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The effect of specific physical training on shooting in west Sumbawa district archery athletes

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Abstract

This research background is based on the researchers' observation that some athletes are still frequently hampered by unstable and inconsistent skills, such as the bow arm or the left hand. The precision of the archer's shots may be impacted by this. The purpose of this study is to ascertain the influence of providing SPT training methods on improving archery shots. An experimental methodology with a pretest-posttest research design and 18 treatments was used in this research. In this study, the researcher took a sample of 12 people and divided it into an experimental group and a control group. The research instrument used was shooting at a distance of 30 meters, where archers shot 36 arrows, which were divided into 6 rambahan. Based on data processing and analysis, an increase in the results of the initial test obtained a value of 1728, and the final test obtained a value of 1780, so that the difference between the pre-test and post-test was 25 scores. The author conducted a hypothesis test with a similar sample t test and obtained the results of one-way specific physical training training ($t\text{-count } 3.5580 > t\text{-table } 2.015$), while the results of the two-way West Sumbawa archery athlete training program ($t\text{-count } -1.0886 > t\text{-table } 2.015$) Thus, H_0 is rejected and H_a is accepted. As a result, the researchers came to two conclusions: (1) there is an Effect of Specific Physical Training on Shots in West Sumbawa Regency Archery Athletes in 2024. (2) There is no effect of the West Sumbawa Regency archery athlete training program on accuracy.

Keywords: Specific physical training, shots, archery

Introduction

Sports are activities that are systematically designed to develop and advance physical, mental, and social potential. According to Permana & Praetyo (2021) ^[1], sports are physical activities that involve the use of muscles for educational, recreational, and achievement purposes. Meanwhile, Salahudin & Rusdin (2020) ^[2] stated that sport is an individual's physical activity that aims to improve the body's condition after doing activities. In general, sport is a physical or mental activity that a person does to maintain and improve health after doing physical activities.

Achievement sports are physical activities that are carried out in a planned and systematic manner to achieve certain goals in a sport (Nopiyanto *et al.*, 2019) ^[3]. Sports achievements need to be planned through a carefully prepared program. Coaching must have clear goals and be maintained for a predetermined period of time (Vanagosi & Dewi, 2019) ^[4]. From this explanation, achievement sports are physical activities that are managed systematically to achieve certain goals in a sport, with careful planning and coaching that has clear goals and is maintained for a certain period of time in order to achieve optimal results.

One of the branches of achievement sports is archery, According to Rahmadani & Sulistyarto (2024) ^[5] archery is a sport that shoots arrows at a target with the best possible accuracy, to get good accuracy requires consistent techniques. Implementing consistent archery practices over time will produce good technical skills, which will have an impact on archery achievements (Vanagosi & Dewi, 2019) ^[4]. Archery is a branch of sport that has a long history and its existence continues to grow in the world of sports, including in Indonesia. At the local level, West Sumbawa Regency is one of the areas that has great potential in the development of archery. As an effort to improve achievements in this sport)

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The organization that plays an important role in directing and improving achievements in sports, especially archery, is the Indonesian Archery Association (PERPANI). PERPANI is not only an organizational entity, but also a pillar for the development, coaching, and monitoring of all archery activities throughout Indonesia. By having a strong mandate, PERPANI has a great responsibility in managing every aspect from training to competition in the world of archery. The focus of this research is on PERPANI of West Sumbawa Regency, where efforts to foster archery achievements at the local level are centered and implemented.

For archery, the influence of endurance and strength components, especially in the upper body components, is very necessary, such as in the hands, arms and shoulders. Muscle endurance itself is an athlete's ability to use muscle groups to contract continuously for a relatively long time and with a certain load (Fahrizqi & Yuliandra, 2021) ^[6]. Currently, there are still many coaches who only use the 4 technique training method without paying attention to physical training. Due to the lack of physical condition training for archery coaches in Indonesia, it is feared that coaches will give athletes the wrong training which will actually cause injury if given too much. The physical requirements needed by archery athletes include arm muscle endurance, because in archery competitions athletes must shoot 24 series/rambahan and each series of archers must shoot 6 arrows, so the total shot is 144 arrows, so it will take a long time, which is around 6-7 hours. In several events that are often experienced by several athletes, during the second qualifying session, most of the athletes' physical condition starts to weaken, which affects their shooting, so it can be said that physical training is very necessary in archery (Baskoro, 2018) ^[7].

