

## Improving Speed to Handball Players

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**Abstract:** Introduction - I chose this theme because the sporting value of a handball player largely resides in the qualities of training, including the speed that shapes and refines the principles and skills required by content development. Technical and tactical preparation is specific to the modern handball game practiced by the best teams in the world.

Objective - This paper tries to make a contribution to the enrichment of the methodical material available to those who have chosen the beautiful mission to initiate the athletes in the handball secrets, to teach them specific movements of the game: as close as possible to Play and the effort to the special requirements of handball.

Therefore, the main purpose of the paper is to demonstrate the usefulness of a specific speed training program.

Methods. The target group consists of 18 members of the men's team C.S. Medgidia, with an average age of  $19.94 \pm 1.28$  years. This team is active in the National Championship, A Division.

The subjects underwent initial screening on July 4, 2018. Final testing was conducted on August 29, 2018.

During 8 weeks (July 6 - August 30, 2018) related to two tests, the team had included in their training program this training program we designed to improve their speed.

Results - The parameter values recorded in the two initial and final tests differ statistically significantly from all parameters, meaning a 100% test. At these parameters, following the verification of statistical hypotheses using Test t, the null hypothesis was rejected, the significance threshold (p) being calculated being less than 0.05. Parameter averages calculated for final testing indicate an improvement in the athletes' preparation for initial testing at all tests.

Conclusions - The main result of this paper is that the speed of subjects has increased, and that confirms the hypothesis that by performing a rigorously standardized program, based on specific speed training, the level of training of the motor quality speed will increase.

**Keywords:** *speed; handball player; performance.*

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## **Introduction**

We chose this theme because the sports value of a handball player lies, to a large extent, on the qualities which they shall be trained in including speed, in the scope thereof and on the basis of which currently principles and skills are required for the development of the tactical and technical content, specific to the modern game handball teams, practiced by the best teams in the world. Specialists in the field claim that the shares of the motive power of the handball game implies, in competition, and especially in the preparation, a mixture between heavy proportion of strength, resistance, speed, the suppleness and skill (Buchheit, 2009; Jensen, 1997; Marques, 2006; Ronglan, 2006). In handball literature discussed "speed training" mainly in terms of those aspects of running that are observed in handball: starting speed, acceleration, running lengths of between 5m and a maximum of 30m (in fast breaks), possibly combined with a change in direction (Feldman, n.d.). Buchheit (2009), Lidor (2005), Marques (2006), Ziv (2009), in their studies on male and female elite and sub-elite team handball players have indicated that strength, jumping abilities and maximal running speed have an impact on performance.

As it happens in the most team sports, the handball players are required to have the ability to speed off with maximum speed on distances of 20 to 25 meters and to be able to repeat these sprints several times during the game (speed - resistance, power - resistance). The ability to run and sprint repeatedly at high intensity is of paramount importance for success (Mohamed, 2009; Rannou, 2001; Souhail, 2010).

Handball involves multidirectional changes of direction (Massuca et al., 2014). Athletes often perform stop-and-go changes of direction in a response to unpredictable stimuli (ball, opponent etc.) over a relatively small court (Karcher and Buchheit, 2014).

Outfield players are often required to repeatedly produce maximal or near-maximal sprints of short duration with brief recovery periods (Bangsbo, Norregaard, & Thorso, 1991). Therefore, the ability to repeat multiple high-speed sprints plays a crucial role in the soccer players' performance. Indeed, Repeated-Sprint Ability (RSA) is an important fitness component of the performance of team-sport athletes (Spencer et al. 2005). Players with good RSA will likely perform better than athletes who are less able to repeat sprint efforts at a similar intensity (Bishop et al. 2001).

Therefore, the ability to repeat multiple high-speed sprints plays a crucial role in the handball players' performance. Indeed, Repeated-Sprint Ability (RSA) is an important fitness component of the performance of team-sport athletes (Spencer et. al. 2005 cited by Padulo et. al. 2015). Players with good RSA will likely perform better than athletes who are less able to repeat sprint efforts at a similar intensity (Bishop et. al. 2001 cited by Padulo et. al. 2015).

