



ORIGINAL SCIENTIFIC ARTICLE

THE EFFECT OF 6 WEEKS OF COMBINATION OF THREE CONE EXERCISE USING BALL AND HIGH-INTENSITY INTERVAL TRAINING ON THE AGILITY AND DRIBBLING ABILITY OF STUDENT FUTSAL ATHLETES

Fajar Adi Wiranata^{1ABCD}, I Dewa Made Aryananda Wijaya Kusuma^{1ACD},
Yanyong Phanpheng^{2ACD}, Arif Bulqini^{1AD} and David Agus Prianto^{1AD}

¹Universitas Negeri Surabaya

²Loei Rajabhat University

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: I Dewa Made Aryananda Wijaya, Kusuma, e-mail: dewawijaya@unesa.ac.id

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Abstract

Study purpose. Three-Cone Drill using the Ball (TCDB) High-Intensity Interval Training (HIIT) is an exercise that requires players to perform fast movements and sharp changes of direction using a ball over three cones with high intensity. This exercise is based on the application of specific training principles using the ball and the principle of overload, which aims to improve agility and dribbling skills. This study aimed to evaluate the effect of TCDB+HIIT on the agility and dribbling ability of student futsal athletes.

Materials and methods. This study used an experimental method with a One-Group Pretest-Posttest Design. The participants in this study were student futsal athletes, totaling 14 players aged 16.6 ± 0.7 years, with body height 170.2 ± 3.36 cm, body mass of 59 ± 9.11 kg, and BMI 20.4 ± 3.25 . The research instruments used were the Illinois Agility Test and the futsal dribbling test. Data analysis used the Paired Samples T-Test at a significance level of 0.05; the prerequisite test used was the Shapiro-Wilk test.

Results. Based on the results of the Paired Samples T-Test test, it was found that the sig value (2-tailed) of the speed variable was $0.001 < 0.05$, with an increase of 0.99 ± 0.57 . In the dribbling variable, the sig (2-tailed) value is $0.001 < 0.05$, with an increase of 1.88 ± 1.722 .

Conclusions. This study concludes that TCDB + HIIT exercises are effectively applied to increase futsal players' agility and dribbling abilities.

Keywords: futsal, three cone drill using ball, high intensity interval training, agility, dribbling ability.

Introduction

Optimal agility and dribbling skills are essential factors in achieving futsal sports achievements (Dogramaci et al., 2011; Mendes et al., 2022; Travassos et al., 2011). Optimal agility allows futsal players to change direction quickly, avoid or pass opposing players, and maintain control of the ball (Farhani et al., 2019; Naser et al., 2017). Meanwhile, optimal dribbling is also crucial in defending, controlling, and moving the ball with great skill and speed (Corrêa et al., 2016; Doewes et al., 2022; Gioldasis, 2018). To simultaneously improve futsal players' agility and dribbling abilities, specific

training is needed with the addition of balls and varied and changing movements (Ayarra et al., 2018). In other words, the required exercises broadly combine the concepts of agility and dribbling with the use of the ball. Such things can provide a more realistic and relevant training experience in actual futsal game situations and conditions (Barron et al., 2020).

One of the exciting exercises to increase agility and dribbling skills simultaneously is the Three Cone Drill using the Ball (TCDB). This drill requires players to perform fast movements and sharp changes in direction using three strategically placed cones while controlling, carrying, and controlling the ball. This exercise can help improve a player's agility and dribbling ability by emphasizing fast movement, changing direction, and effective ball control (Fadillah et al., 2020).

HIIT is a high-intensity interval training. In practice, this exercise uses an anaerobic energy system so that it can

improve physical abilities related to anaerobic energy, such as endurance, speed, and agility (Kunz et al., 2019; Ouertatani et al., 2022). HIIT has mainly been implemented in football, so this is something new when applied to futsal; this can happen because futsal and football have the same intensity in matches (Barnes et al., 2014; Hostrup & Bangsbo, 2023; Rodrigues et al., 2011).

Therefore, this study aims to evaluate the effect of a combination of the Three Cone Drill using the Ball exercise with HIIT on futsal players' agility and dribbling abilities. In the context of this research, this exercise is considered a novelty and innovative thing because, in previous studies regarding the Three Cone Drill, it has yet to be explored much.

