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The Effect of Cone Drill Variations on Agility in MBC (Malang Badminton Club) Badminton Athletes Aged 10-15 Years

Diana Puspita Sari[1], Dr. Mahmud Yunus[2]
[12]Department of Sport Science, Universitas Negeri Malang, Indonesia

Corresponding Author : dianapuspitasari021@gmail.com

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ABSTRACT

The purpose of this study was to examine the effect of variations in cone drill exercises on agility in MBC (Malang Badminton Club) badminton athletes aged 10-15 years, which was conducted by the researcher from September to November 2025. This study used an experimental design with a one-group pre-test and post-test. The sample involved in the study consisted of 10 male athletes aged 10-15 years who actively participated in training. Data were collected by measuring the subjects' agility levels before and after receiving the variation of cone drill exercises, and then the data were evaluated using the t-test method with the assistance of the SPSS software version 31. The analysis results indicated that the calculated t-value (13.648) was greater than the table t-value (1.729) with a significance level of less than 0.001. These findings indicate a significant difference in the agility of athletes before and after being given cone drill training variations. In conclusion, variations in cone drill training show an impact on improving agility in MBC (Malang Badminton Club) badminton athletes aged 10-15 years. This is proven effective with accurate and responsive footwork, allowing the shuttlecock from the opponent's direction to be returned spontaneously, strengthening the athlete's ability to maintain balance during movement or sudden stops. This study contributes to the development of physical training programs, particularly in badminton, and can serve as a reference for coaches in designing programs focused on enhancing agility.

Keywords: *cone drill exercises, agility, badminton*

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Introduction.

One of the most popular sports, also loved by many people, is badminton, especially in Indonesia. To be able to play optimally, an athlete must have optimal physical ability components, one of which is agility. Agility is defined as a physical component to move quickly, change position suddenly, and then maintain proper body balance while performing movements (Deshinta et al. 2024). In badminton, agility is very important because players must be able to respond to the direction of the incoming shuttlecock in a short time, whether it is forward, sideways, or backward.

To improve agility, various training methods can be used. One efficient approach is cone drill training. This exercise is designed to stimulate the work of the leg muscles, coordination, and the speed of body direction changes. Commonly used forms of cone drill exercises include the zig-zag drill, T-drill, and L-drill. Research by (Liza, Subarkah, and Al

2024), shows that cone drill exercises are effective in improving agility in badminton athletes because they can stimulate movements resembling actual match conditions. Similar statements were also made by (Rizki Saputra 2024) that cone drill variations can improve players' reaction speed and lateral movement. This exercise is performed by running through obstacles or barriers around cones as navigation points.

According to the observations conducted by the researcher, one of the crucial elements lacking in MBC (Malang Badminton Club) badminton at that time was in the aspect of agility and the lack of variation in training, especially cone drills, which play a role in supporting athletes' ability to move quickly and effectively, particularly when reaching for the shuttlecock during a badminton game. This condition indicates a gap in the need for an agility training variation program with real on-court conditions, which is still lacking in the application of such training variation methods. Various studies have proven that the implementation of training methods like cone drills can have a significant impact on the agility of young athletes (Marzuqi Riyadi 2021). Therefore, an intervention is needed that can address this gap through a more systematic, targeted, and relevant training approach for the needs of badminton.

In this problem, this research is important to conduct in order to examine the extent of the influence of cone drill variation exercises on agility in badminton athletes at MBC (Malang Badminton Club) aged 10-15 years. The results of this study are expected not only to strengthen previous scientific findings but also to offer solutions that can be applied by coaching staff, especially for badminton athletes, in designing more effective and goal-focused training programs (Maulana 2019). Thus, the development of badminton athletes at school age can be more focused and sustainable.

Methodology

The effect of cone drill variations on agility in badminton athletes in this study was investigated using a pre-experimental design. This research was conducted from September to November 2025, and the population included all male athletes actively participating in training at the MBC (Malang Badminton Club), totaling 30 athletes. In its implementation, subject selection was carried out through purposive sampling, a sampling technique chosen based on specific considerations and criteria (Subhaktiyasa 2024). The sample consists of 10 male badminton athletes.

Table 1. Pretest and Posttest Design

Pre-test	**Treatment**	***Post-test***
O_1	X	O_2

Source: (Sugiyono 2013)

This study applied a one-group pre-experimental model with a pre-test and post-test design. Data collection was conducted by measuring the subjects' agility through a T-test before they received treatment (pre-test). The intervention was carried out over six weeks with a frequency of three sessions per week, resulting in a total of 16 training sessions. After the intervention period ended, a final test was conducted to evaluate the athletes' agility. The study was conducted in three locations: GOR Badminton Rajabasa Malang, the GOR yard, and the basketball court next to the GOR.

