

THE INFLUENCE OF TIRE RUBBER PULLING EXERCISE MEDIA ON ARM MUSCLE STRENGTH IN VOLLEYBALL ATHLETES OF PUTRA RAMAS TABANAN CLUB

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Abstract. The purpose of this study was to determine the effect of rubber tire pulling training media on arm muscle strength and to determine the differences in the results of tire rubber pulling training with smash training without using a ball. This study used an experimental randomized pre-test and post-test groups design. The population was taken from all athletes at the Putra Ramas volleyball club in 2021. The data are the results of arm muscle strength when pulling the expanding dynamometer taken before and after training. The obtained data were tested using the SPSS 22 computer program. The data were normally distributed and homogeneous, so that they were then tested using paired t-test to compare the average values before and after training between each group, while the independent t-test was to determine the difference in the average values between the two groups. The conclusion is that pulling the rubber tire with 10 repetitions of 3 sets and smash training without using the

ball for 10 repetitions of 3 sets both increase arm muscle strength and states that the alternative hypothesis is accepted.

INTRODUCTION

Volleyball is a type of big ball game that uses a net as a barrier, and is played in groups with a ball used as the playing medium. Volleyball is a sport played by two opposing groups. Each group has six players. The volleyball game is known as a dynamic and intelligent sport, because it demands a combination of physical ability and quality technical skills (Parwata, 2021). The basic techniques that must be mastered by volleyball players when playing volleyball, such as: passing, serving, smashing and blocking. Volleyball is a sport that is very popular among people in Indonesia because it can be played by children and adults, both men and women, and can be played in open or closed fields (Yastini, 2021). Volleyball games are usually played either just for fun or to get achievements.

People in Tabanan district, especially Tibubiu village, really like the volleyball sport. In Tibubiu village, there is also a men's volleyball club called Putra Ramas. Volleyball games in Tabanan district have become a prestigious type of sport. The volleyball competition which is held once a month is a place to show their abilities in playing volleyball from each village or sub-district in Tabanan. The achievement got by the Putra Ramas volleyball club is

winning 2nd place in the Putra Dewata Cup I volleyball tournament in 2022 in Sangketan Village, Penebel, Tabanan. The factors that influence the Putra Ramas volleyball club's achievements are environmental factors. The majority of people in Tibubiu village enjoy playing volleyball so that the teenagers in Tibubiu village are increasingly enthusiastic in practicing because they are always supported by the village residents.

However, as time went by, the achievements and physique condition of Putra Ramas' athletes declined. It can be seen in previous tournaments that after winning 2nd place in the Putra Dewata Cup I tournament, Putra Ramas only passed the preliminary round. There are several factors that influence the decline in the performance of Putra Ramas volleyball club, one of which is the decline in arm muscle strength in the Putra Ramas volleyball athletes. It can be seen directly when the players are competing on the field, their smashes are not hard enough and are not on target. Remembering that arm muscle strength is very important and influential in playing volleyball for attack and defense. Seeing these conditions, researchers were interested in increasing arm muscle strength in volleyball athletes of Putra Ramas by carrying out training on pulling rubber tires for 10 repetitions in 3 sets.

The facilities and infrastructure owned by the Putra Ramas volleyball club include: volleyball court, net, net post and lights. The material taught by volleyball coach of Putra Ramas is basic training of volleyball techniques, playing volleyball tactics and training to improve physical condition. Physical condition is a complete unit of components that cannot be separated easily. Physical condition training is a process of developing the ability for physical movement activities which is carried out systematically and progressively increased to maintain or increase the level of physical condition in order to achieve optimal physical work ability. When humans carry out daily activities, whether in physical or non-physical activities, a person's physical condition is very influential (Valeria & González-Calvo, 2021). Besides influencing a person's work productivity, physical condition also influences psychological aspects such as increasing work motivation, work enthusiasm, self-confidence, thoroughness and so on (Maksymchuk et al., 2020).

In addition to improving physical and spiritual fitness, sports coaching and development can also foster a character of discipline and sportsmanship and generate a sense of national pride through achievements in sports. Changes in the field of sports occurred as a result of methods and forms of training discoveries that were in accordance with science and technology which had a positive impact on the sports development. Talking about sports and achievements, it cannot be separated from the supporting factors for getting these achievements (Darmada et al., 2020).

