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The Effect of Arm Muscle Strength and Leg Muscle Explosiveness on Ball Shooting Results Basketball

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Abstract: The problem in this study is the lack of students in basketball shooting results so that the players often experience failures. The formulation of the problem in this study is whether there is an effect of arm muscle training and leg muscle explosive training on shooting results in extracurricular students of SMP Negeri 2 Bangka Barat. The purpose of this study is to find out whether there is an effect of arm muscle training and leg muscle explosiveness training on shooting results in extracurricular students of SMP Negeri 2 Bangka Barat. The method used in this study is the one group experiment method. The sample in this study is the total of the existing population, namely 26 students who participate in extracurricular activities at SMP Negeri 2 Bangka Barat. Based on the results of the research and the results of statistical calculations on the test of improving the results of arm muscle strength exercises to influence arm muscle strength and leg muscle explosiveness on basketball shooting results in extracurricular students of SMP Negeri 2 Bangka Barat, the author can conclude that: isometric exercises have an effect on basketball shooting in extracurricular basketball games of SMP Negeri 2 Bangka Barat. The magnitude of the influence is shown significantly at the real level of 0.05 with t calculated > t 0.95 (50) = 6.84 > 1.70.

Keywords*:* Arm Muscle Strength, Basketball Shooting, Leg Muscle Explosiveness

A. Introduction

Sport can be understood as a human activity carried out to improve physical health while providing pleasure and personal satisfaction. According to Lebed (2022), sport includes various forms of physical activity involving games, competitions, and other physical activities with the aim of obtaining recreation, victory, and achievement. This illustrates how sport not only serves as a means to improve body fitness, but also as a form of entertainment and competition that can enrich life experiences. Sport as a routine activity has many benefits, both in terms of health and psychology (Delle Fave et al., 2018). In the context of health, exercise plays an important role in maintaining body fitness, preventing disease, and improving the function of vital organs. Regular exercise can improve muscle strength, flexibility and endurance,

helping the body to be more efficient in carrying out its daily functions (Kramer, 2020). In addition, regular physical activity also contributes to weight management, reduces the risk of chronic diseases such as diabetes and heart disease, and improves sleep quality. Meanwhile, based on the Health Belief Model (HBM) theory, it is a theory developed to understand how a person's beliefs influence their health behavior, including exercise (Wu et al., 2020). According to this theory, a person will be more likely to participate in exercise if he or she believes that exercise can prevent disease or health problems, feels vulnerable to disease without exercise, and perceives that the benefits of exercise outweigh the barriers.

However, exercise goals are not always the same for every individual. There are a variety of reasons why someone chooses to exercise, which often reflects their personal needs and desires. For some people, sport is a way to achieve achievements and make a name in the competitive arena (Savić et al., 2018). Professional athletes, for example, train with the goal of achieving a medal, world record, or top spot in a competition. They focus on intensive training and strategies designed to maximize their performance in a particular sport. On the other hand, many people play sports for recreation and entertainment purposes. For them, sport is not just about competition or achievement, but rather about enjoying physical activity, filling free time, and getting joy from social interactions with friends or family. Recreational sports can include a variety of activities, such as leisurely cycling, swimming, or playing tennis, that are done more for fun than to achieve competitive goals (Wibowo et al., 2023). According to Dasso (2019) stated that each individual has different motivations for exercising. This motivation can be influenced by various factors, including personal goals, physical condition, and individual preferences (Collado-Mateo et al., 2021). Some people may be driven by a desire to improve their health or fitness, while others may be more interested in the social aspects of exercise, such as building relationships with others or becoming part of a community.

Overall, sports play a multifunctional role in people's lives. Apart from improving physical and mental health, it also provides opportunities for social interaction and the pursuit of personal achievement. By understanding the various purposes and benefits of exercise, individuals can choose the type of activity that best suits their needs and desires, and derive maximum benefits from each exercise session undertaken. Exercise, in its many forms and purposes, is an essential element in a healthy and fulfilling lifestyle. Activities at school are often carried out both inside and outside of school hours, and sports activities outside of school hours are generally programmed as extracurricular activities (Dauenhauer et al., 2022). Extracurricular activities are designed to support the development of students according to their needs, potential, talents and interests, through activities that are specially organized by students and competent educational staff at school (de Prada Creo et al., 2020; Hui et al., 2021). Sport is defined as physical activity that aims to

maintain and improve the fitness of the human body (Malm et al., 2019). In addition, sports can also be a source of entertainment and fun activities, or directed to achieve certain achievements (KINCZEL et al., 2020).

