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The Effect of Mental Exercise and Muscle Endurance on the Shots of Archery

Athletes

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Abstract

This study aimed to determine and analyze the effect of imagery training and circuit training using tools, to analyze the effect of imagery training and circuit training without tools, to analyze the effect of self-hypnosis training and circuit training using tools, to analyze the effect of self-hypnosis and circuit training without equipment. Tools and the interaction between mental training and resistance to archery ability. This study used an experimental method with a 2x2 factorial design. This population consisted of 32 archers from South Sumatra. The sample used was total sampling. The data analysis technique used analysis of variance (ANOVA) at a significance level of (0.05). The results showed 1) There was a difference in the effect between imagery training and circuit training using a tool on the results of shots from a distance of 50, 40 and 30 meters. 2) there are differences in the effect of imagery training and circuit training without tools on the results of 50, 40 and 30 meters distance shots. 3) There is a difference in the effect of self-hypnosis training and circuit training using a tool on the results of shots from a distance of 50, 40 and 30 meters. 4) There is a difference in the effect of self-hypnosis training and circuit training without tools on the results of shots from 50, 40 and 30 meters distance. 5) There is no interaction between mental training and muscle endurance in the results of 50,40 and 30 meters of archery shots. The conclusion of this study shows that circuit training using tools and mental imagery, self-hypnosis is more significant. The results can be seen in the average increase in the total score, namely 31.13 and 31.12. Moreover, with the increase in circuit training without tools and imagery, self-hypnosis, the average increase in the total score is 10.00 and 13.5, and there is no interaction between mental exercise and muscle endurance on the results of shots from a distance of 50, 40 and 30 meters.

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INTRODUCTION

Archery is a branch of precision sports, different from other sports because archery measures the results on particular objects, whereas archery relies heavily on consistent techniques to achieve maximum scores (Hardi & Nurama, 2019; Ramadan, 2017). Archery is an outdoor sport; although there are also several competitions which are indoor but mainly at the national level, archery is still outdoor, so the wind is very influential on the speed of arrows, and athletes are required to be able to read the wind situation on the field, not to mention the sound disturbances from the spectators. Therefore, archers must have high concentration so that archery techniques do not change and are consistent (Yachsie et al., 2021; Hadiana et al., 2020). Archery is a sport that requires: 1. Coordination of visual movements, 2. Feeling of movement, 3. Endurance of arm muscle strength, 4. Length of pull, 5. Concentration, and 6. To maximize emotional balance, a coach must provide the training program needed by athletes (Baskoro, 2018).

In each achievement sport, four basic motors are developed: physical, technical, tactical and mental. An archery athlete must also have a good physique so that the athlete is not quickly tired in a match because of the weather and the strong pull. Psychologically the archery athlete must have a strong mentality, courage and also high concentration (Wahyu Setia Kuscahyaning Putri, 2019), in general, many coaches pay little attention to

and ignore this mental aspect because most coaches always emphasize physical mastery, technique and tactics, the elements needed to achieve good performance in archery, there must be 1. They have qualified coaches and athletes from a physical point view, technical and mental, 2. There are good facilities and infrastructure, 3. A supportive social environment in archery (Baskoro, 2018; Wibowo & Rahayu, 2016). The components that support archery are a mental and physical improvement, technique and tactics. It will be in vain if not accompanied by mental improvement. The results will be negative, where mental is a driving force in strengthening physical abilities, techniques and tactics in appearance sports. Every athlete will compete, coaches and athletes should prepare mentally, and athletes are also ready to face emotional stimuli and mental loads (Jamaliah et al., 2015).

Athletes in the sport of precision will have good performance if they have good physical endurance, composure, and self-control so that athletes can display training and match performance with maximum concentration and achievement by applying mental exercises studied in psychology, namely mental imagery training where psychology can make the athlete's emotions more controlled and create a relaxed feeling which can make the athlete's technique even better (Nalborczyk et al., 2022). Imagery training is a process in the mind in which sensory experiences are stored in memory and

internally repeated and experienced again in mind without presenting an external stimulus, meaning that a repetition of a movement, event, situation or experience in the mind is done intentionally but does not require the atmosphere, conditions, equipment and people who exist in the experience or event. In addition, imagery is also used by sports psychologists to be included in training programs and pre-competition preparation, which causes calm for the athletes (Koehn & Díaz-Ocejo, 2022), also this imagery can improve performance, concentration to injury healing, and this imagery training can give routinely to athletes (Saefullah, 2021).