In sports, training media is needed to support muscle strength in athletes (Maksum, 2012). Learning media, no matter how good it is, if it is not used for learning, it has no benefit to the education world. AECT (Association for Education and Communication) Source: "The Definition of Educational Technology 1977" defines media as all forms used to process the distribution of information. Media in sports is a medium for learning or practical training.

In fact, many theories have been written by experts in the context of sports coaching in their respective branches. This media can be used by physical education teachers in the physical education learning process. For example, the test ball, which is used for softball hitting practice. It is natural because this tool and other tools were created in connection with training certain sports (Lubis, 2013).

Training and physical development materials do not yet prioritize standard techniques that support increased performance in certain sports. Physical education material should be in the form of coordinative movement tasks that support the motor learning process. The success of physical education depends on how the teacher designs it (Mirayani, 2021). The material must be concrete in the sense that it contains elements of basic coordinative abilities such as reaction power, rhythm, balance, kinesthetic spatial orientation abilities and there should be no students who are unable to carry it out (Nala, 2015). Preparing such material turns out to be more flexible using the tools available around us and the results are more effective. One simple tool that can be used or can be made by teachers themselves as a medium for physical education learning, for example a rubber tire is used to be pulled forward and backward to increase arm muscle strength (Putri Sri Devi et al., 2022). Rubber tires are a medium that can be used for training to increase arm muscle strength in athletes.

This research discusses the effect of rubber tire pulling training media on arm muscle strength in Putra Ramas volleyball club athletes. Researcher hopes that there is an influence between pulling rubber tires on arm muscle strength in Putra Ramas volleyball club athletes.

METHOD

Based on the objectives to be achieved in this study, the type of research and the methods considered most effective will determine the final research design and the category (class) of research to be carried out. Various research groups can be identified to determine their types. The type of this study is experimental research (Dantes, 2012). The samples will be taken from the existing population. The sample determination is preceded by inclusion and exclusion criteria (Sugiyono, 2013). After that the sample size is determined using the Pocock formula. After the initial test, all samples were divided into 2 groups using the ordinal pairing technique. After that, both groups carried out their respective training (Widana & Muliani, 2020). After undergoing training for 6 weeks, all samples returned to carry out a final test, namely measuring arm muscle strength using an expanding dynamometer.

The aim of this research was to determine the effect of rubber tire pulling training media on arm muscle strength and to determine the difference in the results of 10 repetitions of 3 sets of rubber tire pulling training and 10 repetitions of 3 sets of smash training without using a ball on arm muscle strength. This research used an experimental randomized pre-test and post-test groups design (Sukadiyanto & Muluk, 2011).

RESULTS AND DISCUSSION

This research was carried out at the Putra Ramas volleyball court for 6 weeks. The sample in this study consisted of 12 men who were divided into two groups, each group consisting of 6 people. The control group was given smash training without using a ball, 10 repetitions in 3 sets, while the treatment group was given training in pulling rubber tires, 10 repetitions in 3 sets. The results of this research are presented in the following discussion.

Table 1. Data on Characteristics of Research Subjects in Treatment Group and Control Group

Subject characteristics	Control group			Treatment group		
	n	Average	SB	n	Average	SB
Age (year)	6	18,33	1,633	6	18,67	2,066
Weight (kg)	6	66,83	5,845	6	65,17	7,653
Height (cm)	6	170,83	5,269	6	172,50	7,148

Based on the table above, it shows the sample characteristics in the control group (smash training without using a ball 10 repetitions 3 sets) in terms of age with average of 18.33 ± 1.633 years, average weight 66.83 ± 5.845 kg, average height 170.83 ± 5.269 cm. characteristics of the research sample in the treatment group (tire pulling training 10 repetitions 3 sets) in terms of age with average age of 18.67 ± 2.066 years, average body weight 65.17 ± 7.653 kg, average height 172.50 ± 7.148 cm.

According to these data, the characteristics of the two research sample groups were in the same condition, so that the variables age, height and weight did not have a significant effect on the results of this study. These findings are in accordance with the results of research conducted by [Aron Laxdal & Rune Giske \(2020\)](#).

