

THE EFFECT OF CIRCUIT TRAINING USING TOOLS AND WITHOUT TOOLS ON ARCHERY SCORE RESULTS

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Abstract

The purpose of this study was to compare and analyse the effect of circuit training using tools and without tools on the results of archery scores at distances of 50, 40, and 30 meters archery athletes. This study uses an experimental method with a two group pre test and post test design, a population of 38 South Sumatra archers, sampling using purposive sampling so that 32 archers of the national round are obtained, the analysis technique uses paired sample t and Independent Sample T-test at the significance level α (0.05). The results of this study: there is a significant difference between circuit training using tools and without tools on the results of archery scores at distances of 50, 40, and 30 metres with a sig value of 0.021 <0.05. The conclusion of this study shows that: there is a significant difference between circuit training using tools and without tools on the results of archery scores at distances of 50, 40, and 30 metres.

Keywords: Archery, Circuit Training using tool, Circuit Training Without Tool, Scor

Introduction

Archery is one of the precision sports, different from other sports because archery measures the results on certain objects, where archery relies heavily on consistent techniques to achieve maximum scores (Kim et al., 2021). Archery is an outdoor sport although some matches are also indoor but mostly at the national level archery is still outdoor, so the wind is very influential on the speed of the arrows, and athletes are required to be able to read the wind situation in the field, not to mention the noise disturbances from the audience, so archers are very required to concentrate highly so that archery techniques do not change and are consistent (Sato et al., 2021). Archery is a sport that requires: 1. Visual motion coordination, 2. Sense of motion (feeling), 3. Endurance of arm muscle strength, 4. Length of pull, 5. Concentration and 6. Emotional balance, to maximise all of that a coach must be able to provide the training program that athletes need (Sien et al., 2017).

Every sporting achievement there are four basic biomotors that are developed including: physical, technical, tactical and mental. An archery athlete should also have a good physique so that in the match the athlete is not easily tired because of the weather and strong pull and psychologically archery athletes must have a strong mentality, courage and also high concentration (Taha et al., 2017). In general, many coaches pay less attention and ignore this mental aspect, because most coaches always emphasise physical mastery, techniques and tactics, the elements needed in achieving good performance in archery then there must be 1. Qualified coaches

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and athletes seen from physical, technical and mental, 2. The existence of good facilities and infrastructure, 3. (Vynogradskyi et al., 2024). A very supportive component in archery is mental, physical improvement, technique and tactics, will be useless if not accompanied by mental improvement, then the results will be negative, where mental is a driving force and a driver in strengthening physical abilities, techniques and tactics in a sports performance, every athlete will compete coach and athlete should prepare mentally and athletes are also ready to face emotional stimuli and ready to face mental loads (Tsai et al., 2021).

Accuracy sports athletes will have good performance if they have good physical endurance, calmness, and self-control, so that athletes can perform training and match performance with maximum concentration and achievement with the application of mental training studied in psychology. Where psychology is able to make athletes' emotions more controlled and create a relaxed feeling that can make athletes' techniques even better (Yudho, 2022). Physical exercise is able to improve the cardiovascular system, if an athlete lacks physical activity then what will happen is a decrease in muscle strength and endurance, a decrease in cardiovascular, neurological and endocrine system levels, Athletes largely rely on their physical attributes to achieve success, but they also need skills, strategies and mental preparation. When training the physical component, the training model must be carefully selected (Nabila & Kusnanik, 2021). Because the training model must actually provide the biomotor abilities needed for sports, such as arm muscle endurance training, the development of biomotor components is very important in sports., arm muscle strength, hand squeezing muscles, and abdominal muscle endurance can help improve the athlete's physique, namely with circuit training, circuit training is an exercise programme whose patterns and movements have been determined and consist of several points where at one certain point the athlete performs movements that have been determined by the coach, circuit training has a minimal risk of injury if the portion is considered, the benefits of several circuits are increasing endurance and muscle strength (Ahmeti et al., 2020).

Archery sports rely heavily on the endurance of the muscle strength of the hands, arms and shoulders, where archery endurance is expected to contract continuously for a relatively long time and with a certain load (Boullosa et al., 2020). Exercises that will help improve physically during archery are circuit training exercises, circuit training is defined as an exercise programme consisting of several points where at each point the athlete must perform predetermined types of exercises, patterns and movements. The exercise is said to be complete if the athlete has completed all points on the circuit in

accordance with the predetermined dose and is carried out repeatedly. This exercise has a minimal risk of injury if the portion is considered, one of the right forms of exercise is circuit training using dumbbells.

