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The Effect of Power Medicine Ball Training on Long Throw-In Ability in Football Athletes

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Abstract

This study aims to determine the effect of power training using a medicine ball on improving long throw-in ability in football athletes. The research method used was an experiment with a one-group pretest–posttest design, involving 12 active male football athletes in the UPI Football Student Activity Unit aged 18–20 years who play the positions of fullback and winger. The training program was carried out for 16 sessions using the set system method, including the Overhead Medicine Ball Throw, Chest Pass to Wall, Rotational Throw, and Medicine Ball Slams movements with a load of 4–5 kg and explosive intensity. The instrument used was the Throw-in Distance Measurement Test to measure the throwing distance. The Pretest score had an average (mean) of 17.11 with a standard deviation of 2.85, while the Post-test score had an average of 19.01 with a standard deviation of 3.10. The results showed a significant increase in long throw-in ability after being given training using a medicine ball. This increase occurred because the training was able to develop functional arm, shoulder, and core muscle strength through explosive movements that resemble real throwing techniques. It can be concluded that power training using a medicine ball is an effective and applicable method to improve long throw-in ability in football athletes.

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INTRODUCTION

Football is the world's most popular sport, demanding a combination of technical, tactical, physical, and mental abilities. Each skill plays a crucial role in the effectiveness of the game, including throw-ins, which are often crucial in creating goal-scoring opportunities (Parlindungan & Giartama, 2022). As tactics have evolved, the long throw-in is now considered an offensive strategy on par with the corner kick (Gibson et al., 2020).

Long throw-in ability depends on the strength and explosive power of the arm, shoulder and core muscles to produce maximum body rotation (Sirotic et al., 2019). Accurate long throws provide an advantage in controlling the ball and creating opportunities (Woods et al., 2021). However, at the amateur club level in Indonesia, many players do not yet have optimal throwing power due to a lack of specific training (Hidayat, 2016).

Physical fitness is a fundamental aspect of an athlete's performance. According to (Nurcahya et al., 2019). Optimal performance in football relies not only on technique but also on a good level of physical fitness to support endurance, coordination, and concentration during the game. Limited physical condition can hinder an athlete's abilities, including explosive movements such as long throw-ins. Therefore, improving fitness through functional strength training is a key requirement in developing football athletes.

In addition to physical fitness, sports development must also include character building and noble values (Mulyana et al., 2024). He explained that sport serves as a medium for internalizing the values of discipline, responsibility, and self-control. Coaches and athletes need to view training not only as a means of physical improvement, but also as a means of building integrity and sportsmanship.

One effective method to increase explosive power of arm muscles and core strength is medicine ball training, which is included in the power training category with explosive movements such as throwing and rotating the body (Ratamess et al., 2018). This exercise works on the anaerobic alactic acid energy system which plays a vital role in producing high strength in a short period of time (McGill, 2019). In addition, this exercise also improves coordination, core stability, and upper body movement control (Tharp et al., 2020).

Previous research has shown the effectiveness of medicine ball exercises in increasing arm muscle strength (Harista & Trisnowiyanto, 2016). found that this exercise was more effective than clapping push-ups for increasing arm muscle explosive power (Gallo & Bradley, 2018). also stated that medicine ball overhead throw training can strengthen the shoulders and core muscles. However, specific studies on the effect of medicine ball training on long throw-in ability in football are still limited in Indonesia.

Most football research focuses on techniques such as passing, shooting, and dribbling, while throw-in ability has not received much study (Nugraha & Hadinata, 2019; Pra Rudiana & Prasetiyo, 2020). While a powerful and accurate throw-in can be a tactical weapon for fullbacks and wingers (Stone et al., 2021), a lack of attention to this aspect could potentially hinder the development of players' basic technical skills in dead-ball situations.

Foreign research shows that long throw-ins are greatly influenced by the body's biomechanical coordination (Sirotic et al., 2019) emphasized that throwing effectiveness is determined not only by arm muscle strength, but also by the synergy between trunk rotation, pelvic stability, and leg movement. However, these studies were mostly conducted on European professional players who have different training facilities and intensity than Indonesian players.

