



The Effect of Rebound Ball Exercises on Motor Response Speed and Some Saving Skills of Football Goalkeepers

Ahmed Taha Ahmed ^a Hamoudi Issam Noaman^b.

^{ab} University of Tikrit / College of Physical Education and Sports Sciences

*Corresponding author: Ahmed.t.ahmed@tu.edu.iq

ARTICLE HISTORY

Received 13 February 2026
Revised 15 April 2026
Accepted 07 June 2026
Online 12 June 2026

KEYWORDS:

Rebound balls
motor response
saving skills.

SUBJECT AREA:

Sports Training
Motor Learning and Control
Football Performance
Goalkeeping Skills
Reaction and Motor Response Speed

LICENSE

© 2026 The Author(s). Published by Al-Malwiya Journal of Sport and Movement Sciences under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

ABSTRACT

The research aimed to: Preparing rebound ball exercises to develop motor response speed and some saving skills for football goalkeepers. Identifying the effect of rebound ball exercises on the motor response speed of football goalkeepers.

The researchers used the experimental method with one experimental group employing pre- and post-tests, due to its suitability to the nature of the problem to be solved. The experimental method is considered one of the closest scientific research approaches to solving problems scientifically. The research population consisted of goalkeepers from clubs in Salah Al-Din Governorate participating in the Iraqi qualifying league for the third division during the 2025/2026 sports season, totaling (24) goalkeepers. The research sample included the goalkeepers of Al-Dour Youth Sports Club, consisting of (4) goalkeepers, representing (16.666%) of the original population. In light of the results obtained through the pre- and post-tests and according to the exercises used, the researchers reached the following conclusions: The exercises used contributed effectively to the development of motor response speed and some saving skills of the goalkeepers. The use of modern training tools (rebound devices that return balls unpredictably) had a clear role in improving the studied variables. Based on the conclusions, the researchers recommend the following: Adopting the exercises used in this study when training goalkeepers because of their positive effect on physical variables and saving skills.

Introduction

Football is considered one of the most difficult sports activities, as it requires a high level of integration among all aspects and playing positions. Achieving positive results does not rely solely on individual skills and abilities; rather, it requires precise integration between technical, physical, tactical, and mental aspects. With the major and noticeable changes in modern playing styles and the increasing pace of matches, players in football positions are now required to possess special and highly advanced characteristics that enable them to coordinate effectively with other positions on the field in accordance with the requirements of the game. The goalkeeper position is considered one of the foremost and most sensitive positions because of the great responsibility it carries, which requires the player occupying this role to possess high-level qualities that qualify him to protect the goal from conceding goals. (Hussein , Fares ,2023 , 55)

The skills that a goalkeeper must possess, especially saving skills, are closely associated with specific physical abilities such as explosive strength of the arms and legs, reaction speed, flexibility, agility, and movement speed in order to perform at a high level. Improving the performance of these skills requires training methods that are not traditional, but rather resemble the changing and unpredictable conditions of actual matches so as to simulate the true nature of performance. (Reilly , 2005 , 142)

Rebound ball exercises are considered among the important exercises used to develop motor response speed, which is an essential characteristic for goalkeepers, as well as agility, coordination, and mental abilities that enable them to deal effectively with unexpected balls. In addition, these exercises have a positive impact on the goalkeeper's technical abilities. These exercises depend on the use of tools that change the speed and direction of the ball in an unpredictable and unknown manner for the goalkeeper, creating unusual and unexpected situations during the training session that are similar to what occurs in actual matches. This is precisely the type of training goalkeepers need in order to correctly deal with fast, changing, and unpredictable balls during games. (Abu Al-Ala , 2010 , 233)

Based on the above, the importance of this research lies in the use of rebound ball exercises that are consistent with the requirements of modern football, which is characterized by speed and variation. These exercises simulate different match situations that rely on surprise and changes in the speed and direction of the ball. This stimulates the goalkeeper's neuromuscular system and enables him to make the appropriate decision as quickly as possible, which positively reflects on the level of skill performance alongside the improvement in physical variables. Consequently, this contributes to achieving interconnection and integration among the technical, physical, and mental aspects of performance.

