

The Effect of a Proposed Training Program to Improve the Speed Component of High Jump Handball Scoring Skill

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Abstract

Introduction: Modern sports training is a dynamic process that aims to develop athletes' performance through the use of advanced techniques and methods based on scientific evidence. **Objectives:** To explore the impact of a proposed training program to improve the speed element of the high jump goal-scoring skill in handball.

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Methods: According to the study population, all students enrolled in the handball course in the second semester of the academic year 2023/2024 at the College of Physical Education and Sports Sciences at Hashemite University, who number (88) male and female students. The sample of the study consisted of (30) male students who were deliberately selected from the study population, where they were divided into two groups, the number of individuals in each group (15) students who were deliberately selected where they were divided into two groups. The researchers used the quasi-experimental approach. The researchers used the Social Sciences Package (SPSS), unloaded the data and used the following statistical methods to reach the results, which are: means, analysis of one-way covariance (ANCOVA) and standard deviations.

Results: The results showed that the training program was distinguished in improving the speed component of the high jumping handball scoring skill among the study individuals, as the experimental group improved better than the control group. **Conclusion:** The researchers recommend increasing the frequency and training intensity of speed and jumping ability exercises, as intensive repetition contributes to enhancing physiological adaptation and increasing performance efficiency in the long term.

Keywords: *Training program, speed, scoring skill, handball.*

INTRODUCTION

Modern sports training is a dynamic process that aims to develop athletes' performance through the use of advanced techniques and methods based on scientific evidence (1). Modern training is based on the principle of comprehensive performance analysis, where techniques such as big data analysis and artificial intelligence applications are integrated to analyze performance and provide recommendations to improve it (2). In addition, a multidisciplinary approach is used that includes nutrition, mental health, and biomechanics to ensure maximum benefit from the athlete's physical and mental capabilities (3).

Recent research indicates that designing training programs based on the personal needs of each athlete enhances performance and reduces the risk of injury. Researchers also emphasize the importance of effective recovery periods to ensure full recovery, which contributes to improving performance in the long term (4). Modern sports training programs are among the most important developments that have contributed to enhancing sports performance and improving physical fitness levels. These programs are based on scientific foundations that combine traditional exercises with modern techniques, such as the use of functional training, free weight training programs, and technology-based recovery exercises, such as digital movement analysis and biofeedback (5).

These programs also focus on customizing exercises based on the individual's needs, which helps achieve the best results with the least risk of injury (6). Moreover, studies indicate that adopting technology such as smart applications and wearable measuring devices contributes to increasing motivation and commitment of individuals to their training programs (7). These innovations represent advanced steps towards making sports more effective and comprehensive in meeting the needs of different groups.

Handball is a team sport that requires a combination of high physical skills, speed, and strength in addition to team cooperation (8). Modern handball relies on advanced tactical strategies aimed at improving players' performance at the individual and team levels. Studies have shown that improving sport-specific physical fitness, such as explosive power and aerobic endurance, plays a pivotal role in achieving athletic excellence (9).

Regular training to improve motor balance and neural reactions also enhances the accuracy of passes and shooting on goal (10). Research indicates that using training techniques based on match simulation helps improve players' tactical response under pressure, which increases their efficiency in decisive matches (11). Speed is one of the most important basic elements in handball, as it plays a vital

role in improving players' performance on the field (12).

Speed in handball includes several aspects, such as running speed, reaction speed, and speed of performing motor skills, such as shooting and passing. According to a study conducted by Sobko et al (13), developing speed requires a variety of training exercises that include cardiovascular and muscular endurance exercises, in addition to strength exercises that help improve the explosive ability needed for quick movements. Training on immediate motor response also enhances decision-making speed, which is an essential element in decisive matches (14). Therefore, improving speed requires an integrated approach that combines physical and technical preparation.

IMPORTANCE OF THE STUDY

The importance of this research stems from its role in shedding light on the development of the speed element, which is one of the basic factors in improving the athletic performance of the high jump scoring skill in handball (15). The importance of the research is represented in the following points:

1. The research contributes to enriching scientific knowledge about the effect of specialized training programs on improving speed in handball.
2. The research provides an addition to the literature related to the development of motor skills specific to team games, which helps coaches and researchers design more effective training plans.
3. The research provides a proposed training program that can be applied to improve the motor and skill performance of players, which helps them achieve distinguished performance in matches.
4. The research supports coaches in identifying practical training strategies to improve the speed element in high jump scoring, which is positively reflected in the results of sports teams.
5. This research aims to bridge the gap between practical practice and scientific development, making it an important reference in the field of handball sports training.

2- OBJECTIVES OF THE STUDY

The objective of this study is to identify the effect of a proposed training program for improving the speed element of the handball high jump scoring skill.

