Bulletin of the *Transilvania* University of Braşov
Series IX: Sciences of Human Kinetics • Vol. 12(61) No. 1 – 2019
https://doi.org/10.31926/but.shk.2019.12.61.11

DEVELOPMENT MODELS IN HANDBALL PLAYERS

Ion Bogdan CHEPEA[1]

Abstract: *"The purpose of this study is to highlight the ability of handball coaches who can understand the mechanics of acceleration appropriately and to use this ability to provide handball players with the suggestions needed to achieve the desired angles of the joints and body to achieve speeds increased. The performance of a handball player is conditional on achieving a given move at the maximum possible speed. Thus, increasing the pitch of the pitch by achieving large amounts of force in the shortest possible time is fundamental to the maximum speed a handballer can achieve. At the moment, speed requirements for handball players have changed, evolving over time. When we talk about the development of speed in handball players, we refer to the rapid movement of the whole body in response to a stimulus. Acceleration, maximum reaction speed, speed of change of direction is the basic components of handball players' performance. The characteristic procedures for developing each component of speed at handball players need to be used from the junior age. In handball poty matches, high-speed action are seen, so handball players are forced to make high-speed decisions."*

Keywords: *handball, training, strength, speed.*

1. Introduction

At the moment, speed requirements for handball players have changed, evolving over time. When we talk about the development of speed in handball players, we refer to the rapid movement of the whole body in response to a stimulus. Acceleration, maximum reaction speed, speed of change of direction is the basic components of handball players' performance. The characteristic procedures for developing each component of speed at handball players need to be used from the junior age.

In handball matches, high-speed action can be observed, so handball players are forced to make high-speed decisions.

Handball performance is determined by various high-speed actions, while handball players are forced to make decisions in a very short time and solve multiple handball-specific tasks that occur during a match. [2]

Thus, we can say that the speed for a handball player is a fundamental component in order to achieve the highest performances.

[1] Faculty of Medical and Behavioral Sciences in Târgu-Jiu

In handball games, the player has to make directional changes that are combined with rapid movements of the hands and feet and all these manoeuvres are influenced by the handball player's visual ability by the way he / she perceives the situation, reaction time and the mode of participation.

Speed is the shortest time required for a handball player to move along a fixed distance, but without indicating the direction. [4]

Under these circumstances, it is necessary for a handball coach to use characteristic testing and development procedures for speed when preparing players for competitions.

2. Presentation of the Batch on which the Research will be Carried out

The research was conducted on a team of junior handballs belonging to the Tg-Jiu Sports High School.

In addition to talent and technical skills, LPS Tg-Jiu junior handball players for success are supposed to have physical capabilities so they can compete at the highest level.

In order to determine the health status of the handball team members, we evaluated the physical development indices (waist and body mass).

The waist average for the junior handball players of LPS Tg-Jiu is 1.77. Thus, it can be noticed that 4 junior handballs from the LPS Tg-Jiu team have waist values above the recorded average and 4 junior handball players from the LPS Tg-Jiu team have waist values below the recorded average. Regarding the corps table of the junior handball players of LPS Tg-Jiu it can be noticed that the team average is 73.25 kg.

Data on investigated subjects Table 1

Nr. crt.	Initial name	Waist (H)	Body Mass (m)	The role he plays
1.	M.C.	1,79	76	Inter right
2.	V.R.	1,77	73	Inter left
3.	D.A.	1,73	69	Extremely right
4.	T.A.	1,75	74	Extremely left
5.	D.S.	1,82	76	Center
6.	T.A.	1,76	72	Pivot
7.	C.B.	1,81	75	Pivot
8.	M.C.	1,74	71	Porter

Thus, 3 handball players within the team are under the team average, 4 handball players in the team have a body mass over the team average and one handballer has a body mass equal to the calculated average. After determining the waist and body mass, he could calculate the body mass index (BMI) according to the formula IMC = m / h2 where "m" represents the body mass, and "h" represents the body weight. [7]

The main categories of BMI are:

- < 18,5 underweight
- = 18,5 – 24,9 normal weight
- = 25 – 29,9 overweight
- = 30 or higher obesity

Based on the calculations, it can be stated that all junior handball players of LPS Tg-Jiu have a normal weight because they have BMI between 22 and 24 and the team average is 23,34.

