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The Effect of Cone Drill Training on the Agility of Football Athletes at Cibubur Youth Athlete Training Center (CYATC)

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Abstract

Agility is an important component of physical fitness in football as it supports athletes' ability to change direction quickly, accurately, and with balance. Adolescent football players require optimal agility to enhance their technical and tactical performance. This study aimed to determine the effect of cone drill training on the agility of football athletes at Cibubur Youth Athlete Training Center in 2025. The research employed an experimental method using a pretest–posttest control group design. The sample consisted of football athletes from Cibubur Youth Athlete Training Center who received cone drill training as the intervention. Agility was measured before and after the intervention using the Arrowhead Agility Test. Data were analyzed using a paired sample t-test. The results showed an improvement in agility, indicated by a reduction in Arrowhead Agility Test completion time in the group that received cone drill training. Statistical analysis revealed a significant difference between pretest and posttest scores ($p < 0.05$). In conclusion, cone drill training has a significant effect on improving agility in adolescent football athletes and can be considered an effective training method within athlete development programs.

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INTRODUCTION

Sport has become an integral part of modern society's lifestyle and plays a strategic role in the development of human resources. The Indonesian government emphasizes the importance of sport through Law Number 11 of 2022 on Sports, which states that sport is a planned and systematic physical activity involving physical, mental, and social elements aimed at improving the quality of life of individuals and society. Through sport, improvements in physical fitness, mental health, character development, and national sporting achievement are expected to be achieved (Rismayadi et al., 2020). Therefore, sport is not merely viewed as a recreational activity but also as a means of performance development and national identity formation. Performance evaluation in competitive sports is conducted objectively through the use of technology, such as image processing techniques (Ardiyansi, Berliana, & Abduljabar, 2023).

One sport that plays a major role in social, cultural, and performance contexts is football. Football is a popular sport played worldwide and has developed into a professional discipline that demands high levels of physical, technical, tactical, and mental performance (Geovani Akbar, 2024). In modern football, a player's success is not determined solely by technical skills but also by optimal physical conditioning. Athlete development in football should ideally begin from early childhood through adolescence, as this phase is characterized by significant motor development and physical adaptation (Grygus et al., 2024)

Physical condition is a fundamental factor supporting athletic performance in various sports, including football. Good physical condition enables athletes to perform movements efficiently, reduce injury risk, and maintain performance throughout a match (Lisdiantoro & Utomo, n.d.). Components of physical condition in football include strength, endurance, speed, flexibility, coordination, and agility (Fahlevi et al., 2024). Among these components, agility plays a crucial role because it is directly related to a player's ability to change direction quickly, accurately, and with balance according to game situations.

Agility is defined as the ability to change direction and body position rapidly without losing balance (Young et al., 2021a). In football, agility is essential in various game situations, such as dribbling, one-on-one defending, pressing, and transitions between attacking and defending phases (Geovani Akbar, 2024).Players with high levels of agility tend to be more effective in ball control, evading opponents, and responding quickly to dynamic game situations (Hassan et al., 2022).

However, agility development in football athletes, particularly during adolescence, often faces challenges. Adolescence is a period of rapid growth (growth spurt), which can affect coordination and motor control, potentially leading to decreased agility if not accompanied by appropriate training programs (Mihmidati & Wahyudi, n.d.). In addition to age-related factors, agility is influenced by other physical components such as muscular strength, balance, coordination, and body mass index (BMI) (Anam et al., 2023).

Injury is another important factor affecting agility development in football athletes. Lower extremity injuries, such as ankle sprains, knee ligament injuries, and thigh muscle strains, are among the most common injuries experienced by football players (Herzog et al., 2023). These injuries not only disrupt training processes but can also significantly reduce functional ability and agility performance. Athletes with a history of lower extremity injuries are at a higher risk of performance decline and recurrent injuries if they do not receive appropriate training and rehabilitation programs (Kamiya et al., 2023).

