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The Effect of Push Up Training Using Resistance Band Weights on Increasing The Arm Muscle Power of Basketball Players

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Abstract

Arm muscle power is very important to support various aspects of the game in sports matches, especially in basketball. Arm muscle power supports motion when shooting, dribbling, passing, defense or offense. This study aims to determine the effect of push up training using resistance band weights and on increasing the arm muscle power of basketball players. The method used in this research is a quantitative experimental method with a pretest-posttest control group design. The population in this study were women's basketball players of Club Bandung Utama with an age group of 14 as many as 27 people. The sampling technique in this study used a total sampling technique with the total population (27 people) used as research samples. The test instrument in this study used a medicine ball test to measure arm muscle power. The results of this study indicate that push up training using resistance band weights provides a significant increase in the arm muscle power of basketball players besides that push up training using resistance band weights has a significant effect compared to push ups without using resistance band weights. This shows that push ups using resistance band weights contribute to increasing the arm muscle power of basketball players where arm muscle power is an important component in the game of basketball, because good arm muscle power can support basic technical movements and complex techniques even in the sport of basketball. This study provides recommendations for coaches to be able to use training methods using resistance bands to increase the arm muscle power of basketball players

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INTRODUCTION

Physical condition is a complete unity of components that cannot be separated either in terms of improvement or maintenance. In general, the components of physical condition of each sport that uses a lot of physical activity are not much different, these components are basic biomotor components where one component with another is always related to form a higher quality physical condition component according to the demands of the needs of the sport (Hulfian and Olahraga 2019).

To be able to achieve the biomotor components, a training process with a fairly long period of time is definitely needed, in the training process itself there are several factors that can influence the success of the training process. One of the important factors is the preparation of a training program that is right and in accordance with the athlete, which contains training principles that must be adhered to by both the coach and the athlete (Rohmah and Purnomo 2018), In a book written by (Sidik, Pesurnay, and Afari 2019) The number of systems that affect exercise planning must be guided by exercise principles such as physiological laws, psychological laws, and pedagogical laws.

In basketball, there are several elements that influence as follows: endurance, agility, flexibility, speed, coordination, and strength (Sastra 2023). Skills in playing basketball need to be considered and determined in mastering the basic techniques as previously explained, namely passing, dribbling, and shooting. Shooting is a basic technique in basketball which is done by putting the ball into the opponent's basket or ring with the aim of scoring points

One of the physical components that need to be trained and possessed by basketball players is the arm muscle power component (Trisno, Mongsidi, and Saman 2022). Arm muscle power is needed to control or hold and then to throw or pass the ball quickly, hard, and in a targeted manner (Muslatubun, Saiman, and Akhmady 2022). However, to achieve maximum performance, it must be supported by the role of scientific methods in helping, in other words, scientific methods have a very strong influence in achieving sports achievements. So one of the tools that can be used to increase the arm power of basketball players is to use a resistance band according to (Hadjarati and Haryanto 2022) a resistance band is a tool that is an external load (external resistance) in the form of elastic rubber, training using resistance bands to increase arm muscle power can be done by pulling the resistance band quickly.

Based on research conducted by Indrijaya in 2019, the results of research and discussion of the effect of medicine ball pass training on the arm power of male athletes in basketball extracurricular high school 3 Yogyakarta can be concluded, that there is a significant effect of medicine ball pass training on the arm power of male athletes in extracurricular high school 3 Yogyakarta (Indrajaya 2019), In addition, research has been conducted by (Irawan, Wira Kusuma, and Nurtajudin 2021) on the effectiveness of two methods of training arm muscle strength in basketball players. The training method uses media, namely resistance bands (external resistance) and push ups (internal resistance) to increase arm muscle strength. The two studies both have the same goal, namely increasing arm muscle strength but with different forms of exercise, the two studies both provide suggestions and opportunities for future researchers to consider and conduct research related to efforts to increase arm muscle power using different research subjects. Researchers need to conduct further research with different training tool methods on the topic of arm muscle power. Therefore, researchers are interested in researching this, with differences in the tools and loads used to improve arm power abilities.

