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The Effect of Deadlift Training on The Improvement of Defensive Position Performance in Central Java Kabaddi Athletes

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Abstract

Kabaddi demands high levels of physical ability, particularly muscular strength, core stability, and endurance, yet the training program remains focused on technical and tactical aspects. The purpose of this study was to look at how deadlift training improved the defensive position performance of Central Java Kabaddi competitors. The study employed a quantitative approach, using a quasi-experimental design with a one-group pretest-posttest design. The study included 30 male Central Java Kabaddi Athletes who played as defenders and were chosen using purposive sampling. The intervention, which took the shape of a deadlift training program, lasted eight weeks and consisted of two sessions per week with an intensity of 70-85% of one repetition maximum (1RM). Defensive position performance was assessed using the Defensive Hold Time (DHT) indicator. Normality tests, paired sample t-tests, and effect size analysis (Cohen's d) were used to analyse the data. The findings revealed that the average DHT score increased from 3.47 seconds in the pretest to 4.30 seconds in the posttest. The paired sample t-test indicated a significant difference ($p < 0.05$) between pretest and posttest scores. Additionally, with an effect size of 2.35, deadlift training was shown to have a significant impact on improving performance in Kabaddi athletes. Consequently, we can conclude that deadlift exercises are beneficial for enhancing the defensive skills of Kabaddi athletes.

How to Cite

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INTRODUCTION

Elite sport aims to improve human quality and requires structured efforts to achieve excellence in any sport. Improving an athlete's training performance is linked to the implementation of a structured, systematic, and science-based training program (Hasan et al., 2025). An organized training program guides athletes to adapt physiologically and biomechanically to the demands of competition, which increases movement efficiency and reduces performance decline and the risk of injury (Hewett & Bates, 2017; Utama et al., 2025). Therefore, when developing athletes for a specific sport, it is crucial to select training methods appropriate to the physical and technical characteristics of that sport.

Kabaddi is a high-intensity, physical contact team sport that relies on speed, agility, and good physical condition (González-Devesa et al., 2026; Santika & Subekti, 2020). Within a limited space and within a short period of time, participants must demonstrate strength, balance, and coordination. In kabaddi, athletes experience significant physical stress on the musculoskeletal system, particularly during defensive situations where players must intercept, block, and impede the opponent's movements.

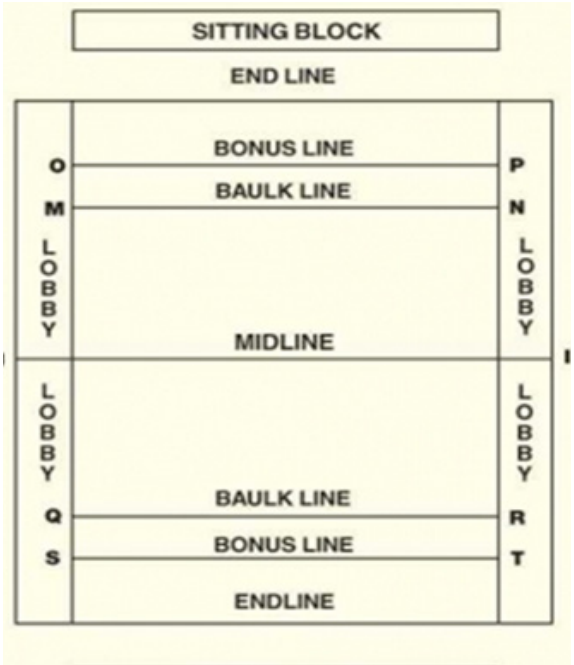

Figure 1. Illustration of Kabaddi Match Situations and Interaction Between Raider and Defender (Kaekaha, 2018)

Defense is crucial in kabaddi. The role of the defender is to prevent the attacker from safely returning to their side after an attack. Furthermore, if a team has good defensive practices, they can score points and prevent the opponent from attacking (Patel et al., 2025). Therefore, defensive performance is considered one of the most powerful determinants of team success, especially in elite competitions. Kabaddi is a team sport with high physical contact. When defending, players who lack the strength to maintain a low position or the ability to read the game can be pressured by opposing attackers. To be a good defender, they must have strong legs and quick reflexes to maintain coordination and balance, enabling them to read and stop opponents. Virgile & Bishop, (2021) state that successful defense relies on leg strength and general center-of-mass control, including awareness of body position changes under pressure. Conversely, without sufficient lower-body strength and stability, proper upper-body coordination will be ineffective in maintaining balance. Such a stance can cause players to lose proper positioning, miss an oncoming attack, and thus commit technical errors or fail to maintain their position.