Within the context of youth football development, football schools (SSB) and football academies play a strategic role in developing athletes' technical, tactical, physical, and mental aspects in an integrated manner (Nasrullah et al.,). During adolescence (13–17 years), training should focus on developing sport-specific physical abilities, including agility, which serves as a foundation for performance at higher competitive levels (Irawan et al., 2022). However, in practice, many training programs still place greater emphasis on technical skills and endurance, while agility training is not yet implemented systematically and variably (Geovani Akbar, 2024).

Field observations and interviews with coaches at Cibubur Youth Athlete Training Center revealed that several athletes still experience difficulties in performing rapid changes of direction during dribbling or defensive actions. Athletes tend to respond slowly to dynamic game situations, show suboptimal coordination between upper and lower body movements, and experience fatigue more quickly during high-intensity play. These conditions indicate that athletes' agility still needs to be improved through more effective and specific training methods.

Previous studies have shown that structured agility training can enhance athletes' change-of-direction ability and reaction speed. One wi-

dely recommended training method is cone drill training. Cone drills are designed to train rapid directional changes using varied movement patterns that resemble actual football game situations (Santoso et al., 2023). This type of training has been proven effective in improving coordination, balance, reaction speed, and body control during movement (Morral-Yepes et al., 2023). Moreover, cone drill training can be adjusted according to the FITT principles (frequency, intensity, time, and type), making it safe and effective for adolescent athletes (Young et al., 2021b)

Although several studies have demonstrated the effectiveness of cone drill training, empirical research specifically examining its effect on agility in adolescent football athletes within local development settings, particularly at Cibubur Youth Athlete Training Center, remains limited. Therefore, an experimental study is needed to scientifically evaluate the effectiveness of cone drill training as an agility training method.

Based on the above rationale, the research question of this study is: does cone drill training affect the agility of football athletes at Cibubur Youth Athlete Training Center in 2025? The objective of this study is to determine the effect of cone drill training on improving agility in adolescent football athletes. The proposed hypothesis is that cone drill training has a significant effect on improving agility among football athletes at Cibubur Youth Athlete Training Center in 2025.

METHODS

This study employed a pre-experimental approach using a quantitative method, in which numerical data were used to examine cause-and-effect relationships between variables (Marinu Waruwu, 2024) . The research design applied was the One Group Pretest–Posttest Design, where measurements were conducted before and after the intervention to determine the effect of the training program. Experimental research aims to understand the impact of specific treatments on the variables under investigation (Abraham & Supriyati, 2022).

The population of this study consisted of all football athletes at SSB Cibubur Youth Athlete Training Center, totaling 24 athletes. A population of this size was considered less efficient in terms of time, effort, and research costs (Abt et al., 2020)The sampling technique used was total sampling, in which all population members who met the inclusion criteria were selected as research participants, as recommended by Sugiyono (2018). Based on the inclusion and exclusion criteria, the final sample comprised 15 male football athletes aged 14–17 years.

The data collection instrument used in this study was the Arrowhead Agility Test, which was employed to measure athletes' agility levels. A valid and reliable research instrument is essential to ensure the accuracy of the collected (Atıcı & Bayrakdar, 2025). The Arrowhead Agility Test has been reported to have a validity coefficient of 0.981 and a reliability coefficient of 0.995, indicating that it is appropriate for measuring agility.

Data analysis began with a normality test using the Shapiro–Wilk test to determine whether the data were normally distributed. Subsequently, hypothesis testing was conducted using a paired sample t-test to compare pretest and posttest results within the same group. The t-test was applied to determine whether there was a statistically significant difference resulting from the intervention. The criterion for decision-making was based on a significance level of 0.05.

Figure 1. Desain Penelitian.

RESULTS AND DISCUSSION

The study was conducted at Cibubur Youth Athlete Training Center, East Jakarta, from February 10 to April 30, 2025. A total of 15 male youth football athletes participated in this study after three athletes withdrew due to lower extremity injuries. The participants' ages ranged from 15 to 17 years, with a mean age of 16.46 ± 0.83 years. Most participants were 17 years old (66.7%), followed by 15 years (20.0%) and 16 years (13.3%).

