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Original article

EXPERIMENTAL STUDY REGARDING DEVELOPMENT OF SPEED, COORDINATION AND BALANCE IN FOOTBALL GAME FOR CHILDREN AGE 10 - 12 YEARS

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Abstract

Objectives. This research aims to present a series of tests specific to football game for children age 10-12 years, tests that are structured based on balance, coordination and speed.

Methods. The pedagogical experiment was conducted on a team of children from Brasov, following a correlation between the level of the technical executions performed, balance indicators, coordination and speed of the players. During the initial and final testing specific materials were used, the subjects being tested using training net for coordination, "Flamingo" test for balance, and a trial specific for speed in the football game.

Results. The processing of the results after the final test revealed a direct correlation between the coordination indicators (training net), the balance indices ("Flamingo" test) and the level recorded in the speed test. The results are presented in the tables, being processed from a statistical and mathematical point of view.

Conclusions. The conclusions of the scientific research confirmed the research hypotheses, highlighting in the case of this research, direct correlations between the balance of subjects, their coordination and indicators of motor quality and speed.

Key words: balance, coordination, Flamingo test, speed.

Introduction

Football is a game that requires from the players different types of effort that are determined by the moments of the game. In this process are involved speed, endurance, force, coordination and balance, all of these being improved in a specific report. We can say that between these conditional abilities there is a certain interdependence due to the fact that any movement in the game of football includes all abilities, but only one or more of them predominate. So by developing one of the capabilities, we request them and the others. (Iordan, București 2017)

In the literature, the treatment of conditional capacities is done separately only to facilitate the theoretical understanding of each capacity. Most orientations and trends in the modern game of football have as an essential conditional capacity for high performance in football, namely, speed.

Manno R. (1987) defines speed as "the ability to perform motor actions in a minimum amount of time.

In the opinion of Cernăianu C. (2001) "speed represents the player's ability to move his body or a segment in a minimum amount of time".

Speed is the genetically conditioned motor quality, which makes it very little perfectible. During a game, speed is decisive for the degree of spectacle and effectiveness, being a main attribute in its development. It manifests itself in its general form combined with endurance, strength and coordination, as well as with the technical elements and tactical actions.

The football player performs during a game between 50-160 actions in speed, on distances between 20-24 meters, which totals about 500-2000 meters, in addition to this being present the speed of reaction to various stimuli of the game. In the game of football, we find speed in the following forms:

- Travel speed
- Reaction speed
- Execution speed
- Repetition speed
- Acceleration speed

The player's ability to cover a certain distance in the shortest possible time is defined as the speed of movement. Thus, we can deduce that the one who develops the corresponding force can move at

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maximum speed.

Running in the football game will never be done from a predetermined point, nor will it be possible to determine with which foot it will be done. In these conditions, between two players who have the same speed, an obvious advantage will be the player with the fastest departure.

ZaŃiorski V. M. (1968) states that latent time comprises "5 components:

- The appearance of the excitation in the receiver;
- Transmission of excitation to the central nervous system (SNC);
- Excitation processing at the SNC level and order formulation;
- Transmission of the signal from the SNC to the muscles;
- Muscle excitation when the motors response occurs;

The quality that allows the player to solve the situations of the game in favor of his team by the rapid execution of a process or complex of technical procedures and is measured by the time elapsed from its beginning to the end of the act or action performed is identified as the speed of execution.

Repetition speed is the player's ability to execute a number of identical moves in a predetermined time. Responsible for this action is the mobility of cortical nerve processes. The frequency of the movements refers to the movement of the players on the field and their technical executions, from running.

The player's ability to develop the speed to the upper limit, in the shortest possible time, is identified with the acceleration speed.

Some experts consider the speed of choice an important component of the complex reaction that the player manifests in choosing a decision. It is represented by the optimal response to the opponent's actions, highlighting the athlete's intelligence. The sequence of this decision-making process includes: the preparation, adoption, execution of the decision and control over the execution of the decision.

