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The Effect of Medicine Ball and Shoulder Press Training on Increasing Badminton Smash Power in PB Joyful Medan Athletes

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Abstract
Objectives:
This study aims to determine the effect and effectiveness of Medicine Ball and Shoulder Press training on increasing badminton Smash power in PB Joyful Medan athletes
Materials and Methods:
The research method used was quantitative with a quasi experimental approach using the Two Groups Pretest Posttest Design. The population consisted of 30 athletes, and a sample of 20 athletes was selected using purposive sampling, divided into two groups: the experimental group (Medicine Ball and Shoulder Press training) and the control group, each comprising 10 athletes.
Results:
The results showed an increase in the Mean Smash power score in the experimental group from 11.00 at Pretest to 48.20 at Posttest (a 338.18% improvement). The Paired Sample t Test analysis yielded a t count of 56.08, which was higher than the t table (2.262) at a 5% significance level (df = 9), with a Sig. (2 tailed) value of 0.000 (< 0.05).
Conclusions:
Based on the research results, badminton smash accuracy among PB. Joyful Medan athletes was fairly good and was significantly influenced by relevant physical components, particularly muscle strength, explosive power, and movement coordination. Therefore, improving these components through structured and continuous training is important to enhance smash performance.
Keywords: Medicine Ball; Shoulder Press; Smash Power; Badminton.

Introduction

Sport is one of the important means of developing an individual's physical, mental, and social potential. Every athlete has basic abilities that can be improved through structured, systematic, and continuous training. In the context of badminton, smash accuracy is one of the indicators of technical skill that determines a player's success in a match. Therefore, efforts to improve smash accuracy through appropriate physical and technical training are essential. Badminton is one of the high performance sports that has gained considerable popularity and has developed rapidly in Indonesia. This sport requires athletes to master various supporting aspects, including technical accuracy, physical fitness, game tactics, and mental readiness in order to achieve optimal performance. In badminton, mastery of stroke techniques plays an important role in determining an athlete's success during a match. According to Hidayat et al. (2024:401), badminton involves various basic techniques that athletes need to master, and these techniques have a relatively high level of complexity. Among the various stroke techniques, the smash is the most dominant stroke and makes a major contribution to scoring points.

A smash is an attacking stroke performed at high speed and with maximum accuracy, with the aim of putting pressure on the opponent while ending the rally. An effective smash is characterized by shuttlecock speed, stroke precision, and accuracy in directing the shot toward the target. Athletes with good smash accuracy tend to have greater opportunities to score points than athletes whose smash accuracy is not yet optimal. Therefore, developing smash accuracy is one of the main focuses in the development of

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badminton athletes, particularly at the club level. Smash accuracy does not depend solely on mastery of basic technique but is also strongly influenced by the athlete's physical condition, particularly the strength and explosive power of the arm, shoulder, and upper body muscles. The arm and shoulder muscles play an important role in producing a strong and fast racket swing, while coordination among these muscles determines the effectiveness of the stroke. If an athlete's physical condition is inadequate, the resulting smash tends to be less optimal even when the athlete possesses good technical skills.

The development and improvement of sports achievement in Indonesia are supported by a clear legal foundation. Law Number 3 of 2005 concerning the National Sports System emphasizes the importance of programmed training to improve athletes' performance. In addition, guidelines issued by the Indonesian Badminton Association (PBSI) establish training standards that include the development of technical and physical abilities, including the strength of the arm and shoulder muscles that support the smash stroke.

To improve athletes' physical condition, a training program is required that is planned, systematic, and adapted to the characteristics of badminton. One form of training commonly applied to improve upper body strength and power is medicine ball training. This type of training is functional and involves explosive movements that resemble the movement pattern of a smash, thereby helping to improve strength, explosive power, and coordination of the arm and shoulder muscles more specifically. In addition to medicine ball training, the shoulder press is also recognized as an effective strength training exercise for developing the shoulder and upper arm muscles. The shoulder press focuses on strengthening the deltoid, triceps, and other supporting muscles that are directly involved in lifting and swinging the racket. Increased shoulder muscle strength is expected to help athletes produce stronger, more stable, and more consistent smashes, while maintaining performance throughout a match. Based on observations at PB. Joyful Medan, most athletes still experience difficulties in performing effective smash strokes. Although the basic technique has been mastered, the speed, strength, and accuracy of the stroke are not yet optimal, causing the shuttlecock to be easily returned by the opponent. This condition indicates a need to improve physical strength and technical mastery through more focused training.