Another aspect is archery, archery shooting is very necessary because without a good shot, archery athletes will not be able to win and a difference of one point in archery will determine victory. In addition to the above aspects, tactics and mentality during the competition greatly affect the results that athletes will get, but the most important aspects are arm muscle endurance and archery shooting (Baskoro, 2018) ^[7]. In the 2023 Porprov event, the team athletes from West Sumbawa Regency failed to win a gold medal due to a difference of 2 points in the final when playing against the team from Sumbawa Regency.

The research was conducted on athletes of West Sumbawa Regency, because in West Sumbawa Regency, in terms of achievement, it is very good, but on the one hand, what the researcher observed was that some athletes are still often constrained by techniques such as bow arms or left hands that are not stable and consistent so that they can affect the shots from the archer's shots. The training system of archery athletes in West Sumbawa Regency is good because there is routine mandatory training every week, namely Saturday and Sunday, then on other mandatory days athletes are allowed to practice independently, freely adjusting their respective activity schedules, and at the end of the month there is always an evaluation or scoring.

The right method to train arm muscle endurance is SPT. Specific Physical Training is physical training that is specifically designed to meet the unique needs of a particular sport or activity. This program focuses on improving physical abilities that are relevant to the specific techniques and demands of the sport, with the aim of maximizing athlete performance (Lee & Banner, 2008) ^[8]. Specific Physical Training was deliberately developed by Coach Lee to improve Endurance, Power/Strength and Flexibility through specific

archery muscle training using archery equipment. There are four specific SPT exercises as detailed in the book Total Archery - Endurance, Power/Strength, Flexibility and Structure.

Referring to previous research conducted by Riko Adi Baskoro (2018) entitled The Effect of Bow Training on Arm Muscle Endurance and Archery Accuracy in UNY Archery UKM Athletes. From the results of Riko Adi Baskoro's research, where the training system that trains arm muscles or bow training is more effective for the training system than regular archery training, then from the results of his research Riko Adi Baskoro drew the conclusion to combine regular training with arm muscle training where the training is similar to the Specific Physical Training training applied by Coach Kisik Lee for the American Archery national team. The training program carried out by archery athletes in West Sumbawa Regency where athletes usually do archery training twice a week by shooting 300 arrows, then when combined with Specific Physical Training training one hour a day will increase arm muscle endurance or stability in archery besides Specific Physical Training can improve muscle memory which functions for the consistency of archery techniques.

Another study conducted by Muhamad Roofid Briliansyah, Rian Triprayogo and Ida Zubaida in 2024 entitled The Effect of Plank Exercise on Arm Muscle Endurance and Archery Accuracy of Serang City Archery Athletes. From the results of the analysis of different test data using paired t-test (before after). The results of this study indicate that there is an effect of plank exercise on arm muscle endurance and archery accuracy of archery athletes with a p-value of 0.01. From the results of the study, it can be concluded that plank exercise has an effect on arm muscle endurance and archery accuracy of Serang City archery athletes. This strengthens the hypothesis that physical exercise, especially on arm muscle strength, can increase accuracy in shooting ^[9].

Some coaches in Indonesia believe that training arm muscles can improve archery accuracy, but they have not conducted research on the Specific Physical Training Method. Based on the explanation above, the researcher is interested in examining whether Specific Physical Training exercises affect shooting accuracy. Therefore, the researcher wants to know whether there is an effect of Specific Physical Training exercises on archery accuracy. In this study, the researcher divided the participants into experimental and control groups to compare the efficiency of the training program carried out by archery athletes in West Sumbawa Regency, especially in relation to the effect of the Specific Physical Training method on shooting.