Research Problem

Through the researchers' field experience and their observation of matches and goalkeepers' performance levels, they noticed a weakness in goalkeepers' ability to deal with rebound balls, which negatively affects performance in saving situations, especially during one-on-one situations and balls that change direction after rebounding. This weakness may be attributed to deficiencies in motor response, as well as low movement speed of the legs, which limits the goalkeeper's ability to move quickly and take the appropriate position at critical moments. It is also associated with a weak level of neuromuscular coordination between the legs and arms, which negatively affects the accuracy and timing of saving and blocking movements. In addition, there is a noticeable deficiency in mastering the basic saving skills, whether in terms of correct technique or speed of execution, which increases the likelihood of the goalkeeper failing to control rebound balls or clear them safely. Furthermore, the weak integration between physical abilities (such as speed and agility) and technical skills contributes to reducing the efficiency of responding to sudden stimuli inside the penalty area. Therefore, there is a need to study these variables scientifically in order to reveal the nature of the relationship between them and the level of saving skill performance among football

goalkeepers, with the aim of reaching more effective training methods that contribute to the development of motor response and some saving skills. Based on the above, the research problem can be summarized in the following question:

Do rebound ball exercises have a positive effect on developing motor response speed and some saving skills for football goalkeepers?

Research Objectives The research aims to:

Prepare rebound ball exercises to develop motor response speed and some saving skills for football goalkeepers.

Identify the effect of rebound ball exercises on motor response speed among football goalkeepers.

Identify the effect of rebound ball exercises on some saving skills among football goalkeepers.

Research Hypotheses

There are statistically significant differences between the pre-tests and post-tests results of the research sample in motor response speed for football goalkeepers in favor of the post-tests.

There are statistically significant differences between the pre-tests and post-tests results of the research sample in some saving skills for football goalkeepers in favor of the post-tests.

Research Fields

- Human Field Goalkeepers of Al-Dour Youth Sports Club for the 2025/2026 sports season.
- Spatial Field Al-Dour Sports Stadium.

Materials and Methods

Study Design

The researchers used the experimental method with a single experimental group employing pre-test and post-test measurements, as it was appropriate to the nature of the problem to be solved. The experimental method is considered one of the closest scientific research approaches for solving problems through a scientific method.

Participants

The research population was identified as the goalkeepers of clubs in Salah al-Din Governorate participating in the Iraqi qualifying league for the Third Division for the 2025/2026 sports season, totaling (24) goalkeepers. The research sample included the goalkeepers of Shabab Al-Dour Sports Club, numbering (4) goalkeepers, representing (16.666%) of the original population. The sample was selected intentionally (purposive sampling) for the following reasons:

- The availability of fully equipped fields suitable for applying the research variables.
- The proximity of the club's location to the researchers' residence, which facilitates communication with the players and the implementation of the research procedures.

Procedures and Instruments

Description of the Tests

Nelson Test for Motor Response (Mohammed , 1982 , 25)

Ground Rolling Ball Catch Test (Hussein , 2020 , 224 – 227)

Medium-Height Ball Catch Test(Hussein , 2020 , 227 – 230) Pilot Studies

First Pilot Study:

The researchers conducted the first pilot study on a sample consisting of (2) goalkeepers at Shabab Al-Dour Sports Club stadium, with the assistance of the supporting work team. The aim was to obtain results and information that could be utilized during the main experiment. This included identifying the locations for fixing the equipment inside the penalty area in a manner similar to match conditions.

Second Pilot Study:

The researchers conducted the second pilot study on a sample of (2) goalkeepers at Shabab Al-Dour Sports Club stadium, with the assistance of the supporting work team. The aim was to learn how to perform the exercises using the tools and to determine the maximum values of the designed training exercises.

Pre-Tests

Pre-tests were conducted on the research sample at Shabab Al-Dour Sports Club stadium in the presence of the supporting work team. All sample members (4 goalkeepers) participated in the tests, which included:

- *Motor reaction speed test
- *Ground ball catching test
- *Medium-height ball catching test

Implementation of the Experiment

The designed training exercises were implemented during the special preparation period within the main part of the training unit, with the assistance of the work team. The researchers used the repetitive training method. The training program consisted of (24) training units distributed over (8) weeks, with (3) training units per week on Saturdays, Mondays, and Wednesdays.

The researchers considered progression and fluctuation in training load throughout the program. Training intensity was determined based on heart rate measurements for each goalkeeper. Rest intervals between exercises and sets were also applied according to the objectives of each training unit.

