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THE EFFECT OF TOUCHING CONES TRAINING ON THE REACTION SPEED OF FUTSAL GOALKEEPERS

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Abstract

This study aims to determine the effect of touching cones training on the reaction speed of futsal goalkeepers at SMA PGRI 2 Palembang. The research method used was experimental with one-group pretest-posttest design involving 6 active goalkeepers. The training program was conducted over 16 sessions, with a frequency of 4 times per week and a duration of 120 minutes per session. The instrument used was a visual reaction test measured using a digital stopwatch. The pretest results showed an average reaction time of 0.385 seconds, while the posttest results improved to an average of 0.22 seconds. The Shapiro-Wilk normality test indicated that the data were normally distributed ($p > 0.05$). The hypothesis test using the t-test resulted in a t-value (t_{count}) of 17.2369 and a t-table value (t_{table}) of 2.571 at a 5% significance level, meaning $t_{count} > t_{table}$, so the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. This indicates a significant effect of touching cones training on improving the reaction speed of futsal goalkeepers. The training has proven effective in enhancing visual response speed to stimuli, which is crucial for goalkeeper performance. This research may serve as a reference for coaches in designing reaction-based training programs for futsal goalkeepers.

Keywords: Touching Cones, Reaction Speed, Futsal Goalkeeper, Futsal

INTRODUCTION

Sports can be defined as an activity that a person does in their life, either as a hobby or professionally with a special training plan like an athlete. People who like sports can do sports every day. The public's passion for sports produces many enthusiasts for certain sports. Big ball games, such as soccer and futsal, are some types of sports that are in great demand today. Both types of physical sports can also be used as hobbies or interests to spend free time (Rizki, 2022).

Futsal is a type of indoor soccer sport that is very technical and requires less playing time to score. Futsal is a dynamic sport where players must keep moving. It also requires good technical skills and perseverance. The techniques used in futsal are almost the same as the techniques used on grass fields. What distinguishes futsal is that players must hold the ball away from their feet because the hard surface of the field makes them have to hold the ball. If the ball is far from their feet and the field is small, opposing players will easily grab the ball (Aka et al., 2024).

Futsal comes from Spanish, namely Futbole De Sala. Which means Futbole is football, Sala is room. So futsal is indoor football. So the definition of Futsal is a

game consisting of 5 Players (including the goalkeeper) and 7 Players on the bench of reserve players. The goal is to score the most goals and win (Aurora & Hananto, 2022). Futsal was discovered and expanded in 1930 (Aurora & Hananto, 2022).¹ Futsal is an invasion game played by two teams of five players, including the goalkeeper.¹¹ The match is played on a field with a smaller ball and goal size compared to football, so each player must move quickly. The team that scores more goals than the opposing team wins the match (Didi Muhtarom et al., 2024). Futsal is a type of indoor soccer officially recognized by FIFA. Futsal has a dynamic and fast game because the field is smaller and there are fewer players. This makes it one of the most popular sports in modern society (Sari et al., 2024).⁴ Futsal is a ball game played by two teams, each consisting of five people. The goal is to put the ball into the opponent's goal, by moving the ball using the feet (Pratiwi & Rahmadani, 2023).¹ Futsal is an indoor ball game, played by two teams, each consisting of five people using ball manipulation techniques with the feet and other body parts besides the hands with the aim of putting the ball into the opponent's goal (Purba et al., 2023).¹⁴ In addition to the five main players, each team is also allowed to have reserve players. Futsal is a dynamic sport, where the players are required to always move and require good technical skills such as passing, control, dribbling and shooting (Pohan & Fernando, 2024). Player equipment, such as shirts, pants, long socks, calf protectors, knee protectors, and goalkeeper elbows, are specifically designed for futsal (Najmudin et al., 2020). In futsal, there are several basic techniques or skills that must be mastered well. The goal is for the game to run smoothly, interestingly and fun. Basic futsal techniques include passing, control, dribbling and shooting (Toha, 2020).

The goalkeeper is a player who is in the last line in the D-area. In this position, he can block the ball with his whole body from attacks by opposing players. Futsal goalkeepers are important players in every match. They must be ready to block the ball from shots from close or long range, either from the right or left front side (Sejati & Ridlo, 2022). A goalkeeper is responsible for guarding the goal and preventing the ball from entering it. In some situations, the goalkeeper can also be involved in attacks (Mauladani et al., 2024). In this case, the ball is distributed to

the defenders through short throws or long kicks to initiate counterattacks. Studies show, for example, that Indonesian national goalkeepers often use hand gestures to signal their teammates to defend (Windoro et al., 2021). The role of a goalkeeper also includes physical and mental components, such as reaction speed, concentration, and courage to face high-risk situations. Therefore, it is very important to provide training that focuses on improving the abilities of goalkeepers so that they can easily handle the pressure in futsal matches (Hamid et al., 2024). One of them is reaction speed.