By focusing research on the effect of TCDB+HIIT on the agility and dribbling skills of futsal players, the information obtained can provide a better understanding of the benefits of this exercise in improving the agility and technical abilities of futsal players. This research can also provide a valuable contribution to developing more effective training programs to improve agility and dribbling abilities to increase futsal players' competitive performance.

Materials and methods

Study participants

Fourteen male futsal athletes from senior high school (SMAN) 4 Bojonegoro, East Java, Indonesia, participated in this study. Participants in this study were student futsal athletes aged 16.6 ± 0.7 years, with a height of 170.2 ± 3.36 cm, a body mass of 59 ± 9.11 kg, and a BMI of 20.4 ± 3.25 . Furthermore, 14 student futsal athletes were given TCDB+HIIT training. Before the experiment was conducted, participants were informed about the benefits and potential risks associated with the research.

Study organization

This study used an experimental method with a One-Group Pretest-Posttest Design. Fourteen futsal athlete students will do TCDB+HIIT training for six weeks

(Permana et al., 2022; Pettersen & Mathisen, 2012). Before and after being given treatment to determine the effect of the exercise, participants will be given an agility and futsal dribbling ability test. In measuring the agility of this study using the Illinois Agility Test and dribbling using the futsal dribbling test.

Statistical analysis

Data analysis in this study consisted of 2 parts: the prerequisite test using Shapiro-Wilk and hypothesis testing using the Paired Sample T-Test. This study uses a paired sample t-test hypothesis test. This test aims to analyze the differences in pretest and post-test results. Statistical analysis in this study used the IBM SPSS Statistics 29.0

Results

This research was conducted for one month and a half, with a total of 20 days of practice with details of one pretest, 18 treatments, and one post-test. The number of participants is as many as 14 players. The results of calculating agility and complete dribbling ability are obtained as follows.

Table 1 above describes the data resulting from increased dribbling speed and ability in this study. Based on the calculation of the pretest and posttest, get an average increase in agility of 0.99 ± 0.57 and dribbling ability of 1.87 ± 1.72 .

Based on the results of table 2 above, the results of the normality test with the Shapiro-Wilk test instrument obtained the results from the pretest agility value $0.26 > 0.05$, posttest agility value $0.86 > 0.05$, pretest dribbling value $0.28 > 0.05$, post test dribbling value $0.64 > 0.05$, then all data the research results were normally distributed and continued to test the hypothesis using parametric statistics paired sample t-test.

Based on the results of Table 3 above, From the results of the hypothesis test with the Paired Sample T-Test test instrument, the agility data results obtained have a sig (2-tailed) value of $0.001 < 0.05$, it can be concluded that there is a significant increase in agility through TCDB training +HIIT. The results of the dribbling data have a sig (2-tailed)

Table 1. Data Descriptive

Variable		N	Mean $\pm$ SD	Min	Max	Mean $\pm$ SD Pre-Post
Agility	Pretest	14	18.33 $\pm$ 0.93	16.75	19.53	0.99 $\pm$ 0.57
	Posttest	14	17.33 $\pm$ 0.95	15.82	19.01	
Dribbling Ability	Pretest	14	15.13 $\pm$ 2.34	12.07	20.87	1.87 $\pm$ 1.72
	Posttest	14	13.25 $\pm$ 1.38	10.91	15.29	

Table 2. Normality Test

Variable		Shapiro-Wilk		
		Statistic	Df	Sig.
Agility	Pretest	0.93	14	0.26
	Posttest	0.97	14	0.86
Dribbling Ability	Pretest	0.93	14	0.28
	Posttest	0.95	14	0.64

The data are presented by means $\pm$ SD and sig. value; In the Shapiro-Wilk test, the data is normally if the sig. ≥ 0.05

Tabel 3. Paired Sample T-Test

Variable	Paired Difference				t	df	Sig. (2-tailed)
	Mean±SD	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
Pre-Post Agility	0.99±0.57	0.15	0.66	1.32	6.5	13	0.001
Pre-Post Dribbling Ability	1.88±1.72	0.46	0.88	2.87	4.08	13	0.001

The data are presented by means ± SD; *statistically significant difference, mean scores at point comparisons from baseline: sig (2-tailed) value of ≤ 0.05.

value of 0.001<0.05, so it can be concluded that there is a significant increase in dribbling ability through TCDB+HIIT training.