Based on the explanation that has been discussed, the researcher wants to conduct a study entitled "The Effect of Push Up Exercises Using Resistance Band Loads on Basketball Players' Arm Muscle Power. Related to the topic, the research problem that arises is: Is there a significant effect of push-up training using resistance band weights on the arm muscle power of basketball players? Is there a significant effect of push-up training using resistance band weights on the arm muscle power of basketball players?, Is there a significant effect of push-up training without using resistance band weights on the arm muscle power of basketball players?, Does push-up training using resistance band weights have a more significant effect than push-ups without using resistance bands on the arm muscle power of basketball players? Related to the formulation of the problem, the purpose of the proposed research is to determine the significant effect of push-up training using resistance band weights on the arm muscle power of basketball players, To determine the significant effect of push-up training without using resistance band weights on the arm muscle power of basketball players, to determine the significant difference in the effect of push-up training using resistance band weights with push-up training without using resistance band weights on

the arm muscle power of basketball players.

METHODS

The research method is one way used in a study. The method in this study is a quantitative approach research using the experimental method. In the study conducted by the researcher using the pretest-posttest control group design (Sugiyono 2013), in the study conducted the initial test (pre-test) has the aim of measuring the components of the two hand medicine ball push test before being given the sample treatment divided into two first using the formula A-B-B-A (Ordinal Pairing).

To obtain valid and accurate data, researchers need an instrument as a research procedure to obtain data. The instrument in this study used a medicine-ball. This instrument is intended to measure the arm and shoulder power of basketball players. The population in this study were basketball players from the Bandung Utama club with a total of 27 people. The sample in this study were all female basketball players with an age group of 14 years at the Bandung Utama club, considering the limited population, the research sample used was the total sample (total sampling) where the entire population was used as a sample, the number of samples to be studied was 27 people.

The sample group division technique in this study was carried out by ranking the pretest results, then paired with the A-B-B-A pattern (ordinal pairing) (Lestari and Nasrulloh 2019). In this study, the data collected came from quantitative data generated through the implementation of the pretest and posttest. The data was then processed with the help of Statistical Product and Service Solution (SPSS) 22 software, namely using the paired sample t-test. This test tests whether there is a difference or influence, data description, normality test (Shapiro-Wilk), significance hypothesis test using a parametric approach will use the Paired Samples Test.

RESULTS AND DISCUSSION

Based on the results of the data obtained from the resistance band treatment group and the push up control group which is raw data, data processing is needed to obtain standardized data. So that these data must be processed and analyzed using the help of Statistical Product and Service Solution (SPSS) version 22. The following researchers present the data that has been processed in accordance with what was discussed earlier in the research methodology.

Table 1. Descriptive Statistics Test of Resistance Band Group and Descriptive Statistics of Control Group (push-ups)

Group	Min	Maxi	Sum	Mean	Std. D
Pretest Resistance Band	2.10	3.20	27.30	2.4818	.37899
Posttest Resistance Band	2.60	3.70	34.10	3.1000	.45166
Pretest push up	1.90	3.00	22.60	2.2600	.30623
Posttest push up	2.40	3.20	26.45	2.6450	.24546

In the **Table 1** obtained data on the experimental group given push up treatment using resistance bands there is a minimum value of 2.10 for the initial test (pretest) and 2.60 for the final test (post test). And the maximum result of the data is 3.20 for the initial test (pretest) and 3.70 for the final test (post test). Then the sum value is 27.30 for the initial test (pretest) and 34.10 for the final test (post test). With an average on the pretest obtained 2.4818 and for the posttest 3.1000. with a standard deviation of 0.37899 for the pretest and for the post-test obtained 0.45166. In addition, data was also obtained for the control group with push up treatment which obtained a minimum value of 1.90 for pretest and for postest 2.40, then for a maximum value of 3.00 for pretest and 3.20 for postest. Then for the sum value of 22.60 for the pretest and for the postest obtained a value of 26.45. the average value of the pretest 2.2600 for the postest obtained a value of 2.6450. then the results were obtained for the standard deviation value with a value of 0.30623 for the pretest then for the postest obtained 0.24546. And then the author calculates the normality test using shapiro-wilk and obtained data in the **Table 2.**

Table 2. Normality Test of Pretest and Posttest Data

	Shapiro-Wilk		
	Statistic	Df	Sig.
Pretest Resistance Band	0.855	10	0.066
Posttest Resistance Band	0.851	10	0.059
Pretest Push- UP	0.859	10	0.075
Posttest Push- UP	0.866	10	0.091

