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The comparison between the influence of rehaencalina-rehaencalina-torso (RRT) and rehaencalina-bench press-torso (RBT) training on javelin throwing ability

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Abstract

Explosive power athletes are a significant requirement in javelin throwing. Increasing the explosive power of the arm requires proper training, including using rehaencalina exercises. This study aimed to determine the modification of rehaencalina exercises to improve the ability to throw javelins. This research uses the Experiment method, which uses a two-group pretest-posttest design. The sample in this study was 18 javelin throw athletes from Makassar State University. The research instrument used a javelin-throwing ability test. Data analysis was processed using descriptive test statistics, normality test, homogeneity test, and Anakova test. The results found a comparison of the effects of the two treatment groups on the variable javelin throwing ability, resulting in an average javelin throwing ability between exercises showing an increase in javelin throwing ability seen from the average increase in test results. The average javelin throwing ability for both groups showed that group 1 of the Rehaencalina-Rehaencalina-Torso (R-R-T) exercise resulted in a better improvement in javelin throwing ability than group 2 of the Rehanecalina-Bench Press-Torso (R-B-T) exercise. This study concludes that arm power explosiveness modification exercises with Rehaencalina exercises can improve javelin throwing ability. The results of this study can be a foothold to pay attention to the physical component in improving sports skills.

Keywords: Rehaencalina-rehaencalina-torso exercise, explosive arm power, throwing ability, rehaencalina-bench press-torso exercise.

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INTRODUCTION

One number in athletics that is growing quite rapidly is the javelin throw. Javelin throwing athlete orientation is an achievement sport, where the highest achievement is the target of each javelin thrower. The javelin throw is a throw-in athletic sport contested in sports weeks, and javelin throw has been contested since the Greek Olympic Games. Throwing is the movement of channelling energy to the object to be thrown which produces power on the object so that the object can move forward or upward. Power is one of the elements to obtain good explosive power. The combination of strength and speed becomes a whole unit to get a good throw. Therefore, speed is also an important supporting factor in giving birth to better and more efficient motion (Telaumbanua & Siahaan, 2020). Today, the literature on javelin training primarily focuses on kinematic analysis or summarizing the experience of javelin trainers needs to be improved (Pedro et al., 2022). However, javelin throwing is very technical and involves precise sequential movements of the lower and upper body segments. An in-depth analysis is required to get optimal results. This sport is very detailed, for example, the thing that determines the throw is when the javelin is released, which is the most important part of the throwing technique (Purnomo, 2011). The angle of release is considered an important feature for covering the maximum distance of the throw, where the lower and upper body parts play an important role in the javelin (Wijayanti & Suntoda, 2017).

In simple terms, the stages of javelin throwing motion start from the head, how to hold and carry a spear, posture when throwing a spear, how to throw a spear, and a spear-throwing attitude (Mirawati & Rahmawati, 2017). To support these stages of motion, it is necessary to have good physical and technical skills. This technique and physique require a program in order to develop the ability of javelin-throwing athletes (Dellal et al., 2011). Javelin throwing is a movement that requires power, flexibility and coordination (Akkase, 2023). These three elements of physical condition greatly support the ability to throw javelins through systematic

training, appropriate training methods and suitable training handling. This training method contributes a little to improving the performance of javelin athletes. An approach from the perspective of sports biomechanics is needed to be the basis for the preparation of javelin training programs. The training must be special in developing the components needed in javelin throwing.

To improve the success of javelin throwing, judging from the pattern of foot-to-arm movement, the muscles that determine the movement of throwing a javelin, especially the hip-to-arm muscles, still need to improve the form of exercise (Al-Lami & Severukhin, 2020). The most important factor is the javelin throwing technique, the speed at which the thrower releases the javelin. This is in line with the opinion (Lee, 2013) that throwing speed is the most important factor for achieving a high throwing distance in javelin throwing. To achieve high throwing speeds, the transfer of mechanical energy through kinetic chains plays an important role. Internal and external rotational movements of the upper arm contribute significantly to sports equipment's kinetic energy transfer and acceleration (Al-Lami & Severukhin, 2020). One of the efforts to improve the ability to throw javelins is physical exercise for athletes. Bafirman & Wahyuri, (2018) Physical exercise and sports activities can make changes to all functions of the body's systems. Physical condition is a very important aspect in improving the performance of athletes. Physical development is a factor that needs to be resolved and improved without waiting for a better situation.