Not only can imagery training shape the mentality and concentration of an athlete, but the concentration is also an essential part of a sports match because concentration can optimize playing abilities, techniques and tactics, which ultimately impact positive results in a match to form better concentration. Again, self-hypnosis mental training is an appropriate choice for archery athletes because this exercise has a simple method, has a better success rate and does not require a long time to implement (Bolla et al., 2018). This self-hypnosis method is a method that can concentrate on one thing so that the athlete is more focused on himself (Langenati, 2016).

In addition to imagery training and hypnotherapy, physical training is also very much needed by an archery athlete, more precisely, muscle strength endurance training where archery is very dependent on the

endurance of hand, arm and shoulder muscle strength, where archery muscle endurance is expected to be able to contract continuously for a relatively long time and with a specific load (Fahrizqi et al., 2021). Circuit training exercises that will help improve the physique when shooting archery are circuit training exercises; circuit training is defined as a training program consisting of several points where the athlete must perform the type of exercise, pattern and movement that has been predetermined. The exercise is said to be complete if the athlete has completed all points on the circuit according to the predetermined dose and is done repeatedly. This exercise has a minimal risk of injury if the portion is considered; one form of proper exercise is circuit training using dumbbells; several forms of circuit training with dumbbells that can be applied are front raises, lateral raises, dumbbell shrugs, overhead side bends, overhead triceps, dumbbell lunge, bend over dumbbell reserve fly, dumbbell upright row, shoulder press, Russian dumbbell twist. The benefits of some of the circuits above are to strengthen the muscles of the arms, shoulders, and abdomen and can also increase the strength and endurance of the arm muscles (Fahrizqi et al., 2021); it is hoped that this circuit training exercise using dumbbells can help improve archery performance in the South Sumatra region.

South Sumatra also has archery athletes divided into several regions of South Sumatra. For the Palembang area, there are already

several archery clubs shaded by Koni, and even archery extracurriculars already exist in several South Sumatra schools, especially high schools, based on observations that researchers made in South Sumatra that South Sumatra won a medal at the last national event in 2013, namely Popnas Jakarta. In 2015 and 2017 did not get one medal at any number; even for 2016 PON, it did not pass the pre-PON selection, and in 2021 no athlete was sent to participate in the pre-PON selection.

Based on the observations made by the researchers' observations and interviews that the effect of archery achievement in South Sumatra has decreased from year to year, archery trainers in several districts in South Sumatra only focus on techniques and tactics. However, the physical and mental components are not trained using the exercises needed by athletes. So that this deficiency is what causes archery achievements in South Sumatra to decline from year to year, which makes researchers raise this issue. This deficiency can be seen at the South Sumatra 2021 Porprov event. Several areas in South Sumatra have shown interest in archery. However, athletes are physically unable to perform archery techniques perfectly until the end of the match because the athletes' bodies and minds have not been perfectly formed, especially in 2022, there will be many busy match schedules every month, which will be held alternately from district to district, specifically for junior/ student. Therefore, in the next few matches, a training program is

urgently needed that suits the needs of athletes to maximize archery achievements in physical, technical, tactical, mental and mental development.

The purpose of this study was to determine and analyze the effect of imagery training and circuit training using tools, analyze the effect between imagery training and circuit training without tools, analyze the effect between self-hypnosis training and circuit training using tools, analyze the effect between self-hypnosis and circuit training without tools: tools and the interaction between mental training and archery endurance.

METHODS

This study uses a quantitative and quasi-experimental method (Ramadan & Juniarti, 2020), which aims to compare two treatments to the research subjects. The design in this study uses factorial design techniques. Sampling used a total sampling technique, totalling 32 people, where all archery athletes were in the national round of South Sumatra.

The data analysis technique used the ANOVA test to fulfil the assumptions, and the prerequisite analysis test was carried out, namely the normality test (Shapiro Wilk) and homogeneity test (Levene test) hypothesis testing using the test (Two way repeated measure ANOVA).

