



The Effect of Reaction Training on Futsal Goalkeeper's Reaction Ability

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Abstract

The background of this research is based on the importance of the role of goalkeepers who are required to have a high reaction speed in responding to stimuli that come quickly and unexpectedly. The use of rugby football as a training medium gives the characteristics of irregular bounces. So that it can provide a more varied reaction stimulus for the goalkeeper in responding to the direction of the ball's arrival. This study aims to analyze the effect of reaski ball training using rugby ball media on improving the reaction ability of futsal goalkeepers. The research method used was quasi-experimental with a pretest-posttest design of one group. The population in this study is 10 UKM futsal goalkeeper athletes at the Sumedang Campus, with a sampling technique using purposive sampling. The instrument used is the Hand Touch Reaction Test to measure the reaction speed. Treatment in the form of reaction ball training using rugby balls was given for 4 weeks with a total of 12 meetings. Data analysis was carried out using a paired sample t-test at a significance level of 0.05. The results showed that the average reaction time decreased from 1.3840 seconds in the pretest to 1.1900 seconds in the posttest. In addition, a significance value of 0.000 ($p \leq 0.05$) was obtained, indicating a significant difference between before and after treatment. Thus, it can be concluded that reaction ball training using rugby ball media has a significant influence on improving the reaction ability of futsal goalkeepers.

How to Cite

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INTRODUCTION

Sport is a physical activity that has an important role in daily life, not only to maintain health and fitness, but also as entertainment, recreational facilities, and competitions. In addition to being beneficial for the physical, exercise can also help increase confidence, train discipline, cooperation, and reduce stress. One of the sports that is currently developing quite rapidly is futsal. Futsal is a game similar to soccer, but it is played on a smaller field and is usually indoors. Futsal games have a fast tempo so players are required to have technical skills, physical condition, concentration, and the ability to make decisions quickly during the match (Spyrou et al., 2021)

One of the sports that is experiencing rapid development is futsal. Futsal is a modified form of football that is played indoors with fewer players. The popularity of futsal in Indonesia continues to increase and is popular in various age groups (Fitanto et al., 2020). Futsal players have quite significant differences compared to football, both in terms of the field, the rules of the game, and the number of players. In futsal, each team consists of five players. With these five players, they must have fast-paced conditions to make a decision in a short period of time (Herlambang et al., 2022). Basic technical skills such as passing, dribbling, and shooting are important aspects that must be a pseudo-futsal player, mastering these techniques will greatly affect the overall effectiveness of the player. In addition, players are also an important factor in creating chances and defending defense (Suryadi et al., 2021) .

Among all players, the goalkeeper has an equally important role as the goalkeeper's job is not only to guard the goal but also to set the flow of play from the backline. Goalkeepers are also required to actively build defense through fast and accurate ball distribution (Kelwou & Matitaputty, 2024). One of the most crucial abilities is reaction speed, which is the ability to respond quickly and precisely, especially to shots that come unexpectedly. In the context of futsal, the goalkeeper's reaction is greatly influenced by visual perception factors, coordination, and quick decision-making in dynamic situations. Research shows that reaction time is an important indicator of goalkeeper performance, as it determines success in anticipating shots from different attack distances and angles (Anticipative et al., n.d.)

Reaction speed is a person's ability to respond quickly and accurately to stimuli in a short period of time. In the context of futsal,

this ability greatly determines the success of the goalkeeper in anticipating the opponent's attack. In addition to physical factors, speed is also influenced by concentration, perception, and decision-making ability (Alias et al., 2024) . To improve the goalkeeper's reaction ability, a specific and directed training program is needed, one of which is through reaction ball training. Repetitive reaction exercises can help the body become more accustomed to responding quickly to situations that arise during a game (Koral et al., 2021) Previous research has shown that reaction-based training can significantly improve goalkeeper response abilities (Herlambang et al., 2022) .