Figure 2. Basic Defensive Position in Kabaddi (Nabila & Silalahi, 2024)

According to a preliminary analysis on the defensive behavior of Central Javanese kabaddi athletes, most playershave not yet been able to consistently maintain their defensive body position. In practice, it's rare for defenders to stand up against attackers with more physical power. This would mean that the defensive physical training methods implemented are certainly not wholly aligned with what they would have to encounter in real life as evident during on-field training. On to p of this, current training does little to build the desired strength and stability. Thus, there is a need for a more specific training program to improve the defensive aspects of athletes.

Strength training is widely considered

an effective approach to improving athletic performance and overall physical condition, particularly in high-contact sports. Its primary goals include increasing muscle capacity, developing balanced muscle function, and improving movement patterns relevant to sport performance (Zemková & Zapletalová, 2022). In contact sports like kabaddi, greater strength enables athletes to withstand external forces better, maintain stability against an opponent, and execute techniques more efficiently during competition.

The deadlift is a common compound movement for building overall muscle strength. The squat in the deadlift is a multi-joint resistance exercise that engages major muscle groups, including the glutes, hamstrings, quadriceps, erector spinae, and core. The deadlift is one of the most relevant exercises for lower-body strength and trunk stability, as it relies on the hip-hinge movement pattern (Martín-Fuentes et al., 2020)

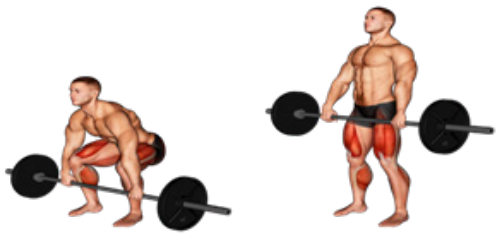

Figure 3. Deadlift Technique Involving Lower Body and Core Muscles (Luna, 2025)

There are strong biomechanical similarities between the deadlift and defensive movements performed in kabaddi. For example, when in a defensive position, players will assume an isometric semi-squat as they resist an opponent's horizontal force. This performance requires synchronous recruitment of the lower body and core the major muscle groups involved in the deadlift (Baskaran & Radhakrishnan, 2023; Flandez et al., 2020). Essentially, this makes deadlift training a highly specific way to improve deadlift performance in defensive play in kabaddi.

Although the benefits of strength training, such as the deadlift, have been widely documented in improving athlete performance, its use in kabaddi conditioning programs, particularly in Central Java, remains relatively limited, creating a research gap between the concept of strength-based training and its implementation on the field. Kabaddi training programs have tended to emphasize technical and tactical aspects as well as general conditioning. In contrast, structured strength training has not been a top priority, despite the high physical demands of defensive play. This lack of depth can lead to reduced lower-body strength and core stability, which have been shown to hinder defensive effectiveness in contact sports (Flandez et al., 2020). Urgensi for this research is crucial to examine training approaches that can specifically improve defensive endurance, one of which is deadlift training. The use of Defensive Holding Time (DHT) as a performance indicator provides a more functional evaluation dimension because it not only measures physical components separately but also reflects the athlete's ability to maintain a defensive position in real time. The novelty of this study lies in integrating deadlift training with DHT measurements as indicators of defensive performance in kabaddi. This field is still rarely studied, especially among regional athletes. Therefore, the objective of this study is to analyze the effect of deadlift training on defensive endurance, as measured by DHT, and to provide scientific contributions and practical recommendations for developing more systematic, targeted, and evidence-based training programs in kabaddi.

METHOD

This study employed a quantitative, quasi-experimental, cross-sectional design. Specifically, a single-group pretest-posttest design was employed, involving only one group of participants and no control group. The study procedure began with a pretest to assess baseline performance, followed by implementation of a structured deadlift training program, and concluded with a posttest to evaluate changes in weight-bearing position performance as the primary outcome measure. This study consisted of several phases: preparation, pre-test data collection, implementation of the deadlift training program (treatment), and post-test data collection. This study was conducted at the Sugijono Gym Laboratory, Faculty of Sport Science, Semarang State University. This location was chosen because it provided all the necessary facilities and instructors to ensure controlled athlete movements and valid physical performance measurements.

