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The Effect of Muscle Strength Training Using Resistance Bands on Student Disc Throwing Results

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Abstract

Study purpose. The purpose of this study is to determine 1) The effect of learning results using resistance bands on the results of discus throwing throws, 2) The effect of learning outcomes using resistance bands on learning outcomes of discus throwing techniques, 3) Comparison of the results of discus throwing techniques and throws using resistance bands on the learning outcomes of students of SMK Negeri 1 Cirebon.

Materials and methods. The research used was an experimental pretest-posttest group design. The population in this study was class X students of SMK Negeri 1 Cirebon, totalling 718 students. This study used purposive sampling technique, with the sample being class X students of SMK Negeri 1 Cirebon totalling 71 students. Data collection instruments include the results of pretest and posttest discus throwing techniques and throws.

Results. The research shows that (1) There is an effect of learning outcomes using resistance bands on the results of discus throwing techniques, with a tcount value of 41.485> ttable value of 1.667 and a significance value of 0.000 <0.05. (2) There is an effect of learning outcomes using resistance bands on the results of discus throwing, with a tcount value of 25.722> ttable value 1.667 and a significance value of 0.000 <0.05. (3) There is an increase in learning outcomes of techniques and throws in throwing discs using resistance bands, with a percentage of technical results of 4.10% and throwing results of 5.77%.

Conclusion The results of data processing using the SPSS 26 assistance application, there is an effect of training using resistance bands on the results of techniques and throws of discus throwing students in class X SMK Negeri 1 Cirebon, this is evidenced by the results of techniques and throws there is an increase in pretest and posttest.

Keywords: Disc Throwing, Resistance Bands, Technique and Disc Throwing

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Introduction

Athletics as the Mother of Sport is a physical activity that can improve all aspects of biomotor abilities, such as strength, endurance, speed, flexibility, coordination. Some numbers of athletic sports competitions in Indonesia are, namely, shot put, javelin throw, disc throw, high jump, pole vault, long jump, long distance running, relay running, short distance running (Ramadan & Sidiq, 2019). Athletics is a sport that requires good strength, speed, tightness, coordination, stability, and physical endurance (Salahudin et al., 2023). *Pembelajaran atletik di sekolah merupakan cikal bakal dari kemampuan siswa dalam beraktivitas sehari-hari* (Sobarna et al., 2020). Disc throwing is a throwing motion of a flat-shaped tool with a certain weight made of wood and iron pingirannya, which is done with one hand by throwing from the side of the body to achieve the greatest possible distance in accordance with the applicable rules (Efendi et al., 2024).

Disc throwing is an athletic sport that involves throwing a heavy disc in a spinning motion (Chen et al., 2021). Disc throwing is one of the athletic numbers that requires strength, technique, coordination, and consistency. Physical education learning in athletic material will improve if the teacher can provide some manipulative motion innovations so that some of the problems faced are resolved properly (Putranto & Ulfah, 2023). Coordination is very necessary for discus throwers when competing to get a long throw (Samudro, 2021). Muscle strength is one of the key factors affecting athlete performance in discus throwing. At the school level, especially at SMK Negeri 1 Cirebon, learning discus throwing sports often does not achieve maximum results. This can be caused by various factors, one of which is less than optimal learning in increasing the muscle strength needed for discus throwing. Discus throw (or, disc throw) is a track and field event with a high degree of physical and technical demands (Alhumaid & Atta, 2022).

Explosive power (Power) is the accuracy of a person to use maximum strength in the shortest possible time (Adnan & Arlidas, 2019). Based on the previously stated problems, arm muscle power is the most important problem in students when doing discus throwing sports, so a training method to increase arm strength for the results of discus throwing techniques and throws can be done and become a solution to the problem. Leg muscle power is an activity that is carried out quickly and releases all explosive abilities in a short time (Nopiyanto et al., 2019). So the treatment carried out on class X students of SMK Negri 1 Cirebon is training using resistance bands to increase muscle strength and discus throwing technique.