Exercises to strengthen physical abilities as support for skills in sports must match the characteristics of technical skills. Physical exercise in sports must adjust the physical character of the sport to provide a stimulant in the development of techniques (Klimashevsky, 2018). One of the physical abilities in javelin throwing is an explosive force applied to overcome/overcome resistance that is lower than maximum resistance but with maximum acceleration strength. Moved, characterized by explosive power, is a single movement/repetition, such as throwing or jumping (Yu,

2018). Many methods can be taken to increase strength and speed (explosive), such as training methods using outer weights and inner loads or both. Rehaencalina exercise is a form of exercise using external weights and is the most appropriate to increase strength and speed (explosive).

Rehaencalina-Rehaencalina-Torso (R-R-T) and Rehaencalina-Bench Press-Torso (RBT) exercises are types of exercises with a form of pressure or emphasis on a group of arm and shoulder muscles during contractions. The difference between these two types of exercise lies in the type of contraction in the muscles. Torso exercises are done slowly and under control, with the base of motion in the joints. Bench press exercise is an exercise that uses external weights and is a suitable form of exercise to increase speed and strength. Focusing on the part trained in torso training is a form of exercise that can be used to increase flexibility related to the javelin throw, when going to remove the javelin, good flexion is needed so that the body position can move away from the throwing radius so that there is a spring force on the thrust back. The muscles trained during torso training are rectus abdominis, internal oblique, external oblique, and pyramidal (Prabowo, 2016).

Bench Press-Torso is a form of exercise that can be used to increase explosive arm power and body flexibility, which is associated with throwing a javelin when going to release the javelin, good body flexibility is needed so that the body position can move away from the throwing radius so that there is a spring force on the body's ability. The muscles trained during the bench press-torso are anterior deltoids, upper and middle pectoralis major, latissimus dorsi, trapezius, infraspinatus, triceps, biceps, rectus abdominis, internal oblique, external oblique (Akinbiola & Yekeen, 2022; Ginanjar et al., 2022).

Based on the background presented, an experimental study is needed on the application of Rehaencalina exercise modifications using the rehaencalina – rehaencalina-torso (Torso Twist) training model and rehaencalina-bench press-torso training in the sample group to bring out

perfect javelin throw results. This study hopes that comparing Rehaencalina training modification training can improve skills in javelin throwing so that it becomes an alternative in training programming.

METHOD

The method used in this is an experiment with a two-group pretest-posttest design. Experimental research methods are methods used to discover the effects of a particular treatment on others under controlled conditions. This study is a pre-experimental study with pretest and posttest group designs. 18 male javelin throwers were a sample of the study. All of these samples were javelin throwers from Universitas Negeri Makassar, a simple random sampling was chosen in determining the sample of this study. Randomly, the samples were grouped into rehaencalina-rehaencalina-torso (R-R-T) exercises (body weight = 55.5±7.76 kg; height = 162.6±6.91 cm; javelin throw ability = 21.7±5.5) and rehaencalina-bench press-torso (R-R-B) exercises (body weight = 52.1±6.66 kg; height = 158.3±2.44 cm; javelin throwing ability = 21.7±3.9). The form of design in question is as shown in the picture below:

Table 1. Two-group pretest-posttest research design

Pretest	Treatment	Posttest
O_1	X_1 X_2	O_2

The instruments of this study are weight and height measurement, the explosive power of the arm, and javelin throwing ability. Weight and height measurement using a Stadiometer and weight scale, explosive power arm using a medicine ball throw test, and javelin throwing ability using a javelin throw test. This study used the IBM SPSS version 25 data analysis tool. The data obtained were analyzed using parametric statistics of the Anava test at a significance level of 95%. For parametric statistics of the Anava test, it is used to find the mean, standard deviation, and variance. After that, testing the requirements of the analysis (classical assumption test) is to test the normality of the data using Kolmogorov-Smirnov and Shapiro-Wilk, testing the homogeneity of the data using the Levine Test. Then, proceed with hypothesis testing using anakova.

RESULT

Table 2 shows that the average ± standard deviation (SD) for height, weight, and javelin throw ability showed significant differences in SD.

Table 2. Description of the results of the analysis of weight, height, and javelin-throwing ability

Variable		Groups 1		Groups 2	
		Mean	± SD	Mean	± SD
Wight (kg)	Pretest	55,5556	7,7639	52,1111	6,6604
	Posttest	55,5556	8,2630	51,5556	6,3465
Height (cm)	Pre Test	162,6667	6,9101	158,3333	2,4495
	Posttest	162,6667	6,9101	158,3333	2,4495
JTA (M)	Pre Test	21,7289	5,5843	21,7289	3,9097
	Posttest	28,5178	5,3300	24,8822	3,2357

To find out whether the data is normally distributed, it is necessary to do a normality test. Kolmogorof-Smirnof (K-SZ) normality test results were performed on group 1 rehaencalina-rehaencalina-torso (R-R-T) exercises, group 2 rehaencalina-bench press-torso (R-B-T) exercises.