Extracurricular activities, especially in the context of sports, provide opportunities for students to develop physical and mental skills outside of their academic curriculum. Through participation in extracurricular sports, students not only benefit from improved physical health and fitness, but also learn about discipline, teamwork and personal achievement (Bisa, 2023). These activities are often a venue for students to explore their interests in different types of sports and physical activities, which may not always be available in the regular education program. Extracurricular sports also play an important role in shaping students' character and emotional well-being (Feraco et al., 2023). These activities often involve competitions and challenges that encourage students to overcome obstacles and achieve goals, which can boost self-confidence and personal satisfaction. Furthermore, involvement in sports can help reduce stress and improve sleep quality, as well as improve the balance between students' social and academic lives (La Cascia et al., 2021). Thus, sport serves not only as a means to achieve physical health but also as an integral component in the holistic development of students in school (Suyato et al., 2024).

Achievement sports are sports that foster and develop sportsmen in a planned, tiered, and sustainable manner through achievements with the support of sports science and technology (Kurniawan et al., 2021). One of the coaches to improve achievement through sports is with extracurricular activities, in schools there are various extracurricular activities such as football, volleyball and basketball. Basketball is one of the most popular sports in the world, with famous leagues such as the NBA (National Basketball Association) in the United States and international championships under the auspices of FIBA. This sport is known for the speed, skill and strategy involved in the game. Basketball was first created by Dr. James Naismith in 1891 as a way to keep students fit during the winter. He designed this game by installing peach baskets on the walls of the gymnasium and instructing the students to put balls into the baskets.

Extracurricular activities in general are activities that are used as a forum for students who have an interest in participating in activities according to their interests, talents, and hobbies (Goshin et al., 2021). Extracurricular activities are used as a tool to detect student talents and are designed systematically so that they can produce and grow the potential of students and as a forum to develop student character in the approach of various activities. Basketball extracurricular activities are activities that are held to increase abilities and improve the achievement of students who have talents, interests, and abilities in basketball and as one of the positive activities for students to avoid environmental influences and promiscuity. The existence of extracurricular activities that must be attended by all students is

expected to be able to facilitate every talent and interest of students, so that they can form and foster skills to develop their talents and interests to get achievements and form and foster the character of students, because the focus is not only in the form of practice but also in the form of social and self-introduction to know their character and potential. Extracurricular activities themselves are carried out outside of mandatory class hours. This activity provides time flexibility and gives freedom to students, especially in determining the type of activity that suits their talents and interests, so extracurricular activities will not interfere with the mandatory learning schedule of the subject because the time and place are adjusted proportionally, in each activity carried out, it must not be separated from the objective aspect.

Achievements in basketball are influenced by a multitude of factors, including physical, technical, tactical, and mental aspects (Luo et al., 2023). Among these, technical skills play a crucial role as they form the foundational capital for any basketball player aspiring to excel (Mark & Alexander, 2019). Mastery of fundamental techniques, such as dribbling, shooting, and passing, is essential for a player to progress to higher levels of competition and recognition. However, technical proficiency alone is insufficient without the support of excellent physical conditioning. A basketball player must possess robust physical attributes to complement their technical skills. Among these physical conditions, arm muscle power and leg muscle explosiveness are particularly critical. Arm muscle power is vital for effective shooting, passing, and defensive actions, while leg muscle explosiveness is essential for quick sprints, jumps, and overall agility on the court (Pojskic et al., 2018). The development of these physical attributes often requires targeted training programs. For instance, exercises such as push-ups and squats are commonly used to enhance arm and leg strength respectively. By incorporating such exercises into a training regimen, players can improve their muscle power and explosiveness, leading to better performance during games and practices. In summary, while technical skills form the basis of a player's ability, physical conditioning, including arm muscle power and leg muscle explosiveness, is necessary to maximize their performance and achievements in basketball. A well-rounded training approach that addresses both technical and physical aspects is essential for players aiming to reach their full potential and excel in the sport.