This study included all male kabaddi athletes from Central Java who participated in the team training for the 2025 National Championships. The study involved 30 male kabaddi players aged 18–25, who played the defensive position (corner or cover). Participants had regularly participated in a training program without acute injury in the past three months. This inclusion criterion was

used to ensure that the recruited participants were appropriate and aligned with the variables analyzed in this study. The independent variable was an eight-week structured resistance training program performed twice weekly, with deadlifts at 70–85% of one-repetition maximum (1RM). This study employed the Defensive Hold Time (DHT) to measure athletes' defensive position performance in kabaddi, collected through simulated match situations. The instruments in this study included a 1RM Deadlift test to determine maximal lower-body and lower-back strength, and a Defensive Hold Time (DHT) test to measure defensive ability. DHT results were measured with a digital stopwatch and scored by two experienced coaches for objectivity. The equipment and materials used in this study included barbells and weight plates, as well as a camera used to document the exercise and analyze the participants' movements. The research procedure began with a Defensive Hold Time (DHT) test at the pretest stage to determine the participants' initial endurance capabilities. Next, all participants participated in an eight-week deadlift training program. This program was structured based on the principle of progressive overload, with training loads gradually increasing every two weeks. Throughout the training process, researchers provided constant support to ensure each movement was performed correctly and in accordance with established procedures and safety standards.

Data analysis was performed using SPSS software. The Shapiro–Wilk test was used to assess data normality, followed by a paired-samples t-test to examine differences between pretest and posttest scores. Additionally, Cohen's d was calculated to determine the magnitude of the training effect on holding-position performance, with statistical significance set at $p \leq 0.05$.

RESULTS AND DISCUSSION

The results of this study are based on defensive performance analysis data from both the pretest and posttest. Defensive Holding Time (DHT) is measured in seconds as the time an athlete can withstand a defense against an opponent in a competitive environment during a simulated match. Defensive performance scores are directly correlated with higher DHT scores; the higher the DHT score, the better the athlete's defense. After data collection and repeated measurements, both before and after the test, the validity and reliability levels were determined using the same instrument.

Pretest results from Central Javanese Kabaddi players showed significant variation in initial defensive performance. DHT scores ranged from 1.70 to 5.00 seconds, with an average of 3.47 seconds. This distribution indicates significant differences among athletes in their baseline physical condition, particularly in lower-limb strength and trunk stabilization, as well as in their ability to maintain posture under pressure from an opponent. Less defensive athletes tended to have lower pretest scores and lacked the stability gained from maintaining a defensive posture. More defensive participants maintained superior neural recruitment patterns even before training began.

All subjects in the group underwent an eight-week deadlift training program, training twice weekly. Through progressive overload, the program utilized intensities of 70% to 85% of the one-repetition maximum (1RM). The deadlift was used because it is a compound exercise that targets several large muscle groups, including the glutes, hamstrings, quadriceps, and lower back. These movements help provide both balance and strength for athletes, which is crucial in sports or situations that require high performance, such as kabaddi. The combination of these muscle movements allows an individual to work harder than before.

Following the treatment, post-test results showed that most athletes improved their defensive performance. Post-test DHT scores ranged from 3.05 to 5.00 seconds, with an average of 4.30 seconds. This represents an average increase of 0.82 seconds from the pre-test. These findings suggest that athletes can maintain their holding position longer in post-deadlift training programs. Improvements were observed in most subjects, with greater improvements among participants with lower pre-test scores than among athletes with higher average scores, who showed more modest but consistent improvements. s

Table 1. descriptive statistics of pretest and posttest defensive hold time

Variable	N	Min	Max	Mean
Pretest	30	1.70	5.00	3.47
Posttest	30	3.05	5.00	4.30

Higher mean DHT score and lowest posttest show overall improvement of resilience in the participant group. Such descriptive data will serve as a basis for further inferential statistics. Before hypothesis testing, a normality test was performed to examine the research data for normality. In particular, parametric statistical

tests such as the paired-sample t-test employed in this study necessitate testing for normality. Kolmogorov–Smirnov and Shapiro–Wilk tests were used to check the normality of DHT data before and after testing. The choice of analysis was based on the Shapiro–Wilk test results, given that N<50 (N = 30).