⁵ Speed is the ability to move limbs, legs, arms, or static parts of the body, even the whole body at the highest speed. Speed is the ability to move quickly (Mardiansyah et al., 2021). Speed is a person's ability to perform the same movement consistently in the shortest time (Hermawan & Sili, n.d.). A person's movement reaction, which occurs briefly, such as moving from place to place, or in the form of movement in place in response to certain movements, is called speed (Lamusu & Lamusu, 2020). In sports, speed also means the ability to respond quickly to stimuli, such as a goalkeeper's reaction to the ball or a player anticipating an opponent's movement (Rizki Amelia, 2024). Several things can affect speed, such as muscle strength and flexibility (Matarani et al., 2024).

³ Reaction is a person's ability to respond to kinesthetic, visual, or auditory stimuli quickly and accurately. Reaction is an important component in sports that affects athlete performance. Quick reaction allows athletes to adapt to changing situations during the match, such as anticipating the movement of opponents or the ball. This is very important in several types of sports, such as futsal, fencing, and soccer (Anwar et al., 2024). These stimuli can be kinesthetic, visual, or auditory, and require athletes to regulate the relationship between muscles and the central nervous system. Reaction, according to research, is an important part of physical training that contributes to athletes' agility, speed, and balance. According to research, reaction is related to coordination between the nervous system and muscles. Various factors, such as the athlete's physical and mental condition, affect reaction (Ismalasari et al., 2024).

Reaction speed is a person's ability to respond to a stimulus quickly. The

stimulus received can be through the organs of sight, hearing, a combination of both, and touch (kinesthetic) (Kristina & Jayadi, 2024). Reaction speed is an important component in futsal, especially for the goalkeeper position. Goalkeepers are required to have fast reaction abilities to anticipate balls from various directions in a short time (Dafid et al., 2023). Reaction speed is one of the important abilities for futsal goalkeepers, considering that this game takes place quickly with limited space. Touching cones training is one effective method to increase reaction speed. This exercise involves rapid movements and intensive changes in direction, helping to improve the body's response to external stimuli (Saputra, 2020). According to research, the touching cones method can have a positive impact on improving futsal goalkeeper reflexes through structured repetitive training (Saputra, 2020). In another study, it was found that this exercise was able to increase reaction time through a whole body reaction test, showing a significant difference between the pre-test and post-test results (Kahfi et al., 2020).

Touching cone training is a physical training method designed to improve reaction speed and coordination through rapid movements of touching certain cones as directed. Coordination is a person's ability to perform movements quickly and precisely (Lestari, 2019). This exercise utilizes visual or verbal stimulation provided by the coach to trigger a quick response from the athlete. This technique is often used in futsal to improve the goalkeeper's response to unexpected game situations (Taufiq & Dewi, 2021). This exercise involves several cones placed in a certain pattern.

METHOD

The research method used in this study is an experimental research method. This study aims to determine the effect of touching cones training on futsal reaction speed. The population in this study were 6 futsal goalkeepers at SMA PGRI 2 Palembang. This study is expected to obtain good results, so the research method used is an experiment. The basics of the experimental method are experimental activities using a pre-test (before being given the implementation and post-test (after being given the implementation) with touching cones exercises.

The population in this study were all futsal goalkeepers of SMA PGRI 2

Palembang students who actively participated in futsal extracurricular activities in the current academic year, totaling 6 people. The sampling technique used total sampling, because the number of futsal goalkeepers at SMA PGRI 2 Palembang is relatively small (6 people). Therefore, all members of the population who meet the criteria will be used as samples. In each study, researchers design research steps that are in accordance with the one group pre-test post-test design research paradigm. The technique used in the collection in this study was by using an initial test and a final reaction speed test which is useful for determining the treatment given to the sample. The instrument used in this study was a visual reaction speed test, which has been validated by experts in the field of sports coaching.

Table 1. Assessment Norms

No	Interval	Category
1	0,001 - 0,100	Special
2	0,101 - 0,200	Very well
3	0,201 - 0,300	Good
4	0,301 - 0,400	Enough
5	0,401 - 0,500	Not enough
6	0,501 >	Less than once

(Rizki, 2022)

RESULT AND DISCUSSION

This research was conducted at SMA PGRI 2 Palembang located at Jl. Ahmad Yani Lr. Gotong Royong 9/10 Ulu Plaju. This research was conducted on futsal goalkeepers who were still active in futsal extracurricular activities at SMA PGRI 2 Palembang on April 9, 2025 to May 9, 2025. The first meeting began on Wednesday, April 9, 2025 by holding an initial reaction speed test (Pretest) which was followed by 6 futsal goalkeepers. Touching cones training was carried out 4 times a week. The implementation of touching cones training on futsal goalkeepers was carried out on Monday, Wednesday, Friday and Saturday starting from 15.00-17.00 WIB, following the futsal extracurricular training schedule at SMA PGRI 2 Palembang.