In handball game can identify the following attributes and skills specific, which must be measured:

- The starter speed: when fight directly to the opponent, related to the limited space and land, it is very important that the player to have a quick start so to exceed the opponent directly. This can only be achieved if at the beginning of muscular contractions, the athlete is able to generate a maximum of force, and create an initial speed high (Cazan et. al., 2013).

Speed start is encountered in the structure following moments and share technical and tactical actions: triggering counter attack quickly re ball after the goal, debranding place open to receive the ball, crossing steering ball or without the ball, branding directly or indirectly penetration among defenders, defensive retreat after losing the ball or after a goal is scored, the input intercept the balls (Cazan et. al., 2013).

- The rate of acceleration. In a very short time from the start of the race, the athlete reaches the maximum speed. This time depends on the strength and rapidity of the muscle contraction, while the acceleration power depend both the arms and legs. Speed acceleration is reached in the following moments of structure and technical and tactical actions: counter, quick, throw the ball after the goal, crossing the ball or without the ball direction, branding, defensive retreat after losing the ball or after a goal is scored (Cazan et. al., 2013).

- Speed acceleration is found in the following moments of structure and technical and tactical actions: counter, quick, throw the ball after the goal, refolding defense after losing the ball or after a goal is scored. Speed acceleration is found in the following moments of structure and technical and tactical actions: counter, quick, throw the ball after the goal, crossing the ball or without the ball direction, branding, defensive retreat after losing the ball or after a goal is scored (Cazan et. al., 2013).

- The rate of coordination (agility). Handball dynamics has changed so suddenly that the athlete must quickly change direction, with the lowest stall and accelerate back towards where it came from. To increase braking ability rapidly to a rapid movement in the other direction, you need to train these agility movements. The rate of coordination is found in the structure

of the following points and action both technical and tactical: changes in direction of the ball or without the ball, branding, passing the ball coming successively with the threat score, the movement of the fundamental position laterally, forward, backward, attacking the opponent with the ball, withdrawal semicircle (Cazan et. al., 2013).

Explosivity in handball gesture translates into speed, the detention and the maximum force, so the force is likely to be mobilized and used in a very short time in a specific gesture (neutralization striker, 1 against 1 etc.) (Negrea & Cazan, 2011).

### **The purpose and tasks work**

Taking into account all these, this paper tries to contribute methodically to the enrichment of references provided for this beautiful mission to initiate the secrets of the handball athletes, when you learn the specific movements of the game so close to the game along with the burden to the special requirements of handball.

The main purpose of this paper is to demonstrate the usefulness of a special improving speed training program.

### **Work hypothesis**

We will assume that if we use a specific speed training program, we will get superior results in speed tests.

### **Material and method**

In accordance with the experimental research in this field of physical education and the sports group we chose a small size target group (18 athletes).

The research subjects are 18 in number, members of Team Handball C.S. Medgidia, with an average age of  $19.94 \pm 1.28$  years, stature  $191.61 \pm 4.59$ , body mass  $95.28 \pm 8.71$ . The team is playing in the National Championship, A Division.

The research was conducted on the team C.S. Medgidia and the tests took place in the Sports Hall from Medgidia, while the team was carrying out official matches, on the sports arena approved by the Romanian Handball Federation and by the gym of the same hall as well.

The subjects underwent initial test on 4 July 2018. The final test took place on August 29, 2018.