Arm muscle strength and leg muscle explosiveness play a crucial role in a basketball player's ability to shoot accurately and with power. Without strong arm muscles, a player may struggle to generate enough force to shoot the ball with precision. Similarly, without explosive leg muscles, a player may not be able to jump high enough to create the necessary arc on their shot. In this paragraph, we will explore how these physical attributes impact a player's shooting performance and discuss strategies for improving arm muscle strength and leg muscle explosiveness. Improving arm muscle strength can be achieved through weight training exercises such as bicep curls, tricep dips, and shoulder presses. Additionally, incorporating

plyometric exercises like medicine ball throws and push-ups can help increase explosiveness in the arms. To enhance leg muscle explosiveness, players can focus on exercises like squats, lunges, and box jumps (Huang et al., 2023). By consistently working on these muscle groups, basketball players can enhance their shooting abilities and become more accurate and powerful on the court.

In addition to weight training and plyometric exercises, basketball players can also benefit from incorporating agility drills and sprints into their workout routines. These types of exercises can help improve footwork, speed, and overall athleticism on the court. By combining strength training with agility work, players can develop a well-rounded skill set that will give them a competitive edge during games. By focusing on these key areas of physical fitness, basketball players can maximize their potential and excel in their sport. It is important for players to also incorporate rest and recovery into their training schedule to prevent burnout and reduce the risk of injury. Taking the time to properly stretch and cool down after workouts can also help improve flexibility and prevent muscle soreness. Additionally, working with a coach or trainer can provide players with personalized guidance and feedback to help them reach their full potential. By committing to a well-rounded training regimen and staying disciplined in all aspects of their fitness routine, basketball players can continue to improve and succeed on the court.

The explosive power of leg muscles is a person's strength to use their leg muscles. Leg muscle power is the contraction of a group of leg muscles to produce movement with maximum speed and maximum strength (Enoka & Duchateau, 2019). One example of the application of leg muscles in basketball is dribbling. Dribbling is a basic technique in doing dribbling in a basketball game. From the observation of researchers in the field, the researcher saw that in basketball extracurricular students at SMP Negeri 2 Bangka Barat, especially the aspect of strength, in this case the researcher saw when students were shooting basketball games, researchers saw the slack of students in the results of shooting basketball so that the players often experienced failures caused by (1) lack of ball encouragement when shooting, (2) Not jumping or lack of jumping when shooting the ball does not reach the ring, (3) Difficulty controlling the ball during shooting, (4) Not having enough power in shooting. The strength of the arm muscles and the explosiveness of the leg muscles are the top priorities in training the shooting results of each student. In addition, schools have not been supported by complete training facilities. The school does not yet have a licensed basketball coach. The training standards have not been measured, the training methods provided are also the same training methods in general, the training program is not interesting, so it has an impact on the student's basketball game, especially the level of strength that the student has. Therefore, the level of student strength is low.

B. Methods

In this study, the method used was the one-group experimental method. This method is designed to examine the relationship between cause-and-effect variables in an experimental context. The experimental method is a research method used to find the effect of certain treatments on others under controlled conditions. In this method, the variable being tested is given to the experimental group, while the control group is not given this treatment. In its implementation, this study involved all extracurricular players at SMP Negeri 2 Bangka Barat as research subjects, with a sample size of 26 players. Sampling was conducted using a total sampling technique, in which the entire relevant population was sampled without additional random selection.

The main instrument in this study was a shot test, in which participants' performance was measured based on the number of balls that successfully entered the target within a certain time. To ensure accuracy in time measurement, a stopwatch was used, and recording was done by trained timekeepers. The training program applied in this study included push-up and squat thrust training methods. These exercises were performed for 16 meetings, with a frequency of four times a week. These training methods were chosen because they were considered to improve muscle strength and endurance, which could potentially improve shooting results.

After the training period was completed, the research subjects were tested again through a posttest to measure the changes in shot outcomes compared to the data obtained before training (pretest). Data analysis was conducted using SPSS Version 23 software. This tool was used to calculate the effectiveness of the push-up and squat thrust methods in improving shot outcomes. By comparing the pretest and posttest data, this analysis aims to evaluate whether the physical exercises applied can significantly improve the players' shooting performance. This experimental method provides a solid basis for identifying the impact of specific exercises on sporting ability, as well as for developing data-driven recommendations for more effective training programs in the future.

