The Effect of Weighted Ball Shooting Training on Shooting Improvement in Female Basketball Athletes

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Abstract

This study aimed to examine the effect of weighted ball shooting training on the improvement of shooting skills in female basketball athletes. An experimental approach employing a One Group Pretest–Posttest Design was applied. The research participants consisted of 12 female basketball athletes aged 18 years from the Favorita KU Club. Total sampling was used, meaning all members of the population were included as the research sample. Shooting performance was measured using the Shooting Point Test. Data were analyzed using a Paired Sample T-Test with SPSS version 26. The findings indicated that the weighted ball shooting training model significantly enhanced the shooting skills of the basketball athletes, with an improvement of 27.95%. The results of the study indicate that the weighted ball shooting training model had a significant effect on improving basketball athletes' shooting performance. The conclusion is that weighted ball shooting training is effective in improving shooting performance in female basketball athletes. The implementation of a five-week training program with a repetition-based approach resulted in a statistically significant improvement in shooting ability.

How to Cite

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INTRODUCTION

Shooting is an attempt to score by putting the ball into the basket using one hand, in which the ball is released with a coordinated extension of the arm (elbow), trunk, and knees simultaneously (Xianbiao, 2020). Based on court location, shooting is classified into three types: shots taken beyond the three-point line (three-point shooting), shots taken inside the three-point line (medium shooting), and free throws. Therefore, every player is required to master proper shooting techniques (Yarmani et al., 2017). In basketball games, shooting ability is one of the key determinants of victory, as the final outcome of a match is decided by the total number of points scored by a team (Risjanna et al., 2021). Several common obstacles faced by athletes include inconsistency in force application during ball release, suboptimal coordination between the arms, trunk, and lower limbs, as well as insufficient body stability while performing shooting movements. Furthermore, differences in physical characteristics such as relatively lower strength of the arm and leg muscles compared to male athletes, often affect shooting distance and accuracy, particularly in medium-range and three-point shooting (Vencúrik et al., 2022). Therefore, the use of specific training media designed to support shooting performance is essential, with an emphasis on muscle strengthening, movement coordination, and repetitive practice of correct techniques, in order to optimally enhance the shooting ability of female basketball athletes.

Problems were identified among female basketball athletes of the Favorita KU-18 Club, who experienced difficulties in performing effective shooting, as many of their shots were inaccurate and often failed to reach or touch the rim. Further observations revealed that one of the main factors contributing to poor shooting performance was the athletes' difficulty in generating sufficient force during the shooting motion. (Maulana & Barikah, 2023) reported that although basketball players are trained to shoot from various distances such as from outside the perimeter area or from the free-throw position some players still do not achieve optimal shooting performance. This is concerning, as effective shooting ability is a crucial element in basketball, given its significant contribution to scoring points for the team (Wulandari, 2020; Mashuri, 2017). When executing a shot, accuracy and precision are essential to prevent the ball from being intercepted by opponents, which requires good physical condition, particularly

adequate arm muscle strength (Rustanto, 2017). Several training media or tools commonly used to enhance arm muscle strength in support of shooting performance include resistance bands, medicine balls, dumbbells, and weighted balls. These training tools function by providing additional resistance, thereby stimulating the arm, shoulder, and wrist muscles to work more forcefully and in a coordinated manner. Both medicine balls and weighted balls similarly provide external resistance to improve muscle strength and power; however, they differ in training focus and application. Medicine balls are frequently used in dynamic plyometric and functional training exercises (Trajković et al., 2017), whereas weighted balls are designed to apply specific resistance to movement patterns that closely resemble actual game situations, making them particularly effective for optimizing sport performance, especially in enhancing shooting ability (Houcine et al., 2021). The appropriate training media to improve shooting performance is using a Weighted Ball.