In the initial test the subjects underwent anthropometric measurements, and then after warm-up for 20 min, which consisted of

stretching, jogging, elements of school running and school jump (running with knees up, running pendulum leg back etc.), gymnastics, running faster, sprints, the subjects completed the following tests in this order:

1.5m and 10m-sprint test

2.30m- sprint test

3.4X5m- sprint test

In the 30-m sprint test, each subject performed a sprint as fast as possible from a standing start with their front foot 1 meter behind the first timing gate. All subjects were instructed to sprint as fast as possible. To measure sprinting time, we used 4 light beams (Brower Timing System CM L5; Brower, UT, USA) placed at 0, 5, 10 and 30 m of the testing distance. Each light beam consisted of an infrared sender and an infrared emitter with antennas. Each unit was mounted on a tripod 1 m above the floor. Data were sent from the beam sets directly to the handheld coach monitor. It runs in handball shoes, start taking in standing behind the starting line. It runs individually. Each subject had to repeat the sprint test twice (2-minute recovery between tests). The fastest 30-m sprinting time was used for further calculation.

Testing speed on 4x5m - will be drawn two lines of 2 m with 5 m distance between them. On each line will accommodate photocell gate. It runs in handball shoes, start taking in standing behind the starting line. It runs individually. It will move with the maximum speed towards the other line. The line should reach with one leg, and return to the starting line. Testing will take place 4 times the distance of 5 m without stopping having regard to the obligation that every return to touch the line with one foot. The return must not be done through indirection but by the sudden stop and return to 180 °. Each subject had to repeat the sprint test twice (2-minute recovery between tests).

All results will be expressed in seconds and tenths of a second.

Within eight weeks (from 6<sup>th</sup> of July to 30<sup>th</sup> of August 2018) during the two tests, the team included in the training program, the new training program designed to improve the speed

The program provides two workouts per week, on Monday and Wednesday, an hour each workout, included in the team's training session.

**Tab. nr.1** Speed Improving Training Programme

Week	Actions	Quantity volume/intensity-95-100 %/ pause 10-30 sec.
1.	1.1. Leg jumping on a 50-60cm bench to the beep	6-8 jumping on each leg
	1.2. Standing on one foot, leg jumping on bench of 80cm high	6-8 jumping on each leg
	1.3. Standing on one foot, leg jumping on the gym bench to the beep	6-8 jumping on each leg
	1.4. Standing on one foot, leg jumping on a 20cm crate, jumping on the ground, jumping on another 30cm crate. It runs with starting signal, working on pairs, as a contest	6-8 jumping on each leg
	1.5. Standing on one foot, leg jump over a line and sprint on a 5m distance. It runs with sound start, working on pairs, as a contest.	2-3 x
	1.6. Standing on one foot, jump on one leg in a circle, jump on the same leg in another circle and sprint on a distance of 5m. It runs with starting signal,, working on pairs, as a contest	2-3x
	1.7. Standing on one foot, jumping on one leg on the gym and sprinting on a 5m distance. It runs with starting signal,, working on pairs, as a contest	2-3 x
	1.8. Standing on one foot, crossing over two gym benches and sprinting on a 5m distance. It runs with starting signal, working on pairs, as a contest. It can also be made with a handball ball in hands.	2-3x
2.	1.9. Standing on one foot, leg jumping over a 20 cm fence in a circle located at 50cm from the fence, and sprinting over 5m. It runs with starting signal,, working on pairs as a contest	2-x
	2.0. Standing on one foot with a 5-6 kg medicinal ball in your hands, leg jumping over a 20cm fence and sprinting on a 5m distance. It runs with starting signal,, working on pairs, as a contest	2-3x
	2.1. Standing on one foot, leg jump over 4 fences of 20cm and sprint on a distance of 5m. It runs with starting signal, working on pairs, as a contest	2-3x
	2.2. Standing back to the gym bench, legs jump back over	2-3x