The right method during training is an important factor in achieving maximum results in student learning when tested later, many exercises can be done with the help of the right tools to increase arm muscle strength and disc throwing techniques. When discussing training issues, it is closely related to the power and endurance of an athlete, endurance is a biomotor component that is needed in physical activity (Dhanireksa et al., 2023). One of the lessons that uses external aids, namely resistance bands. Resistance band is a device consisting of elastic rubber as a load (Hadjarati & Haryanto, 2022). Resistance Band itself is a sports tool made of rubber which is useful for adding weight to the workout movements that are being carried out. Its small size and portability make it suitable for home use or travelling. Like dumbbells, this tool also has a variety of sizes with different variants of stretchability (Fajar Ramadhan, 2023).

Training is the process of preparing athletes for higher performance. In addition, training can also be defined as the ability of a coach to optimise performance resulting from a systematic training process based on knowledge and expanded by several disciplines (Amansyah, 2019). Arm muscle strength training can be done using resistance bands or using your own body weight (Kuswanti et al., 2024). Overall, elastic band resistance training ma have improved upper limb muscle strength (Li et al., 2024). Physical education and sports programmes often still use conventional training methods. These exercises may be less appealing to students and less than optimal in improving their discus throwing performance. In addition, facilities for

strength training such as gyms and weightlifting equipment may be limited. Under these conditions, training using resistance bands can be an effective and efficient alternative. Bandı egzersizlerinin motor performancei geliştirdiğini (MOR et al., 2022).

The results of observations at the school conducted in February 2024, there are still students who perform the wrong sideways style disc throwing technique, namely in the preliminary technique and the final technique when the disc is released, and there are even some students who have never done disc throwing sports while attending elementary and junior high school. Other observations also show that the low muscle power strength of students. This is indicated by the low initial test conducted during the discus throwing lesson with an average throw distance of male students below 10 metres and female students below 6 metres (low category).

The results of the research and data analysis above, it is evident that the t-count is greater than the t-table with a number at a significant level of 5% showing a number of 2.074, this means that t-count 4.566> t-table 2.074 so that "There is an Effect of Push Up Training on Disc Throwing Achievement in Class VIII Male Students of SMPN 1 Dompu". This is because students who do Push Up training throw further than students who do not do Push Up training (Pratama, 2023). The results of data processing with statistical analysis show that this study has a sig value of 0.000 <0.05 which means Ho is rejected. Thus, dumbbell training using resistance bands has a significant effect on arm muscle strength in the Petanque Team of Muhammadiyah Palopo University (Sahariana et al., 2020). The results of research on the effect of the resistance band method on the ability to throw discs, the conclusions in this study are as follows, there is an effect of the resistance band method on the ability to throw discs of FKIP Jambi University student athletic course contracts in the Sports and Health Education Study Program. The results obtained thitung 8,627 (Ali & Hasibuan, 2020).

The results of previous studies show a significant effect of resistance band training to increase strength in various types of sports, but in this study will focus on training using resistance bands to increase muscle strength on the results of techniques and throws in the discus throwing sport of class X students of SMK Negeri 1 Cirebon.

Materials and Methods

Study participants.

In the population of this study the authors took the population of class X students of SMK Negeri 1 Cirebon with a total of 23 classes with a total of 718 students, 165 female students and 553 male students. Population is a generalisation area consisting of objects or subjects that have certain qualities and characteristics set by researchers to study and then draw conclusions (Sugiyono, 2019).

In this study, the authors used the technique used in this research is non probability sampling, namely purposive sampling. Purposive sampling is a sampling technique with certain considerations (Sugiyono, 2019). Sampling in this study uses certain considerations or criteria in the selection of samples, including: (1) the sample taken is a class taught by researchers during the PPL (field experience practice) process at SMK Negeri 1 Cirebon. (2) The 2 classes taken as samples were the classes with the lowest criteria during the data collection of practical exam scores taught by researchers during field experience practice at SMK Negeri 1 Cirebon so that researchers took samples in the form of these 2 classes. The sample in this study was class X students, the sample class to be studied amounted to 2 classes, namely class X electronic engineering 4 and electrical engineering 4 at SMK Negeri 1 Cirebon with a total of 72 students with 1 student who dropped out in class 4 electronic engineering so the sample used was 71 students.

Study organization.

This type of research uses experimental methods, namely conducting pretest and posttest tests that are given treatment and comparing the results of pretest and posttest tests of discus throwing techniques and throws after being given treatment using resistance bands. The research design used is "pretest-posttest group design", which is a research method conducted by experiment, which is a quantitative method, used to determine the independent variable (treatment / treatment) on the dependent variable (result) under controlled conditions (Sugiyono, 2019). The independent variable in this study is the effect of muscle strength training using resistance bands and the dependent variable in this study is the result of disc throwing techniques and throws.