Discussion

This study evaluates the effect of implementing TCDB+HIIT exercises on dribbling and agility abilities. The treatment was carried out for six weeks with a frequency of 3 times a week, with a total of 18-day training. This exercise is based on applying specific training principles using a ball and the overloading principle every two weeks. The results showed a significant increase in agility and dribbling ability through TCDB+HIIT training with an intensity of 80%-90%.

The selection of the TCDB+HIIT training program using a ball approach is an essential aspect of efforts to achieve the goals, in this context, to increase agility and dribbling skills (Sekulic et al., 2021). In the process, players must make quick movements with the ball and make sharp changes in direction. This can train and improve dribbling technical skills, speed, and eye and foot coordination. These specific drills allow the player to develop his dribbling skills in real-time in situations similar to those of a real match. Specific training can provide sufficient stimulus to improve coordination in soccer performance (Szabo et al., 2020; Tessitore et al., 2011). On the other hand based on literature studies, the HIIT approach can improve the physical performance of players (Arazi et al., 2017; Clemente et al., 2021).

The principle of overload, which is applied every two weeks, also improves dribbling ability and agility. Increasing training intensity gradually exposes players to more significant challenges, promoting physiological adaptation and increased performance (D'Isanto et al., 2022; Trecroci et al., 2022). Giving excess weight in training can stimulate muscle growth, increase muscle strength, and speed of muscle contraction (Plotkin et al., 2022). This is necessary because it can positively influence dribbling situations and actual futsal matches. Physiological adaptation is essential in improving dribbling ability and agility. During six weeks of practice, body adaptation involves various physiological aspects (Sharma & Kailashiya, 2018). Increased muscle strength can help players produce more substantial movements and optimal ball control. Increasing the speed of muscle contraction can also increase the responsiveness of players to changes in direction and fast movements (Chaabene et al., 2018). In addition, giving TCDB + HIIT exercises can make the muscles more elastic, and the range of motion for the joints will be much more optimal; this will make the joints very flexible and impact the swing of the legs when taking

a step wider. In addition, the dynamic balance has also increased because, in this exercise, the athlete must be able to control the body's condition when making movements. In addition, having good agility will have a positive impact on aspects of muscle speed and explosive power (Herridge et al., 2020; Lockie et al., 2014). This adaptation gives players more optimal agility in overcoming challenges in futsal games.

Physiological adaptation, TCDB+HIIT training can also impact psychological. In the process, high-intensity training and a focus on technical skills can increase players' confidence in their dribbling and agility abilities (Nascimento et al., 2016). This can occur due to repeated exercises with a frequent frequency every week. In other words, this can also be a mental boost for players in increasing their agility and dribbling abilities. The significant increase in agility and dribbling ability in this study may also be influenced by motivational factors and the players' dedication to the training program (Garcia-Mas et al., 2010).

In this context, this study's results indicate that applying TCDB+HIIT exercises for six weeks with a frequency of 3 times a week, by applying the specific training principles using the ball and the principle of overload, significantly improves dribbling and agility abilities. The principle of specific training using a ball helps train and improve dribbling technical skills, while the principle of overload gradually increases training intensity and promotes physiological adaptation, especially agility (Thongnum & Phanpheng, 2022).

Conclusions

Based on the research results and discussion in this study, TCDB+HIIT training for six weeks with a frequency of 3 times a week can improve agility and dribbling student futsal athlete.

Conflict of interest

Authors do not receive endorsement from any organization for submitted work. The author has no relevant financial or non-financial interest to disclose.

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ВПЛИВ 6 ТИЖНІВ КОМБІНОВАНОГО ВИКОНАННЯ ВПРАВ НА БІГ ПОМІЖ ТРЬОМА КОНУСАМИ З ВИКОРИСТАННЯМ М'ЯЧА ТА ВИСОКОІНТЕНСИВНИХ ІНТЕРВАЛЬНИХ ТРЕНУВАНЬ НА СПРИТНІСТЬ І ЗДАТНІСТЬ ДО ВЕДЕННЯ М'ЯЧА УЧНІВ-ФУТЗАЛІСТІВ

Фаджар Аді Віраната^{1ABCD}, І Дева Маде Арьянанда Кусума^{1ACD}, Яньон Пханпхен^{2ACD}, Аріф Булкіні^{1AD}, Девід Агус Пріанто^{1AD}

¹Сурабайський державний університет

²Лоейський університет Раджабхат

Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 8 с., 3 табл., 2 рис., 40 джерел.