Agility tests before and after the treatment were conducted to obtain data which was subsequently analyzed using SPSS version 31. In addition, statistical analysis through the SPSS program is still required to ensure whether there are significant differences before the treatment and after the intervention. The prerequisite test for the normality assumption of the data was evaluated using the Shapiro-Wilk test, as well as the homogeneity of variance with Levene's Test. Meanwhile, hypothesis testing employed a comparative paired t-test. This was done to measure the level of influence of implementing variations of cone drill exercises on the agility of MBC (Malang Badminton Club) badminton athletes aged 10–15 years before and after receiving the treatment.

Results

The following are the agility (t-test) data results of MBC (Malang Badminton Club) badminton athletes aged 10-15 years, before any treatment was given and after the intervention, which has not yet been analyzed using SPSS.

Table 2. Pretest and Post-test Agility T-Test Results

Name	*Pre-test*	*Post-test* (second)	Time Change (second)
RKY	13.18	12.45	0.73
TMT	12.45	11.92	0.53
JNT	13.33	12.80	0.53
DWA	12.47	12.43	0.04
WSN	12.21	11.53	0.68
BTG	13.97	13.76	0.21
JSY	12.00	11.87	0.13
IRF	12.35	11.93	0.42
JYD	13.67	13.32	0.35
DMS	12.33	11.85	0.48

The results of this data provide an overview of changes in agility levels after undergoing treatment or a training program. Based on the pretest and posttest results, there is a noticeable difference in time scores. The posttest data is faster compared to the pretest, indicating an improvement in agility among MBC (Malang Badminton Club) badminton athletes aged 10-15 years. In addition, statistical analysis (SPSS) is still necessary to confirm the significance of the differences between the test results before and after the intervention.

The findings obtained from the analysis process were then tested using SPSS, with the details including:

Normality Test

Table 3. Normality Test Result

Agility	*P Value*	Sig 5%	Description
Pretest	0.173	0.05	Normal
Posttest	0.234	0.05	Normal

Referring to the analysis findings, this study tested normality using the Shapiro-Wilk test method. The data is normally distributed with a p-value of 0.173 for the pretest and 0.234 for the posttest > 0.05, indicating that the data distribution meets the normality requirement.

Homogeneity Test

Table 4. Homogeneity Test Result

Research Results	Df	F table	F calculate	*P*
agility T-Test	1:18	4.41	1.711	0.861

Based on the analysis results, the homogeneity test in this study showed a calculated F value (1.711) smaller than the F table value (4.41), which means the data variance is homogeneous.

Hypothesis Test

Table 5. Hypothesis Test Result

Research Results	Df	T table	T calculate	*P*	Sig 5%
Agility T Test	19	1.729	13.648	<0,001	0,05

The t-test results showed a significance value of <0.001 and a t-calculated value (13.648) > t-table value (1.729), so H0 is rejected and H1 is accepted. This indicates a significant difference, meaning that variations in cone drill training have an effect on agility in badminton athletes aged 10-15 at Malang Badminton Club (MBC).

Dicussion

This research was conducted from September to November 2025 on Malang Badminton Club (MBC) badminton athletes aged 10-15 years, with a sample size of 10 male athletes. The study findings indicate that variations in cone drill training have an effect on the agility of Malang Badminton Club (MBC) badminton athletes. This is evident from the differences in pretest and posttest results. The final conclusion shows that there is an improvement in agility among Malang Badminton Club (MBC) badminton athletes aged 10-15 years. This improvement was confirmed through Paired T-Test results using SPSS version 31. Therefore, it can be concluded that variations in cone drill training are effective in enhancing the agility of Malang Badminton Club (MBC) badminton athletes aged 10-15 years.

At the age range of 10–15, improving agility through cone drill training is related to the activation of fast-twitch muscles, as movements involving changes of direction, acceleration, and deceleration require quick and explosive muscle contractions. However, at this age, the muscular, bone, and joint systems are still in the growth stage. Therefore, training that stimulates fast muscles should be given gradually and controlled. Training begins at a moderate pace

to ensure correct movement patterns, then the intensity is increased progressively so that the neuromuscular system can adapt safely without increasing the risk of injury. This approach aligns with the theory of physical development in children and adolescents, which states that speed and agility training can be provided at a young age as long as it follows the principles of progression and proper supervision (Lloyd, S., and Oliver L. 2012).

Agility skills can improve after the introduction of varied cone drill exercises, which is explained through the neuromuscular adaptation process. Training sessions that include repeated acceleration, deceleration, and rapid changes of direction can enhance coordination between the muscles and the central nervous system, especially in the lower limb muscles. This adaptation process allows athletes to respond to movement stimuli more quickly and efficiently (Sheppard, M, and Young 2006). From a physiological perspective, cone drill exercises involve movement patterns of acceleration, deceleration, as well as rapid changes of direction (change of direction/CoD). Therefore, they require solid integration between the sensory-motor system and proprioception. Adaptations that arise from this training include improved postural control, better neuromuscular coordination, and optimal ability to control the body's center of gravity during the process of changing movement direction (Putra, Jamil, and Ningrum 2025).