Balance is considered a very important aspect of the performance of all individuals while doing a series of daily activities, which is achieved through a process that involves the harmonious functioning of the musculoskeletal and neurological systems. (Jacobson, G.P., C.W. Newman and Kartush, 1992)

The game of football requires a variety of motor skills including maintaining balance while running, fiddling, hitting the ball, scoring, dispossessing and changing direction. Balance, represents the ability to maintain a stable body position on a supportive basis,

is an important component of the human ability to stand on one leg.

Balance typically forms the basis of motor qualities, from the simple to the complex. The balance in the game of football, dynamic by its nature, requires the singular control of the joints to be able to perform tasks during the game and training, such as: hitting the ball, jumping, landing, dispossession, running but also slots. Dynamic balance requires a proprioceptive ankle-knee combination and stability of the center of gravity in order to achieve a straight posture. (Răzvan Enoiu, Braşov 2006);

The center of gravity is the body's ability to maintain the body's dynamic balance as a result of disturbing internal or external factors.

Balance is a fundamental requirement in sports. Stability of the center of gravity is the body's ability to maintain the dynamic balance of the torso due to internal or external disturbance. The ability of the torso to control the pelvis and legs, resulting in optimal strength and movement to the terminal segment. Unstable environments, such as standing on one leg, require very well-developed sensory and motor systems in an attempt to reduce increased postural balance. In order to constantly make the necessary corrections to withstand the destabilizing effect of gravity and disturbances during running and jumping, the central and peripheral nervous system must determine the position of the body's center of gravity relative to the gravitational force and support base, then perform movements. coordinates to correct any deviation of the center of gravity. The physiological systems and processes used in balance are visual, vestibular and somatosensory in nature and muscular and articular perception. Balance is based on the combinations of all these systems for the proper functioning of the body. (Tropp, H., Odenrick, P. 1985).

Coordination is the ability to perform with fluidity, rhythm and precision movements of different body segments in order to complete a high-precision sporting action.

In his book from 1993, Taber's Cyclopedic Medical Dictionary, the author defines coordination as the work of a set of muscles in order to produce a certain movement. In the field of drive systems science, coordination is considered the body's ability to organize two or more segments in order to achieve a particular motor goal.

In human movement, coordination can be defined as "the process of mastering the degree of freedom offered to moving limbs, in other words the

conversion to a controllable system of movement." The Russian psychologist Nikolai Berntein made a significant contribution to how the components of systems are composed and the degree of freedom while bringing a relationship of their functioning through the specific modeling of movement models. These models were named by Turvey in 1977, coordinating structures and can be designed as a temporary and flexible assembly of many micro components, so that a single micro component can take part in several coordinating structures on different occasions. (Turvey, M. T. 1977).

Coordination is based on the ability of the central and peripheral nervous system as a psychomotor ability, but at the same time the muscle-ligament to perform a series of smooth movements, harmonious, in time, space, but also in different directions and conditions, being determined the correlation between the activity of the mentioned systems during the movements.

Methods

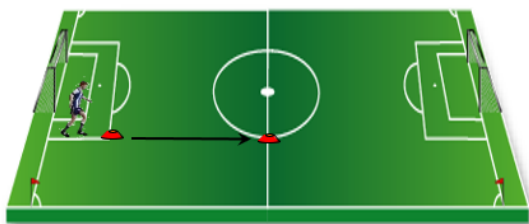
The working hypothesis of the research consists in the use in the process of preparing the means designed to improve balance, coordination and speed, we assume that will lead to the development of these three components in the game of football, for juniors aged between 10 and 12 years.

The experimental period was eight weeks. The research took place on six subjects legitimated at one of the clubs in the city of Brasov, subjects aged between 10 and 12 years. In the initial and final research, specific equipment was used, for coordination we have used the training net.