The research instrument is 71 students who will conduct a pretest of disc throwing techniques and throws, treatment is carried out for training to increase muscle strength using resistance bands, while the posttest is carried out to see the improvement in the results of the technique and the results of students' throws when conducting disc throwing tests using actual discs.

Statistical analysis.

This research data was obtained from the results of the pretest and posttest tests, as well as documentation during the test and treatment. Test is one way to collect data about the object in the research that will be carried out directly. For data collection has been collected accurately. This study uses pretest and posttest techniques which function as data collection techniques which will be given treatment before conducting a posttest to draw conclusions on the posttest test. This study collected data on the results of the pretest and posttest when performing disc throwing techniques and throws.

Table 1. Discus throw pretest and posttest technique data sheet

Aspects Assessed			
	Indicators	Descriptor	Score
Disc Throw	Disc Holding Technique	1. The disc is held with four open fingers 2. The four fingers are placed on the disc. 3. The tips of the knuckles bend and cover the edge of the disc to hold it and the thumb is free.	1-3
	Prefix Technique	1. Stand in a sideways manner. 2. The direction of the throw and the right hand are straight and both knees are lowered when taking a step. 3. Swing the right arm forwards and backwards with both knees up.	1-3
	Suffix Technique	1. The right leg is turned down to lift the pelvis from the low position above the right leg pushed upwards.	1-3

	2. The body is rotated back to the right and then back with the pelvis rotating to the right as well. 3. The disc is released at chin level for the disc throw..

Source: (Physical education, sport and health class XI, Mukholid 2007)

The criteria for scores that students do in taking the discus throwing technique test are as follows:

Score 1: Only performs one movement element of each descriptor
Score 2: Performs two movement elements
Score 3: Performs three movement elements

The data obtained in the form of table 1 using the predetermined formula. To determine the development of completeness of the results of disc throwing techniques with sideways style in class X students of SMK Negeri 1 Cirebon using the Minimum Completeness Criteria (KKM) value. To determine the percentage of student ability, the formula is used:

$$\text{KKM} = \frac{Indikator\ 1 + Indikator\ 2 + Indikator\ 3}{Jumlah\ Deskriptor} x\ 100$$

Description:

If the indicator has high criteria, high carrying capacity and moderate students, then the KKM (minimum completeness criteria) value is:
With the following learning completeness criteria:

Table 2. Criteria for student learning completeness scores

Value	Category	Completeness
> - 9.00	Very high	Completed
8.50 – 8.00	High	Completed
7.50 – 7.00	Medium	Completed
< - 6.99	Low	Not Completed

With criteria:
0% ≤ KKM < 69% : Students have not completed their learning
70% ≤ KKM ≤ 100% : Students have completed their learning

Table 3. Data sheet of pretest and posttest throwing results of discus throwing

No	Formula	Category
1.	X ≥ (M + 1,5 x SD)	Very good
2.	(M + 0,5 x SD) ≤ X < (M + 1,5 x SD)	Good
3.	(M - 0,5 x SD) ≤ X < (M + 0,5 x SD)	Fair
4.	(M - 1,5 x SD) ≤ X < (M - 0,5 x SD)	Less
5.	X < (M - 1,5 x SD)	Very Poor

Description:
X = Score
M = *Mean*
SD = Standard Deviation

After knowing the level of description of the discus throwing technique, which includes the categories of excellent, good, sufficient, less, very less, it will be found how much the percentage is. To get a percentage number can use the following formula:

$$P = \frac{F}{N} x\ 100\%$$

Description:
P = Percentage sought
F = Frequency
N = Number of subjects

Next is to analyse the data that has been taken when conducting pretest, treatment and posttest using t-test. Before hypothesis testing, normality, homogeneity and correlation testing is carried out first whether the data is normally distributed or not. After testing normality, homogeneity and normal correlation, hypothesis testing will continue using the t-test whether there is a significant difference or not.