	the bench, legs jump forward over the bench and sprint on the 5m distance. It runs with starting signal,, working on pairs, as a contest.	
	2.3. Down on knee support, start with starting signal and sprint on 10 m. Running on pairs as a contest.	2-3x
	2.4 Sitting on a gym bench, start with starting signal and sprint on 10 m. Running on pairs as a contest.	2-3x
	2.5. Sitting on a bench of 15cm, arms up, start with starting signal and sprint on 10 m. Running on pairs as a contest.	2-3x
	2.6. Sitting on the ground with your palms at your neck, start with starting signal and sprint on 10 m. Running on pairs as a contest.	2-3x
3.	2.7. Working on pairs, sprint on a distance of 10m. One takes the sitting up start, and the other sits on a chair at 4m in front of them. The starting signal is given by the player sitting up.	2-3x
	2.8. Working on pairs, they sit on the gym bench with a medicinal ball in their hands, then sprint on 10 m distance. Start with starting signal.	2-3x
	2.9. Sitting on the gym with 2 x 5 kg medical balls in your hands, start at starting signal.and sprint 5m with the ball in your hands and then roll the balls and continue the sprint for another 10m. It runs first individually and then in pairs as a contest.	2-3x
	3.0. Standing with a medicinal ball on the ground before the feet. At the starting signal the ball with two hands is thrown forward with two hands and runs at speeds over the distance of 5m	2-3x
	3.1. Running with speed for a 10m start position from different positions: Standing on a leg with a knee grabbed with both hands, standing on one foot with one foot grabbed by the ankle	1-2x
	3.2. Working in pairs sitting on the gym bench, jumping on the ground and sprint for 5m distance. Start with the starting signal.	1-2x
	3.3 Working in pairs, sitting out, sprint for 5m distance, start with starting signal and pick up a cone at the finish line.	1-2x
	3.4. Working on pairs standing up, jump back on two legs over a cone and sprint for 5m distance, start with starting signal.	1-2x

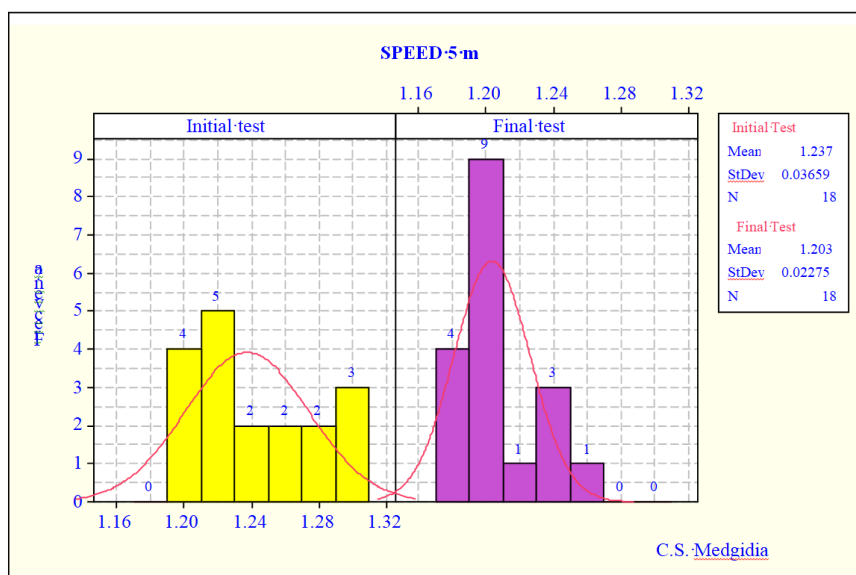
4.	3.5. Working on pairs standing, up run backwards with a bypass of a cone located 1m back, and sprint for 5m distance, start with starting signal	1-2x
	3.6. Working on pairs, sitting on a gym bench with one leg on the bench. Start with starting signal, then alternate change of the support leg on the bench at high speed.	1-2x
	3.7. Idem 3.6. but at the second signal, pass over the bench and sprint for 5m distance.	1-2x
	3.8. Idem 3.6. but at the second signal, back to 180° and sprint for 5m distance.	1-2x
	3.9. Working on pairs at the first signal, running on the spot, then sprint for 5m distance at the second signal.	1-2x
	4.0. Working on pairs, start with starting signal, kneeling up to the right / left, sprint for 5m distance at the second signal.	1-2x
	4.1. Standing on one leg in the side of a gym bench, jump on the bench on the support leg on sounding.	2-4x on each leg
	4.2. Standing on one leg in the side of a gym bench, jump over the bench landing on the support leg on sounding, and sprint for 5m distance.	1-2x on each leg
5.	4.3. Working on pairs, start at starting signal, sprint for 10 m distance (slope 10-15°)	2-4 x
	4.4. Working on pairs, , start at starting signal, move on 1m oblique left, back, right slash, back and slope over 10m distance. (slope 10-15°)	2-4 x
	4.5. Working on pairs, start at starting signal, move on 1m oblique get a cone at 1,5 m distance and sprint for 10 m distance (slope 10-15°)	2-4 x
	4.6. Working on pairs, start at starting signal, sprint for 10 m distance (slope 10-15°), and sprint for 10 m distance.	2-4 x
	4.7. Working on pairs, from self-alignment with arms up, start at starting signal, sprint for 10 m distance, sprint for 10 m distance (slope 10-15°).	2-4 x
	4.8. Steering up to 30 steps at high speed, step by step	2-4 x
	4.9. Working on pairs, start at starting signal, . Steering up to 20-25 steps at high speed, step by step	2-4 x
	5.0. Steering up to 30 steps at high speed, step by step.	2-4 x
	5.1. Working on pairs, start at starting signal steering up to 30 steps at high speed, step by step.	2-4 x
	5.2. Working on pairs, start at starting signal, steer up 20 steps at high speed, two in two gears and at the end of the 5m distance sprint the stairs (if space allows us to make	2-4 x



