



P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIIF): 5.38
IJPESH 2024; 11(5): 226-229
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<https://www.kheljournal.com>
Received: 14-06-2024
Accepted: 23-07-2024

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The effect of training using tennis balls and size 2 balls on the reaction ability of soccer goalkeepers

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DOI: <https://doi.org/10.22271/kheljournal.2024.v11.i5d.3519>

Abstract

Background and Research Objectives: Physical components in goalkeepers are agility, reaction, strength, flexibility, power. Goalkeepers need reaction ability to make saves to be conceded. This study aims to determine the effect of training using tennis balls and training using size 2 balls on improving the reaction ability of soccer goalkeepers.

Materials and Methods: This research is an experiment that uses a Two-Group Pretest-Posttest Design research design. The subjects in this study were goalkeepers of UNY soccer school aged 10-14 years. The sampling technique in this study used total sampling technique. The subjects in this study amounted to 12 goalkeepers. The statistical analysis technique used the Statistical Package for Social Science (SPSS) version 26 software. To test the hypothesis using the t-test, before testing the hypothesis first conduct a prerequisite test.

Results

1. There is a significant effect of training using tennis balls on the goalkeeper's reaction ability with the acquisition of a t-count value of 3.071 and a significance value of 0.028 probability.
2. There is a significant effect of training using size 2 balls on the goalkeeper's reaction ability with the acquisition of a t-count value of 3.871 and a significance value of 0.012 probability.

Conclusion: Further researchers who are interested in examining the goalkeeper's reaction ability, then this study can be used as a reference to help researchers in examining the effect of training on goalkeeper reaction ability. However, this research is still only limited to training variables using tennis balls and size 2 balls. Therefore, it is hoped that future researchers can examine the effect of other exercises on the ability of goalkeepers.

Keywords: Training, tennis ball, size 2 ball, goalkeeper, soccer, reaction

1. Introduction

Football is a game played by two teams, each team consisting of 11 players and led by 1 referee, 2 assistant referees and 1 fourth official. According to Bozkurt, Çoban, and Demircan (2020) ^[3] Football is a team game where each player has their own duties such as defenders, midfielders, attackers, and goalkeepers. According to Hamsah (2004) ^[6] Football is a team game that involves 4 elements, namely physical, technical, tactical, and mental. All of these elements are interrelated, so this is where the coach's job is to be able to improve physical, technical, tactical and mental abilities. Team and individual success in facing opponents depends on the ability of these elements.

In a soccer game there are various positions including attackers, midfielders, defenders, goalkeepers. Each position has its own role in the game, such as the goalkeeper has a role to keep the goal from conceding. According to FIFA the goalkeeper is a key position in football that requires special attention and a dedicated program. To be a successful goalkeeper, it is imperative that a goalkeeper must carry out training on technique, physicality, tactics and also personal values such as confidence, character and assertiveness which all need to be taught from an early age. the goalkeeper position is a unique and integral part of soccer and shows that goalkeeping requires a high level of proficiency in a variety of complex actions(Otte, Millar, and Klatt 2020) ^[12].

One of the important factors to become a professional soccer player in achieving achievement, in addition to mastery of technique, tactics, and mentality is physical condition (Musrifin &

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Bausad, 2020) [10].

The physical condition of professional soccer players to reach peak performance through programmed and well-progressed training starting from an early age based on the basic principles of physical condition training according to a predetermined age. (Wildan, and Widiawati 2023) [19]. To reach the peak of achievement in football, a good physical condition is needed by carrying out programmed and progressive training based on the principles of training starting at an early age.

Exercise is a process that is carried out systematically and repeatedly with a progressive increase in load. In line with the opinion (Arbain, 2017) [1] exercise is a form of exercise that is planned regularly, following certain patterns and systems, carried out with systematic methods, and repeated repeatedly. Exercise aims to change movements that are initially difficult to become not difficult, then automatic, and reflective so that the movement becomes efficient. For the context of specialist soccer goalkeeper training, it is generally advocated that repetition of relevant skills in training is the only way to consistently improve ability (Otte *et al.* 2020) [14].

Some of the principles of training involve active participation in training, all-round development, specialization, individualized approach, variety, models in the training process, and increasing loads (Bompa and Buzzichelli. 2019) [4]. Meanwhile, Sukadiyanto (2010) [18] presents training principles such as readiness, individualization, adaptation, overload, progressive, specific, variation, warm-up and cool-down, long-term training, the principle of opposites, moderation, and systematic. These training principles include basic concepts such as the load given should exceed the current capacity (overload principle), overall development of physical aspects, specialization according to goals, individual approach, intensity and quality of exercise that are considered, variation to prevent boredom, and a systematic approach in planning and implementing training.