Results

Disc Throw Results of Class X Students of SMK Negeri 1 Cirebon

The results of the pretest and posttest of the discus throw results of class X students of SMK Negeri 1 Cirebon are as follows:

Table 4. Pretest-Posttest Disc Throw Results of Class X Students of SMK Negeri 1 Cirebon

No	Description	Number of Students	Throw Result		Difference
			Pretest	*Posttest*	
1.	*Pretest Throwing Result*	71	325,27	471,54	146,27
2.	*Posttest Throwing Result*	71	335,16	480,08	144,92
	Total		660,43	951,62	291,19

Table 5. Categorisation of Pretest Throwing Results of Class X Students of SMK Negeri 1 Cirebon

No	Interval	Frequency	Percentage	Kategori
1.	17,50 - >	0	0%	A
2.	14,50 – 17,49	2	2,82%	B
3.	11,50 – 14,49	4	5,63%	C
4.	8,50 – 11,49	50	70,42%	D
5.	0 - 8,49	15	21,13%	E
	Category	71	100%	

From table 5, it can be seen that the pretest skill level of discus throwing of students in class X SMK Negeri 1 Cirebon is D with the highest frequency consideration in several D categories with 50 students or 70.42%. The skill level of students in class X SMK Negeri 1 Cirebon who are in category A is 0 or 0%, category B is 2 students or 2.82%, category C is 4 students or 5.63%, category D is 50 students or 70.42%, and category E is 15 students or 21.13%.

Table 6. Categorisation of Posttest Throwing Results of Class X Students of SMK Negeri 1 Cirebon

No	Interval	Frequency	Percentage	Kategori
1.	17,50 - >	7	9,86%	A
2.	14,50 – 17,49	11	15,49%	B
3.	11,50 – 14,49	47	66,20%	C
4.	8,50 – 11,49	6	8,45%	D
5.	0 - 8,49	0	0%	E
	Jumlah	71	100%	

From table 6, it can be seen that the posttest skill level of throwing discs of class X students of SMK Negeri 1 Cirebon has increased after being given training using resistance bands is C with consideration of the highest frequency in several C categories with 47 students or 66.20%. The skill level of students in class X SMK Negeri 1 Cirebon who are in category A is 7 or 9.68%, category B is 11 students or 15.49%, category C is 47 students or 66.20%, category D is 6 students or 8.45%, and category E is 0 students or 0%.

Table 7. Descriptive Statistics of Pretest-Posttest Throwing Results Class X Students of SMK Negeri 1 Cirebon

Descriptive Statistics						
	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Pretest	71	4,35	15,73	660,43	9,3018	1,96684
Posttest	71	8,40	18,46	951,62	13,4031	2,31098
Valid N (listwise)	71					

Based on the bar chart in Figure 1 above, it shows that the pretest test of discus throwing results of class X students of SMK Negeri 1 Cirebon with an average pretest score of 9.3018 there was an increase after being given treatment and doing the final posttest with a score of 13.4031.

Results of Disc Throwing Technique of Class X Students of SMK Negeri 1 Cirebon

Table 8. Results of Pretest-Posttest Disc Throwing Technique Class X Students of SMK Negeri 1 Cirebon

No	Keterangan	Jumlah Siswa	Hasil Teknik			Skor
			Grip	Awalan	Akhiran	
1.	*Pretest* Teknik	71	131	87	77	295
2.	*Posttest* Teknik	71	198	164	139	501
	Jumlah	142	329	251	216	796

Table 9. Categorisation of Pretest Disc Throwing Technique Results Class X Students of SMK Negeri 1 Cirebon

No	Description	Technique Test Results	Category	Number of Students	Percentage

1.	*Pretest* Teknik	> 70	Completed	0	0%
		< 70	Not Completed	71	100%
2.	*Posttest* Teknik	> 70	Completed	56	78,87%
		< 70	Not Yet Completed	15	21,13%

From table 9, it can be seen that the pretest and posttest technical skills of class X students of SMK Negeri 1 Cirebon during the pretest were still classified as incomplete, namely 100%, after being given training using resistance bands there was an increase in the posttest with a complete category of 78% and an incomplete category of 21.13%.

