

STUDY ON THE EFFICIENCY OF THE 9-METER LINE IN JUNIOR HANDBALL PLAYERS IN THE PHASE IV OF THE ATTACK

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Keywords: handball, athletes, training, offensive efficiency

Abstract

Sports performance in modern handball largely depends on the players' effectiveness in decisive moments of the game, and the fourth phase of the attack—the finishing phase—is one of the most important. The 9-meter line, made up of the two backcourts and the playmaker (center), plays an essential role in initiating and completing offensive actions. For junior teams, developing the ability to finish correctly and efficiently from the 9-meter area requires a complex approach that combines technical, tactical, and psychological preparation. This study investigates the effects of a structured training program aimed at improving both general and specific motor potential of the 9-meter line (center and left/right backs) in Junior III handball players. Nine athletes participated in tests measuring speed, strength, agility, dribbling, and technical skills. The results indicate significant improvements in all motor skills after the intervention, demonstrating the effectiveness of targeted technical-tactical training on offensive performance. The findings support the implementation of specialized training programs to enhance efficiency in critical phases of the game. Although handball evolves as players move into higher categories and the technical-tactical preparation of junior players must already align with the demands of modern handball. This requires individualized training and planning based on positional responsibilities.

Introduction

Handball, as a sport discipline, is a competitive game in which opposing teams aim to achieve athletic performance expressed through winning championship titles or national and international trophies, maintaining their place in a competitive league, or securing promotion to a higher category [10].

Handball is a team sport played by both boys and girls, with competitions organized by age categories or performance levels. Modern handball is a dynamic indoor sport contested by two teams of seven players (six field players and one

goalkeeper), plus substitutes. The match is played in two halves of 30 minutes each, and the objective is to score as many goals as possible by using passes, feints, shots, and other well-coordinated and synchronized tactical actions.

Today, modern handball has become a highly intense and dynamic team sport, requiring from players exceptional physical qualities, advanced technical and tactical skills, and strong psychological preparation. All these must be expressed through effective cooperation, speed in movement and execution, high-level technical mastery, and diverse strategies. The contemporary handball game demands dynamism, quickness, aggressiveness, offensive mindset in all phases, and high execution technique, all based on solid tactical reasoning [3].

According to contemporary authors [9] and [4], modern handball emphasizes the following characteristics:

- high execution speed and fast transitions – quick counterattacks and rapid defensive recovery;
- superior physical conditioning – high strength, anaerobic endurance, speed;
- advanced psychological preparation: fast decision-making, anticipation, creative thinking, and rapid analysis of game situations;
- specialized roles for each position – backcourt players, wings, pivot, goalkeeper – each requiring specific physical and technical attributes;
- diverse tactics: teams use complex offensive schemes (screens, positional switches, pivot play) and modern defensive systems (3:2:1, 5:1, 6:0);
- varied defensive structures, collective play, and elaborated tactical concepts;
- the use of technology and video analysis: training sessions and matches are reviewed with modern software to improve performance.

In summary, according to the literature, modern high-performance handball has reached an advanced stage of development and transformation, which makes it necessary to conduct a thorough analysis of all its methodological and scientific aspects. The issues of contemporary handball must be constantly updated to keep pace with the organic evolution of this spectacular and widely appreciated sport [7].

Sports training represent a long-term process, structured as a motor-functional system aimed at achieving high-level performance in various competitions. It can also be described as the totality of demands placed on the human body that ultimately lead to morphological and functional adaptations, increasing the athlete's capacity for effort [2].

According to another author [5], training may also be defined as a carefully and rigorously planned process of preparing athletes with the goal of obtaining top results in competition.

In team sports, training is a specialized process aimed at developing the player's personality (both individually and within the team) in terms of improving

their physical and sport-specific abilities, with the purpose of building the capacity for achieving high performance [8].

Therefore, sports training in handball are a systematic process of physical, technical-tactical, psychological, and theoretical preparation through which players develop superior abilities. It focuses on improving motor qualities, perfecting specific techniques (passing, shooting, dribbling, marking), and strengthening team play relations. Regardless of the sport/game, five specific factors of preparation are found in athletes' training: physical preparation, technical preparation, tactical preparation, theoretical preparation, and psychological preparation.

Performance in modern handball largely depends on players' efficiency in decisive game moments. Phase IV of the attack, which includes finalization, is one of the most critical. The 9-meter line, composed of left back, right back and the center (playmaker), plays a central role in initiating and completing offensive actions [6].

For junior teams, developing the ability to finalize effectively from the 9-meter line requires a complex approach that integrates technical, tactical, and psychological preparation. Specific, structured, and progressive exercises enable players to make quick decisions, collaborate with the pivot, and assume responsibility for successful finalizations [6].