The training procedure was divided into three stages, namely warming up, core and cooling down. Warming up was carried out in the form of stretching activities. Next, in the core activity, the researcher explained the touching cones

exercise procedure accompanied by examples and demonstrations of the movements. Then, students were given the opportunity to ask questions about the unclear material presented. After that, students carried out the exercise activities as instructed and directed. After doing the core exercise, the next activity was for students to do a cool down movement. And the end of the activity was by providing directions on the exercise activities that had been carried out. The treatment was carried out for 16 meetings, then at the end of the meeting a posttest was carried out. The results are:

Table 2. Distribution List of Initial Test Results (Pretest)

Interval Class	f _i	x _i	x _i ²	f _i x _i	f _i .x _i ²
0,35 - 0,37	2	0,36	0,1296	0,72	0,2592
0,38 - 0,40	3	0,39	0,1521	1,17	0,4563
0,41 - 0,43	1	0,42	0,1764	0,42	0,1764
Σ	6			2,31	0,8919

Based on the initial test (pretest) above, it was stated that there were 2 students who obtained a time of 0.35-0.37 seconds, 3 students obtained a time of 0.38-0.40 seconds, and 1 student obtained a time of 0.41-0.43 seconds.

Table 3. Distribution List of Initial Test Results (Posttest)

Kelas Interval	f _i	x _i	x _i ²	f _i x _i	f _i .x _i ²
0,18 - 0,20	2	0,19	0,0361	0,38	0,0722
0,21 - 0,23	2	0,22	0,0484	0,44	0,0968
0,24 - 0,26	2	0,25	0,0625	0,50	0,1250
Σ	6				0,2940

Based on the final test score data (posttest) above, it states that there are 2 students who get a time of 0.18-0.20 seconds, 2 students get a time of 0.21-0.23 seconds, and 2 students get a time of 0.24-0.26 seconds. So it can be concluded from the results of the initial test (pretest) and the final test (posttest) of the futsal goalkeeper's reaction speed results there is an increase. Furthermore, the data was tested for normality and homogeneity which stated that the data was normal and

homogeneous. Furthermore, hypothesis testing or significant testing was carried out in this study using the t-test statistical test. Based on the results of the t-test conducted on the pretest and posttest values of the futsal goalkeeper's reaction speed at SMA PGRI 2 Palembang, the t-count value was 17.23369 and the t-table value was 2.571 at a significance level of 5% ($\alpha = 0.05$) with degrees of freedom (df) = 5. Because the t-count value is greater than the t-table ($17.23369 > 2.571$), the test decision is to reject H_0 and accept H_1 , thus it can be concluded that there is an effect of touching cones training on the goalkeeper's reaction speed in the SMA PGRI 2 Palembang futsal team. This study is in line with previous theories and findings, in the theory of reaction speed, it is stated that reaction is a person's ability to respond to visual, auditory, or kinesthetic stimuli quickly and accurately (Anwar et al., 2024).

Futsal goalkeepers specifically need this coordination ability because they must be able to read the direction of the ball and respond in a very short time in a narrow and fast playing space (Mauladani et al., 2024). Coordination is a person's ability to perform movements quickly and precisely (Lestari, 2019). (Hermansah, 2018) emphasized that visual-motor coordination-based training plays an important role in developing reaction time and movement precision, which indirectly strengthens the results in this study.

The touching cones training program that researchers applied was special because it was specifically designed to train visual, motor, and cognitive coordination in an integrated manner. This training requires the goalkeeper to respond quickly to stimuli by touching the cone according to the coach's cue, which requires integration between vision, body movement, and decision making in a short time.

CONCLUSION

Based on the results of the research that has been conducted on the effect of touching cones training on the reaction speed of futsal goalkeepers at SMA PGRI 2 Palembang, it can be concluded that touching cones training has a significant effect in increasing the reaction speed of goalkeepers. This is proven through the results of data analysis which show a significant difference in reaction time between

before (pretest) and after (posttest) the treatment is given. The average reaction time before treatment is 0.385 seconds and after treatment it becomes 0.22 seconds, with an average difference of 0.165 seconds. The t-test used in this study produced a t-value of 17.23369 > t-table 2.571 or t-test > ¹²t-table, which means that the null hypothesis is rejected and the alternative hypothesis is accepted. Thus, the hypothesis stating that there is an effect of touching cones training on the reaction speed of futsal goalkeepers at SMA PGRI Palembang can be accepted as true.

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