Goalkeepers must have good physical fitness, namely flexibility and mobility, balance and coordination, agility, speed/reaction, and strength (Wildan A. 2023) [19]. In line with Timo's opinion (2014) [17] some physical components in goalkeepers are agility, reaction, strength, flexibility, power. In soccer, goalkeepers have a unique and important role in the team, which requires timely and explosive adjustments to speed, position, and body orientation in response to a stimulus. (Ibrahim *et al.* 2019) [7]. Based on the above opinion, guards need reaction skills to make saves so as not to concede. To achieve good reaction skills, goalkeepers need to go through programmed and progressive training. Based on the reality in the field by conducting observations and interviews conducted with the head coach and goalkeeper coach, that UNY soccer school goalkeepers have difficulty in making saves due to poor reaction skills, as well as a lack of training variations to improve goalkeeper reaction skills.

Reaction speed is the ability of the athlete's organism to answer a stimulus as quickly as possible in order to achieve the best possible results. Reaction speed can be interpreted as a body movement that a person makes to respond to a stimulus as quickly as possible (Deviyanto, E., 2020) [5]. Reaction speed is a human skill that produces a response after receiving a stimulus. One of the elements that every football and futsal goalkeeper must have is to have good reaction speed. Reaction speed has a very significant role in several sports, such as athletics, volleyball, soccer, and others.

Based on the facts in the field and the explanation above, it is certainly interesting to study and research deeper, therefore

researchers are very interested in conducting research on the effect of training using tennis balls and size 2 balls on the reaction ability of soccer goalkeepers. The results of the study are expected to provide information and suggestions for coaches and players who need training methods to improve the reaction ability of goalkeepers who are good and right.

This study aims to determine the effect of training using tennis balls and training using size 2 balls on improving the reaction ability of soccer goalkeepers.

2. Materials and methods

2.1 Participants

The subjects in this study were UNY soccer school goalkeepers aged 10-14 years. The sampling technique in this study using total sampling technique. The subjects in this study amounted to 12 goalkeepers.

2.2 Research Design

This research is an experiment that uses a Two-Group Pretest-Posttest Design research design. The research subjects were divided into two groups, where one group received treatment with a training method using a tennis ball that was hit using a tennis racket, while the other group received treatment with a training method using a size 2 ball that was thrown. Suharsimi Arikunto's opinion (2002, p. 272) [2] experimental research is research that is intended to determine whether or not there is an effect of something imposed on the investigated subject. The group in this study was given a Pretest and Posttest. The data collection technique in the study used a hand touch reaction test to measure the goalkeeper's reaction speed.

2.3 Statistical Analysis

The statistical analysis technique used the Statistical Package for Social Science (SPSS) version 26 software. To test the hypothesis using the t-test, before conducting the hypothesis test, first conduct a prerequisite test. The statistical p-value level was set at p-value <0.05.

3. Results & Discussion

3.1 Descriptive Statistics

Descriptive statistical results of pretest posttest training variables using tennis balls and training variables using size 2 balls can be seen in table 1.

Table 1: Descriptive Statistics of Training Using Tennis Balls and Size 2 Balls

Variables	Mean	±	Std. Deviation
Pretest Exercise Using Tennis Balls	1,40	±	,16
Posttest Exercise Using Tennis Balls	1,30	±	,09
Pretest Exercise Using Size 2 Ball	1,37	±	,10
Posttest Exercise Using Size 2 Ball	1,29	±	,08

Based on table 1 above, the pretest training data using tennis balls (1.40±0.16), Posttest training using tennis balls (1.30±0.09), pretest training using size 2 balls (1.37±0.10), posttest training using size 2 balls (1.29±0.08).

3.2 Normality Test

The normality test was performed using the Shapiro-Wilk test. In this test, the hypothesis being tested is whether the sample comes from a population with a normal distribution. The decision to accept or reject the hypothesis is made by comparing the Asymp. Sig value with 0.05. If the value of Asymp. Sig > 0.05, then the hypothesis is accepted, but

otherwise if Asymp. Sig < 0.05 is rejected.

Table 2: Normality Test Results

Variable	Sig.	Description
Reaction Speed Test	0.107	Normal

Based on table 2 above, it can be seen that the acquisition of a normality test with an Asymp.sig value of $0.107 > 0.05$, so based on the basis of the Shapiro-Wilk test decision making, it can be stated that the data is normally distributed.

3.3 Homogeneity Test

Homogeneity test is needed to ensure that the sample groups come from a homogeneous population. The homogeneity test was conducted using the F test on the pretest results of both groups.