Table 2. Data Normality and Homogeneity Test Results Using Expanding Dynamometer Before and After Exercise in Both Groups

Expanding dynamometer measurement	Normality test (<i>saphiro wilk-test</i>)		Homogeneity test (<i>levene-test</i>) P value
	Control group P value	Treatment group P value	
Pre-test	0,110	0,820	0,234
Post-test	0,093	0,404	

Information:

Control group: Smash training without using a ball, 10 repetitions, 3 sets

Treatment group: Tire pulling training, 10 repetitions 3 sets

Based on the data normality test results (Shapiro-Wilk test) using an expanding dynamometer before and after training in the control group and treatment group, it shows that the data in both groups shows p greater than 0.05 ($p > 0.05$), so the data is declared normally distributed. Likewise, the homogeneity test results (Levene Test) show that the data in both groups based on the results of expanding dynamometer measurements is homogeneous because p is greater than 0.05 ($p > 0.05$), so the data can be tested using a parametric test to see whether there is an increase or a decrease in results on research variables.

Table 3. The Average Difference Test in the Increase of Arm Muscle Strength before and after Exercise

Expanding dynamometer measurement		Min.	Max.	Average	SB	Difference	t	P
Control group	Pre-Test (kg)	15	18	17,00	1,265	1,67	-7,906	0,01
	Post-Test (kg)	17	20	18,67	1,366			
Treatment group	Pre-Test (kg)	14	17	15,50	1,049	5,83	-8,919	0,00

Expanding dynamometer measurement	Min.	Max.	Average	SB	Difference	t	P
Post-Test (kg)	19	25	21,33	2,251			

Information:

Control group: Smash training without using a ball, 10 repetitions, 3 sets

Treatment group: Tire pulling training 10 repetitions 3 sets

For more details, the average difference in increase of arm muscle strength in the two groups can be seen in the following graph:

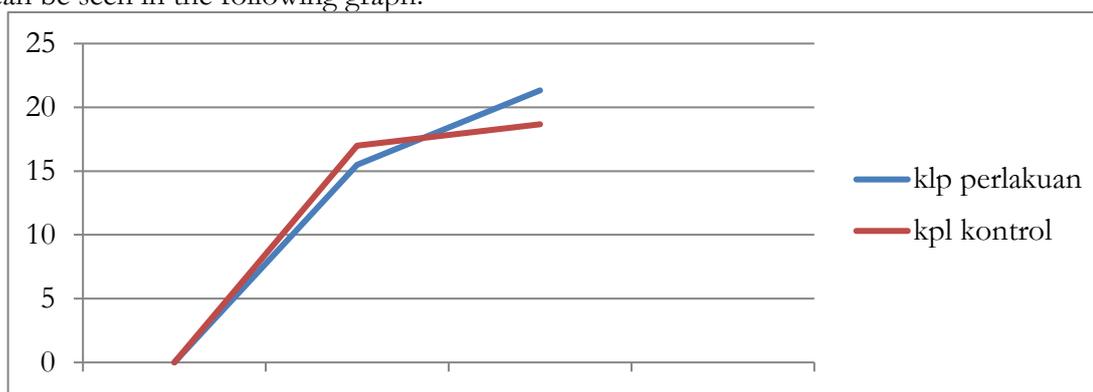


Image 1. Graph of the Average Increase of Arm Muscle Strength for the Two Groups

Based on the table and graph above, it shows that the difference in average arm muscle strength in the control group and treatment group, before and after training based on measurements using an expanding dynamometer shows p value smaller than 0.05 ($p < 0.05$). So these values indicate that smash training without using a ball, 10 repetitions 3 sets and training on pulling rubber tires 10 repetitions 3 sets, can significantly increase arm muscle strength.

Table 4. Data of Differences Test in Treatment Effects between Groups Using the T-Test Independent in Determining the Final Results of Arm Muscle Strength Measurements

	Group	Average	T	P	Average Difference
Post-test	Control	18,67	2,481	0,03	2,66
	Treatment	21,33	2,481	0,03	

The difference test from the measuring results of arm muscle strength using an expanding dynamometer can be seen from the average difference after training for each treatment group as in table 4. Based on Table 4, there is a difference in the average post test results between smash training without using a ball, 10 repetitions, 3 sets (control group) and training on pulling rubber tires, 10 repetitions, 3 sets (treatment group), with a value of ($p = 0.03$), $p < 0,05$, which shows a significant difference in the final test results between the control group

and the treatment group. These findings are in accordance with the results of research conducted by [Travis et al. \(2019\)](#) & [Damayanthi \(2022\)](#).

Furthermore, the percentage change in the measuring results of arm muscle strength using an expanding dynamometer after training for 6 weeks in both experimental groups is presented in table 5.