This gap forms the crucial basis for this research. There are few experimental studies in Indonesia examining the effect of medicine ball power training on long throw-in ability. Most coaches still rely on conventional methods like push-ups and weight training without a specific approach to trunk rotational strength. Therefore, this study proposes a simple, efficient, and applicable training model using a medicine ball as the primary tool for strengthening upper body muscles.

The novelty of this research lies in the systematic application of power medicine ball training to improve long throw-in ability in Indonesian football athletes. Using a one-group pretest-posttest experimental design, this study objectively analyzed changes in performance before and after training. This approach is expected to contribute to the development of effective and contextual sports science-based training models.

METHODS

This study uses an experimental method with a one-group pretest–posttest design (Sugiyono, 2016). This design involves one group receiving power medicine ball training with long throw-in ability measured. This approach is sui-

table for use in sports research assessing the effectiveness of training on improving performance.

The training model applied uses the set system method, namely regulating the number of sets and repetitions in training to maximize muscle strength and explosive power (Bompa & Haff, 2019; Zatsiorsky et al., 2020). The training program was conducted over 16 sessions, consisting of Overhead Medicine Ball Throw, Chest Pass to Wall, Rotational Throw, and Medicine Ball Slams, with 100% explosive intensity, 4–5 kg weight, 3 sets × 6 repetitions, and a 60-second rest break between sets (Ratamess et al., 2018).

The research subjects were 12 active male football athletes in the UPI Football UKM aged 18-20 years who played the positions of fullback and winger, because these two positions most often do long throw-ins (Stone et al., 2021). The instrument used is the Throw-in Distance Measurement Test, which measures the throw-in distance using a tape measure in centimeters (Alexander & Theodorakis, 2012). The test was conducted three times, and the best result was used as the primary data.

The pretest and posttest data were analyzed using SPSS version 25 (Fadluloh et al., 2024). Analyzed using the Paired Sample T-Test to determine the significance of the increase in throwing distance (Santoso, 2020). The significance level is set at $\alpha = 0.05$.

RESULTS AND DISCUSSION

Table 1. Descriptive Test

	N	Min	Max	Mean	Standard Deviation
Pretest	12	11.57	21.70	17.1133	2.85381
Post Test	12	12.96	23.87	19.0125	3.10221
Valid N (listwise)	12				

Table 1 shows the descriptive statistics of the Pretest and Posttest scores of 12 respondents. The Pretest score had an average (mean) of 17.11 with a standard deviation of 2.85, while the Posttest score had an average of 19.01 with a standard deviation of 3.10. It can be seen that the average Posttest score was higher than the Pretest, indicating an increase in results after the treatment was given.

The results of the normality test using the Shapiro-Wilk method show significance values for the PreTest (Sig. = 0.200 and 0.828) and PostTest (Sig. = 0.200 and 0.725), all of which are greater than 0.05. This means that the data is normally distributed, so parametric tests such as the Paired Sample T-Test can be used.

The results of the homogeneity of variance test using Levene's test. The significance values (Sig.) for all calculation methods, whether based on the mean, median, median with adjusted df, or trimmed mean, were all above 0.05 (between 0.751 and 0.779). This indicates that the data have homogeneous or equal variance between groups. Thus, the assumption of homogeneity of variance is met, allowing parametric statistical analysis to proceed.

The test results show an average difference between the PreTest and PostTest of -1.899 with a significance value (Sig. 2-tailed = 0.000) < 0.05. Thus, there is a significant difference between the PreTest and PostTest values, which means that the treatment or training given has a real effect on improving test results.

The results of this study demonstrate a significant effect of power training using a medicine ball on improving long throw-in ability in football athletes. This finding aligns with the initial hypothesis that implementing explosive-based training using a medicine ball power exercise can increase the explosive power of the arm, shoulder, and core muscles, which directly contribute to the power of the throw-in. This improvement occurs because the movements in medicine ball training have muscle contraction patterns that resemble actual throwing movements in football, so the resulting neuromuscular adaptations are specific to the skill being trained.