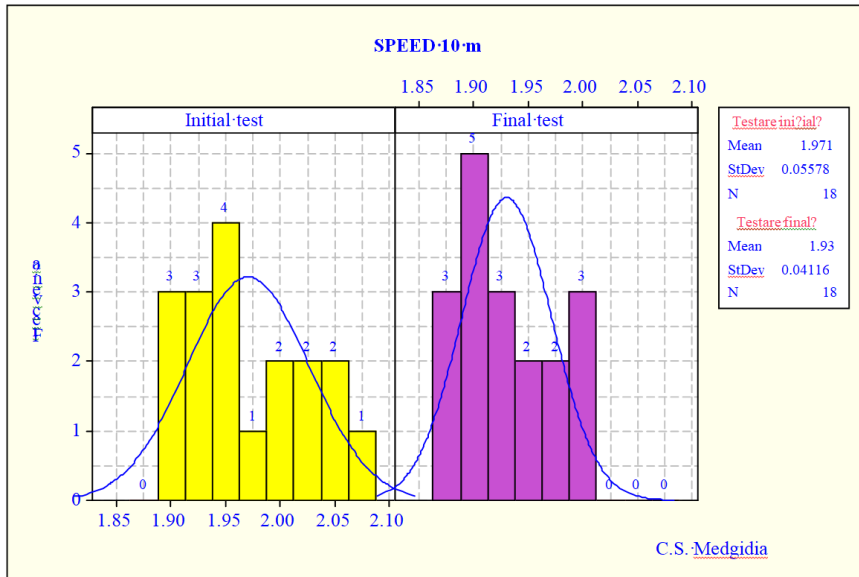
	the sprint forward, if not turn 90 ° to the left / right and sprint)	
	5.3. Steering up 10-speed steps, step-by-step and end-of-stairs on two feet and sprint left / right on 5m distance	2-4 x
	5.4. Working on pairs, standing on one foot, start at starting signal, steering up to 20 steps at high speed 20 high-speed, in two gears.	2-4 x
	5.5. Standing on the edge of long jump sand, jogging to the pit and another 10m distance beyond the pit.	2-4 x
6.	5.6. Working on pairs, an athlete with a training shirt wrapped around the waist, the other behind it is on the ends of the blouse. The first runs the knees up and tries to advance; the other put resistance, and then releases him. After being released, it runs at maximum speed over a distance of 10-15m	2-4 x
	5.7. Idem 5.6. but the back opposes resistance and tries to unbalance by pulling left or right on the ends of the blouse and then releasing it.	2-4 x
	5.8. Working on pairs, an athlete with an elastic strap around the waist, the other behind it is on the ends of the string. The first one runs 20m of speed, the other put resistance, yet allows them to move forward.	2-4 x
	5.9. Working on three-player groups. Two of them put resistance with their hands on the shoulders of the third one trying to accelerate. After three or four seconds, they release him, running for 20m distance.	2-4 x
	6.0. Working on pairs, start at starting signal sprint down over a 10m distance. (slope 10-15 °)	2-4 x
	6.1. Working on pairs, start at starting signal, starting up position. At the start, each one is helped by a partner who holds one hand and pulls him towards the running direction so to help him begin. It runs on a distance of 10-15m.	2-4 x
7. and 8.	6.2. Athletes divided into pairs, grabbed by one hand, try to draw their partner over a marker line in the middle. At the coach's signal, one of two of them will sprint 20m forwards, using the partner's force to start. The runner is pre-set.	2-4 x
	6.3 Relay race overcoming a cone over a distance of 5/10/15 / 20m	1-2 x
	6.4. The is runner bypassing a cone over a distance of 5 / 10m with departure from sitting on the bench with arms raised above the head.	1-2 x