Table 3. Intergroup normality test

Variable		Pretest		Posttest	
		K-SZ	P	K-SZ	P
Weight (Kg)	K1	0.405	0.997	0.461	0.984
	K2	0.832	0.493	0.897	0.397
Height(cm)	K1	0.558	0.915	0.558	0.915
	K2	0.406	0.996	0.406	0.996
KLL (m)	K1	0.654	0.786	0.745	0.636
	K2	0.469	0.980	0.579	0.890

Table 3 shows the normality test results in group 1 of rehaencalina-rehaencalina-torso (R-R-T) exercises, group 2 of rehaencalina-bench press-torso (R-B-T) exercises show P > 0.05, meaning normal distribution.

The results of the homogeneity test under the initial conditions of all variables (weight, height, javelin throwing ability) can be seen in Table 3 below:

Table 4. Oneway ANOVA for all groups

Variable	Sig
Weight	0.327
Height	0.095
Javelin Throwing Ability	0.828

Table 4 of the variance homogeneity test results above shows that the data has a diversity that is not significantly different P > 0.05, the smallest P = 0.095 means that all variables (weight, height, and javelin throwing ability) have homogeneous variance.

Test the results of changes in each variable between times in each group.

Table 5. Changes in the variable of javelin throwing ability of the rehaencalina-rehaencalina-torso group

Descriptive	Pretest Javelin Throw	Posttest Javelin Throw
N	9	9
Mean	21,7289	28,5178
Std. Deviation	5,5843	5,3300

In Table 5, the average javelin throwing ability in the rehaencalina-rehaencalina-torso group increased javelin throwing ability from the initial week (pretest to posttest). This shows that the administration of rehaencalina-rehaencalina-torso exercise treatment shows good ability improvement.

Table 6. Variable changes in javelin throwing ability group rehaencalina-bench press-torso

Descriptive	Pretest Javelin Throw	Posttest Javelin Throw
N	9	9
Mean	21,2256	24,8822
Std. Deviation	3,9097	3,2357

In Table 6 The average javelin throwing ability in the rehaencalina-bench press-torso group saw an increase in javelin throwing ability from the initial week (pretest to posttest). This shows that the administration of the rehaencalina-bench press-torso exercise treatment shows a good increase in ability. From these results, the 2 treatment changes were better for the Rehaencalina-Rehaencalina-Torso group than the rehaencalina-bench press-torso.

Comparison of the effects of both treatment groups on the variable ability to throw javelins. The average javelin throwing ability between exercises showed an increase in javelin throwing ability from the first week (pretest to posttest).

Table 7. Comparison of the effect of exercise on javelin throwing ability

	Mean	t	df	Sig. 2 (tailed)
Rehaencalina-rehaencalina-torso (rehaencalina-rehaencalina-torso) training.	4,444	1,835	8	,000
Rehaencalina-bench press-torso (R-B-T) training	3,333	1,414	8	,000

In Table 7, the average javelin throwing ability for both groups showed that group 1 of the Rehaencalina-Rehaencalina-Torso (R-R-T) exercise resulted in a better increase in javelin throwing ability than group 2 of the Rehanecalina-Bench Press-Torso (R-B-T) exercise.

DISCUSSION

The research conducted is a field experiment research. The study samples were treated with group 1 rehaencalina-rehaencalina-torso (R-R-T) exercises and group 2 rehaencalina-bench press-torso (RBT) exercises. This study was to compare the effect of rehaencalina-rehaencalina-torso (R-R-T) and rehaencalina-bench press-torso (RBT) exercises on javelin throwing ability. The results of this study stated that the average javelin throwing ability for both groups showed that group 1 of the Rehaencalina-Rehaencalina-Torso (R-R-T) exercise resulted in an increase in javelin throwing ability better than group 2 of the Rehanecalina-Bench Press-Torso (R-B-T) exercise. These findings suggest that doing physical exercise can improve technical ability in sports. Research (Viktor et al., 2022) which reveals that physical training can improve technical skills in sports.

Further research by Sundari & Sukadiyanto (2019) explains that physical exercise in explosive power can improve the ability in javelin throwing. The development of the impact of providing physical exercise that contributes to technical training is caused by the body's increased functional ability to increase the body's acceleration ability (Rianto, 2020). Many training methods can be used in training explosive power, one of which is the type of rehaencalina exercise. Explosive power training using body weights is a rehaencalina exercise because everyone's body load is different. As revealed by Bompa (2019), the ratio between the maximum

strength of the athlete and body weight or lean body mass." Sports are a way for a person to increase his potential. With practice, a person can learn or improve movement in the techniques in the sport involved to improve the physical abilities that support the sport. Santos & Franchini, (2021) state that rehaencalina training is a type of sport that utilizes weights to improve an athlete's physical quality, either in the form of weights with additional tools or just using one's own weight. In javelin throwing, the muscles used in throwing are the muscles in the upper extremities, and the dominant muscles are the shoulder muscles and the surrounding area. To train shoulder movements can be Rehaencalina-Rehaencalina-Torso (R-R-T) and Rehaencalina-Bench Press-Torso (RBT).