Table 10. Descriptive Statistics of Pretest-Posttest Technique Tests Class X Students of SMK Negeri 1 Cirebon

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
*Pretest_* Techniques _	71	3	6	295	4,15	,786
*Posttest_* Techniques	71	5	9	501	7,06	,998
Valid N (listwise)	71					

Berdasarkan diagram batang tabel 10, menunjukkan bahwa *pretest* tes hasil teknik lempar cakram siswa kelas X SMK Negeri 1 Cirebon dengan rata-rata skor *pretest* 4,14 terdapat peningkatan setelah diberikan perlakuan dan melakukan *posttest* akhir dengan skor sebesar 7,06.

Data Normality Test

This normality test data calculation uses the formula from Shapiro-Wilk with data processing using the SPSS 26 application.

Table 11. Normality Test Data for Disc Throw Results Class X Students of SMK Negeri 1 Cirebon

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
*Pretest_* Result_Throw	,101	71	,072	,971	71	,097
*Posttest_* Result_Throw	,112	71	,026	,973	71	,123
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
*Pretest_* Result_Technique	,109	71	,037	,972	71	,120
*Posttest_* Result_Technique	,113	71	,026	,973	71	,128

Based on table 11, it can be seen that the pretest-posttest data on the results of throwing and discus throwing techniques of students in class X Negeri 1 Cirebon have a significance

value> 0.05. So it can be seen that the data on the results of throws and techniques are normally distributed.

Homogeneity Test

The Homogeneity Test is useful for testing sample similarity data, namely the variant or not the sample variant that has been taken from the population. The rule of homogeneity instructions if p> 0.05, then the throwing test results are declared homogeneous, if p < 0.05, then the throwing test results are said to be inhomogeneous.

Table 12. Homogeneity Test of Throwing Results and Disc Throwing Techniques Class X Students of SMK Negeri 1 Cirebon

Data	Significance	Description
Pretest-Posttest Throw Result	0,109	Homogen
Pretest-Posttest Technique Result	0,171	Homogen

Based on table 12, it can be seen that the pretest-posttest data of throwing results and discus throwing techniques of class X students of SMK Negeri 1 Cirebon have a significance value> 0.05, so the data is homogeneous.

Correlation Test

The correlation test is carried out to test whether the data has a correlation relationship or not, the correlation test is carried out using the SPSS 26 application provided that if the analysis results of the significance value <0.05 then the data is correlated, but if the data analysis results show significance> then the data is not correlated. Furthermore, based on the conclusion from the information above that the research is declared to have a relationship if the pearson correlation value> rtable and if the pearson correlation value < rtable then there is no relationship.

Table 13: Correlation Test Results of Throwing and Disc Throwing Techniques Class X Students of SMK Negeri 1 Cirebon

Correlations

		Pretest_Throw	*Posttest_Throw*
Pretest_Throw	*Pearson Correlation*	1	,814**
	Sig. (2-tailed)		,000
	N	71	71
Posttest_Throw	*Pearson Correlation*	,814**	1
	Sig. (2-tailed)	,000	
	N	71	71
		*Pretest*_Teknik	*Posttest*_Teknik
Pretest_Technique	*Pearson Correlation*	1	,807**
	Sig. (2-tailed)		,000
	N	71	71
Posttest_ Technique	*Pearson Correlation*	,807**	1
	Sig. (2-tailed)	,000	
	N	71	71

Based on the data from the correlation test results of throwing and discus throwing techniques of class X students of SMK Negeri 1 Cirebon, it shows that the significance value is <0.05, namely 0.000 <0.05, which means that the data has a correlation.

Based on table 13, the correlation test analysis data above shows that the data of class X students of SMK Negeri 1 Cirebon for pearson correlation of throwing results is 0.814 with r table 0.235 and engineering results is 0.807 with r table 0.235, then when viewed with the value of r table is 0. 235, it can be concluded that the data analysis of the correlation test of the throwing results of class X students of SMK Negeri 1 Cirebon is 0.814> 0.235, where the pearson correlation data is greater than rtable, the throwing results data has a relationship, as well as the technical results data is 0.807> 0.235, where the pearson corrleation data is greater than rtable, the technical results data has a relationship.