In **Table 2**, the results of the calculation of the normality test with shapiro-wilk for the first

two groups of resistance band treatment groups and obtained a statistical value of 0.855 during the initial test (pretest) with a sig value of 0.066 and for the final test (post test) obtained a statistical value of 0.851 and a sig value of 0.059. then the initial and final values> 0.05 then the data is declared normal. Then for the control group with push up treatment obtained a statistical value of 0.859 with a sig of 0.075 for the initial test (pre test) then for the final test (post test) obtained 0.866 with a sig value of 0.091. then the initial and final values> 0.05 and can be declared normal and in these results the authors use a parametric approach for each group. Furthermore, the author conducts hypothesis testing which can be seen in the next table.

Shows the results of hypothesis testing in the resistance band treatment group with a t value of 8.128 with a sig value (2- tailed) of 0.000. Then the value of sig (2-tailed) <0.01 H0 is rejected then H1 is accepted. This means that training using resistance bands has a significant effect on the arm muscle power of basketball players.

Shows the results of hypothesis testing in the push up control group with a t value of 8.374 and a sig value (2- tailed) of 0.000. then the value of sig (2-tailed) <0.01 H0 is rejected then H1 is accepted This means that push up training has a significant effect on the arm muscle power of basketball players. And judging from the average t value, it can be concluded that the resistance band group has a more significant effect than the control group which is given the push up treatment.

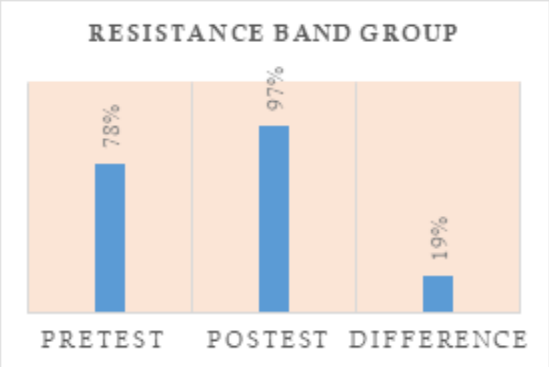

Figure 1. Graph of the Effect of Push Up Exercise Using Resistance Band Loads

In the **Figure 1**, the results can be obtained at the time of the pretest of 78% and obtained data of 97% at the time of the posttest, so the difference or increase after treatment is obtained by 19%. Furthermore, the author also gets the value in the control group, then the results are as shown in the next figure.

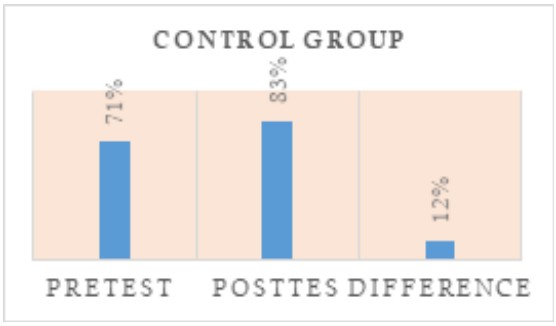

Figure 2. Graph of the Effect of Push Up Training Without Using Resistance Band Loads

The **Figure 2** shows that the control group at the time of the pretest obtained a result of 71% and a result of 83% at the time of the posttest, and got a difference of 12%, so it can be seen in the push up group using resistance bands and the control group obtained a greater increase in the resistance band group than the control group with an increase of 19% for the resistance band group and 12% for the control group.

Furthermore, the author wants to know whether there is an average difference in the results of increasing arm muscle power in basketball players through training using resistance bands and training using internal loads using the independent sample t-test test with the provisional hypothesis (conjecture) formula as follows: Ho: There is no difference in the average results of arm muscle power between push up exercises using resistance bands and push ups using internal weights. Ha: There is an average difference in arm muscle power results between push up exercises using resistance bands and push ups using internal weights.

Judging from the results of the independent sample test output between the posttest of the push up group using resistance bands and the posttest of the push up group using internal weights, it is known that the Sig. (2-tailed) value of 0.011 is smaller than 0.05, in accordance with the decision-making guidelines described above, Ho is rejected and Ha is accepted, which means that there is an average difference in increasing the arm muscle power of basketball players.