Table 2

BMI of junior handball players of LPS Tg-Jiu following the calculations

Crt. No.	Initial name	BMI
1.	M.C.	23,71
2.	V.R.	23,30
3.	D.A.	23,05
4.	T.A.	24,16
5.	D.S.	22,94
6.	T.A.	23,24
7.	C.B.	22,89
8.	M.C.	23,45

Increases or decreases in small BMI often result in profound diminution of performance. Excessive weight, a BMI of over 24.9, can have more negative effects on the body of a handball player, among which we can recall increasing heart rate, increasing body temperature and increasing pressure on the bones and joints, and these factors can significantly affect the speed of a handball player.

For a junior handler, the BMI is associated with the speed it can develop. Thus, with the reduction of BMI, the need for oxygen is reduced and the energy costs associated with the running effort are reduced, which leads to an improvement in speed.

3. Velocity Rating Methods for Handball Players

3.1. Initial speed evaluation at junior handball players of LPS Tg-Jiu

For the present research we used a complex of research methods, which are closely linked. To determine the start-up speed of a junior handler, it is recommended to test short-haul runs up to 40 meters, making such tests very easy to interpret.

In terms of determining the maximum speed, in the handball it is recommended to test for distances up to 30 meters, because most of the actions take place over short distances.

Through the evaluation methods, the acceleration, rapidity and ability of a handball player in the LPS Tg-Jiu handball team can be determined to change the direction in a firm manner.

The initial speed evaluation of the LPS Tg-Jiu Handball Team was conducted in May 2018 and we used the following test procedures:

- sprint on a 10 m (foot start) distance;
- sprint on a 30 m (foot start) distance;

The data obtained from the test were statistically evaluated, the main method being absolute quantitative research.

When transposing the research results, it can be observed from the hypothesis that the speed level (times obtained) in the case of junior handball players of LPS Tg-Jiu will not differ significantly. So, after initial testing, we obtained the following data.

— *Sprint 10 m (foot start)*

Table 3

The results of the 10 m (sec) sprint test of the LPS Tg-Jiu handball juniors (initial testing)

Crt. No.	Initial Name	Results	The role he plays
1.	M.C.	2,75	Inter right
2.	V.R.	2,79	Inter left
3.	D.A.	2,86	Extremely right
4.	T.A.	2,88	Extremely left
5.	D.S.	2,79	Centru
6.	T.A.	2,66	Pivot
7.	C.B.	2,72	Pivot
8.	M.C.	2,79	Porter

According to the data presented in table 3, it can be seen that the arithmetic mean of the times obtained by the junior handball players of LPS Tg-Jiu in the sprint test on the distance of 10 m was 2.78 (sec). The worst time was 2.88 with 0.10 (sec), lower than the average of the whole team.

— *Sprint 30 m (foot start)*

Table 4

The results at the 30 m (sec) sprint test of the LPS Tg-Jiu handball juniors (initial testing)

Crt. No.	Initial Name	Results	The role he plays
1.	M.C.	5,8	Inter right
2.	V.R.	5,4	Inter left
3.	D.A.	5,6	Extremely right
4.	T.A.	5,7	Extremely left
5.	D.S.	5,6	Centru
6.	T.A.	5,4	Pivot
7.	C.B.	5,5	Pivot
8.	M.C.	5,7	Porter

The arithmetic average of the times obtained by the junior handball players of LPS Tg-Jiu in the sprint test over the 30 m distance was 5.5875 (sec). At the same time, it can be noticed that the best time was achieved by one of the team pairs (TA) and the left inter (VR), with 0.1875 (sec) less than the team average, which is not a very big difference, but it is significant because it has to be taken into account that the speed is a poorly perfected quality.

After analyzing the sprint speed over the 10m distance and sprinting over the 30m distance, it can be noticed that the times achieved can be improved because they are below the established rules.