Hasil Uji Hipotesis

Hypothesis testing in this study was tested using t test analysis, namely paired sample t test (df = n-1) using the SPSS 26 application.

a. Hypothesis Test of Disc Throw Results

Table 14. Hypothesis of Pretest-Posttest Test of Throwing Results Class X Students of SMK Negeri 1 Cirebon

Throw	Average	t_{hitung}	t_{tabel}	Significance
Pretest Throw	9,3018	25,722	1,667	0,000
Posttest Throw	13,4031			

Based on table 14 analysis of the throwing results of class X students of SMK Negeri 1 Cirebon in table 14 using the SPSS 26 application, it can be seen that the tcount of the throwing results is 25.722 and ttable (df 70) 1.667, with a significance value of 0.000. Because the tcount is 25.722 > ttable 1.667, and the significance value is 0.000 <0.05. Then the results show there is a significant difference, thus the alternative hypothesis (Ha) with the statement "there is a significant effect of training using resistance bands on the results of throwing discs of class X students of SMK Negeri 1 Cirebon", is accepted.

b. Hypothesis Test of Disc Throwing Technique Results

Table 15. Hypothesis of T-test of Pretest and Posttest of Engineering Result Class X Students of SMK Negeri 1 Cirebon

Techniques	Average	t_{count}	t_{table}	Significance
Pretest Techniques	4,15	41,485	1,667	0,000
Posttest Techniques	7,06			

Based on table 15 analysis of the results of the technique of class X students of SMK Negeri 1 Cirebon in table 14 using the SPSS 26 application above, it can be seen that the tcount of the throwing result is 41.485 and ttable (df 70) 1.667, with a significance value of 0.000. Because the tcount is 41.485 > ttable 1.667, and the significance value is 0.000 <0.05. Then the results show there is a significant difference, thus the alternative hypothesis (Ha) with the statement "there is a significant effect of training using resistance bands on the results of discus throwing techniques of class X students of SMK Negeri 1 Cirebon", is accepted.

Percentage Improvement

a. Percentage Increase in Throwing Results of Disc Throwing

Table 16. Percentage of Improvement in Disc Throw Results Class X Students of SMK Negeri 1 Cirebon

Throw Result	Average	Difference	Percentage
Pretest	9,30	4,1	5,77%
Posttest	13,40		

Based on the results of the analysis in table 16 above, it shows that the percentage increase in the results of throwing discs of class X students of SMK Negeri 1 Cirebon after being given training using resistance bands is 5.77%.

b. Percentage of Improvement in Disc Throwing Technique Results

Table 17. Percentage of Improvement in Disc Throwing Technique Results Class X Students of SMK Negeri 1 Cirebon

Technique Results	Average	Difference	Percentage
Pretest	4,15	2,91	4,10%
Posttest	7,06		

Based on the results of the analysis in table 16 above, it shows that the percentage increase in the results of the discus throwing technique of class X students of SMK Negeri 1 Cirebon after being given training using resistance bands is 4.10%.

c. Percentage of Throwing and Technique Results of Class X Students of SMK Negeri 1 Cirebon

Based on the results of the analysis, it shows that the percentage increase in the results of discus throwing of class X students of SMK Negeri 1 Cirebon after being given training using resistance bands is 5.77%. For the percentage of the results of the discus throwing technique of class X students of SMK Negeri 1 Cirebon after being given training using resistance bands of 4.10%.

Discussion

Previous research studies in the form of the effect of Plyometric combination training using resistance bands on the vertical jump ability of male basketball athletes (Herlambang & Rismayadi, 2024). The results of the study can be concluded that there is a significant effect of plyometric combination training using resistance bands on the vertical jump ability of male basketball athletes.

Besides, the research (Anhar et al., 2023) obtained the results that the training model using rubber is effective in increasing the speed of pencak silat front kicks. From the training model there is a significant influence on the results of the front kick speed of the athletes of the Pencak Silat Nurul Husna Indonesia martial arts college in Bima City. Research results (Pairi et al., 2023). Based on data analysis, it is known that the sig value is 0.000 <0.05 which means that Ho is rejected. Thus it can be concluded that there is a significant effect on training using resistance bands on leg strength of the University of Muhammadiyah Palopo futsal team. This squat exercise aims to increase leg strength in the futsal team of Universitas Muhammadiyah Palopo. Furthermore, research (Wangi et al., 2023). Hasil dari latihan dumbell dan punch

resistance band selama 8 minggu berpengaruh terhadap peningkatan power lengan petinju remaja putra, dengan nilai pengaruh latihan Punch Resistance Band sebesar 68,7% dan latihan dumbell sebesar 69,4%.