3- METHODOLOGY

3.1 Study Design and Setting

A case control study was conducted at Hashemite University.

3.2 Study Sample

The research sample consisted of (30) male students who were selected deliberately from the community of the study, where it was divided into two groups, each with one of (15) students.

- The control group continued training on the departmental program set.
- The proposed training program was successfully applied to the experimental group.

3.3 Group equivalence

To identify similarities between two groups (Experimental and Control), "Independent Sample T. Test" was applied (Table 1) in pre-measurements.

According to Table (1), the differences between the two groups on the pre-measurements ($n = 30$) for the element of speed high jump handball scoring skill. No statistically significant difference was found between group ($p=0.260$)

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Table 1: The differences between the experimental and control groups in the pre-measurements

Group	N	Mean (M)	SD	t-value	(df)	Sig. (2-tailed)
Exper.	15	12.5	1.8	1.15	28	0.260
Control	15	12.0	1.9			

3.4 Validity of the tests

The researchers offered a battery of tests designed to evaluate speed, along with the suggested training endeavor, to a panel of sports officials who are specialized and seasoned arbitrators. These arbitrators possess expertise in the areas of analysis, resistance tests, measurement and evaluation, physical diagnosis, and handball training from Physical Education colleges in Jordanian universities, the total number of whom was (6) arbitrators.

3.5 Reliability of the tests

The researchers used the test and re-application method (Test Re. Test) to verify the stability of the tests chosen by the arbitrators. The tests were applied to a survey sample of (10 students) chosen intentionally. Then, the same tests were applied again to the survey sample under the same conditions and a difference of a week in time. Then, a correlation coefficient for stability (Test Re. Test) was extracted for the measurement tools and shown in Table (2). It shows the strength and stability of the measurement. The researchers used the Social Sciences Package (SPSS) version 25, and uploaded the data and used the following statistical methods to reach the results, including means, Analysis of one-way covariance (ANCOVA), and standard deviations.

Table (2): Pearson's correlation coefficient for reliability (Test Re. Test) for measurement tools (n = 10) for the speed element

Variable	First test	Second test	Correlation coefficient (r)	(Sig.)
Speed element	12.29	12.55	0.94	0.001**

- (r) represents the correlation coefficient between the results of the first and second tests, as

4. RESULTS

4.1 Measurements of Speed Element in The High Jump Scoring Skill in Handball

According to table (3), the pre- and post-measurement of the experimental and control groups, and one-way analysis of variance (ANCOVA) was applied to the variables according to the group after determining the effect of their pre-measurement, and the results are presented below. Experimental group: There is an increase in the mean from the pre-measurement (12.5) to the post-measurement (15.2), indicating a clear improvement in the speed element.

Control group: There is a slight change in the mean between the pre-measurement (12.0) and the post-measurement (12.3), which reflects the lack of significant progress compared to the experimental group.

Table 3: speed scores (high-jump skill) for experimental and control groups, pre- and post-test

Group	Measurement	N	Mean	(SD)
Experimental	Pre	15	12.5	1.8
Experimental	Post	15	15.2	1.6
Control	Pre	15	12.0	1.9
Control	Post	15	12.3	1.8

4.2 The Effect of the Training Program on Developing the Speed Element of the High Jump Scoring Skill in Handball Between the Study Groups

Table (4) shows the ANCOVA that estimates whether the training impacted post-test speed in the jump scoring skill of the handball while controlling the base (pre-test) performance. According to the results, the pre-measurement was a significant covariate ($F = 14.67$, $p = 0.001$), suggesting that initial

speed level meaningfully predicted post-test score and must be adjusted for these differences. After making this adjustment, the group effect was highly significant ($F = 28.23$, $p < 0.001$), indicating that the experimental and control groups differed in their post-test speed, and that such difference was due to the training program and not due to the interaction at the pre-test. As a whole, these results support that the program produced a clear improvement in the speed element of the skill compared to the control condition.

Table 4: ANCOVA results for post-test speed (high-jump scoring skill) by group (pre-test as covariate)

Source	Sum of squares (SS)	D. of freedom (df)	Mean squares (MS)	F value (F)	Sig. (P)
Pre Measurement	25.4	1	25.4	14.67	0.001
Group	48.9	1	48.9	28.23	0.000
Error	48.0	27	1.78		
Total	122.3	29			

5. DISCUSSION

The present study showed that there was a statistically significant post-intervention improvement in high-jump shooting speed compared with the control group. This result supports the practical concept that targeted neuromuscular conditioning can improve sport-specific actions in handball, where successful scoring often depends on producing high ball velocity under time pressure and in the presence of defensive constraints. Importantly, analyzing post-test outcomes while controlling for baseline values using ANCOVA is widely recommended for pre-post controlled designs because it improves precision and statistical power when baseline and follow-up are correlated, while also helping to account for any baseline imbalance between groups (16).