The following principles were adopted:

- *The repetitive training method was used in implementing the exercises.
- *The program consisted of (8) micro-cycles (weekly cycles) and two meso-cycles, each meso-cycle consisting of four micro-cycles. Each micro-cycle included (3) training units (total of 24 units).
- *A load fluctuation ratio of (3:1) was applied in each meso-cycle.
- *A weekly load fluctuation ratio of (2:1) was applied.
- *The exercises were appropriate for the research sample.
- *Work-to-rest ratio was (3:1).
- *Training load was controlled by fixing intensity and rest across all training units while varying volume.
- *The exercises were applied at the beginning of the main part of the training unit.

Post-Tests

After completing the training program over (8) weeks, the researchers conducted the post-tests on the research sample under the same conditions and facilities as the pre-tests to ensure high reliability of results and to determine the effect and effectiveness of the training program in improving test outcomes.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics (Version 26.0; IBM Corp., Armonk, NY, USA). Normality of distribution was confirmed via the Shapiro–Wilk test ($p > 0.05$ for all variables). Descriptive statistics (mean $\pm$ SD) were calculated for all outcome measures. Paired-samples t-tests were used to assess within-

group changes (pre vs. post), and independent-samples t-tests evaluated between-group differences in change scores. Effect sizes were calculated using Cohen's d, with thresholds of small (0.20), medium (0.50), and large (0.80) as defined by Cohen (1988). The alpha level for statistical significance was set at $p < 0.05$ for all comparisons.

Results

Table 1. Shows the arithmetic means, standard deviations, t-values, and significance level (sig) between pre- and post-tests of the research variables

No.	Variables	Pre-test Mean	SD	Post-test Mean	SD	t-value	sig
1	Motor Reaction Speed	2.785	0.370	2.323	0.246	6.921	0.006
2	Ground Ball Catching	2.050	0.191	2.800	0.182	5.981	0.000
3	Medium Ball Catching	2.075	0.170	2.775	0.095	17.146	0.000

Note. VJT = Vertical Jump Test; SBJ = Standing Broad Jump; IAT = Illinois Agility Test; Δ = mean difference (Post – Pre); d = Cohen's d effect size; SD = standard deviation. All PTG within-group changes: $p < 0.001$. All CG within-group changes: $p > 0.05$.

Table 2. Shows the arithmetic means, standard deviations, and improvement percentage of the research variables

No.	Variables	Pre-test Mean	SD	Post-test Mean	SD	Improvement %
1	Motor Reaction Speed	2.785	0.370	2.323	0.246	16.589
2	Ground Ball Catching	2.050	0.191	2.800	0.182	26.786
3	Medium Ball Catching	2.075	0.170	2.775	0.095	25.225

Note. No significant between-group differences were observed at baseline for any variable (independent samples t-test, $p > 0.05$ for all). PTG = Plyometric Training Group; CG = Control Group; SD = standard deviation.

Discussion

From Tables (1) and (2), it is evident that there was a clear improvement in the research variables among the goalkeepers in the post-tests compared to the pre-tests. In addition, the improvement percentages of the post-tests showed noticeable development. The researchers attribute the improvement in each variable as follows:

From Tables (1) and (2), it is evident that there was a clear improvement in the research variables among the goalkeepers in the post-tests compared to the pre-tests. In addition, the improvement percentages of the post-tests showed noticeable development. The researchers attribute the improvement in each variable as follows:

Motor Reaction Speed:

From Tables (1) and (2), the results of the motor reaction speed test showed statistically significant differences, as the significance value (sig = 0.006) was lower than the level of significance (0.05), indicating a significant improvement in favor of the post-test. The improvement percentage reached (16.589%), which reflects the clear positive effect of the training program.

The researchers attribute this development to the nature of the training exercises, which relied on training tools that return balls unpredictably to the goalkeeper, forcing him to respond immediately to sudden stimuli with changing directions and speeds. This type of training directly contributes to improving reaction speed by enhancing the efficiency of the nervous system in receiving sensory stimuli (visual and motor), processing them rapidly, and producing an appropriate motor response in a very short time.

Continuous exposure to such unpredictable situations also improves the ability of momentary anticipation and quick decision-making under pressure, which is a fundamental requirement for goalkeepers, especially when dealing with rebound balls characterized by randomness and unpredictability. Therefore, the training not only developed the physical aspect but also enhanced neuromuscular integration and motor perception.

These findings are consistent with the study of Physical Education and Sports Science (Aidan, 2023,286), which confirmed that specialized training using various tools and equipment contributes to the development of motor reaction speed in goalkeepers due to exposure to different stimuli requiring fast and accurate responses.