Table 5. Percentage of Change in Arm Muscle Strength after Training

Analysis Result	Control Group	Treatment Group
Pre-Test of Arm Muscle Strength (Kg)	17,00	15,50
Post-Test of Arm Muscle Strength (Kg)	18,67	21,33
Differences in Arm Muscle Strength (Kg)	1,67	5,83
Percentage (%)	9,8%	37,6%

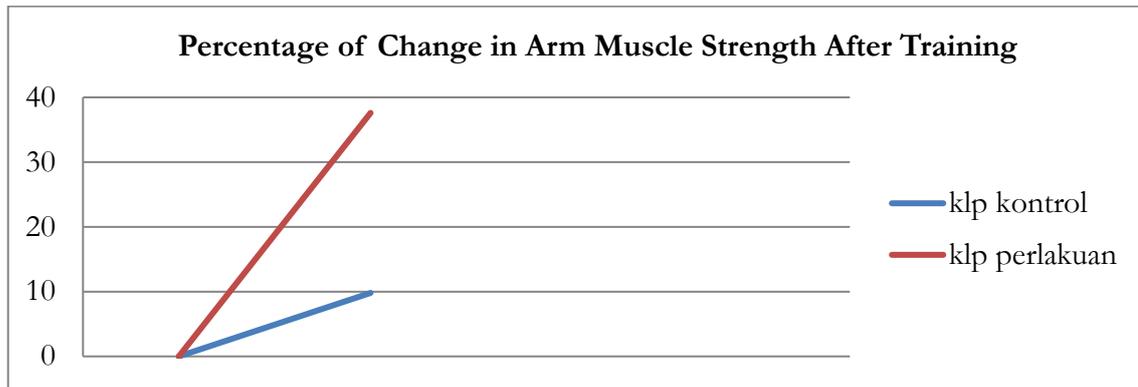


Image 2. Graph of the Percentage Change in Arm Muscle Strength after Training

Based on the average percentage of change in arm muscle strength using the expanding dynamometer after training for 6 weeks in table 4,5, it shows that the average percentage of change in arm muscle strength using the expanding dynamometer in the training of treatment group was greater than the control group. Thus, it can be said that the treatment group research produced better changes in expanding dynamometer results than the control group training. These findings are in accordance with the results of research conducted by [Yeshayahu Hutzler et al. \(2019\)](#).

CONCLUSION

Based on the results of data analysis using the t-test, it can be concluded that the rubber tire pulling training, 10 repetitions 3 sets (treatment group) with smash training without using a ball 10 repetitions 3 sets (control group) with a value of ($p = 0.03$) $p < 0.05$, shows a significant difference in the final test results between the treatment group and the control group. There is a significant difference between the post test results of the treatment group with an average increase in arm muscle strength after training of 21.33 and the control group experienced an increase in arm muscle strength after training with an average of 18.67, so the results show that the training for pulling rubber tires, 10 repetitions 3 sets, are better than

smash training without using a ball 10 repetitions 3 sets, in increasing arm muscle strength in Putra Ramas volleyball club athletes in 2021.

Based on the research conclusions, several things are suggested that are related to increasing arm muscle strength. For club members, it is recommended that this 10 repetitions 3 sets of rubber tire pulling training can be used as a guide in carrying out exercises to increase arm muscle strength to make them more effective and efficient. To gain increased arm muscle strength, do this training for 6 to 8 weeks with a frequency of 4 times a week. For trainers, it is recommended that the results of this research can be used as a reference in carrying out training on pulling rubber tires with 10 repetitions 3 sets. It is very good to be applied to achieve optimal performance. For club managers and related agencies, it is recommended that they should complete training facilities and infrastructure, including providing rubber tires for training so that training can run well, and in the end the club's achievements are as expected. It is recommended that other researchers to do further research on how to increase the strength of player's arm muscles by taking other variables, so that this research is more complete and there are more ways to be applied to increase the strength of player's arm muscles.