In this study, the training medium used was a rugby ball because it has a different shape and reflection characteristics than a regular ball. Rugby balls tend to produce erratic bounce directions, making training more varied and challenging for goalkeepers. The use of the ball with irregular bounces makes the goalkeeper have to respond to the direction of the ball faster during practice. Research conducted by (Runswick, n.d.) Explain that the use of a ball with unpredictable bounces can help improve the athlete's ability to change the direction of the ball in game situations. In addition, the training approach with various movements and changing situations is also considered to help athletes be better prepared to face fast-paced game conditions (Runswick, n.d.) Therefore, the use of rugby balls in this study was chosen as a variation of reaction training media for futsal goalkeepers.

This condition provides a more complex stimulus for the goalkeeper in anticipating the direction of the ball's arrival. Exercises using unpredictable balls are believed to improve the ability to react, coordinate, and make decisions quickly in dynamic situations. Research in the field of Sports Science shows that a training approach based on variability and uncertainty can improve the motor adaptability of athletes to changes in the game environment. In a study by Ian Renshaw and Keith (Renshaw, Davids, Sullivan, et al., 2022)

Exercise Unpredictable is a practice that goalkeepers cannot predict, both in terms of time and unpredictable direction. In this exercise, goalkeepers are required to quickly make changing decisions quickly and accurately. According to recent research, sports Unpredictable It is designed to mimic the actual conditions of a match where during the start of the match the athlete cannot predict the situation. Therefore, this method is considered effective in improving the reaction,

coordination, and motor skills of goalkeepers to changes in situations (Febby Ardhia et al., 2022). Training with unexpected situations can help improve the athlete's movement response ability. In addition, the research (Koral et al., 2021) It is also explained that the variation of movements in training can help improve the reaction ability of athletes in the face of rapidly changing game situations.

In addition, advanced research in this approach confirms that manipulation of exercise variables (such as unpredictable direction, speed, and bounce of the ball) allows athletes to develop more effective and flexible motion solutions in real-life game situations (Renshaw, Davids, Sullivan, et al., 2022) . Recent studies have also shown that the variability of movements and stimuli in sports contributes to the improvement of perceptual-cognitive abilities as well as the reaction speed of athletes in complex situations (Koral et al., 2021).

However, research that specifically discusses the use of rugby balls as a reaction training medium for futsal goalkeepers is still quite limited. Most previous studies have used more common sports media such as tennis balls or regular reaction exercises. Therefore, this study was conducted to determine the effect of reaction ball training using rugby ball media on improving the reaction ability of futsal goalkeepers, so it is expected to be one of the variations of effective and easy-to-apply training methods.

The novelty of this study comes from a media tool that uses rugby balls to measure the reaction of futsal goalkeepers. In general, reaction exercises are more common using tennis court balls because they are easy to control and have a more stable direction of bounce. Meanwhile, rugby balls have an erratic bounce direction so that the exercises become more varied compared to the usual reaction exercises. Research on the reaction of futsal goalkeepers has indeed been used quite a lot, but in the use of rugby balls as a training media tool it is still rarely used, especially in athletes at the university level. Through this research, he provides a variety of different exercises to help increase the reaction speed of the goalkeeper.

The purpose of this study is to find out the extent to which reaction ball training using rugby ball media tools can have an effect on improving the goalkeeper's ability to react. In addition, this study also aims to look at reaction times in goalkeepers before and after being given a training program during several meetings. Through this research, it is hoped that training using rugby

balls can be one of the effective and applicable variations of training in futsal goalkeeper training programs, especially to train the speed of response to prompts that come quickly and unexpectedly.

METHOD

This research is included in the range of experiments with a quantitative approach because the data in this study is in the form of numbers and analysis using statistics, according to (Juliana et al., 2026) The quantitative approach research focuses more on the use of data in the form of numbers which are then analyzed using statistics. In this way, the results of the study become clearer, measurable, and can be used to describe conditions in a wider population. This approach also helps researchers to organize research more regularly and systematically.

The research design used is the design Pretest-Posttest One Group, which involves one control group. (Hananto & Melini, 2023) explained that this design was included in a quasi-experiment because the study was conducted on only one group with no control group for comparison. In this design, the research subjects are given a pretest, after which it is given in the form of reaction exercises Unpredictable using a rugby ball and ending with a final measurement (posttest) to find out the changes that occur after treatment is given.