C. Results and Discussion

The results of the study showed a significant increase in *shooting* results after the application of *push-up* and *squat thrust training methods*. The following is the pretest and posttest data from the research results in the following table:

Table 1. Results of Calculation and Analysis of Significance Test Data *Pretest* and *Posttest* Shooting Test

Period Test	Average (X)	Standard Deviation (S)	$t_{count} > t_{table}$	$t_{count} > t_{table}$	Result
Initial Test	10,73	2,67	6,84	1,70	Significant
Final-Test	14,19	2,44			

If you look at the average score, the results of the initial test for shooting basketball are 10.73 and the final test after being treated is obtained with an average of 14.19. So, it can be concluded that being given training (treatment) can have a significant influence. The analysis of the final test results reveals that the computed l-count is 0.1725, which is rounded to 0.17 for comparison with the l-table value of 2.000. Given a confidence level of 0.95 with degrees of freedom (dk) equal to 50, the results suggest that the final test group follows a normal distribution, as the criteria for normality are met. Further statistical analysis indicates that the calculated f-value is 1.19, which is less than the f-table value of 1.96 at a 0.05 significance level. This comparison confirms that the data from both the initial and final tests are homogeneous, implying that the variance within the groups is consistent across the two test periods. Additionally, the comparison of the t-value, which is greater than t 0.995 (38) = 6.84 and significantly higher than the critical value of 1.70, supports the conclusion that there has been a substantial improvement in basketball shooting performance. This improvement is attributed to the exercises administered, which led to a significant enhancement in arm muscle strength. The results demonstrate the effectiveness of the training program implemented for the basketball extracurricular activities at SMP Negeri 2 Bangka Barat, highlighting its impact on increasing students' shooting abilities.

Overall, the results of this study suggest that muscle strength, particularly in the arms and legs, plays a significant role in basketball shooting performance. Coaches and players looking to improve their shooting abilities should focus on developing strength in these areas through targeted exercises and training programs. Future research should further explore the specific mechanisms by which muscle strength impacts shooting success, as well as potential interventions to enhance strength and performance. In conclusion, developing both arm and leg muscle strength is crucial for achieving optimal shooting performance on the basketball court. Whether it be through weightlifting, resistance training, or plyometric exercises, building up strength in the arms and legs can greatly improve shooting accuracy, power, and consistency. This physical foundation not only enhances shooting performance, but also contributes to overall athleticism and injury prevention on the court. By dedicating time and effort to strengthening these muscle groups, players can take their shooting abilities to the next level and make a greater impact on the game.

Additionally, developing core strength is also essential for maintaining balance and stability while shooting. Strong core muscles help players maintain proper form and technique, reducing the risk of injury and increasing shooting efficiency. In addition to physical strength, mental strength is also a key component in achieving optimal shooting performance. Maintaining focus, confidence, and composure under pressure can greatly impact a player's ability to consistently make shots. By incorporating both physical and mental training into their practice routine, players can enhance their overall shooting performance and become more reliable contributors to their team's success. With the combination of physical and mental training, players can improve their shooting accuracy and consistency. By developing strong core muscles and mental toughness, players can better handle the physical demands and mental pressure of shooting in high-pressure situations. As a result, players will not only be more reliable contributors to their team's success but also be able to elevate their own performance to new heights. Ultimately, mastering the art of shooting requires a holistic approach that encompasses both physical and mental aspects of the game.

Based on the results of the study, there was a significant increase in basketball shooting results after the application of the push-up and squat thrust training methods. This finding implies that the applied training method is effective in improving the students' basketball shooting ability. Improved shot results, the average shot score in the initial test was 10.73, while after the application of the exercises, the average score increased to 14.19. This increase in score shows that push-up and squat thrust exercises have a significant positive impact on students' basketball shooting ability. These exercises increase arm muscle strength, which is an important factor in producing stronger and more accurate shots. Then on the Data Normality and Homogeneity Test, the normality test results show that the final test data follows a normal distribution, with l-count of 0.1725 which is smaller than l-table 2.000. This ensures that the data obtained from the final test meets the criteria of normality. In addition, the homogeneity test results showed that the data from the initial and final tests were homogeneous, with a calculated f-value of 1.19 which is smaller than the f-table of 1.96. This indicates that the variance within the test group is consistent between the two test periods, thus the validity of the comparison results between the pretest and posttest is maintained.