Table 2. Normality test results of pretest and posttest DHT data

Variable	Test	Statistic	f	Sig.
Pretest	Kolmogorov–Smirnov	0.063	3	0.200
	Shapiro–Wilk	0.976		0.721
Posttest	Kolmogorov–Smirnov	0.135	3	0.169
	Shapiro–Wilk	0.912		0.017

Based on the Shapiro-Wilk test, the pre-test data were normally distributed ($p > 0.05$), while the post-test data showed a value close to 0.05. The post-test Kolmogorov-Smirnov test indicated a normally distributed result ($p > 0.05$). Due to the paired design, adequate sample size, and robustness of the parametric analysis, the data were suitable for a paired t-test.

Table 3. Paired Sample t-Test Results of Defensive Hold Time

Pair	Mean Difference	SD	SE	t	df	Sig. (2-tailed)
Pretest–Posttest	0.82433	0.35043	0.06398	-12.885	29	0.000

The results of this study stated that deadlift training affect real improvements in defensive positioning ability. kabaddi athlete Central Java This conclusion is supported by the statistically significant difference in Defensive Hold Time (DHT) from pretest to posttest. A paired-samples t-test confirmed these results, yielding significance at $p < 0.05$, along with a relatively large effect size (Cohen's $d = 2.35$). These findings indicate that the deadlift training program was not only statistically significant for defensive performance but also practically meaningful.

This suggests that increasing DHT scores contributes to improved endurance in kabaddi. An eight-week deadlift training program has been shown to improve athletes' DHT scores. The deadlift itself is a compound exercise that physiologically targets the hip muscles, lower extensors, and core stabilization muscles. From a biomechanical perspective, the deadlift movement pattern is similar to defensive movements in kabaddi, such as resisting an opponent's push, blocking, and tackling. Previous research by (Flandez et al., 2020), also demonstrated that strength training plays a significant role in improving athlete performance in contact sports. These findings align with the principle of training specificity, which states that training that mimics the movement demands of a particular sport will have a more effective impact on improving athlete performance.

Those with lower initial strength levels at pretest showed greater improvements compared to those with higher initial strength levels. This indicates that deadlift training is effective in developing core strength while improving overall body stability, particularly under maximal loads. These findings align with research by (Fajar et al., 2026; Prasetyo et al., 2026) which found that athletes with lower initial strength levels tend to benefit more from weight training programs. Therefore, the results of this analysis confirm that individuals starting from lower strength levels have the potential to experience more significant improvements after engaging in a structured training program.

In sports science literature, an effect size above 0.8 is generally considered large and significant for improving performance. In fact, an effect size of 2.0 or greater indicates that deadlift training has a very strong effect on endurance. These results indicate that regular deadlift training can help improve the physical conditioning of kabaddi athletes. This finding is also supported by Virgile & Bishop (2021), who stated that a well-designed strength training program can improve athlete performance, particularly in contact sports and martial arts.

The results demonstrate the importance of structured, effective strength training in kabaddi. Kabaddi training largely focuses on technical drills, tactical scenarios, and aerobic exercises, with little attention to strength training, even though structured strength training can improve athlete performance. There are several limitations to this study. First, it involved a single-group pretest-posttest design without a control group. Therefore, although improvements were observed, it cannot be concluded that these improvements were solely due to the deadlift training intervention. Second, the relatively small sample size in this study limited participation to only male kabaddi athletes from Central Java province. This makes it difficult to generalize the findings to other populations. For example, there were no effectiveness findings for female athletes or those at different competition levels.

The findings of this study support the role of deadlift training in conditioning programs for

kabaddi athletes. Success on the field as a defender is likely due to the deadlift intervention. This suggests that the deadlift is an effective and easy way to improve defensive performance in kabaddi.

CONCLUSION

Based on the research results, it can be concluded that deadlift training has an impact on improving the defensive performance of Central Javanese kabaddi athletes, as indicated by an increase in the Defensive Holding Time (DHT) value from an average of 3.47 seconds in the pretest to 4.30 seconds in the posttest, with an increase of 0.82 seconds. The results of the paired-samples t-test showed a significant difference ($p < 0.05$), indicating that the deadlift training intervention has a strong impact both statistically and practically. The eight-week training program with an intensity of 70–85% 1RM was proven effective in increasing lower body muscle strength and core stability, which directly contribute to athletes' ability to maintain a defensive position. These findings emphasize the importance of implementing structured, specific strength training in kabaddi and suggest that integrating deadlifts into training programs can be an effective strategy to improve athletes' defensive qualities.

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