Materials and Methods

This research is a type of quantitative research. According to Priadana & Sunarsi (2021) ^[10], quantitative research is a systematic investigation that aims to understand and analyze phenomena through the collection of data that can be measured objectively. Quantitative research in the field of sports is used to analyze various aspects of athlete performance and the effectiveness of training programs. Through this approach, researchers can measure important variables such as speed, strength, endurance, and accuracy, using statistical techniques to evaluate the relationship between variables. While the research design uses the two group pretest posttest design (Sugiyono, 2016) ^[11]. In this design there are two groups, namely the experimental group and the control group. The variables in this study include dependent variables in the form of shooting while the

independent variable is Specific Physical Training. The sample will be given a pretest to determine the initial condition. The sample consists of 2 groups, namely the experimental group and the control group. The control group was given treatment using a training program that had been implemented in the West Sumbawa Regency archery athlete training center program, while the experimental group was given treatment using the Specific Physical Training method. After completing the treatment, the two groups were given a post-test which aimed to measure the shooting results of the treatment that had been given.

Table 1: Design Study

Group	Pre-Test	Treatment (X)	Post-Test
Control	O1	West Sumbawa Regency Archery Training Program	O2
Experiment	O3	Specific Physical Training	O4

(Sugiyono, 2016) ^[11]

Information

- **O1:** Pre-test experimental group
- **O2:** Post-test of experimental group
- **O3:** Pre-test control group
- **O4:** Post-test of control group
- **X:** Treatment

The population of this study was 24 archery athletes from West Sumbawa Regency. Sampling in this study used the Purposive Sampling method, which is a method in which researchers deliberately select samples based on certain criteria that are considered relevant to the research objectives. These criteria are determined based on careful consideration to ensure that the selected sample has special characteristics that can provide data or information that supports hypothesis testing or answers research questions. (Lenaini, 2021) ^[12] criteria include:

1. Already registered as an Archery Athlete for West Sumbawa Regency
2. Willing to take part in treatment

Master the recurve bow and standard bow techniques

So that according to the criteria above, from 24 populations, those who meet the criteria as samples in this study amount to 12 people and will be divided into two groups, so that the research sample consists of 6 samples in the control group and the experimental group.

The data collection technique in this study is by an archer doing 36 arrow shots and totaling the results of each arrow or called the total score with a distance of 30 meters and the process is called scoring. (Based on the Regulation of the World Archery Federation). The tools and materials needed for calculating the score are:

1. Each archer's bow
2. Score sheet/stationery

Table 2: Score Sheet

Name: Distance									
Series	Arrow						Total		
	1	2	3	4	5	6			
1									
2									
3									
4									
5									
6									

1. Arrows
2. Face target

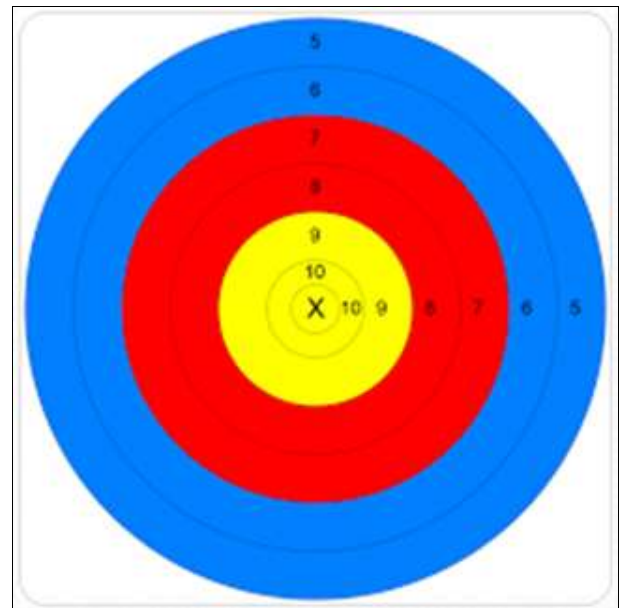


Fig 1: Face Target

Bearings

The stages of data analysis in this study using SPSS version 22 began by conducting a Normality Test using the Shapiro-Wilk Test to ensure that the data was normally distributed, which is an important prerequisite in parametric statistical analysis. After the data was proven to be normal, a Paired Sample T-Test was conducted to evaluate the difference in means before and after treatment in the same group, for example the experimental group. Furthermore, a homogeneity test was conducted to check whether the variance of the post-test data from the experimental group and the control group was similar, so that both could be compared fairly. The final stage of analysis was the Independent Sample T-Test, which was used to compare the results between the experimental group and the control group to determine whether there was a significant difference after treatment. Through this stage, researchers can ensure the validity and reliability of the data analyzed, as well as evaluate the impact of the treatment applied. (Darma, 2021) ^[13].