The results of observations and an interview with the coach, Kevin, indicated that the main factors affecting the effectiveness of the smash are the strength of the arm and shoulder muscles and the athletes' movement coordination. According to the coach, training that focuses only on stroke technique without accompanying muscle strengthening exercises is not sufficient to significantly improve smash performance. Therefore, the coach emphasizes the importance of combining technical training with specific physical exercises, such as medicine ball and shoulder press training, to improve muscle explosive power and stability. Smash accuracy in badminton is one of the techniques that strongly determines an athlete's success in obtaining points. An effective smash requires a combination of arm and shoulder muscle strength, movement coordination, and racket swing speed. According to Tony Grice in his book Badminton: Steps to Success, successful smash execution is strongly influenced by upper body muscle strength and proper technique. Nevertheless, in practice, smash accuracy among athletes in various badminton clubs has not yet reached optimal levels.

This condition can also be observed among athletes at PB. Joyful Medan, where their smash performance remains less than optimal, both in terms of strength and stroke accuracy. This is presumably caused by a lack of training specifically targeting improvements in arm and shoulder muscle strength. In addition, the training programs provided tend to be monotonous and have not yet utilized strength based training variations such as medicine ball and shoulder press. In fact, strength training plays an important role in improving stroke performance in badminton.

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Scientifically, medicine ball training has been shown to improve arm muscle power and movement coordination. This is consistent with research conducted by Atle Saeterbakken, which states that explosive load training can significantly improve muscular explosive power. In addition, shoulder press training is also known to be effective in increasing shoulder muscle strength, which plays a direct role in overhead movements such as the smash. Research conducted by David G. Behm in the field of sports training science indicates that shoulder muscle strength training contributes to improved performance in athletic movements involving upward pushing.

Nevertheless, to date, relatively few studies have directly compared the effectiveness of medicine ball and shoulder press training in improving badminton smash accuracy. Therefore, further research is needed to examine the effects of these two types of training and determine which type of training is more effective in improving athletes' smash accuracy. This research is expected to provide a scientific contribution as well as a practical solution for coaches in developing more effective and varied training programs.

Materials and Methods

Study Design

This study is a quantitative study employing a quasi experimental method. The research design applied in this study is the Two Group Pretest Posttest Design.

Study Participants

The population for this study consisted of 30 athletes from PB Joyful Medan. Purposive sampling was employed; based on the established criteria, the final sample comprised 20 athletes.

Study Organization

The research instrument used in this study is a badminton smash accuracy test. This test aims to measure the athletes' smash accuracy levels before and after the training intervention. The test instrument was developed based on smash accuracy indicators, which include accuracy and the outcome of the smash shot.

Statistical Analysis

Data were analyzed using Paired Sample t Test via IBM SPSS Statistics

Results

Pre test data regarding badminton smash accuracy among PB Joyful Medan athletes was collected on May 8, 2026. This was followed by the administration of a training program designed by the researcher, consisting of 12 sessions with a frequency of three sessions per week. Post test data was collected on June 8, 2026. The data gathered in this study was based on a sample of 10 athletes in the experimental group and 10 athletes in the control group.

The pre test and post test data regarding badminton smash accuracy among PB Joyful Medan athletes are presented in the table below.

Table 1. Pre test and Post test Data on Badminton Smash Accuracy: Experimental Group

No	Name	*Pre Test*	*Post Test*	Difference
1	Zayden	10	48	38
2	Kevin	10	49	39
3	Marcello	8	46	38
4	Jaydan Owen	12	49	37
5	Edrick Soh	11	50	39
6	Alif	9	45	36
7	Joyvier	14	47	33
8	Brayden	10	50	40

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9	Atsuko	11	48	37
10	Juan	15	50	35

Table 2. Pretest and Posttest Data on Badminton Smash Accuracy for the Control Group

No	Name	*Pre Test*	*Post Test*	Difference
1	Calista	18	41	23
2	Ken	17	42	25
3	Garren	11	29	18
4	Cicero	11	40	29
5	Howard	17	47	30
6	Edward	14	45	31
7	Justine	10	45	35
8	Fredick	11	42	31
9	Revan	11	36	25
10	Welbert	14	45	31

Descriptive statistics for the pretest and posttest of badminton smash accuracy among PB Joyful Medan athletes covering both the experimental and control groups are presented below:

Table 3. Descriptive Statistics for Pretest and Posttest Badminton Smash Accuracy: Experimental Group

Statistics	*Pretest*	*Posttest*
N	10	10
Mean	11	48,2
Median	10,5	48,5
Mode	10	50
Stdv	2,16	1,75
Minimum	8	45
Maximum	15	50

Table 4. Descriptive Statistics for Pretest and Posttest Badminton Smash Accuracy: Control Group

Statistics	*Pretest*	*Posttest*
N	10	10
Mean	13,4	41,2
Median	12,5	42
Mode	11	45
Stdv	3,03	5,33
Minimum	10	29
Maximum	18	47

The researchers explain these data and present them using bar charts comparing the pre test and post test results regarding smash accuracy among PB Joyful Medan athletes.