The efficient execution of technique is also conditioned by a high number of repetitions performed in various situations and through diverse movement patterns. Emphasized that a handball player is considered game-ready and capable of high performance when they can run at high speed, change direction quickly, catch the ball in complex situations, shoot with power, finish from any offensive action, create separation from defenders rapidly, and collaborate intelligently and efficiently with teammates. In short, the player must perform all specific on-court actions and movements—with or without the ball—efficiently, quickly, and in a coordinated manner [1].

According to the specialized literature, handball technique includes the totality of sport-specific motor skills related to ball-handling actions and the movement patterns used by players on the court. In other words, technique refers to all forms of movement executed by players, with or without the ball, aimed at achieving motor mastery and ultimately reaching high performance in competitions.

Material-method

9 junior III handball players from Sport Highschool Botoșani participated in the study. Their positions were as follows: center: 3 players; right back: 3 players, left back: 3 players.

The study consisted of an experimental design with pre- and post-intervention assessments. Tests were divided into: general motor fitness (10 m sprint, 5x10 m

shuttle run, long jump, high jump) and specific motor skills (T-test (agility), 25 m dribbling, triangle movement test, handball ball throw.

The training program was applied over the competitive season 2024–2025, focusing on technical-tactical efficiency of the 9-meter line.

Results

The results at the initial testing for general motor fitness and specific motor skills are presented in tables 1 and 2.

Table 1. Initial results for general motor fitness

| No. | Athlete | Position | 10 m sprint (s) | Shuttle 5x10 m (s) | Long jump (cm) | High jump (cm) |
|-----|---------|------------|-----------------------|--------------------------|----------------------|----------------------|
| 1 | B Ș-G | Center | 1.86 | 19.51 | 218 | 36 |
| 2 | B R | Right back | 1.88 | 20.64 | 212 | 36 |
| 3 | H C-C | Center | 1.74 | 19.75 | 214 | 40 |
| 4 | T L-A | Right back | 1.86 | 20.53 | 213 | 39 |
| 5 | Ș M-E | Center | 1.99 | 21.25 | 204 | 28 |
| 6 | D L G | Left back | 1.76 | 19.33 | 216 | 45 |
| 7 | T R-S | Right back | 1.74 | 20.53 | 216 | 39 |
| 8 | H D-M | Left back | 1.55 | 21.07 | 194 | 33 |
| 9 | M E-N | Left back | 1.72 | 20.62 | 198 | 36 |
| | X | | 1.79 | 20.36 | 209.44 | 36.89 |
| | SD | | 0.13 | 0.68 | 8.65 | 4.76 |
| | CV (%) | | 7.02 | 3.32 | 4.13 | 12.89 |

Table 2. Initial results for specific motor skills

| No. | Athlete | Position | T-test (s) | Dribbling 25 m (s) | Triangle movement (s) | Handball throw (m) |
|-----|---------|------------|---------------|-----------------------|-----------------------------|--------------------------|
| 1 | B Ș-G | Center | 10.11 | 4.67 | 12.11 | 32 |
| 2 | B R | Right back | 10.79 | 5.03 | 12.53 | 28 |
| 3 | H C-C | Center | 9.75 | 4.94 | 11.95 | 33 |
| 4 | T L-A | Right back | 9.33 | 5.02 | 12.46 | 37 |
| 5 | Ș M-E | Center | 10.12 | 4.96 | 12.31 | 29 |
| 6 | D L G | Left back | 9.75 | 4.57 | 11.7 | 33 |
| 7 | T R-S | Right back | 10.14 | 5.01 | 13.05 | 35 |
| 8 | H D-M | Left back | 10.03 | 4.8 | 13.7 | 37 |
| 9 | M E-N | Left back | 10.53 | 4.91 | 12.94 | 38 |
| | X | | 10.06 | 4.88 | 12.53 | 33.56 |
| | SD | | 0.43 | 0.16 | 0.62 | 3.54 |
| | CV (%) | | 4.29 | 3.37 | 4.94 | 10.55 |

After a preparation period of approximately 7–8 months, during which the specific exercise program for the 9-meter backcourt line was systematically applied—along with additional training programs adapted to each phase of the preparation period—the final evaluation of the Junior III handball players was conducted. The purpose of this evaluation was to measure the progress achieved in terms of efficiency in the fourth phase of attack, with emphasis on technical execution, as well as general and specific motor abilities.

The evaluation was carried out using the same tests administered in the initial stage, under identical conditions, to ensure objectivity and comparability of the results. The assessment focused both on individual improvement and on the collective efficiency of the 9-meter line players, while also examining the overall development of motor capacity across the entire team.

The following tables present the results of the LPS Botoșani junior III athletes; however, the statistically processed results highlight the performance of the 9-meter backcourt players (tables 3 and 4).