6.5. Relay race carrying the handball, placing it on the ground, bypassing the ball, speeding backwards and handing over the handball. The next one runs, walks around the ball, raises it from the ground, returns and passes the ball to the next one.	1-2 x
6.6. Sprint 5m distance, bypass of two cones parallel to the starting line, sprint 5m again, bypassing a runner and running for handover	1-2 x
6.7. Rear starting ground with a knee on the ground, running 5m distance, add-on bypass of three cones parallel to the starting line, running 5m distance again, bypassing a runner and run-in running	1-2 x
6.8. Idem 6.7. but standing on one foot	1-2-x

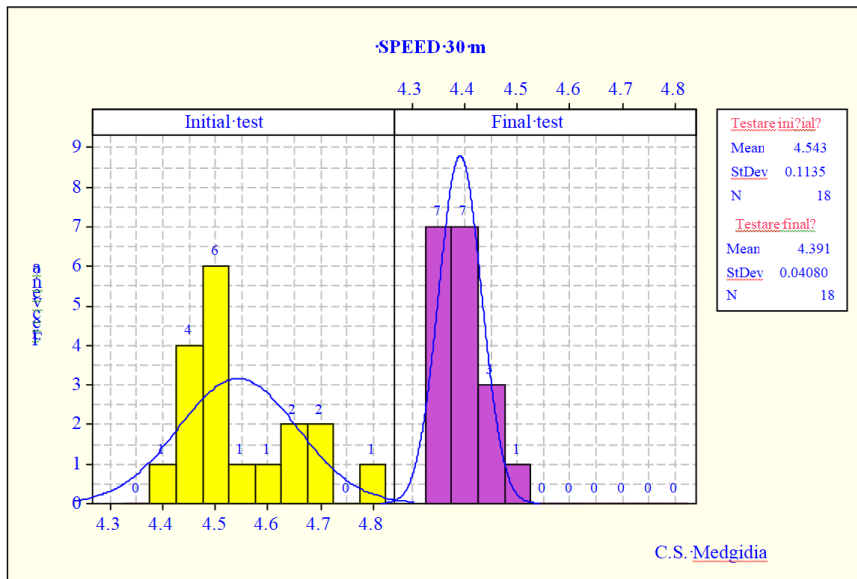
## Results and analysis



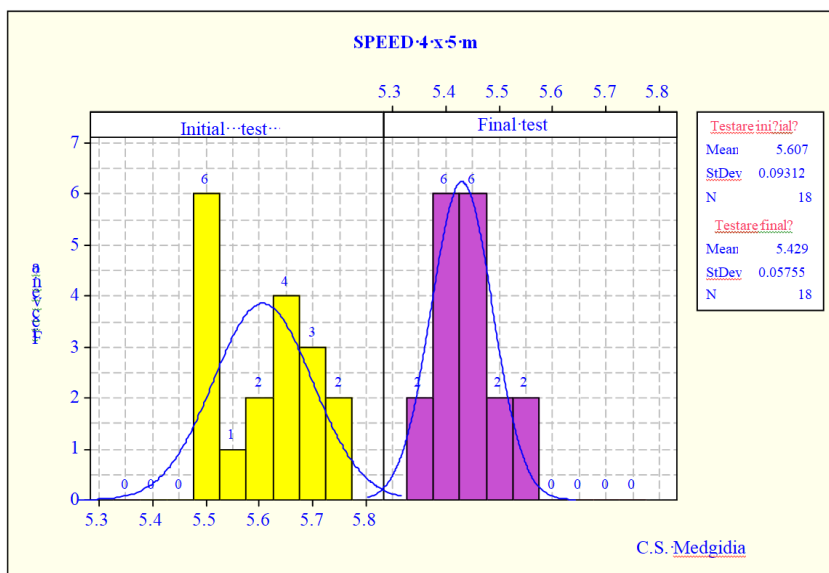
**Fig.1** Speed Diagram 5m



**Fig.2** Speed Diagram 10m



**Fig.3** Speed Diagram 20m



**Fig.4** Speed Diagram 30m

**Tab. no.2** Results before and after of the speed training program

No	Test speed	Test	Average	Diference F-I	$\sigma$	Cv (%)	t	P
1	Speed 5 m	Initial	1.24	-2.74%	0.04	2.96%	6.88	0.00001
		Final	1.20		0.02	1.89%		
2	Speed 10 m	Initial	1.97	-2.06%	0.06	2.83%	7.28	0.00001
		Final	1.93		0.04	2.13%		
3	Speed 30 m	Initial	4.54	-3.35%	0.11	2.50%	8.11	0.00001
		Final	4.39		0.14	0.93%		
4	Speed 4 x 5 m	Initial	5.61	-3.16%	0.09	1.66%	13.40	0.00001
		Final	5.43		0.06	1.06%		

The parameter values recorded for the two initial and final tests differ statistically significantly from all parameters, meaning a 100% test. At these parameters, following the verification of the statistical assumptions using Test t, the null hypothesis was rejected, the significance threshold (p) being calculated being less than 0.05. Parameter averages calculated at final test indicate an improvement in athletes' training over initial testing at all tests.