The population in this study is all goalkeeper athletes of the Futsal Student Activity Unit (UKM) at the Sumedang Indonesian Education University Campus which totals 10 people aged 18-21 years. Given the relatively small population and the existence of special criteria that must be met, the sampling technique used is purposive sampling. According to (Andrade, 2021) Purposive sampling is a sampling method that is selected based on certain characteristics needed in the study. This technique is used so that the data obtained is more in line with the research objectives and can provide relevant information. In addition, (Lenaini, n.d.) mentioned that purposive sampling is carried out by setting certain criteria for respondents so that the selected sample is truly in accordance with the needs of the research. Therefore, this technique is often used in research that requires specific and more detailed data.

The data collection technique was carried out by measuring the goalkeeper's reaction ability before and after treatment. In the initial stage, a pretest is carried out to determine the initial reaction ability of the research subject. Furthermore, they were given a 4-week training program with a

total of 12 meetings held three times a week. After the training program is completed, a posttest is carried out to measure changes in reaction ability after treatment is given.

The instrument used in this study is the hand touch reaction because it measures the speed of reaction to a given impulse. This test was chosen because it was in accordance with the purpose of the study, which was to see changes in reaction ability after being given training treatment using rugby ball media tools. In its implementation, the subject is asked to respond quickly to a visual stimulus and then touch the cone according to the instructions given. The test results were used to compare reaction times before and after exercise. This instrument has a validity value of 0.656 and a reliability of 0.705 so it can be considered suitable for measuring reaction ability.

Data analysis in the study was carried out to determine the difference in reaction ability before and after treatment. Before the hypothesis test is carried out, an assumption test in the form of a normality test and a homogeneity test must be carried out to determine that the data meets the requirements of parametric analysis. If the assumption is eligible, then the analysis can be continued using parametric statistical tests.

Hypothesis testing can be done using a t-test (a paired sample t-test) to determine the average difference in reaction ability between the pretest and posttest. The test was performed at a level of $\alpha = 0.05$. If the significant value (p-value) ≤ 0.05 , then an alternative hypothesis (H_1) is accepted, which means that a significant effect of reaction ball exercises on the reaction skills of futsal goalkeepers. On the other hand, if the p-value > 0.05 , then the null (H_0) hypothesis is accepted, which means that there is no significant influence.

RESULTS AND DISCUSSION

Table 1. Descriptive Statistics

N	Blank News	Max	Means	SD
10	1,25	1,50	1,3840	0,07720
	1,05	1,30	1,1900	0,07424

Based on the results of the descriptive statistical test, it is known that the average reaction ability of the goalkeeper has decreased from 1.3840 seconds during the pretest to 1.1900 seconds during the posttest. This decrease in reaction time indicates an increase in reaction ability after being given treatment in the form of reaction ball exercises.

Table 2. Normality Test

Shapiro-Wilk		
Statistics	df	Signs
.979	10	.958
.967	10	.866

Based on **Table 2** of Shapiro Wilk's pretest results, the pretest produced a statistical value of 0.979 with a df of 10 and a significance of 0.958. These results showed that the pretest group was normally distributed because of ($p > 0.05$). Then in the posttest group, it had a statistical value of 0.967 with a df of 10 and a significance of 0.866. This data is also usually distributed with ($p > 0.05$).

Table 3. Paired Sample Test

Installation Differences				t	df	Sign 2
Std De- viation	Std. Signi- ficant error	95% Confidence Interval Difference				
		Lower	Top			
0,00966	0,00306	0,18709	0,20091	63,501	9	<.001

The results **Table 3** of this study show that reaction ball training using rugby ball media has a significant influence on improving the reaction ability of futsal goalkeepers. This can be seen from the decrease in the average reaction time from 1.3840 seconds at the time of the pretest to 1.1900 seconds at the time of the posttest. The decrease in reaction time showed that after undergoing a training program for 12 meetings, goalkeeper athletes were able to respond more quickly to the stimuli given during the test.