In addition, cone drill exercises improve agility because the body is required to coordinate the sensory and motor systems with every change of direction and speed. Agility is not just rapid movement, but a sensory-decision-motor execution process, where the body receives stimuli through the senses (vision and proprioception). Then the brain processes this information to select the appropriate response before the movement is carried out. This synchronization reflects how changes in direction and quick reactions are neurologically integrated in training (stimulus perception, response selection, movement execution) (Erika 2022). In the sensorimotor system, information from the eyes, muscles, and joints continuously provides 'feedback' to the brain, which helps regulate body position in real-time and adjust steps. This makes motor responses more coordinated and efficient during repetitive exercises like cone drills. (Hulatt 2024). As training continues for 16 sessions over 6 weeks, sensorimotor adaptations occur through the brain's and nerves' improved ability to predict position changes, speed up decision-making, and coordinate faster and more accurate movements, functionally enhancing agility performance without losing balance or body control (Zwierko et al. 2022).

In terms of physical components, one of the things needed by badminton players is agility (Okanansa, Sukendro, and Mardian 2022). Agility can be defined as the capacity to change the position and direction of the body spontaneously and accurately while moving without losing stability (balance). In the world of badminton, agility is very important to be able to reach the shuttlecock delivered by the opponent through quick movements using footwork. Perfect shuttlecock retrieval also affects mastery of badminton stroke techniques, including serve, lob, drop shot, and smash. To improve agility, sessions should be conducted through a variety of cone drill exercises. These types of physical exercises are specifically designed to develop agility potential and acceleration of directional changes, coordination, and body reaction through movement patterns carried out around cones (Mita, Erliana, and Arisman 2017). Drill is a form of training that requires a lot of repetition so that a movement can be performed almost automatically. In the drill method, participants are asked to follow the movements according to the coach's instructions and repeat them multiple times until the skill is fully mastered (Yohanes 2019).

This Cone Drill exercise is a form of agility training that also involves various leg muscles, including the quadriceps and hamstrings, which work during the initial push-off and direction changes, as well as calf

muscles such as the gastrocnemius and soleus that help with stability and acceleration. It is the trained muscle response that enables players to move faster and more agilely on the field (Khoiriah, Fadhli, and Riyad 2020). The key to improving agility is the ability to maintain a steady speed while changing direction. This means that the less the speed decreases when the body shifts and transfers its center of weight, the more agile the movement will be (Rifai, Bustomi, and Hambali 2020). This condition is also supported by keeping the body facing forward while moving.

In this study, the implementation of cone drill variations using cone arrangements in various specific patterns included: 3 cones (shuttle run), 5 cones (zig-zag), 4 cones (T-drill), 6 cones (shadow badminton), 6 cones (footwork to all cones while holding alternately). The training program was conducted at GOR Badminton Rajabasa Malang with a training frequency of three sessions per week, and it was administered over six weeks to Malang Badminton Club (MBC) athletes aged 10-15 years. According to Bompa and Haff, if the training program is carried out consistently for approximately 6–8 weeks, the body will begin to adapt to the training load provided, resulting in improvements in certain abilities. Training three times a week is considered ideal for beginners and can provide significant development (Bompa, Buzzichelli, and Carlo 2019).

A study published in the Journal of Sports Science in 2023 investigated the effects of using the four-cone drill on PB Natura badminton athletes and showed that this design significantly improved the players' agility. The primary skill that badminton athletes must master is agility, as the game requires quick position changes, efficient footwork, and flexible movements to reach all areas of the court. The study's results confirmed that cone-based training, including the five-cone drill, has a significant positive effect on developing both agility and movement speed in athletes (Zhannisa et al. 2023). Another study published in the Journal of Physical Education and Sports in 2020 examined the impact of training (five cone snake drill, v-drill, as well as lateral two in-the-hole and in-out shuffle) on agility and speed abilities. The study's findings showed that all three training programs had a significant effect on improving both agility performance and movement speed. Moreover, the analysis results revealed a clear difference between the types of training, where lateral two in-the-hole and in-out shuffle were proven to be superior and more efficient in developing agility and speed compared to the five cone snake drill (Galih, Edy, and Oce 2020).

Conclusions

Referring to the analyzed data, the presentation of study findings, and the evaluation conducted, it can be interpreted that variations of cone drill exercises influence the improvement of agility in badminton athletes of the Malang Badminton Club (MBC) aged 10-15 years.

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