



**The Effect of Medicine Ball Training on Hip Rotational Power to Improve Batting Performance in Baseball Athletes**

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**Article History**

Received May 2025

Accepted June 2025

Published Vol.14 No.(2) 2025

**Keywords:**

Medicine Ball; Batting; Baseball

**Abstract**

This study aims to determine the effect of medicine ball training on batting performance in Baseball Labs athletes by emphasizing the role of hip rotational strength. Medicine ball training is a form of strength training that involves rotational and explosive movements, in accordance with the characteristics of the batting motion in baseball. This study uses an experimental method with a one group pretest-posttest design. The research sample consisted of 20 baseball athletes using purposive sampling technique. The instrument in this study used "The O'Donnel Test" with the Funggo Batting Test test item. The sample followed the training program for 16 meetings. Data analysis using the Wilcoxon Signed Rank Test. The results of the analysis showed that there was a significant difference between the pretest and post-test results ( $p < 0.05$ ), which means that medicine ball training has a positive effect on improving batting results. Thus, this exercise can be used as an effective alternative in the functional strength development program for baseball athletes.

**How to Cite**

Anwar, F. P., Sunaryadi, Y., Nurjaya, D. R., & Mulyana. (2025). The Effect of Medicine Ball Training on Hip Rotational Power to Improve Batting Performance in Baseball Athletes. *Journal of Physical Education, Sport, Health and Recreation*, 14 (2), 493-497.

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## INTRODUCTION

The sport of baseball is considered "America's favorite pastime" with the first structured game taking place in 1845 under the direction of Alexander Cartwright. (Ason et al., 2019) Baseball games are played by 2 teams of 9 players for 9 innings and when both teams are able to draw, it will continue with the next inning until there is a winning team. (Peterson F & Jamail, 2024). Batting is the most iconic part of the baseball game where when the batting stroke is good, the more we get points. (Liu et al., 2020) When batting is done correctly, the energy that is transferred sequentially from the hip movement and the explosive power of the hand muscles, will produce maximum hitting power. (Kee, 2018). In order to transfer the power generated from the lower body to the upper body when hitting, baseball players need adequate hip and body rotation strength. (Szymanski et al., 2007) Therefore, batting speed and power are the most important components in successful batting in baseball. (Kee, 2018)

In the previous research entitled "The Effects of Medicine Ball Training on Bat Swing Velocity in Prepubescent Softball Players" (Rebold et al., 2018) which was written by Mallori S, Dkk Shows that medicine ball training can improve the results of batting shots (Rebold et al., 2018). Although medicine ball training in children initially had less impact than baseball training. However, this exercise was later recommended by experts because it is safer and has less risk of injury. (Washington et al., 2002) In addition, Ikeda and colleagues recommended medicine ball training as an appropriate training mode to enhance strength development because there is no deceleration phase at the end of concentric movements in many medicine ball exercises, which is similar to many sports movements such as hitting. In addition, medicine ball exercises also allow baseball players to mimic the powerful, sequential, and rotational movements observed when hitting a baseball, therefore, allowing the batter to swing the bat with greater force. (Rebold et al., 2018) However, in Indonesia not many researchers have examined hip strength with medicine balls to produce long shots, especially at little league age.

LABS is a baseball and softball sports club based in Bandung. As a sports club, of course, it must require athletes to have qualified abilities in both defense and offence (batting). But as long as I train, the problems that occur in these labs athletes they do not have the strength and speed in batting which results in shots that are not far

away. Therefore, medicine ball training is needed by focusing on the hip area. as stated by (Ae et al., 2017) that many of the researchers put hip rotation as a major part of hitting the ball.

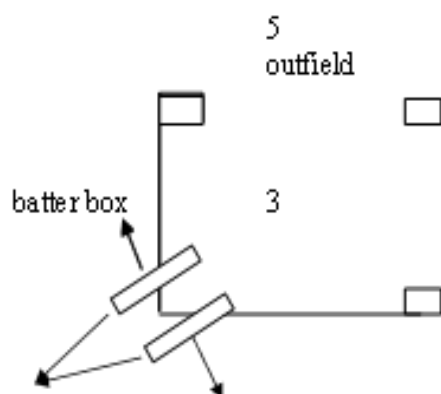
## METHODS

This research uses experimental methods with a quantitative approach. Experimental research is research that involves intervention by researchers beyond what is expected for measurement. (Cooper & Schindler, 2008) The quantitative approach is the science and art related to the procedures (methods) of data collection, data analysis, and interpretation of the results of the analysis to be able to obtain information for drawing conclusions and making decisions. (Solimun et al., 2018) and using the research design "one group Pretest posttest design". namely a research design in which there is a pretest before treatment and a posttest after treatment, thus it can be known more accurately, because it can compare with the one held before treatment Sugiyono in (Rustandi & Safitri, 2019)