Table 1. Research Design

	Endurance Training	Circuit Training Using tools (B1)	Circuit Training Without Tools (B2)
Mental Exercise			
	Imagery (A1)	A1B1	A1B2
	Self Hypnosis (A2)	A2B1	A2B2

FINDINGS AND DISCUSSION

Findings

1) Based on the results of the Two way repeated measure ANOVA test for a score of 50 meters in all groups, a significant value of 0.000 <0.05 is obtained, it can be concluded that Ho is rejected and Ha is accepted, so there is a difference in the effect of the four types of training on the result of the 50-meter score. 2) Based on the results of the Two way repeated measure ANOVA test for a score of 40 meters in all groups, a significant value of 0.001

<0.05 is obtained, it can be concluded that Ho is rejected and Ha is accepted, so there is a difference in the effect of the four types of training on the results of the 40-meter score on the shot result 40 meters 3) Based on the results of the Two way repeated measure ANOVA test for a score of 30 meters in all groups a significant value of 0.000 <0.05 is obtained, it can be concluded that Ho is rejected and Ha is accepted. Then there is a difference in the effect of the four types of training on the result of the 30-meter score.

Table 2. Two Way Repeated Measure ANOVA

Distance Score	Results	Mean±Std	Significance	Information
Score 50 M	Pre-Test	243,59±25,84	0,000	Significance
	Post-Test	250,63±26,95	0,000	Significance
Score 40 M	Pre-Test	261,25±24,70	0,001	Significance
	Post-Test	267,34±26,22	0,001	Significance
Score 30 M	Pre-Test	277,66±19,79	0,000	Significance
	Post-Test	285,53±20,97	0,000	Significance

Based on the results of the normality test in the table above for circuit training using tools and imagery with the Shapiro-Wilk test, it has a pre-test value of 0.0933 > 0.05 and a

post-test of 0.0742 > 0.05. The research data is usually distributed.

Based on the results of the normality test in the table above for circuit training without tools and imagery with the Shapiro-

Wilk test, it has a pre-test value of $0.964 > 0.05$ and a post-test of $0.931 > 0.05$. The research data is usually distributed.

Table 3. Residual Normality Test

Exercise	Test Type	Significance	Information
Circuit Training Using Tools and Imagery	Pre-Test	0,933	Normal
	Post-Test	0,742	Normal
Circuit Training Without Tools and Imagery	Pre-Test	0,964	Normal
	Post-Test	0,931	Normal
Circuit Training Using Tools and Self Hypnosis	Pre-Test	0,755	Normal
	Post-Test	0,657	Normal
Circuit Training Without Tools and Self Hypnosis	Pre-Test	0,349	Normal
	Post-Test	0,395	Normal

Based on the results of the normality test in the table above for circuit training exercises using tools and self-hypnosis with the Shapiro-Wilk test, it has a pre-test value of $0.755 > 0.05$ and a post-test of $0.657 > 0.05$. The research data is usually distributed.

Based on the results of the normality test in the table above for circuit training exercises without tools and self-hypnosis with the Shapiro-Wilk test, the pre-test value is $0.349 > 0.05$, and the post-test is $0.395 > 0.05$. The research data is usually distributed.

Table 4. Homogeneity Test Results

Exercise	Test Type	Significance	Information
Circuit Training Using Tools and Imagery	Pre-Test	1.000	Homogenous
	Post-Test	1.000	Homogenous
Circuit Training Without Tools and Imagery	Pre-Test	1.000	Homogenous
	Post-Test	1.000	Homogenous
Circuit Training Using Tools and Self Hypnosis	Pre-Test	1.000	Homogenous
	Post-Test	1.000	Homogenous
Circuit Training Without Tools and Self Hypnosis	Pre-Test	1.000	Homogenous
	Post-Test	1.000	Homogenous

Based on the Test of Homogeneity of Variances table results, a significance value (sig) = 1.000 is obtained. Homogeneity Significance of 5% or 0.05 indicates that the value of Sig $0.1,000 > 0.05$, then the variables are the same (homogeneous).

exercises use tools or without tools; the purpose of this study is to increase the scores of archery athletes, the procedure for conducting this research is circuit training exercises which are divided into two types of circuits, namely groups using tools and not using tools, the aim is that the athletes can increase muscle endurance, both the shoulder muscles and leg muscles, in addition to circuit training the athletes also doing mental