3.2. Ways of speed development for handball players

To improve the results of the 10 m sprint test and the 30 m sprint test, all handbangs of the LPS Tg-Jiu junior team were subjected to exercises that had the role of developing speed. So to improve speed, handball players have to train their muscles to act and react very quickly.

Speed development is used to improve the speed of handball players and their ability to exert maximum force when they perform high-speed moves. [2]

Under the conditions presented, exercises used to develop the speed will be those that have the role of accelerating the reaction time. The most useful exercises for speed development in junior handball players are: [3]

- running with ankle play at different distances of 10, 30, 50 meters;
- knee-high choices made at different distances of 10, 20, 30 meters;
- running at different distances of 20, 30, 40, 50 meters;
- running in rough terrain at different distances of 20, 30, 40, 50 meters;
- downhill running at different distances of 20, 30, 40, 50 meters;
- running in which the handball player

has to execute a maximum number of steps at different distances of 30, 40, 50 meters;

- running in which the handball player has to execute a minimum number of steps at different distances of 30, 40, 50 meters;

The speed training sessions for junior handball players are recommended to be varied between days with light, medium and heavy workouts. In the present study, it is a junior team, in which case the body undergoes changes and because of the workouts there have been changes physical development indices (waist and body mass).

Data on investigated subjects Table 5

Crt. No.	Initial name	Waist (H)	Body Mass (m)	The role he plays
1.	M.C	1,80	76	Inter right
2.	V.R.	1,79	74	Inter left
3.	D.A.	1,73	71	Extremely right
4.	T.A.	1,77	74	Extremely left
5.	D.S.	1,82	77	Centru
6.	T.A.	1,78	73	Pivot
7.	C.B.	1,81	75	Pivot
8.	M.C	1,75	72	Porter

Thus, according to the data in table 5 we recalculated the Body Mass Index (BMI).

Table 6

BMI of junior handball players of LPS Tg-Jiu following the calculations

Crt. No.	Initial Name	BMI
1.	M.C.	23,45
2.	V.R.	23,09
3.	D.A.	23,72
4.	T.A.	23,62
5.	D.S.	23,24
6.	T.A.	23,04
7.	C.B.	22,89
8.	M.C.	23,51

According to the data presented in table 6 it can be noticed that the team average for BMI is 23.32 being improved by 0.02 compared to the initial evaluation, which can be considered insignificant as it cannot significantly influence the results obtained by the junior handball players of LPS Tg-Jiu in the tests speed in final testing.

3.3. The final speed evaluation of the junior handball players of LPS Tg-Jiu

Handball is a different sport than other sports, but it involves running, so by testing the skills of the handball player, we can figure out whether the speed development program can properly develop a junior handball player.

The final speed evaluation of the LPS Tg-Jiu Handball Team was conducted in January 2019 and we used the following test procedures:

— *Sprint 10 m (foot start)*

Table 7

The results of the 10 m (sec) sprint test of the LPS Tg-Jiu handball juniors (final test)

Crt. No.	Initial Name	Results	The role he plays
1.	M.C.	1,87	Inter right
2.	V.R.	1,89	Inter left
3.	D.A.	1,86	Extremely right
4.	T.A.	1,88	Extremely left
5.	D.S.	1,92	Centru
6.	T.A.	1,86	Pivot
7.	C.B.	1,88	Pivot
8.	M.C.	1,89	Porter

According to the data presented in table no. 3.5., it can be seen that the arithmetic mean of the times obtained by the junior handball players of LPS Tg-Jiu in the 10 m distance sprint test at the final test was 1.88 (sec) with 0.9 (sec) less than the initial testing. What makes us say that the training was a very good one and the times recorded in the final test of junior handball players of LPS Tg-Jiu were good and very good.

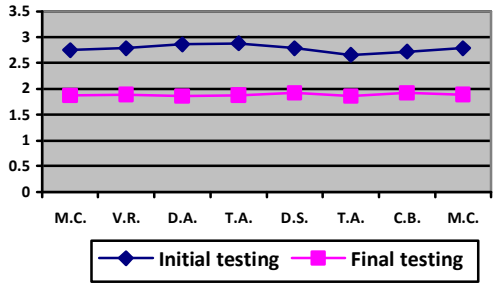

Fig. 1. *Results obtained in the initial and final testing at the sprint test 10 m*

In figure 1 it can be noticed that the handball players who managed to get the best results in the initial testing, were able to get the best results in the final test.

