical data analysis that need to be studied further to explain why this research hypothesis cannot be accepted, why there can be no significant interaction between togok flexibility exercises and forms of static balance exercises with eye-hand coordination. So from the results of the study it is said that there is no difference in the effect between togok flexibility exercises and static balance exercises on the results of shooting petanque, and there is no interaction between togok flexibility exercises, static balance and eye-hand coordination on the results of petanque shooting.

The results of testing the first hypothesis showed that the overall average exercise score in the togok flexibility group was the same as in the static balance group. In the togok flexibility training group, the results were not much different, or there was no significant difference in the effect of the form of static balance. Thus it can be stated that these two exercises both influence the shooting results of Riau petanque athletes.

The results of testing the second hypothesis prove that there is no interaction between togok flexibility exercises and static balance with eye-hand coordination on the shooting results of petanque athletes; in other words, the proposed research hypothesis results cannot be proven true. The togok flexibility exercise group, static balance exercise in the high category of eye-hand coordination and the togok flexibility exercise group, static balance in the low category of eye-hand coordination, both had no interaction. Thus, there is no interaction effect between training and eye-hand coordination on the shooting results of Riau petanque athletes.

Nurfatoni's research (2020) said that the flexibility of the togok a finding resulted that the role of the flexibility of the togok was not very important when shooting because the position of the body to the shoulders did not move; the only thing that moved was the arm when weaving. By the results of previous studies that researchers have carried out, this study found the same results as the results of previous studies. This research was carried out again because the flexibility of the togok is part of the physical condition component. In the Petanque game, physical condition is integral to improving optimal shooting results. The reason for the flexibility of the togok to become a research study is that physical conditions can change. These changes can increase or decrease. So in this study, it can be stated that flexibility does not play an essential

role in increasing the shooting results of petanque athletes.

Anam's research (2021), entitled " The effect of using body balance media on shooting results in petanque sports, stated that balance affects shooting results. This is a statement that is different from the findings made by the researcher, which states that balance training has no effect on the shooting results.

Then the research by (Wahyudhi et al. 2021; Haryanto et al., 2021) said that eye-hand coordination did not have a significant relationship in determining the outcome of shooting petanque. The accuracy of shooting in the sport of petanque has been carried out by researchers. This is due to the factors that influence the process of the given exercise. These factors include the lack of independent training carried out by athletes and the lack of training models provided. So, the components of physical conditions such as hand-eye coordination are not carried out correctly.

Based on the results of research data in the field, the athletes who join the Riau petanque training are some of the athletes who are still new to understanding the sport of petanque, specifically in several districts in Riau Province and are still preparing for their careers to become professional petanque athletes, so the training carried out can be said to have not reached the maximum. Such conditions like this can result in the results of the research that has been done not having a significant difference in value.

Then the program that is run is not as expected, because some athletes are still undisciplined in training for example delays. It causes an uneven training load which should increase day by day but on the contrary and the intensity of the exercise given is getting a decrease in the intensity of the athlete.

Based on the explanation, it shows that improving shooting results not only by carrying out the form of exercise but also by the desire and spirit of the athlete in training. Even though the trainer provides a good form of exercise without the support of the awareness and enthusiasm of the individual himself, there will be no results from the training process undertaken. This causes the goals not to be as desired, and the material or training program will not be absorbed perfectly and maximally by the athlete. Then also, in improving shooting results in petanque sports, a coach must also have and choose various forms of training according to the needs to achieve maximum performance.

CONCLUSSION

Based on research findings and discussion of research results, it can be concluded as follows: There is no difference in the effect between togok flexibility exercises and static balance exercises on the Riau petanque shooting results, as seen from the two-way ANOVA calculation; there is no significant difference because of Fcount < Ftable (Fh = - 0.599 < Ft = 4.20). Then there is no interaction between togok flexibility exercises and eye-hand coordination on the

shooting results of Riau petanque athletes; it can be seen from Fcount (AB) = 0.35 < Ftable 4.20).

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