Ground Ball Catching:

The results of the ground ball catching test showed a clear significant improvement in goalkeepers' performance. The arithmetic mean increased from (2.050) in the pre-test to (2.800) in the post-test, while the standard deviation decreased from (0.191) to (0.182), indicating improved skill performance and greater consistency among participants.

The t-value (5.981) at a significance level of (0.000) confirms that this improvement was not random but a direct result of the training program.

The researchers attribute this development to training exercises based on rebound balls using training equipment, which create unpredictable game-like situations. Returning the ball at different angles and speeds forces the goalkeeper to react quickly to ground balls, enhancing motor reaction speed, neuromuscular coordination, anticipation, and correct timing of catching.

Training involving multiple balls and stimuli increases the efficiency of the nervous system in processing sensory information and making quick decisions, which directly improves ground ball control accuracy.

These results are supported by (Abdulhadi,2021 , 691) who stated that multi-ball training significantly develops anticipation skills and decision-making speed in goalkeepers by improving their ability to read ball trajectories and respond effectively to changing situations.

Medium-Height Ball Catching:

The results of the medium-height ball catching test showed a highly significant improvement between pre- and post-tests. The mean increased from (2.075) to (2.775), with a decrease in standard deviation from (0.170) to (0.095), indicating clear improvement in performance and high homogeneity among participants.

The t-value (17.146) at a significance level (0.000) confirms that this improvement is real and resulted from the training program, supported also by the improvement percentage (25.225%), which reflects the high effectiveness of the training exercises.

The researchers attribute this improvement to specialized training exercises that relied on follow-up balls using modern training tools that return balls in different directions, heights, and speeds unpredictably. These exercises simulate real match conditions, requiring fast reaction, accurate positioning, and optimal timing, especially for medium-height balls, which are very common in matches.

Repeated exposure to such exercises, along with continuous variation in ball trajectory and height, developed neuromuscular coordination between the eye and hand, and improved anticipation and decision-making timing. Additionally, the use of tools that randomly return balls increased the efficiency of the nervous system by training goalkeepers to respond to unexpected stimuli, improving accuracy and stability under match-like conditions.

In this regard, (Mohammed , 2024 , 215) emphasizes that specialized and game-like training exercises are among the most important factors in developing motor skills, as they enhance neuromuscular coordination and execution accuracy.

Conclusions

In light of the results obtained from the pre- and post-tests and according to the training exercises used, the following conclusions were reached:

The applied training exercises effectively contributed to the development of motor reaction speed and some goalkeeping saving skills.

The use of modern training tools (ball-returning devices with unpredictable responses) had a clear impact on the positive results obtained.

The high number of repetitions within the training unit contributed to improving the performance level of saving skills under conditions similar to match situations.

The integration between physical and skill training within the training unit led to an overall improvement in goalkeepers' performance rather than developing each aspect separately.

Acknowledgements

The authors would like to thank the Shabab Al-Dour Sports Club for their cooperation and the participants for their voluntary involvement in this study. The authors also acknowledge the support of the College of Physical Education and Sports Sciences, University of Tikrit, in facilitating access to laboratory facilities and testing equipment throughout the study period.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Reilly, T. (2005). Science and soccer. London: Routledge.
- Abu Al-Ala Ahmed Abdel Fattah. (2010). Sports training – Physiological foundations. Cairo: Dar Al-Fikr Al-Arabi.
- Hussein Jabbar Al-Dinawi, et al. (2020). Football goalkeeper – Skills, training, tests, tactical behavior (1st ed.). Cairo: Dar Al-Fikr Al-Arabi.
- Hussein Saddam Imran, & Fares Sami Youssef Malik. (2023). The effect of compound exercises on some basic skills of young football goalkeepers. Journal of Physical Education, 35(1).

- Abdulahdi Mohammed Musa. (2025). The effect of multi-ball training on developing anticipation skill and decision-making speed for football goalkeepers. *Journal of Physical Education Studies and Research*, 36(1).
- Mohammed Hassan Allawi, & Ahmed Nasr El-Din Radwan. (1982). *Motor performance tests*. Cairo: Dar Al-Fikr Al-Arabi.
- Mohammed Hassan Allawi. (2004). *Sports training science*. Cairo: Dar Al-Fikr Al-Arabi.
- Mustafa Mahdi Aidan. (2024). The effect of training using different resistances on developing explosive strength and motor reaction speed of young football goalkeepers. *Journal of Physical Education Studies and Research*, 34(3).