Arm muscular endurance is a condition in which the body is able to perform activities Muscle strength, the amount of fuel stored in the muscles and liver, as well as other factors, all affect the condition of muscular endurance. 3. A balanced diet over a long period of time; 4. Getting enough sleep every night (Bramantha & Setiawan, 2022). The large number of movements that must be performed repeatedly in sports requires arm muscle strength and endurance, which has a significant impact on rhythm. In order to create consistency in arm muscle endurance from the start of the match to the end, the duration and intensity of work required for the sport should be considered when creating a training programme for arm muscle endurance training. in research sports such as archery, volleyball, petanque, and golf trained using circuit training combined with resistance bands will be better in improving athletes' muscle endurance (Dhawale, 2018).

Arm muscle strength is critical to success in several sports such as archery, volleyball, basketball, baseball, and golf, muscle strength is required during training and competition almost 80% of the movements of these sports involve the arm, the capacity to use arm muscles and related muscles must be consistent over a long period of time while holding a certain weight, the large number of movements that must be performed repeatedly in these sports requires good arm muscle strength and endurance which will have a significant impact on the rhythm of the match (Haible et al., 2020). In addition, athletes must be required to use oxygen for long periods of time and maintain focus in a match atmosphere due to many obstacles during the match, an athlete must be able to eliminate distractions from outside the field so that with good focus the athlete is able to direct, therefore it is necessary to train physically so that athletes are able to make movements until the end of the match without fatigue and are able to think clearly by considering the circumstances around the field (Lopez et al., 2021).

In addition to endurance training and arm muscle strength training, abdominal muscle endurance also has a very important role because when athletes compete the abdominal muscles will contract in retrieval, therefore abdominal muscle endurance is needed in sports. (Mills et al., 2020). Furthermore, in archery, the strength of the hand squeeze muscles is also needed in an effort to draw the bow, the fingers must be strong from the beginning of archery to the end of archery if the fingers are trained using the right method, the

fingers will be stronger (Nasrulloh et al., 2021). If combined with hand muscle strength, then in this study these two exercises are combined to get maximum arm muscle strength. Circuit training is a resistance exercise that benefits the cardiorespiratory and neuromuscular systems that can increase muscle strength endurance simultaneously (Pashaei et al., 2024). Circuit training is also a common exercise that is more efficient in time and can more quickly increase muscle endurance and muscle strength, because with the strength and endurance of the muscles, it is less likely that an athlete will experience injury (Yudho, 2022). Therefore, researchers want to combine circuit training using tools and circuit training without tools to shape the physique of athletes.

Based on observations that researchers observed and interviews that the influence of archery achievements in South Sumatra decreased from year to year that archery coaches in several districts in South Sumatra only focus on techniques and tactics but the physical and mental components are not trained using the training needed by athletes, so that this deficiency makes archery achievements in South Sumatra decline from year to year and this is what makes researchers raise this issue and this deficiency is seen in the 2021 South Sumatra Porprov event, several regions in South Sumatra have shown their interest in archery but physically athletes are unable to perform archery techniques perfectly until the end of the match because the athlete's physique and mentality have not been formed perfectly, especially in 2024 there will be many busy match schedules every month, which are held alternately from district to district, especially junior / student championships. Therefore in the next few matches it is very necessary to have an exercise program that suits the needs of athletes where to maximise the achievement of archery physical development, technique, tactics, mental and mental maturity.

Based on the description of the problem above, the method used to overcome by using circuit training exercises using tools, namely dumbbells and without tools, the goal is that South Sumatra archery athletes can improve their physique, especially in archery. Based on the background description above, the authors are interested in conducting research with the title "The Effect of Circuit Training Using Tools and without Tools on Archery Score Results".

Material & methods

This study uses quantitative research with a pseudo-experimental method that aims to compare two different treatments to research subjects. The design in this study used two group pre test and post test. Sampling using purposive sampling technique totalling 32 people where all South Sumatra archery athletes are national rounds. The research was carried out through three stages of research, namely the initial test (pretest), giving treatment in the form of training methods (treatment), and the final test (posttest). The tests given were archery tests with distances of 50, 40 and 30 metres.

The data analysis technique uses paired sample test and Independent Sample T-Test to fulfil the assumptions, the prerequisite analysis test is carried out, namely the normality test (Shapiro Wilk) and the homogeneity test (Levene test). The results of the study are in the form of raw data which is then processed using IBM SPSS 23 Windows with the following hypothesis provisions:

- 1) **Ha:** There is a significant influence after the application of imagery training and circuit raining on the score of archery athletes.
- 2) **Ho:** There is no significant effect after the application of imagery and circuit raining exercises on the scores of archery athletes.

Results

The data in this study were obtained from the results of archery tests at distances of 50, 40 and 30 metres, to compare and determine the effect of circuit training using tools and without tools on the total score of archery athletes. After the archery test was held through the pretest and posttest of the sample, the following results were obtained:

Based on (Table 1), it is known that the archery pretest results get an average score of 782.5 with the lowest score of 704, the highest score of 915, while for the archery posttest scores get an average score of 867 with the lowest score of 799, the highest score of 954.