BIBLIOGRAPHY

- Aron Laxdal & Rune Giske. (2020). Gender and the perceived learning environment in upper secondary school physical education. *Sport, Education and Society*, 25(7), 779-787. DOI: 10.1080/13573322.2019.1666360
- Damayanthi, K. A. U., Widana, I. W., & Sumandya, I. W. (2022). Pengembangan bahan ajar matematika berbasis vokasi menggunakan linkfly siswa kelas X SMK. *Indonesian Journal of Educational Development (IJED)*, 3(2), 199-208. <https://doi.org/10.5281/zenodo.7026852>
- Dantes, N. (2012). *Metode penelitian*. Andi Offset.
- Darmada, I. M., Widana, I. W., Suarta, I. M., Suryaabadi, IBG. (2020). Penguatan pendidikan karakter di sekolah dasar kabupaten Tabanan Bali Indonesia. *Widyadari*, 21(2), 394 – 411. <https://doi.org/10.5281/zenodo.4059735>
- Lubis, J. (2013). *Panduan praktis penyusunan program latihan*. PT Raja Grafindo Persada.
- Maksum, A. (2012). *Metodologi penelitian dalam olahraga*. Unesa University Press.
- Maksymchuk, B., Gurevych, R., Matviichuk, T., Surovov, O., Stepanchenko, N., Opushko, N., Sitovskiy, A., Kosynskiy, E., Bogdanyuk, A., Vakoliuk, A., Solovyov, V., & Maksymchuk, I. (2020). Training Future Teachers to Organize School Sport. *Revista Romaneasca Pentru Educatie Multidimensionala*, 12(4), 310-327. <https://doi.org/10.18662/rrem/12.4/347>
- Mirayani, P., Widana, I. W., Purwati, N. K. R. (2021). Pengaruh model pembelajaran problem solving dan kemampuan berpikir kritis terhadap hasil belajar matematika siswa kelas XI SMA Negeri 7 Denpasar tahun pelajaran 2020/2021. *Widyadari*, 22(2), 429 - 438. <https://doi.org/10.5281/zenodo.5550368>
- Nala, I.G.N. (2015). *Prinsip pelatihan fisik olahraga*. Udayana University Press
- Parwata, I. M. Y. (2021). Pengaruh metode problem based learning terhadap peningkatan hasil belajar pendidikan jasmani olahraga dan kesehatan: meta-analisis. *Indonesian Journal of Educational Development*, 2(1), 1-9. <https://doi.org/10.5281/zenodo.4781835>
- Putri Sri Devi, D. A. P., Widana, I. W., Sumandya, I. W. (2022). Pengaruh penerapan ice breaking terhadap minat dan hasil belajar matematika siswa kelas XI di SMK Wira Harapan. (2022). *Indonesian Journal of Educational Development (IJED)*, 3(2), 240-247. <https://doi.org/10.5281/zenodo.7032283>

- Sugiyono. (2013). *Metode penelitian pendidikan pendekatan kuantitatif, kualitatif dan R&D*. Alfabeta.
- Sukadiyanto & Muluk, D. (2011). *Pengantar teori dan metodologi melatih fisik*. Lubuk
- Travis E. Dorsch, Michael Q. King, Sarah Tulane, Keith V. Osai, C. Ryan Dunn & Chalyce P. Carlsen. (2019). Parent education in youth sport: A community case study of parents, coaches, and administrators. *Journal of Applied Sport Psychology*, 31(4), 427-450. DOI: 10.1080/10413200.2018.1510438
- Valeria Varea & Gustavo González-Calvo. (2021). Touchless classes and absent bodies: teaching physical education in times of Covid-19. *Sport, Education and Society*, 26(8), 831-845. DOI: 10.1080/13573322.2020.1791814
- Widana, I. W. & Muliani, L. P. (2020). *Uji persyaratan analisis*. Klik Media.
- Widana, I. W. & Ratnaya, I. G. (2021). Relationship between divergent thinking and digital literacy on teacher ability to develop HOTS assessment. *Journal of Educational Research and Evaluation*, 5(4), 516-524. <https://doi.org/10.23887/jere.v5i4.35128>
- Yastini, N. K. (2021). Evaluasi pembelajaran daring pendidikan jasmani olahraga dan kesehatan (PJOK) SMA kota Denpasar pada masa pandemi COVID-19. *Indonesian Journal of Educational Development*, 2(3), 416-427. <https://doi.org/10.5281/zenodo.5680956>
- Yeshayahu Hutzler, Stefan Meier, Sabine Reuker & Michelle Zitomer. (2019). Attitudes and self-efficacy of physical education teachers toward inclusion of children with disabilities: a narrative review of international literature. *Physical Education and Sport Pedagogy*, 24(3), 249-266. DOI: 10.1080/17408989.2019.1571183