Table 3: Homogeneity Test Results

Variable	Sig.	Description
Reaction Speed Test	0.906	Homogeneous

Based on the homogeneity test, it can be stated that the reaction speed test data is homogeneous with the acquisition of an Asymp.sig value of $0.906 > 0.05$.

3.4 Hypothesis Test Results

The hypotheses were tested with a t-test utilizing SPSS 26 software, which involves comparing the means between group A and group B. If the value of the calculated $t <$ the value of the t table, then H_a is rejected, otherwise, if the value of the calculated $t >$ the value of the t table, H_a is accepted.

Table 4. Hypothesis Test Results (t-test)

Variable	t-count	t-table	Sig. (2-tailed)	Mean Difference
Pretest-posttest Tennis ball	3,071	2,571	0,028	0,10
Pretest-posttest Ball size 2	3,871	2,571	0,012	0,07

Based on the hypothesis test results in table 4, it can be explained as follows:

Training using tennis balls obtained a t-count value of $3.071 > 2.571$ t-table value with a probability significance level of $0.028 < 0.05$ then H_0 is rejected, H_a is accepted. It can be concluded that training using tennis balls has a significant effect on the reaction ability of soccer goalkeepers. When viewed at the mean difference of 0.10 and the pretest mean of 1.40. This difference reflects an increase of 7.14% from the initial value (pretest of training using tennis balls). This means that training using tennis balls has a positive impact on the goalkeeper's reaction ability.

Training using size 2 balls obtained a t-count value of $3.871 > 2.571$ t-table value with a probability significance level of $0.012 < 0.05$ then H_0 is rejected, H_a is accepted. It can be concluded that training using size 2 balls has a significant effect on the reaction ability of soccer goalkeepers. When viewed at the mean difference of 0.07 and the pretest mean of 1.36. This difference reflects an increase of 5.22% from the initial value (pretest training using ball size). This means that training using size 2 balls has a positive impact on the goalkeeper's reaction ability.

3.5 Discussion

Referring to the research that has been carried out, the results show a significant effect after being given the treatment of

training with tennis balls on improving the reaction ability of soccer goalkeepers by 7.14%. In line with Arbain's research (2017) [1] training using tennis balls has a significant and positive effect on the reaction ability of soccer goalkeepers. Training using tennis balls can be an exercise that the coach applies to improve the reaction ability of soccer goalkeepers because it has a higher level of difficulty with a smaller ball size.

Based on the research that has been carried out, the results show a significant effect on improving the reaction ability of soccer goalkeepers by 5.22%. Training using size 2 balls can be a training program applied by the coach to improve the reaction ability of football goalkeepers, because with a smaller ball size than the ball used during the match so that it has a higher level of difficulty.

Goalkeepers need timely movement, explosive speed, position, and orientation in response to a stimulus quickly with a good level of focus, perception and cognition to make movements such as dives towards the target effectively and efficiently (Deviyanto, E., 2020) [5]. Reaction speed is the shortest time needed to provide a kinetic answer after receiving a stimulus (Deviyanto, E., 2020) [5]. goalkeeper reaction ability is the goalkeeper's response to stimuli in the form of attacks coming from the opposing team towards the goal. The goalkeeper's reaction ability is very influential on the goalkeeper's performance in warding off and saving the net from conceding. Therefore, goalkeepers need training that is carried out systematically repeatedly and increases the load of each exercise. training is a process of practicing that is carried out systematically and repeatedly with the loading given in an increasing manner.

Based on the findings of the study, it appears that both types of training, namely with tennis balls and using size 2 balls, can be integrated or done alternately as part of a progressive training program. This approach aims to provide a variety of training difficulty levels, but both contribute significantly to improving reaction abilities as well as goalkeeping skills.

4. Conclusion

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that: (1) There is a significant effect of training using tennis balls on the goalkeeper's reaction ability with the acquisition of the t-count value of 3.071 and a significance value of 0.028 probability. (2) There is a significant effect of training using size 2 balls on the goalkeeper's reaction ability with the acquisition of a t-count value of 3.871 and a significance value of 0.012 probability. Further researchers who are interested in examining the goalkeeper's reaction ability, then this study can be used as a reference to help researchers in examining the effect of training on goalkeeper reaction ability. However, this research is still only limited to training variables using tennis balls and size 2 balls. Therefore, it is hoped that future researchers can examine the effect of other exercises on the ability of goalkeepers.

6. Acknowledgments

The authors are very grateful to the participants in the study for providing written informed consent, as well as to the coaches for allowing the authors to conduct the study on their premises and for the information provided.

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