Table 1. Description of Statistics on Archery Results.

Kode	Pre Test	Post Test
N	32	32
Mean	782,5	867
Sd	69,8	45,8
Max	915	954
Min	704	799
Sum	25040	27745

Based on (Table 2), it is known that the data normality test uses Shapiro-wilk with a value of 0.166 and 0.281 > 0.05, it can be concluded that the data is normally distributed.

Based on (Table 3), it is known that the data homogeneity test uses the Levene's test with a value of 0.078 > 0.05, it can be concluded that the data is homogeneous.

Based on (Table 4). T-test Circuit training can be seen, with a significance level of 5% at a degree of validity of 30 at a t table value of 2431. p value of 0.000 < 0.21 and 0.22, there is a significant difference between circuit training using tools and without tools.

Table 2. Normality Test.

Tests of Normality				
Exercise Type		Shapiro-Wilk		
		Statistic	df	Sig.
Score Result	Circuit Training Using the Tool	0.920	16	0.166
	Circuit Training Without Equipment	0.934	16	0.281

Table 3. Homogeneity Test.

Levene's Test			
F	df1	df2	Sig
3.32	1	30	0.078

Table 4. Paired Sample Test for Circuit Training Using Tools.

Paired Samples Test					
Pair 1	Circuit Training Using the Tool	Mean	T	df	Sig. (2-tailed)
		867	-5,454	15	0

Dicussion

Archery is a sport enjoyed by many people including those with physical mobility limitations where physicality, vision, anxiety levels and heart rate greatly influence targeting. (Park et al., 2016), Archery is also a sport that requires consistency and stability of movement if the physical, physiological and psychophysical are not suitable, it can affect accuracy. (Sezer, 2017), Archery is a sport that is carried out repeatedly with high precision in addition to psychological, physical that must be good physiological demands of athletes are also needed to replenish energy if the athlete's physiology is not fulfilled then the athlete will be dehydrated. (Savvides et al., 2020).

Circuit training is an integrated skill-related physical fitness development exercise of activities performed simultaneously and summarised in several stations sequenced according to set objectives (Schoenfeld et al., 2021). Circuit training consists of several training stations and is organised in such a way as to form a systematic series of exercises in accordance with the training objectives. (Malik et al., 2013), Circuit training is a method that is quite safe and easy to do which is combined freely from post to post according to muscle needs so that the circuit training method is suitable in increasing arm muscle endurance where arm muscle endurance is very much needed and is an important component, research carried out (Sutapa et al., 2020).

Circuit training using equipment is also often used by some elite athletes to increase endurance and muscle strength, circuit training consists of several stations and at each station an athlete performs a specific type of exercise (Vorbeck & Bördlein, 2020). Circuit training can use the help of tools and do not use tools, circuit training using tools must be planned for the arrangement of the series of exercises, the weight of the load and the number of forces, before doing circuit training must begin with a sufficient warm-up (Kusnanik et al., 2021).

Cardiovascular is also very necessary because when archery an arrow athlete holds his breath so in addition to muscular endurance cardiovascular endurance is also very necessary in archery. In addition to hand and cardiovascular archery also requires leg muscle endurance the function of circuit training for leg muscles is to train endurance, strength and balance so that the archer is able to stand during the training process and compete without experiencing fatigue. (Vynogradskiy et al., 2024), The following is a circuit exercise without the use of tools, the goal is for leg muscle endurance and strengthening of local muscles where archery really requires leg muscle strength because during an archery match an archer takes 3 hours or even more where archers have to walk a certain distance which is done for more than 3 hours and when archery the body position is always standing and is required to be balanced (Yudho, 2022).

Circuit training is able to increase muscle strength and endurance simultaneously, as shown in tables 4 and 5 post test results show a significant increase in muscle strength and endurance after training with the circuit method, this is shown in the t test results in table 6 with a value of 0.021 and $0.22 > 0.05$ which indicates that there is a significant difference in strength to increase muscle endurance of archery athletes, thus circuit training using weights / tools can increase the strength and muscle endurance of archery athletes.

Conclusions

Based on the results of research and discussion, it can be concluded that there is a significant effect of training done with the circuit method in increasing the strength and endurance of the upper, middle and lower body muscles significantly, circuit training should be done for 5 weeks with an intensity of 60-80% of 1 RM, 3-4 Sets, 10-15 repetitions and 1-2 minutes rest between sets, it is evident from the results of our research that circuit training is able to increase muscle strength and endurance in archery athletes, so in this finding circuit training can be used as an alternative training for archery athletes in an effort to improve the athlete's physique, if the athlete's physical performance increases then when competing the athlete can get maximum performance.

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