The increase in reaction ability occurs because the rugby balls used in training produce irregular and unpredictable bounce directions. This condition forces the goalkeeper to constantly adjust to changes in the direction of the ball and respond quickly in a short period of time. In futsal matches, goalkeepers often face unexpected situations, especially from sudden kicks, bouncing balls, or sudden changes in the direction of the ball. Therefore, rugby ball training can simulate match situations more realistically than regular ball training.

Repeated unpredictable exposure to stimuli during the exercise process also contributes to improved perceptual and cognitive responses. Goalkeepers are required not only to react physically, but also to process visual information quickly, make decisions, and coordinate body movements simultaneously. According to (Renshaw, Davids, O'Sullivan, et al., 2022), 1QAStra-

ning with varied and uncertain situations can improve the adaptability and movement response of athletes in a dynamic sports environment. The theory supports the results of this study, where the unpredictable characteristics of rugby help goalkeepers develop a faster response to reactive situations.

In addition, the results of this study are also in line with the research conducted by (Febby Ardhia et al., 2022). which explains that unpredictable training methods can improve the ability of athletes' movement responses. This study strengthens the previous findings because the increased reaction was observed specifically in futsal goalkeepers using rugby ball media. The significant improvement also shows that reaction training not only impacts physical readiness, but also improves concentration, anticipation, and coordination that are crucial in goalkeeper performance.

The statistical results also support the effectiveness of the exercise program given. The paired sample t-test showed a significance value of $p = 0.000$ ($p \leq 0.05$), which means that there was a significant difference between the pretest and posttest results. This shows that the treatment given during the training program has a measurable impact on the goalkeeper's reaction ability. The relatively low standard deviation values in the pretest and posttest results also showed that the improvement experienced by participants tended to be consistent after following the training program.

Although the results of the study show a positive influence, this study still has some limitations. The study only involved 10 participants and did not use a control group, so the results of the study could not be generalized widely. In addition, the research instrument only focused on measuring reaction speed and had not evaluated other components of goalkeeper performance such as decision-making accuracy, agility, and performance during matches. At the beginning of training, some participants also had difficulty adjusting to the direction of the irregular bounce of the rugby ball, so an adaptation process was needed before athletes could benefit from the training optimally.

Overall, the results of this study show that reaction ball training using rugby ball media is effective in improving the reaction ability of futsal goalkeepers. The characteristics of rugby balls that have irregular bounces provide a more varied stimulus that helps goalkeepers react faster and adapt better to dynamic game situations. Thus, this training method can be used as an alternative

to innovative training variations in futsal goalkeeper training programs, especially to increase the speed of reaction and response to match situations.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that reaction ball training affects the reaction ability of futsal goalkeepers. This is shown by the decrease in the average reaction time from 1.3840 seconds at the time of the pretest to 1.1900 seconds at the time of the posttest. The time decrease shows that after being treated, the goalkeeper is able to respond to signals faster than before joining the training program.

The results of the hypothesis test using a paired sample t-test also strengthened the findings, with a p value of 0.000 ($p \leq 0.05$) indicating a difference in reaction ability before and after treatment. Thus, reaction ball practice using rugby balls can help increase the response speed of futsal goalkeepers, which is one of the important parts in dealing with fast-paced game

In addition, the use of rugby ball media that has erratic bounces can provide a different boost than a regular ball. With varying ball bounces, goalkeepers are required to respond to the direction of the ball faster during practice. With repeated training, goalkeepers are more accustomed to responding quickly to the impulses given, so reaction ball training using rugby balls can help improve the reaction ability of futsal goalkeepers. This makes training not only focus on the physical aspect, but also develop the cognitive and perceptual aspects needed in the modern game of futsal.

Thus, it can be concluded that the application of reaction ball drills, especially in combination with unpredictable media, is an effective and relevant method to improve the reaction ability of futsal goalkeepers. The results of this research are expected to be a reference for coaches and sports practitioners in designing training programs that are more varied, innovative, and in accordance with the demands of the game. In addition, further research is recommended to further examine the comparative effectiveness of different types of training media to obtain the most optimal method in improving goalkeeper performance.

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