Discussion

This study uses mental training and muscle endurance, whereas circuit training

exercises, namely mental imagery and metal self-hypnosis which help increase concentration and calm during practice as well as competing, for the ultimate goal is scoring where athletes shoot at distances of 50, 40 and 30 meters for approximately 3 hours,

Muscular endurance is the ability of muscles to contract for some time without experiencing fatigue, where the athlete can fight fatigue that arises during sports activities for a long time. Arising from training loads with medium-low intensity, 2. Local muscle endurance is the athlete's ability to resist the feeling of melting due to training loads with sub-maximum intensity, 3. Remarkable endurance is the ability of the athlete's organism to resist fatigue that arises due to the training load with maximum intensity, 4. Endurance stamina is the athlete's organism to fight fatigue due to activities within a specific time limit with maximum intensity, fast tempo, high frequency and using power (Setyo Budiwanto, 2013). To form the endurance of these muscles, several exercises are needed in the form of repetition of the muscles used; examples of forms of exercise that can be used are weight training, circuit training, interval training, speed play or fartlek and bench stepping, (Harsono, 2018; Setyo Budiwanto, 2013). Archery requires arm-muscle endurance because almost 90% of archery uses the arm to pull, hold and hold the movement after releasing the arrow (Saputra et al., 2020).

In addition to muscle endurance, this study also uses mental treatment, namely

mental imagery and self-hypnosis where. Mental is a condition in which a person can cope with the pressures of life in various situations, both in matches or in everyday life and can work productively and can provide a positive contribution to the environment (Bsa et al., 2019); the imagery is also a process in the mind where sensory experiences in memory are naturally repeated in mind without presenting external stimulation (Rosad, 2015; Ramadan, 2022). In imagery training, a visualization process will occur, namely imagining seeing oneself in mind with full awareness calling for an image that has been imagined in the imagery process, where the aim is for the athlete to be able to control thoughts and emotions and be able to have good mental resilience so that they are not swayed in achieving goals even though under pressure (Aulia et al., 2019). In addition to imagery, self-hypnosis is also used as a treatment in this study, where self-hypnosis is a suggestion for oneself or a way to enter the subconscious mind and reprogram our subconscious mind by speaking, giving instructions to oneself (Yan Nurida, 2008; Kadir et al., 2021), self-hypnosis is to overcome thoughts, feelings and behaviour problems. Currently, hypnosis is understood as an activity of the mind that can make a person's attention more focused and alert and concentrate on one thing to make a person ignore the conditions around him (Putanto, 2016; Ramadan & Ningrum, 2019).

This is in line with archery; if the athlete focuses on one thing, the arrow's accuracy will improve. The data and results of the study showed that there were significant differences in results after being given training for 16 meetings, where the hand muscle endurance of the archers increased even more in line with research (Hendra Purnama, 2019; Fahrizqi et al., 2021; Yachsie et al., 2021) that circuit training using tools can increase endurance and muscle strength, and also in this study a form of physical exercise for muscle endurance is using dumbbells which help train the endurance abilities of the arm and shoulder muscles, namely those subjected to alternating training loads replace each exercise item. By increasing the endurance of the arm muscles, it is helpful to stabilize the arm when pulling and holding the bowstring before it is released to aim at the target. Moreover, in line with (Bsa et al., 2019), imagery training can contribute to concentration so that archers get good results. Then research from (Rahman, 2018) that circuit training can increase leg muscle endurance, and statements from (Wibowo & Rahayu, 2016; Kurniawan & Ramadan, 2016) that imagery training can improve shot results (Bolla et al., 2018; Fauzan et al., 2021), where after being given self-hypnosis training, self-confidence and concentration will increase.

CONCLUSION

The conclusions in the study were conducted in 16 meetings, namely 1) There

were differences in the effect of mental imagery training and circuit training using tools on the results of shots from archery athletes in South Sumatra. 2) There are differences in the effect of mental imagery training and circuit training without using tools on the shooting results of archery athletes in South Sumatra. 3) There are differences in the effect of self-hypnosis mental training and circuit training exercises using tools on the shooting results of archery athletes in South Sumatra. 4) There are differences in the effect of self-hypnosis mental training and circuit training without using tools on the shooting results of archery athletes in South Sumatra. 5) There is no interaction between mental training and muscle endurance on the results of shots from archery athletes in South Sumatra.

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