The movement in the rehaencalina-rehaencalina-torso exercise is done by swinging the hand and pulling the weight from back to front and back again repeatedly, the position of both legs is open, one in front and one behind according to the position of the legs before throwing the javelin (Rianto, 2020). The form of rehaencalina training is carried out according to the specificity of the javelin throwing movement so that the influence of the throwing style in question is a change that occurs as a result of the results of the training treatment (Latuheru & Rizal, 2020). Briefly, this training program is organized as an explosive power exercise. The rehaencalina-bench press-torso (RBT) exercise in this study is a form of weight training and flexibility, while the sequence of movements is as follows: The rehaencalina movement is done by swinging the arm pulling the weight from back to front, the body position is rotated towards the tool. Open leg position: one in front, one behind. This movement is performed repeatedly and is adjusted to the basic movement of throwing a javelin. Rehaencalina exercises are performed with 2 sets, and torso exercises with 2 sets. Then, practice this form of bench press exercise. A study (Ginanjar et al., 2022) found that training using explosive power with weight training can increase the ability of arm muscle power, The method of explosive power training with weight training also has an influence on the grip ability of athletes, where when training the athletes must hold

firmly the training equipment so that the position of the load does not shift. In addition, rehaencalina training forms such as Rehaencalina-Rehaencalina-Torso and rehaencalina-bench press-torso resemble movements when performing javelin throws in interesting positions and javelin throwing.

Javelin throwing requires many physical abilities, such as strength, strength, speed, agility, flexibility, coordination and balance. (Apri Agus & Sepriadi, 2021) refers to the meaning of strength as the ability of muscles to deal with external forces and defines it according to mechanical expression as an influence that changes the state of the body from rest or movement. The problem that arises as to why the results of the throw never reach the maximum when viewed from the distance of the throwing results is that athletes must have technical abilities, and students must also master excellent physical abilities (Wanda et al., 2018). Both physical and technical both synergize with the result of repulsion. According to Chen et al. (2020), the throwing distance depends on muscle contraction when resisting. This means that the outcome of the distance throw will largely depend on muscle elasticity and strength. Strength is defined as the ability of a group of muscles to perform one contraction maximally in an attempt to withstand resistance or load (Pratama & Roepajadi, 2019). The javelin is considered a weight that must be thrown by the arms very strongly.

Both training methods have a significant influence on arm muscle power, this can be seen from the shape of each form of exercise that resembles some basic techniques in javelin throwing. Regarding the importance of the explosiveness of arm muscle power in supporting the ability to throw javelins, it can be understood because, with the explosiveness of power, the arm muscles will provide maximum thrust to the javelin when going to throw the javelin, thus the acceleration of the resulting javelin movement will also be faster (Klimashevsky, 2018). So, the better the strength of the athlete's arm muscles, the better the quality of their javelin throw in connection with the explanation in the previous

paragraph that the physical component element, in this case, the explosiveness of arm muscle power, plays an important role in supporting the mastery of basic javelin throwing techniques.

Future research can take advantage of the results of this study because this study proves that physical exercise models can improve technical abilities in javelin throwing. So, in the future, we must utilize other physical training models to improve technical skills in javelin throwing. Subjects in this study are also very less expected in the future to be able to present a more significant number of subjects, especially with differences in subject characteristics, to produce varied results from current research findings.

CONCLUSION

Based on the results of the data and discussion, the results of this study can be concluded as follows: The Rehaencalina-Rehaencalina-Torso exercise improves throwing skills more than the Rehaencalina-Bench press-Torso exercise in javelin throwing. Based on the results of data analysis and the conclusions of this study, several things can be suggested or recommended: It is necessary to conduct further research over a longer time by looking for the following factors: Provision of adequate nutrition, The subject of the study is placed. Therefore, the findings reveal that those who use Rehaencalina exercise knowledge contribute to the ability of javelin throwing techniques. It also showed that Rehaencalina exercise modifications with both the Rehaencalina Torso and Rehaencalina-bench press had significant improvement differences between the pretest and posttest of the two groups. Significantly, the Rehaencalina-Rehaencalina-Torso exercise is more effective in improving javelin throwing skills. This study will be the basis of information for future researchers who will conduct comprehensive research on the achievements of javelin-based javelin throwing in the sport of javelin throwing.

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