In a study in 2012 (Jørgen & Ian) on twenty-nine male elite youth handball players, age  $16.5 \pm 0.8$  years, selected by the Norwegian Handball Federation (NHF), the sprint test results were  $1.95 \pm 0.09$  (s) for 0–10 m Sprint and  $4.55 \pm 0.21$ (s) for 0–30 m Sprint, close to the value of our initial results, but we must take into account the age difference, which in the case of speed matters (Rannou, 2001).

## Conclusions

Handball performance is multifaceted, and relies on the development of a wide range of physical capacities. Speed is seen as a key component of elite performance in handball, and identification of factors that relate closely to running speed can assist the coach in the development of complementary training programs. The results of this study indicate that the speed of subjects has increased, which confirms the hypothesis that by performing a rigorously standardized program, based on specific speed-training exercises, the speed of training will increase.

- To improve the qualitative indices of the motor-grade speeds, the exercises aimed at setting the correct execution details to develop motricity;

- Rationally chosen exercises to develop the speed indices that can be introduced into the game of motor skills;

- For the purpose of forming new skills, different technical elements, specific actions, with maximum speed or in conditions of fatigue and emotional strain will be made;

- For the development of the speed of motor quality, isotonic and isometric exercises will be used, especially those that include overturning movements that provide an active working activity for the muscular apparatus.

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