Table 3. Final results for general motor fitness

| No. | Athlete | Position | 10 m sprint (s) | Shuttle 5x10 m (s) | Long jump (cm) | High jump (cm) |
|-----|---------|---------------|-----------------------|--------------------------|----------------------|----------------------|
| 1 | B Ș-G | Center | 1.6 | 18.18 | 225 | 40 |
| 2 | B R | Right back | 1.59 | 18.43 | 221 | 42 |
| 3 | H C-C | Center | 1.44 | 17.75 | 232 | 45 |
| 4 | T L-A | Right back | 1.46 | 18.46 | 229 | 44 |
| 5 | Ș M-E | Center | 1.78 | 19.85 | 218 | 38 |
| 6 | D L G | Left back | 1.53 | 17.43 | 220 | 47 |
| 7 | T R-S | Right back | 1.45 | 18.57 | 235 | 45 |
| 8 | H D-M | Left back | 1.39 | 18.97 | 210 | 40 |
| 9 | M E-N | Left back | 1.54 | 18.75 | 220 | 40 |
| | X | | 1.53 | 18.49 | 223.33 | 42.33 |
| | SD | | 0.12 | 0.7 | 7.75 | 3.04 |
| | CV (%) | | 7.66 | 3.79 | 3.47 | 7.18 |

The most significant improvements were observed at 3 players who showed consistent progress in all physical tests [11].

Table 4. Final results for specific motor skills

| No. | Athlete | Position | T-test (s) | Dribbling 25 m (s) | Triangle movement (s) | Handball throw (m) |
|-----|---------|------------|-------------|--------------------|-----------------------|--------------------|
| 1 | B Ș-G | Center | 9.04 | 4.44 | 11.77 | 37 |
| 2 | B R | Right back | 9.34 | 4.22 | 11.35 | 32 |
| 3 | H C-C | Center | 9.35 | 4.72 | 11.24 | 37 |
| 4 | T L-A | Right back | 9.12 | 4.42 | 11.57 | 40 |
| 5 | Ș M-E | Center | 9.42 | 4.37 | 11.38 | 35 |
| 6 | D L G | Left back | 9.11 | 4.21 | 11.21 | 38 |
| 7 | T R-S | Right back | 9.28 | 4.36 | 10.75 | 40 |
| 8 | H D-M | Left back | 9.32 | 4.11 | 12.02 | 40 |
| 9 | M E-N | Left back | 9.14 | 4.42 | 11.55 | 42 |
| | X | | 9.24 | 4.36 | 11.43 | 37.89 |
| | SD | | 0.13 | 0.18 | 0.36 | 3.06 |
| | CV (%) | | 1.45 | 4.03 | 3.18 | 8.08 |

All players showed improvements in agility, dribbling, triangle movements, and throwing distance. The most notable progress occurred in the T-test and triangle movement test.

The graphs below present the arithmetic means of the junior players in the 9-meter line. The data obtained provide a clear picture of the motor and technical-tactical progress of the 9-meter line players, reflecting the extent to which the initially formulated hypotheses are confirmed in practice. The statistical-mathematical analysis of these results allows for drawing relevant conclusions regarding the effectiveness of the applied program and provides a solid foundation for methodological recommendations in the training process of junior players (table 5).

Table 5. Differences between between 2assessments

| Assessment test | Initial | Final | Progress |
|--------------------------|---------|--------|--------------|
| 1. 10 m sprint (s) | 1.79 | 1.53 | 0.26 |
| 2. Shuttle 5x10 m (s) | 20.36 | 18.49 | 1.87 |
| 3. Long jump (cm) | 209.44 | 223.33 | 13.89 |
| 4. High jump (cm) | 36.89 | 42.33 | 5.44 |
| 5. T-test (s) | 10.06 | 9.24 | 0.82 |
| 6. Dribbling 25 m (s) | 4.88 | 4.36 | 0.52 |
| 7. Triangle movement (s) | 12.53 | 11.43 | 1.10 |
| 8. Handball throw (m) | 33.56 | 37.89 | 4.33 |

Discussions

The results confirm that targeted, position-specific training significantly enhances both general and specific motor abilities in junior handball players. Improvements in speed, strength, agility, and throwing efficiency directly contributed to the team's offensive effectiveness during the phase IV of the attack [12, 13].

The study demonstrates that structured, progressive exercises, adapted to age and skill level, are essential in developing the technical-tactical and motor capacities of junior athletes.

Conclusions

The training program focusing on the 9-meter line significantly increased the offensive efficiency of the team.

Improvements in general motor abilities (speed and strength) and specific handball skills (dribbling, agility, and throwing) were observed in all players.

The results validate the hypotheses and demonstrated that systematic training leads to performance gains in junior handball.

The study provides a practical model for coaches aiming to enhance efficiency in critical game phases for junior players.

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