From the research that has been done, it can be seen that students need an interesting and complete understanding of learning so that students can understand and be active in the material provided and learning requires modification of renewal in learning, especially in the discus throwing sport. Based on the results that were carried out well in this study, the researcher made a new hypothesis for discus throwing learning by using resistance band equipment as an increase in muscle strength in discus throwing. The results of discus throwing techniques and throws obtained in training using resistance bands are techniques there is an increase of 4.10% and a throw of 5.77%. From the results of this study it can be seen that training using resistance bands has significantly improved the results of discus throwing techniques and throws.

Based on the results of training research using resistance bands in the normality test, the data obtained from the pretest and posttest of discus throwing techniques and throws get the results of the significance value of the technique 0.120> 0.05 and the results of the significance value of the throw 0.097> 0.05, so the data on the results of the technique and discus throwing are normally distributed. The homogeneity test of the pretest posttest results of discus throwing techniques and throws obtained the results of the significance value of the technique 0.109> 0.05 and the significance value of the throw 0.171> 0.05, so the data on the results of techniques and throws are homogeneous. The correlation test of the results of the technique and the pearson correlation of the throwing results is 0.814 with r table 0.235 and the technical results are 0.807 with r table 0.235, then when viewed with the value of r table is 0.235, it can be concluded that the data analysis of the correlation test of the throwing results of class X students of SMK Negeri 1 Cirebon is 0. 814> 0.235, where the pearson correlation data is greater than rtabel, the throwing result data has a relationship, as well as the technique result data is 0.807> 0.235, where the pearson corrleation data is greater than rtabel, the technique result data has a relationship. Furthermore, the hypothesis test of the pretest posttest results of the technique and the throw got the results of the discus throwing technique with a tcount of 41.485> ttable 1.667, and a significance value of 0.000 < 0.05. Then the results show that there is a significant difference, thus the alternative hypothesis (Ha) with the statement "there is a significant effect of training using resistance bands on the results of discus throwing techniques of class X students of SMK Negeri 1 Cirebon", and the results of discus throwing with a tcount of 25.722> ttable 1.667, and a significance value of 0.000 <0.05. Then the results show there is a significant difference, thus the alternative hypothesis (Ha) with the statement "there is a significant effect of training using resistance bands on the results of throwing discs of class X students of SMK Negeri 1 Cirebon".

Furthermore, the percentage increase in discus throwing technique is 4.10% and the percentage increase in discus throwing is 5.77%. Thus there is a significant increase in the results of discus throwing techniques and throws after training using resistance bands for class X students of SMK Negeri 1 Cirebon.

Conclusions

Based on the discussion of the results of data processing and analysis in the previous chapter, the authors can draw a conclusion as follows: (1) There is an effect of learning outcomes using resistance bands on the results of sideways style disc throwing techniques of class X students of SMK Negeri 1 Cirebon. (2) There is an effect of learning outcomes using resistance bands on the results of sideways style discus throwing of class X students of SMK Negeri 1 Cirebon. (3) There is an increase in the learning outcomes of throwing techniques and results in throwing discs using resistance bands of class X students of SMK Negeri 1 Cirebon.

There are still limitations in this study using only resistance band training tools and only measuring the technique and results of discus throwing. Future research can use other methods to increase muscle strength such as barber, dumbell, and also measure the angle of the throw and combined by other variables.

Based on the results of research and findings during the implementation of research at SMK Negeri 1 Cirebon, the authors propose several recommendations: 1) For Physical Education Teachers at School. (1) Assist students by providing direction and examples and guidance in learning, especially in throwing discs, so that students at the time of learning are ready and can receive the material taught in throwing discs can be obtained in the learning process. (2) Helping students to do learning with different methods and ways using tools so that students can learn more about throwing discs in learning. (3) Helping students by providing new encouragement and enthusiasm in carrying out learning by using tools that have never been done in order to make students happy in learning so that discus throwing learning can be understood by students when learning takes place. 2) For Further Researchers, for future researchers who want to conduct further disc throwing research so that they can make this research a reference and information material so that it can provide useful information when researching with a larger sample population and and methods of using different tools such as dumbbells.

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Conflict of interest

Overall, the authors declare that there is no conflict of interest in this research.

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