Agility performance was assessed using a time-based agility test before (pre-test) and after (post-test) a six-week cone drill training intervention. Descriptive statistics of agility performance are presented in **Table 1.**

Table 1. Descriptive Analysis of Agility Performance

Test	Mean ± SD	95% CI	Min	Max
Pre-test	17,1 ± 0,557	16,79–17,41	16,25	18,24
Post-test	16,2 ± 0,452	15,91–16,41	15,49	17,07

The results indicate a reduction in agility test completion time following the intervention, suggesting an improvement in agility perfor-

mance. Additionally, the decrease in standard deviation from pre-test to post-test indicates greater consistency among participants after training.

The Shapiro–Wilk test showed that both pre-test ($p = 0.614$) and post-test ($p = 0.200$) agility data were normally distributed ($p > 0.05$). Therefore, parametric statistical analysis was appropriate. A paired sample t-test was conducted to examine the effect of cone drill training on agility performance. The analysis revealed a significant difference between pre-test and post-test scores ($p = 0.001$). This result indicates that cone drill training had a statistically significant effect on improving agility in youth football athletes.

The purpose of this study was to examine the effect of cone drill training on agility performance in youth football athletes. The results demonstrated a significant improvement in agility following a six-week cone drill intervention, as evidenced by a meaningful reduction in completion time from pre-test to post-test.

Agility is a critical physical component in football, requiring rapid changes of direction, speed, coordination, and neuromuscular control. Cone drill exercises emphasize multidirectional movement patterns that stimulate complex coordination between the musculoskeletal and nervous systems, thereby enhancing agility performance (Al Hidayath et al., 2022). The findings of this study align with previous research reporting significant improvements in agility following cone drill-based training programs (Santoso et al., 2023).

The reduction in mean agility time from 17.1 seconds to 16.2 seconds indicates not only improved performance but also functional efficiency, as lower completion times reflect better agility. Furthermore, the decrease in standard deviation suggests that the training program contributed to more uniform performance levels among participants, indicating effective adaptation across individuals.

These results are consistent with earlier studies involving youth football players, which found that cone drill training improved agility and related skills such as dribbling performance. The improvement observed in this study falls within the expected range of agility enhancement (1–7%) reported in previous literature, which supports the physiological plausibility of the findings.

However, the magnitude of improvement was classified as moderate. Agility development should be integrated into long-term, periodized training programs alongside speed, strength, and endurance training. Long-term athlete development (LTAD) models suggest that peak agility performance requires 8–12 years of structured training (Bompa & Buzzichelli, 2019). Therefore, the moderate improvement observed in this study is reasonable given the relatively short intervention period.

Additionally, agility development is influenced by multiple physical components, including speed, coordination, strength, and flexibility. Cone drill exercises have been shown to activate key lower limb muscles such as the tibialis anterior, gastrocnemius, rectus femoris, and soleus, which play an essential role in rapid directional changes. Enhanced neuromuscular control resulting from repeated directional changes may also contribute to improved movement efficiency and injury prevention.

Despite the positive outcomes, several limitations should be considered. The training period coincided with the Ramadan fasting month, which may have influenced athletes' physical performance due to altered training schedules and energy intake. Additionally, weather conditions, particularly rainfall, may have affected training quality and movement execution due to slippery field surfaces.

Overall, the findings suggest that cone drill training is an effective and practical method for improving agility in youth football athletes. Implementing cone drill exercises consistently within a structured training program may contribute to enhanced performance and long-term athletic development.

CONCLUSION

Based on the results of the study conducted on football athletes at SSB Cibubur Youth Athlete Training Center in 2025, it can be concluded that adolescent age, particularly within the range of 15–17 years, plays an important role in the effectiveness of agility training. At this stage of motor development, athletes are in an optimal phase to respond to training stimuli, allowing for effective adaptation, especially in the development of complex motor skills such as agility. Furthermore, the findings indicate that cone drill training is effective in improving agility performance among football athletes. This is evidenced by a reduction in the mean agility test time from 17.1 seconds in the pre-test to 16.2 seconds in the post-test, supported by statistical analysis showing a dominant difference with a p-value of 0.001. Therefore, cone drill training can be recommended as an effective training method for enhancing agility in adolescent football players.

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