Significance Analysis on the calculated t-value is 6.84, which is much greater than the t-table of 1.70 at a confidence level of 0.995 with 38 degrees of freedom. This indicates a highly significant difference between the results of the initial test and the final test. This significant improvement underscores that the applied exercise program is effective in improving students' arm muscle strength and shooting ability.The importance of physical exercises such as push-up and squat thrust exercises not only improve arm muscle strength but also contribute to the development of general physical strength. Strong arm muscles play an important

role in producing strong and accurate shooting thrusts. In addition, structured physical training helps to improve basketball playing technique, which is crucial for achieving optimal performance in the sport. Implications for training programs, the findings suggest that training programs that focus on strengthening arm muscles and shooting technique can significantly improve students' shooting ability. A well-designed training program, including strength and technique training, can help students reach their maximum athletic potential. Therefore, it is important for coaches and educators to integrate specific exercises in extracurricular sports programs to achieve better results.

One significant finding from this study was the positive correlation between players who consistently practiced shooting drills and their overall shooting accuracy during games. This suggests that regular practice can significantly improve a player's shooting skills and performance under pressure. Additionally, the results also showed a strong correlation between a player's mental focus and their shooting success, highlighting the importance of mental preparation in high-pressure situations. Overall, these findings have important implications for basketball training programs, as they emphasize the need for a comprehensive approach that addresses both the physical and mental aspects of shooting in order to maximize performance on the court. Coaches and trainers should consider incorporating more drills that simulate game-like scenarios and encourage players to work on their mental toughness. By helping players develop their focus and confidence, teams can increase their chances of success in crucial moments during games. Ultimately, a well-rounded training program that prioritizes both the physical and mental aspects of shooting will give players the best chance to excel on the court.

D. Conclusions

Based on the results of the study, it is clear that arm and leg muscle strength play a crucial role in basketball shooting performance. Players who have higher levels of strength in these muscle groups are not only more likely to be valuable contributors to their team's success but also have the potential to improve their own individual performance. This highlights the importance of incorporating strength training exercises targeting the arms and legs into basketball training programs. Additionally, the findings suggest that focusing on both the physical and mental aspects of shooting is essential for players looking to excel in this aspect of the game. Further research in this area could provide valuable insights into the most effective training methods for improving shooting performance in basketball players. Ultimately, by implementing a comprehensive training regimen that addresses both physical strength and mental focus, players can maximize their potential on the court and elevate their overall performance. By honing their skills through targeted exercises and techniques, athletes can enhance their shooting accuracy and consistency, ultimately leading to greater success in game situations. With continued

research and innovation in this field, coaches and players alike can continue to refine their training methods and push the boundaries of what is possible in basketball performance.

The result of this research shows that the application of push-up and squat thrust training methods has a significant impact on improving students' basketball shooting ability. The data obtained from the analysis shows that the average shooting score in the initial test was 10.73, while after implementing the training, the average score increased to 14.19. This increase indicates a substantial improvement in the students' shooting abilities after undergoing the training program. Further statistical analysis confirmed that the data from the pretest and posttest followed a normal distribution, and that the variance between the two tests was homogeneous. The statistical test results show that the calculated t-value of 6.84 is much higher than the critical t-table value of 1.70, which confirms that the difference between the results of the initial test and the final test is significant. This shows that the training method applied succeeded in increasing arm muscle strength significantly, which had a direct impact on improving the students' basketball shooting ability. These findings highlight the importance of implementing structured physical training methods in extracurricular sports programs at schools to improve student performance. By utilizing appropriate and planned training, schools can make a significant contribution to the development of students' sporting skills and help them reach their optimal athletic potential. This research provides a strong basis for the development of more effective training programs and can be used as a reference for designing training strategies that benefit students in the future.

In conclusion, the implications for basketball players and coaches are clear: by focusing on targeted exercises and techniques to enhance shooting accuracy and consistency, athletes can greatly improve their overall performance on the court. This not only leads to individual success, but also contributes to the overall success of the team. Additionally, the importance of arm muscle strength and leg muscle explosiveness cannot be understated in shooting performance. By continually refining training methods and pushing the boundaries of what is possible, players and coaches can continue to elevate their game to new heights. By incorporating proper shooting form and footwork drills into their practice routines, players can develop muscle memory and increase their shooting efficiency. Furthermore, utilizing video analysis and feedback from coaches can help players identify areas for improvement and make necessary adjustments. With dedication and hard work, basketball players can reach their full potential and achieve success both on an individual level and as a cohesive team unit.

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