The effectiveness of this exercise can be explained by the principles of exercise physiology, where explosive movements performed with light to moderate loads (4–5 kg) stimulate the anaerobic alactic acid energy system. This system plays a role in generating high power in a short period of time, which is essential for long throws (McGill, 2019). In addition, training with a medicine ball also improves coordination between the core, shoulder, and arm muscles, resulting in efficient energy transfer from the lower to upper body.(Ratamess et al., 2018)This muscle synergy allows the athlete to generate optimal body rotational momentum, which ultimately increases the distance of the ball thrown.

This finding is also consistent with research (Harista & Trisnowiyanto, 2016) which showed that medicine ball exercises were more effective than clapping push-ups in increasing arm muscle explosive power in adolescent badminton athletes. Similarly, (Gallo & Bradley, 2018) reported that medicine ball overhead throw training

can improve shoulder strength and core stability in basketball athletes. This suggests that power-based training with medicine balls is cross-sport and can improve motor performance requiring upper-body explosive strength.

Beyond physiological aspects, improving long throw-in ability is also influenced by neuromotor adaptations. Repeated training with explosive movement patterns triggers increased motor unit activation, synchronized muscle contractions, and accelerated type II muscle fiber recruitment (Schoenfeld et al., 2017). This adaptation makes the arm and shoulder muscles more efficient at generating force during a throw. In the context of football, this ability is crucial because a long throw-in is not just a long throw, but also part of an offensive strategy that requires optimal precision and power (Sirotic et al., 2019).

The results of this study also strengthen the concept of functional training in modern football. According to (Zatsiorsky et al., 2020). The set system method used in this training allows researchers to adjust the volume and intensity of training to produce progressive strength adaptations. When applied in a structured manner, this method can increase power without causing excessive fatigue. This is reflected in the study, where athletes experienced improved performance after completing a series of 16 training sessions without any indication of decreased fitness or chronic fatigue.

Apart from strengthening the physical aspects, this research is also in line with the view (Mulyana et al., 2024). Sports training can be a vehicle for developing the values of discipline, responsibility, and self-control. Improved athlete performance occurs not only due to physiological adaptations but also due to changes in attitude and motivation through consistent implementation of a training program. In this context, medicine ball training is not simply an effort to increase strength, but also part of the character-building process through disciplined training and hard work.

From a physical fitness perspective, these results support the opinion (Nurcahya et al., 2019). Optimal performance in football is highly dependent on good physical condition. Medicine ball training helps improve general fitness, including muscular endurance and coordination, which directly contribute to technical skills such as the long throw-in. Therefore, the improved test results in this study can be viewed as a logical consequence of the simultaneous improvement in physical capacity and specific skills.

However, this study has several limitations. First, the relatively small sample size (12 athletes) limits the generalizability of the results to similar populations. Second, the study used only one group without a control group, so the influence of external variables such as motivation or individual physical condition cannot be completely eliminated. Third, the training duration of 16 sessions may not be sufficient to observe long-term adaptations to muscle performance and throwing biomechanics. Further research with an experimental design involving a control group and a longer training duration is recommended to obtain more comprehensive results.

Overall, the results of this study indicate that power training using a medicine ball is effective in improving the long throw-in ability of football athletes. This positive effect is due to a combination of neuromuscular adaptations, increased core and shoulder strength, and improved upper body coordination. Therefore, this training program can serve as a reference for coaches in designing efficient, applicable training models that are tailored to the characteristics of football players in Indonesia.

CONCLUSION

Power training using a medicine ball has been shown to effectively improve long throw-in ability in football athletes. This improvement occurs because the training stimulates functional strength in the arm, shoulder, and core muscles through explosive movements that mimic a real throw. Therefore, medicine ball training can be recommended as an effective method for improving throwing performance in football players.

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