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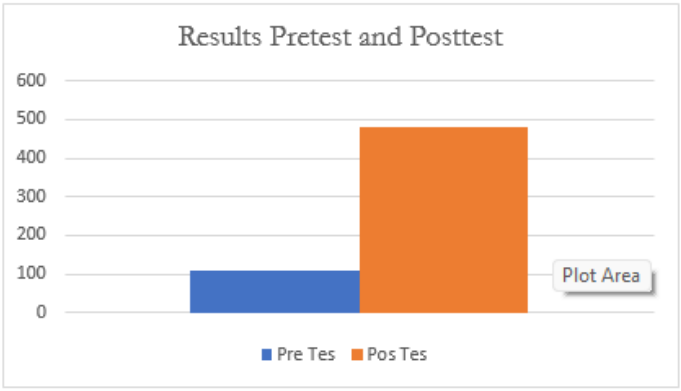

Figure 1. Bar chart of pretest and posttest badminton smash accuracy for the experimental group.

Figure 2. Bar chart of pretest and posttest badminton smash accuracy for the control group.

The diagram above illustrates the smash accuracy pre test results for athletes from PB. Joyful Medan. The experimental group achieved an average score of 11, while the control group scored 13.4. Regarding the post test for smash accuracy, the experimental group recorded a score of 48.2, whereas the control group recorded 41.2.

Discussion

Based on the results of the study conducted on 10 athletes, the mean pre test score was 11.00, while the mean post test score was 48.20. These results indicate an improvement in badminton Smash accuracy among the athletes of PB. Joyful Medan after the treatment was administered. The increase in the mean score of 37.20 points indicates that the treatment provided was able to improve Smash accuracy among the athletes of PB. Joyful Medan.

Before testing the hypothesis, the data were first tested for normality and homogeneity. The results of the normality test showed that the pre test and post test data were normally distributed because the significance values for both were greater than 0.05. Furthermore, the results of the homogeneity test showed that the data had homogeneous variances, with a significance value greater than 0.05. Therefore, the research data met the requirements for analysis using parametric statistics, namely the Paired Sample t Test.

The results of the hypothesis test using the Paired Sample t Test showed that the calculated t value was 56.08, while the t table value was 2.262 at a 5% significance level with degrees of freedom (df) = 9. In addition, the significance value (Sig. 2 tailed) was 0.000, which was less than 0.05. Since the calculated t value was greater than the t table value (56.08 > 2.262) and the significance value was less than 0.05, the alternative hypothesis (H_a) was accepted and the null hypothesis (H_0) was rejected. This indicates

that the treatment had a significant effect on improving badminton Smash accuracy among the athletes of PB. Joyful Medan.

The improvement in badminton Smash accuracy among the athletes of PB. Joyful Medan was attributed to a series of training processes carried out in a structured and repetitive manner. Through the training provided, the athletes were able to better understand the basic techniques involved, including the initial stance, hand position, ball contact, and follow through movement. Systematic repetition of the movements helped the athletes correct technical errors and improve movement coordination, resulting in better Smash accuracy. Harsono (2020:49) states that strength is the energy used to overcome resistance or the ability to generate tension against resistance. Theoretically, the findings of this study are consistent with the opinion of Arikunto (2013), who states that training conducted regularly and continuously can improve a person's abilities and skills in performing an activity.

Based on the data analysis and hypothesis testing, the higher post test score compared with the pre test score demonstrates the effectiveness of the treatment in improving badminton Smash accuracy among the athletes of PB. Joyful Medan. Therefore, the treatment applied can be considered as one alternative that may be used in the training process to improve badminton Smash accuracy among the athletes of PB. Joyful Medan.

Conclusions

Based on the results of the research and data analysis on badminton smash accuracy among athletes of PB Joyful Medan, it can be concluded that the athletes demonstrated a fairly good level of smash accuracy. Statistical analysis indicated that the physical fitness variables examined had a significant relationship or influence on smash performance, suggesting that improvements in relevant physical components, such as muscle strength, explosive power, and movement coordination, can contribute to better smash quality. Smash accuracy is an important technical component in badminton because it can be used to gain points and put pressure on opponents during matches. Therefore, the development of smash ability should be supported through structured, continuous, and appropriately designed training programs based on the principles of sports training.

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Conflict of Interest

The authors declare no conflict of interest.

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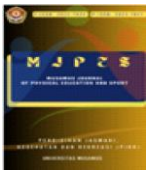

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