Weighted ball are selected as a training medium due to their effectiveness in enhancing arm muscle strength and refining shooting technique through the application of additional load that optimally stimulates muscular activation. Furthermore, training with weighted balls contributes to improved movement speed and control during shooting, leading to greater accuracy and consistency in shot execution (Cabarkapa et al., 2023). Weighted Ball Shooting training is a basketball training method that utilizes balls with a weight greater than that of a standard basketball. The primary objective of this training is to enhance arm muscle strength, ball control, and shooting accuracy. Weighted Ball Shooting involves the use of basketballs that are heavier than the standard ball, typically weighing around 3 pounds (1.36 kg), compared to the standard basketball weight of approximately 22 ounces (0.62 kg) (Scadlock, 2018). The researchers used a 1.5 kg weighted ball as the closest alternative to the previously recommended load. This selection was based on considerations of equipment availability. Therefore, the use of a 1.5 kg weighted ball is still considered relevant in supporting the effectiveness of Weighted Ball Shooting training (Houcine et al., 2017). Training with weighted balls offers specific advantages in improving athletes' physical abilities, particularly in shooting performance. The additional load provided by the weighted ball effectively develops arm muscle strength, resulting in more powerful shots. This is supported by (Arias, 2012) who

reported that weighted ball training is effective in enhancing physical performance and shooting accuracy. The training method applied in this study was the repetition method, in which exercises are performed repeatedly to provide optimal training stimuli for athletes (Mayangsuri et al., 2023). Weighted Ball Shooting training shows a strong correlation with improvements in arm muscle strength, which plays a crucial role in both shooting technique and outcomes. This relationship occurs because the added resistance forces the muscles to work harder than when using a standard basketball (Basketballhq, 2024).

Based on research conducted by (Rahman et al., 2021) reported that medicine ball throw exercises had a more significant effect on three-point shooting accuracy in basketball. Furthermore, (Kresnapati, 2020) found that paired underhand passing training with variations in ball weight produced better results than training that involved changes in net height. In addition, (Kriswantoro & Febriyanti, 2020) revealed that the use of heavier balls was more effective than lighter balls in improving gatting accuracy in the sport of woodball. In contrast to previous studies that generally used general weight training such as medicine balls, this study specifically examines the application of weighted balls directly to shooting techniques, so its novelty lies in a more specific training approach to improving the shooting performance of female basketball athletes.

METHOD

The method used in this study was an experimental method with a One Group Pretest-Posttest Design (Fraenkel et al., 2022). The sample of this study was 12 female basketball athletes from the Favorita KU-18 Club. The sampling technique used was total sampling because the population was relatively small. In this study, total sampling was used.

The instrument used to measure the improvement of athletes' shooting abilities is the Shooting Point Test, which is administered before (pre-test) and after (post-test) the weighted ball training program is administered This tool was chosen because it is valid and reliable for measuring improvements in basketball athletes' shooting abilities (Lubis, 2013). The training program was conducted over a period of five weeks with a frequency of three sessions per week, resulting in a total of 15 training sessions. Upon completion of the program, data were collected, processed, and analyzed using SPSS version 26.

Table 1. Weighted Ball Shooting Training Program

Item	Kg	Reps week 1 & 2	Reps week 3 & 4	Reps week 5	Set	Rest
Spot Shooting (5 Spot) heavy ball	1,5	5	10	15	3	90 s
Spot Shooting (5 Spot) reguler ball	0,567	5	5	5	3	60 s
Free Throw with heavy ball	1,5	5	8	10	3	90 s
Free Throw with reguler ball	0,567	10	12	15	3	60 s
Catch & Shoot with heavy ball	1,5	5	8	10	3	90 s
Catch & Shoot with reguler ball	0,567	10	12	15	3	60 s

RESULTS AND DISCUSSION

This study measured improvements in basketball athletes' shooting ability using the Shooting Point Test. The results of the calculations based on the collected data are presented in the following **Graphs 1** and **Table 2 Table 3 Table 4**.
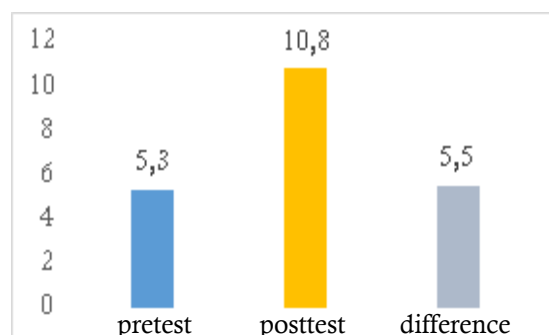
Graphs 1. Pretest and Posttest

Based on **Graphs 1**, it can be explained that the pretest score was 5.3 and the posttest score was 10.8, with a difference of 5.5. Therefore, it can be concluded that the application of the weighted ball shooting training model resulted in an improvement of 5.5 points.