Results & Discussion

Statistical data description obtained pre-test shooting results athlete archery West Sumbawa Regency group experiment (Exercise) Specific Physical Training) show the average value (Mean) is 288.00, the lowest value (Minimum) is 250 and the highest value (Maximum) is 314 with a standard deviation of of 23,740. Post-test results shot athlete archery West Sumbawa Regency group experiment (Exercise) Specific Physical Training) show the average value (Mean) is 296.66, the lowest value (Minimum) is 253 and the highest value (Maximum) is 320 with a standard deviation of of 23,829. Meanwhile results pre-test shot athlete archery West Sumbawa Regency group control (exercise program) athlete KSB archery) shows the average value (mean) is 278.50, the lowest value (Minimum) is 316 and the highest value (Maximum) is 316 with a standard deviation of of 28,026. The results of the post-test shooting athlete archery West Sumbawa Regency group control (exercise program) athlete archery KSB) shows the average value (mean) is 278.66, the lowest value (Minimum) is 248 and the highest value (Maximum) is 318 with a standard deviation of of 25,508. In table 3.

Table 3: Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Pre Test Specific Physical Training	6	250.00	314.00	288.00	23,740
Post Test Specific Physical Training	6	253.00	320.00	296.66	23,829
Pre Test Athlete Training Program KSB Archery	6	250.00	316.00	278.50	28,026
Post Test Athlete Training Program KSB Archery	6	248.00	318.00	278.66	25,508

Prerequisite test data analysis using normality test Shapiro Wilk Z Test (K-SZ). As base taking decision If mark Sig. > 0.05, then the research data normally distributed, whereas if mark Sig. < 0.05, then the research data No normally distributed, whereas from pre-test and post-test group results experiment (exercise) Specific Physical Training) obtained

each value of Sig. 0.531 or $p > 0.05$ and Sig. 0.254 or $p > 0.05$. The results of the pre-test and post-test group control (Exercise program) athlete archery West Sumbawa Regency) were obtained respectively Sig. value 0.260 or $p > 0.05$ and 0.486 or $p > 0.05$. This means that the research data normally distributed. In table 4.

Table 4: Tests of Normality

Variables	Shapiro Wilk			Detail
	Statistics	DF	Sig.	
Pre Test Specific Physical Training	.924	6	.531	Normal
Post Test Specific Physical Training	.877	6	.254	Normal
Pre Athlete Training Program Test KSB Archery	.878	6	.260	Normal
Post Athlete Training Program Test KSB Archery	.915	6	.468	Normal

Condition use Paired Sample T-Test is normally distributed data. Based on Pair 1, it is obtained Sig. value (2-tailed) is $0.01 < 0.05$ which means There is significant influence exercise specific physical training to shot athlete archery West Sumbawa Regency. Based on Pair 2 obtained Sig. value (2-

tailed) is $0.96 > 0.05$ which means No There is significant influence of training program athlete archery West Sumbawa Regency against shot athlete archery West Sumbawa Regency. In table 5.

Table 5: Paired sample t-test

		DF	Sig. (2 tailed)
Pair 1	Pre-test - Post-test exercise specific physical training	5	0.01
Pair 2	Pre-test - Post-test training program athlete archery ksb	5	0.96

Based on the homogeneity test obtained Sig value. $0.504 > 0.05$, so can concluded that post-test data variance group experiment (Exercise) Specific Physical Training) and group

post-test data control (Exercise program) athlete KSB archery) is the same or homogeneous. In table 6.