High-jump shooting speed in handball is a multi-segmental outcome produced by (i) rapid approach/jump mechanics, (ii) efficient stretch-shortening cycle (SSC) use for lower-limb impulse, (iii) coordinated trunk rotation and energy transfer (proximal-to-distal sequencing), and (iv) high-rate force/power production in the shoulder-elbow-wrist complex. Training programs that combine explosive lower-body work (e.g., jumps), acceleration/change-of-direction tasks, and upper-body power/strength stimuli plausibly increase shooting speed through several converging adaptations:

Plyometric-type exposures improve fast SSC behavior by increasing musculotendinous stiffness regulation, neural drive, and the ability to rapidly transition from eccentric braking to concentric propulsion. A large systematic review/meta-analysis indicates that plyometric jump training improves reactive strength index (RSI)—a practical indicator of SSC function—across populations, with larger effects after longer interventions and adequate session frequency (17).

Handball jump shots rely on converting horizontal approach speed into vertical impulse while maintaining stability for an effective throw. Evidence specific to handball supports the relevance of plyometric-oriented conditioning, a 2025 meta-analysis focused on handball athletes reported improvements in jumping ability, sprint ability, change-of-direction performance, and throwing-related outcomes following plyometric training (18). This aligns with the current study's direction of effect, suggesting that the intervention likely improved the "platform" (jump and approach qualities) from which the throw is executed.

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Throwing speed is strongly influenced by the athlete's ability to generate and transmit force through the kinetic chain, and resistance training—especially traditional barbell-based strength training—has the most consistent evidence for improving throwing velocity in handball. A 2024 systematic review/meta-analysis concluded that strong evidence exists for barbell resistance training increasing throwing velocity, whereas other modalities (medicine balls, elastic bands) show mixed or limited evidence depending on the available studies and heterogeneity (19). Accordingly, if the intervention included structured resistance training or power-oriented loading, this could have contributed directly to the observed increase in high-jump shooting speed.

Although the current primary endpoint is shooting speed, acceleration capability often underpins approach dynamics and the ability to create separation from defenders. Contemporary evidence suggests that resisted sprint training improves short-distance acceleration outcomes in many athletic settings, but its superiority over volume-matched unresisted sprinting can depend on load prescription, population, and program structure. A 2024 systematic review/meta-analysis on resisted vs assisted sprint training reported that resisted sprint training was associated with significant improvement in 10-m acceleration compared with normal sprinting in between-group analyses (20). Similarly, a 2024 systematic review/meta-analysis specifically on resisted sprint training and acceleration summarized small-to-moderate improvements across studies, emphasizing the importance of programming decisions and the need for well-controlled comparisons (21).

From a handball perspective, these findings support the plausibility that training elements aimed at acceleration and rapid force expression can indirectly support faster, more effective jump-shot execution by improving approach efficiency and whole-body explosiveness. From a performance standpoint, even modest gains in jump-shot speed may be meaningful because the goalkeeper's available reaction time is extremely limited during close-range or high-tempo attacking sequences. Improvements in speed may also reflect improved intermuscular coordination (timing and sequencing), which is highly relevant to jump-shot mechanics under fatigue or defensive pressure. Therefore, the intervention's effect—beyond statistical significance—should be interpreted as evidence that integrating explosive and strength-oriented stimuli into the training process can enhance a decisive offensive skill in young female handball players.

6- STUDY LIMITATIONS

External validity: participants were university/college players; transferability to elite-level athletes may differ due to higher baseline capacities and different training histories.

Mechanistic uncertainty: the study measured outcome performance but did not include

biomechanical (kinematics/kinetics), EMG, or kinetic-chain measures to confirm the exact mechanism of improvement.

Intervention description: the manuscript should present sufficient detail for replication (frequency, intensity, progression, rest intervals, exercise selection, and compliance).

Outcome breadth: only one primary performance measure was emphasized; adding complementary outcomes (jump height, RSI, sprint split times, COD tests, strength metrics, and/or throwing accuracy) would better explain performance changes and trade-offs.

Effect size reporting: include effect sizes (e.g., partial eta-squared for ANCOVA, Cohen's d, and 95% CI) to convey practical magnitude, not only p-values.

Short follow-up: no retention testing was included; it remains unknown whether gains persist after the program ends.

6- CONCLUSION

This controlled pre–post study showed that the training intervention significantly improved high-jump shooting speed in female handball players compared with controls. The findings are consistent with contemporary evidence that explosive and strength-oriented conditioning—particularly plyometric stimuli, SAQ-related neuromuscular training, and appropriately designed resistance training—can enhance handball-relevant performance variables and throwing outcomes. Overall, the results support implementing structured, progressive neuromuscular conditioning as a practical strategy to improve a key offensive skill in handball.

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