Мета дослідження. Високоінтенсивні інтервальні тренування (НІІТ) з виконанням вправ на біг поміж трьома конусами з використанням м'яча (TCDB) – це вправа, яка вимагає від гравців виконання швидких рухів і різких змін напрямку, використовуючи м'яч, поміж трьома конусами з високою інтенсивністю. Ця вправа ґрунтується на застосуванні спеціальних тренувальних принципів з використанням м'яча та принципу перевантаження, що має на меті підвищення спритності та покращення навичок ведення м'яча. Метою цього дослідження було оцінити вплив комбінованого виконання TCDB+НІІТ на спритність і здатність до ведення м'яча учнів-футзалістів.

Матеріали та методи. У цьому дослідженні використовували експериментальний метод за схемою попереднього та підсумкового тестування на одній групі. Учасниками дослідження стали учні-футзалісти, загалом 14 гравців віком 16,6±0,7 року, зріст 170,2±3,36 см, маса тіла 59±9,11 кг, ІМТ 20,4±3,25. Як інструменти дослідження використовували Іллінойський тест на спритність і тест на футзальне ведення м'яча. Для аналізу даних використовували t-критерій Стюдента для парних вибірок за рівня значущості 0,05; як попередній критерій використовували критерій Шапіро-Вілка.

Результати. На підставі результатів тесту з використанням t-критерію Стюдента для парних вибірок було встановлено, що значення рівня значущості (двостороннього) змінної швидкості становило 0,001 < 0,05 зі збільшенням на 0,99±0,57. У змінній ведення м'яча значення рівня значущості (двостороннього) становить 0,001 < 0,05 зі збільшенням на 1,88±1,722.

Висновки. Результати цього дослідження дозволяють дійти висновку, що вправи TCDB + НІІТ ефективно застосовуються для підвищення спритності футзалістів і покращення їхніх здібностей до ведення м'яча.

Ключові слова: футзал, вправа на біг поміж трьома конусами з використанням м'яча, високоінтенсивне інтервальне тренування, спритність, здібність до ведення м'яча.

Information about the authors:

Wiranata, Fajar Adi: fajarwiranata151@gmail.com; <https://orcid.org/0009-0003-2116-1006>; Department of Sport Coaching Education, Faculty of Sports and Health Sciences, Universitas Negeri Surabaya, Jl. Lidah Wetan, Lidah Wetan, Kec. Lakarsantri, Kota SBY, Jawa Timur 60213, Indonesia.

Kusuma, I Dewa Made Aryananda Wijaya: dewawijaya@unesa.ac.id; <https://orcid.org/0000-0002-4939-7294>; Department of Sport Coaching Education, Universitas Negeri Surabaya, Jl. Lidah Wetan, Lidah Wetan, Kec. Lakarsantri, Kota SBY, Jawa Timur 60213, Indonesia.

Phanpheng, Yanyong: yanyong.pha@lru.ac.th; <https://orcid.org/0000-0002-9290-2479>; Sports and Exercise Science Program, Faculty of Science and Technology, Loei Rajabhat University, 234 Loei - Chiang Khan Road, Loei 42000, Thailand.

Bulqini, Arif: arifbulqini@unesa.ac.id; <https://orcid.org/0009-0009-6029-5799>; Department of Sport Coaching Education, Faculty of Sports and Health Sciences, Universitas Negeri Surabaya, Jl. Lidah Wetan, Lidah Wetan, Kec. Lakarsantri, Kota SBY, Jawa Timur 60213, Indonesia.

Prianto, David Agus: davidprianto@unesa.ac.id; <https://orcid.org/0000-0002-7199-5397>; Department of Sports Coaching Education, Faculty of Sport Science, Universitas Negeri Surabaya, Jl. Lidah Wetan, Lidah Wetan, Kec. Lakarsantri, Kota SBY, Jawa Timur 60213, Indonesia.

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