Based on the results of the description that has been collected previously, the researcher will present the discussion obtained from the research data that has been carried out. The results of this study will be described in accordance with the objectives and hypotheses that have been proposed previously. Power is the product of strength and speed, so athletes who have good power, in doing the technique the results will be relatively strong

and fast (Almunawar et al. 2020), therefore it can be concluded that power is one of the physical components needed in every sport, especially in basketball. Power will not work properly if done with improper training. Resistance bands have indeed become one of the effective training methods to improve various physical aspects, such as strength, endurance, power, speed, and agility. This tool is quite flexible and can be used to train almost all muscle groups, including leg muscles and arm muscles. The use of resistance bands can help increase muscle strength by providing varying resistance. Various studies have shown that training with resistance bands can significantly increase muscle strength, increase stability, and improve overall body movement. In addition, resistance bands can also be applied in injury rehabilitation, as they are easily adjustable in intensity and reduce the risk of more severe injuries compared to other training tools. This makes them a good choice for athletes from various sports who want to improve their performance or address specific muscle issues. Overall, resistance bands are not only for improving muscle strength, but also for improving speed, agility and overall endurance, which are very beneficial for supporting athletic performance. The results of data analysis and findings obtained from the initial test (pretest) and final test (posttest) which were obtained into statistical data data showed that there was an increase in the arm muscle power of basketball players. So it can be concluded that training using resistance bands can increase arm muscle power. This is reinforced by research that has been done before by (Jannah and Purnomo 2011) that there is an effect of overhead tricep extension resistance band training.

Push ups are one of the effective upper body exercises for building muscle strength, stability and endurance. This exercise involves various muscle groups, especially the chest, triceps, and shoulder muscles, as well as the core muscles to maintain balance (Colado et al. 2024). In the training process given to the sample, there was a response when doing a form of push up exercise using internal weights, the sample felt difficulty when doing the movement which meant that there was contraction in the arm muscles in an effort to pull and push. This is not much different from the push up treatment group using resistance bands. At the time of the study, treatment must be considered because if the movement is not strong and fast, the principle of power training will not be achieved. The results of data analysis and findings obtained from the initial test (pretest) and final test (posttest) which were obtained into statistical data showed that there was an increase in the arm muscle power of basketball players. So it can be concluded that push up training without using resistance band loads can increase arm muscle power. This is reinforced by research that has been done before by (Rohmah and Purnomo 2018) that there is an effect of push up training with internal load with a percentage increase there is a significant effect on increasing muscle power.

Lack of time or difficulty in accessing power training facilities is a barrier for people to engage in power training. Time-saving strategies that can be accessed at any time are an advantage of the use of elastic rubber or commonly known as resistance bands. Power training with resistance bands provides comparable strength as well as the same benefits as traditional training methods. In addition, elastic resistance bands are suitable for home-based training interventions but to ensure the effectiveness of the exercise, intensity, volume, heart rate must be considered. Most resistance bands are color-coded according to their resistance level which helps users to adjust the load. The resistance levels are organized into 4 categories: light, medium, heavy, and extra heavy. Each level has a different amount of tension that can be assessed by the user during exercise(Taufik Rahman et al. 2021). The difference between these two exercises is the load given, push ups using resistance bands use external loads or loads obtained from outside, meaning that there are additional loads besides the load from our own bodies, resistance bands are efficient and easy-to-carry fitness sports equipment made of rubber.

CONCLUSION

Based on the results of processing, data analysis, and hypothesis testing, it can be concluded that the research entitled "The Effect of Exercise Using Resistance Bands and Push Ups on Arm Muscle Power in Basketball Players" as follows: Based on the results of the research that has been done, it can be concluded that push ups using resistance band weights have a more significant effect on increasing the arm muscle power of basketball players compared to push ups without using resistance band weights. This shows that push ups using resistance band weights contribute to increasing the arm muscle power of basketball players where arm muscle power is an important component in basketball games, because good arm muscle power can support basic technical movements and complex techniques

even in basketball sports. Based on the conclusions and research results obtained, the authors have suggestions including: For coaches, can use the training method using resistance bands to increase the arm muscle power of basketball players and redevelop this training method in order to maximize the increase in arm muscle power of basketball players.

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