At the moment, handball is mainly characterized by dynamics and a sustained increase in the speed of the game, so it is necessary for handball players to speed up when the game imposes it.

The results obtained from the analysis revealed differences in the sprint capability of the junior handball players of LPS Tg-Jiu and the positions they play. The highest level of sprint ability was achieved in the final test of the pivot (TA) and the extreme right (DA), and the lowest level of sprint ability was obtained by the team center (DS), followed by the goalkeeper team (MC).

— *Sprint 30 m (foot start)*

Table 8

The results at the 30 m (sec) sprint test of the LPS Tg-Jiu handball juniors (final test)

Crt. No.	Initial Name	Results	The role he plays
1.	M.C.	5,0	Inter right
2.	V.R.	5,2	Inter left
3.	D.A.	5,1	Extremely right
4.	T.A.	5,0	Extremely left
5.	D.S.	5,2	Centru
6.	T.A.	5,1	Pivot
7.	C.B.	5,2	Pivot
8.	M.C.	5,1	Porter

The arithmetic average of the times obtained by junior handball players of LPS Tg-Jiu in the 30 m sprint test was 5.11 (sec) with 0.4775 (sec) less than in the initial test. Thus, we can say that the training for speed development was very effective, because the junior handball players of LPS Tg-Jiu managed to get much better results in final testing.

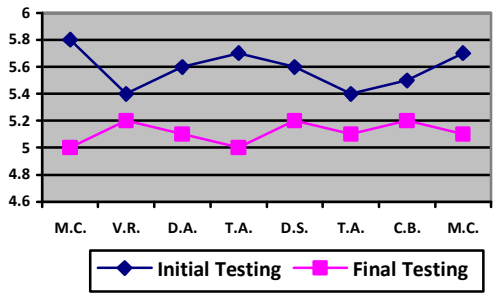

Fig. 2. *Results obtained in the initial and final test at the sprint test 30 m*

In figure 2, it can be seen that the best times were obtained by the right (M.C.) and the far left (T.A.).

Over time, it has been found that with the improvement of the straight line sprint, the handballer will significantly improve both lateral and directional movements [5]. Forming the body to make the right moves will allow the handball player to do what is needed during a match without having to think a lot about it.

4. **Conclusions**

Maximum running speed is one of the most rigorous tasks a handler can achieve per unit of time. In the present study, it can be concluded that handball players also perform actions at sub-maximal speeds.

By comparing the results of the two tables, it can be seen that the pairs of the handball team obtained the best times, ranking below the average of the teams.

The main conclusions drawn from the study show that the characteristic development procedures for speed should be used by handballs, from early ages.

References

1. Arustei, O., Schender, C.: *Handbal. Conținut, mijloace (Handball. Content, means)*. București, Editura Demiurg, 2011.
2. Gogaltan, V.: *Instruirea copiilor și juniorilor în handbal (Training children and juniors in handball)*. București, Editura Demiurg, 2007.
3. Hantău, C., Hantău, C. Ghe.: *Handbal. Noțiuni de bază (Handball. Basic*

concepts). București, Editura ASE, 2012.

4. Harman, E., Garhammer, J.: *Administration, Scoring, and Interpretation of Selected Tests. In: Essentials of Strength Training and Conditioning*, 3rd ed. Edited by T.R.Beachle, and R.W. Earle, 2008.
5. Rizescu, C.: *Handbal. Pregătirea tehnică a începătorilor* (*Handball*. *Technical training for beginners*). Chişinău, Editura Valinex, 2008.
6. Sotiriu, R.: *Handbal – antrenament, teorie, metodică (Handball - training, theory, methodical)*. București, Editura Garold SRL, 1998.
7. Stefan, N., Kantartzis, K., Machann, J., et al*.: Identification and characterization of metabolically benign obesity in humans*. In: Arch Intern Med., 2008, p. 1609-1616.