Furthermore, a table presenting the descriptive statistical data of the pretest and posttest is provided.

Table 2. Statistical data description

Data	Min	Max	Mean	SD
Pretest	3	9	5,3	1.61
Posttest	8	13	10,8	1.40

Based on **Table 2**, the summary of the pretest and posttest data for two-point shooting among basketball athletes shows that the pretest results had a mean score of 5.3 with a standard deviation of 1.61, while the posttest results indicated a mean score of 10.8 with a standard deviation of 1.40

After calculating the mean values and standard deviations, the next step was to conduct a

normality test using the Shapiro–Wilk approach.

Table 3. Normality Test

Data	Statistic	N	Sig.	Result
Pretest	0,929	12	0,373	Normal
Posttest	0,944	12	0,547	Normal

Based on **Table 3**, the results of the normality test using the Shapiro–Wilk test indicate that the pretest and posttest data for two-point shooting, measured using the shooting test, showed significance values greater than 0.05 (sig > 0.05). Therefore, it can be concluded that the pretest and posttest shooting test data in this study were normally distributed and suitable for analysis using parametric statistical tests.

After the data were confirmed to be normally distributed, hypothesis testing was conducted using the Paired Sample T-Test.

Table 4. Paired Sample T-Test

Data	Variable	Dev	t-count	Sig.	Result
Pretest	Shooting point test	5,5	9,222	0,000	Significance
Posttest					

Based on **Table 4**, the results of the Paired Sample T-Test revealed a mean difference of 5.5 between the pretest and posttest scores, with a significance value of 0.000 < 0.05. Therefore, it can be concluded that weighted ball shooting training had a significant effect on improving basketball athletes' shooting performance. Accordingly, the accepted hypothesis was the alternative hypothesis (H_1), indicating that the weighted ball shooting training model had a significant effect on the improvement of basketball athletes' shooting ability.

The improvement in shooting performance is consistent with the fundamental principles of resistance training, particularly exercises that target arm muscle strength. Weighted ball shooting utilizes a ball that is heavier than the standard basketball, thereby providing additional resistance to the arm, shoulder, and wrist muscles. (Scadlock, 2018) explained that the use of weighted balls increases muscle activation more intensively; therefore, when athletes return to using a standard basketball, the shooting motion becomes lighter, more stable, and more efficient. In addition, the training method applied in this study was based on the repetition method, which, according tot (Mayangsuri et al., 2023) is an effective approach for developing automatic movement patterns through motor learning. Repetitive movements performed with heavier loads help strengthen muscle memory, improve shooting mechanics, and enhance wrist stability as well as arm propulsion strength. This is in line with the opinion of (Hermansyah, 2014) who stated that arm muscle strength plays a crucial role in generating ball propulsion from the elbow position through the follow-through phase.

Improvements in muscle strength enhance the propulsive force during shooting, allowing the ball to reach the rim with an accurate trajector. (Hasyim & Haris, 2021) emphasized that arm muscle strength is one of the primary determinants of shooting accuracy, as it influences movement stability at the moment the ball is released. Therefore, the improvement in shooting ability observed in this study can be explained by the mechanism of increased muscle strength and movement stability resulting from weighted training. In line with this (Rahman et al., 2021) found that resistance-based exercises, such as medicine ball throws, significantly improved three-point shooting accuracy. (Kresnapati, 2020) also demonstrated that the use of heavier balls in passing training produced better results compared to training without load variation, indicating that adding weight to the ball has a positive impact on technical performance. The findings of the present study also support the research of (Houcine et al., 2021), who reported that weighted ball training improved movement speed and efficiency in wheelchair basketball players. Although the contexts differ, the mechanism of performance enhancement through additional resistance shows consistency across studies. Other studies have suggested comparing the effectiveness of different weighted-ball loads and evaluating their long-term effects on shooting accuracy and the risk of technical changes in female basketball athletes (Arias, 2012).

CONCLUSION

Based on the findings of this study, it can be concluded that weighted ball shooting training is effective in improving shooting performance in female basketball athletes. The implementation of a five-week training program with a repetition-based approach resulted in a statistically significant improvement in shooting ability, as indicated by the increase in mean shooting scores from 5.3 in the pretest to 10.8 in the posttest. This improvement, equivalent to a gain of 5.5 points or 27.95%, reflects the positive impact of applying additional resistance directly within shooting techniques.

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