Twenty baseball players aged between 12-16 years old with male and female gender at least 1 year of baseball playing experience were included to participate in this study. All participants were recruited only from the Labs Baseball Bandung team. Participants were excluded if they had not reached 1 year of baseball practice, had a history of injury. Prior to participation, participants were instructed on the benefits and risks of the study and signed informed consent. This study was approved by the club and the faculty of Sport and Health Education.

In the initial test, participants gather and line up and lead prayer by one person. After that the examiner checks attendance, conveys the purpose of the test, explains the implementation of the O'Donnel Test Fungo Batting. The participants must warm up and warm up swinging the bat 10 times. The bat size is adjusted based on the age of the participants. Ages 12-13 years use a bat with a length of 31-32 Inc and a weight of -8/-5 while participants aged 14-16 use a bat with a length of 32-33 Inc and a weight of -3. The test participants stood in the "better's box" while holding the bat and ball. Then he bounced the ball and immediately he hit the ball as far as possible. How to score the ball that falls in the out field area gets a score of 5, in field gets a score of 3, foul balls get a score of 1. Each is given the opportunity 10 times to hit. The sum of the scores of the ten strokes, is the score of this test. With validity for the accuracy of the stroke (fungo bat-

ting) is 0.78 and reliability is 0.83. (Luthfi, 2018).



**Figure 1.** The O'Donnel Test

After the pre-test was completed, participants were given treatment to complete 8 weeks of medicine ball training consisting of 4 medicine ball exercises aimed at developing rotational speed. Side medicine ball throws for distance, speed, and accuracy, Russian twists, woodchoppers, and standing side band rotations. All exercises were performed on the dominant and non-dominant side. Previous research incorporating these medicine ball exercises was deemed appropriate for improving rotational speed. Participants aged between 12-13 years old used a 3 kg medicine ball, while participants aged between 14-15 years old used a 5 kg medicine ball. The participants completed two sets of 12 repetitions of all medicine ball exercises, with 30 seconds rest between each exercise, 2 days per week, for 8 weeks. According to the American College of Sports Medicine (ACSM), children and adolescents should perform 8-15 repetitions of an exercise to the point of moderate fatigue with good mechanical form at least two days per week. (Tancred, 2014). The National Strength and Conditioning Association (NSCA) also suggests rest time between sets for children and adolescents is 30 seconds (Washington et al., 2002). All sessions were supervised by the principal investigator and research personnel. During all sessions, the principal investigator discussed and demonstrated the correct medicine ball training procedures, and the participants had the opportunity to ask questions. In addition, all participants in the MB group attended an introductory training session before starting the 8-week medicine ball training as none of the participants had any previous medicine ball training experience. During this session, the participants were taught the proper technique for each medicine ball exercise and any questions they had were answered. (Rebold et al., 2018)

This research procedure tests medicine ball training on the results of baseball labs athletes batting. The data collected is then analyzed using non-parametric test techniques to determine the effect between the independent variable and the dependent variable.

## RESULTS AND DISCUSSION

Based on the result, it can be seen that the initial test obtained a minimum value of 16, a maximum value of 40, a total value of 146, a mean value of 26.20 and a std. deviation value of 8.256. While in the final test obtained, the lowest score was 28, the highest score was 50, and the total score was 830, the average value was 41.50, the standard deviation was 5.385. These results indicate a clear increase in average batting scores after the intervention, suggesting that the medicine ball training had a positive effect on the athletes' performance. Furthermore, the authors conducted a normality test.

The results of the data normality test using the Shapiro-Wilk Test. Based on the result, it can be seen that the initial test obtained a statistical value of 0.887 df 20, and Sig. of 0.024. While the final test obtained a statistical value of 0.919, df 20, and Sig. of 0.095. Based on the test results, both data obtained a Sig value.  $> 0.05$  so that both data are declared "Normally Distributed".