Table 6: Test of homogeneity of variances

Variables	df1	df2	Sig.
Pre-test - Post-test exercise specific physical training	1	22	.504
Pre-test - Post-test training program athlete archery KSB			

Based on the Independent Sample T-Test obtained Sig. value of $0.63 > 0.05$ then can concluded No There is difference significant influence between group exercise Specific Physical Training with exercise program athlete KSB archery against shots. In table 7.

Table 7: Independent Sample Test

	f	Sig.
Equal Variances Assumed	0.24	0.63

Specific Physical Training exercises are carried out researcher reinforced by research previously conducted by Riko Adi Baskoro (2018) entitled Influence Bow Training on Muscle Endurance Arms and Accuracy Archery in Athletes UKM UNY Archery. From the results Riko Adi Baskoro 's research system training exercises muscle arm or *bow training* more effective For system exercise compared to exercise archery like usual, then from results Riko Adi Baskoro 's research is interesting conclusion For merge exercise normal with exercise muscle which arm exercise the similar with exercise Specific Physical Training implemented by Coach Kisik Lee for team national American Archery. The training program carried out by the athlete archery West Sumbawa Regency

where the athletes usually archery two times practice in a week with shooting 300 children arrow, then if combined with exercise Specific Physical Training one hour a day will add Power stand muscle arm or stability in archery besides That Specific Physical Training can increase memory functioning muscles for consistency technique archer.

Durability muscle arm is performance muscles contract and relax in a way over and over again with burden certain, because in archery need time not enough more than 6-7 hours when race so writer in thesis This aiming research whether There is influence exercise Specific Physical Training to shots. Some coaches in Indonesia believe that with practice muscle arm will increase accuracy archery will but they not yet once do study to matter said, then from that researcher want to know whether there is influence exercise Specific Physical Training to accuracy archery. In the study This researcher make group functioning experiments and controls as comparison whether There is efficiency of the training program carried out by the athlete archery West Sumbawa Regency with influence method exercise Specific Physical Training for shot.

The results of data processing show that from results exercise Specific Physical Training with pretest 1728 and posttest

1780, while data processing from training program results athlete archery West Sumbawa Regency with a pretest of 1671 and a posttest of 1672, which means result of exercise specific physical training happen improvement score shot while the training program athlete archery West Sumbawa Regency does not happen improvement shooting at athletes archery West Sumbawa Regency 2024.

From the results study this, can strengthen assumption that with use method exercise specific physical training can increase results scoring shot in sport archery. Meanwhile, the training program is carried out by athletes West Sumbawa archery still Not yet efficient, thing This due to because of the training program implemented still in focus only on shots and schedule exercise still very limited where exercise only held two meetings in a week whereas method exercise more specific physical training focus athletes in training physical and technical Then method exercise This more flexible and very easy to implement done good in the field or at home. However lack from exercise Specific Physical Training for get maximum results Where method exercise This must done in a way useful pair For control technique and monitoring time.

Conclusions

Based on the research results that have been obtained by data analysis and hypothesis testing, that from the results of the paired sample t test, Pair 1 obtained a Sig. (2-tailed) value of $0.01 < 0.05$, which means that there is a significant effect of specific physical training on the shooting of archery athletes in West Sumbawa Regency. Based on Pair 2, a Sig. (2-tailed) value of $0.96 > 0.05$ was obtained, which means that there is no significant effect of the archery training program in West Sumbawa Regency on the shooting of archery athletes in West Sumbawa Regency.

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The researcher also greatly appreciates the contributions of archery coaches and athletes in West Sumbawa Regency; their active participation in interviews and observations offered invaluable firsthand insights into the conditions and challenges faced in archery coaching. Gratitude is also expressed to the Regional Government of West Sumbawa Regency and the private sector for their direct and indirect support, reflecting a shared commitment to developing archery in the area. The researcher extends heartfelt thanks to fellow researchers and friends for their advice, feedback, and moral support throughout this research process, enriching the insights and results significantly. Finally, a special thank you to the researcher's family for their unwavering support in both moral encouragement and practical assistance, as their patience and understanding greatly aided in the completion of this study. It is hoped that the results of this research can

positively contribute to the development of archery in West Sumbawa Regency and serve as a reference for further studies.

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