Therefore, the author uses a non-parametric approach in hypothesizing. The results of hypothesis testing using non-parametric tests can be seen in the significance value of 0.00 means  $p < 0.001$ , which is well below the general significance limit of 0.05. Thus, the null hypothesis is rejected.

Rejection of the null hypothesis indicates a statistically significant difference between the values before and after the aqua treatment. This indicates that the treatment had a real impact on the measured variable. The Wilcoxon test used is particularly appropriate given that the data are paired and may not meet the assumption of normal distribution.

The results of the analysis show a significant difference in batting scores between the pretest and posttest ( $p < 0.001$ ), with the average score increasing from 26.20 to 41.50 after the intervention. This statistically significant improvement indicates that the medicine ball training program had a strong positive effect on the athletes' batting performance. The term significant in this context refers not only to statistical relevance but also to practical enhancement in the

athletes' ability to generate more powerful and effective hits.

This improvement is closely linked to increased hip rotational strength, which was the primary target of the medicine ball exercises. Training drills such as side throws, Russian twists, and woodchoppers directly engaged the rotational muscles of the hips and core, which are biomechanically essential for transferring force from the lower to upper body during the batting motion. The enhanced ability to rotate the hips explosively likely allowed participants to initiate bat swings with greater momentum, resulting in higher impact force and improved scoring.

In essence, the significant increase in post-test scores demonstrates that strengthening the hip region plays a crucial role in improving batting mechanics. Thus, the medicine ball training program focusing on the hip area not only improved the athletes' physical capacity but also enhanced the kinetic chain efficiency involved in batting.

Medicine ball is a commonly used training tool to improve core strength, body rotation, and muscle explosiveness. (Oliva-Lozano & Muyor, 2020; Willardson, 2007). Therefore, medicine ball training can be done with movements such as side medicine ball shows for distance speed and accuracy, russian twists, woodchoppers, and standing side band rotations, thus involving movement patterns that resemble the movement of hitting a ball. Thus, the athlete's body becomes more trained in generating rotational force and providing efficient energy from the lower body to the upper body when hitting the ball. (Setiawan & Andrijanto, 2019; Tuti Lestari, 2012).

The improvement in batting performance after medicine ball training suggests that this method is effective in improving the biomechanical and neuromuscular aspects underlying batting technique. It also improves upper and lower body coordination skills which are crucial in producing powerful and accurate strokes..(Siegel, 2008)

Statistically, the Wilcoxon Signed Rank Test produced a significance value of 0.00 ( $p < 0.05$ ), indicating a real and meaningful effect of medicine ball training on batting performance. This improvement is strongly associated with the enhancement of hip rotational strength, as the exercises specifically targeted the muscles responsible for explosive rotation of the pelvis. Therefore, this training method is highly relevant for inclusion in a baseball athlete's physical development program, particularly to improve hip-driven hitting mechanics that contribute to greater bat speed and power.

Although the results show a significant effect, this study has some limitations. One is that due to the wide age range, significant results may be difficult to detect. Statistical analysis was conducted by looking at separate age groups (12-13 and 14-16 years old, however, this greatly reduced the sample size of each age group making the detection of significant results more difficult. Perhaps it would have been more appropriate if the weight of the medicine ball used matched their body weight. Previous studies have incorporated more than 4 medicine ball drills in addition to other drills or bat swings. It is possible that only doing 4 medicine ball exercises is not a big enough stimulus to increase the rotational strength of the participants. As well as the absence of a control group for comparison, even so, these findings remain relevant to serve as a basis for the development of future physical exercise programs. (Rebold et al., 2018)

Future research should therefore focus on a more specific age range when examining the effects of training programs on children, create a gradual periodization medicine ball training program, and compare medicine ball training with other sport-specific resistance training programs to see which is most beneficial for improving batter speed. However, it should be noted that medicine ball training did not cause the participants' batting swing speed to deteriorate. Medicine ball training in pre-adolescent children may offer additional benefits beyond improving batting swing speed, which should be explored.

## CONCLUSION

Based on the results of the research conducted, it can be concluded that training using medicine balls has a significant effect on improving the batting performance of baseball athletes. The improvement is primarily attributed to the development of hip rotational strength, which plays a central role in generating power during the batting motion. Medicine ball exercises specifically target the muscles responsible for pelvic rotation, enabling more efficient energy transfer from the lower to the upper body. Therefore, this method can be effectively applied in athlete training programs to enhance hip-driven batting mechanics and overall hitting performance.

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