For balance we used the Flamingo test, and for speed we used the test „speed running on a distance of 40 meters”.

The aim of these tests was to assess the level of, coordination, balance and speed as follows:

Test 1 - "Speed running" test on 40m. The athlete starts from the position facing the running direction. The running distance is timed and the result is expressed in seconds (sec);



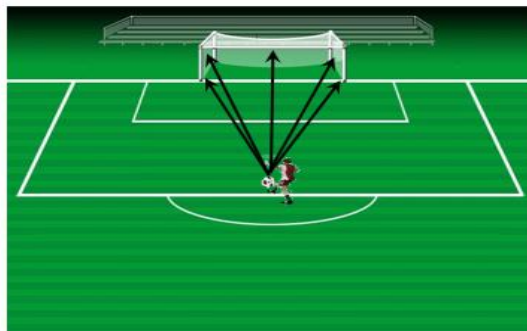
Picture 1 – Speed running test on 40m

Test 2 - The "Flamingo" test, the player is sitting on one leg on a surface with a width of 15 cm, the other leg flexed from the knee is caught with the ankle hand, and the free arm maintains balance. Measure the time the athlete manages to keep his balance without losing his position and the value will be expressed in seconds (sec). The maximum time for every subject is 25 seconds.



Picture 2 – Flamingo test

Test 3 - The 'kicking' test consists of shooting a number of ten hits of the ball towards the goal from the 16 m line two shots for every target marked by the training net, using the wide procedure. The training net is positioned on the goal post. Only the executions in which the ball goes to the target will be scored.



Picture 3 – The kicking test

Results

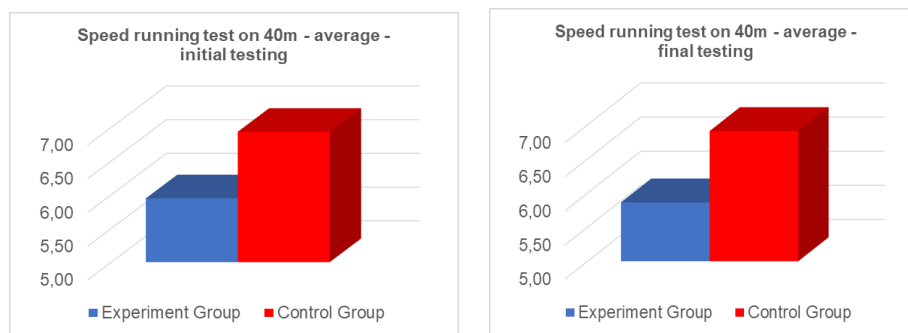
We present below the values recorded by the six subjects and their averages in the sample used.

Table 1. Values obtained in the speed running test on 40m

Experimental Group			Control Group		
Name	Speed I.T(sec)	Speed F.T(sec)	Name	Speed I.T(sec)	Speed F.T(sec)
S.D.	5,2	5,1	G.C.	7,8	7,8
G. D.	5,99	5,9	F.A.	6,2	6,15
R. A.	6	5,9	Z.P.	6,6	6,55
R. A.	5,6	5,5	S.A.	6,72	6,69
O. M.	6,87	6,8	M.M.	7,62	7,62
T.L.	6,02	5,97	B.D.	6,66	6,63
Average	5,95	5,86	Average	6,93	6,91
Standard deviation	0,56	0,57	Standard deviation	0,63	0,65

In table 1 we present the values obtained by the experimental group and the control group in the

initial testing and the final testing for the „speed running test on 40 meters”.



Graphic 1 - Speed running test on 40 m average values for initial and final testing

Following initial testing, the subjects scored an average of 5.95 seconds, while after applying the experimental program, the subjects scored an average

of 5.86 seconds. Thus, we see, by chart number one, a progress of 0.09 seconds.

Table 2. Values obtained in the Flamingo test

Experimental Group			Control Group		
Name	Flamingo I.T(sec)	Flamingo F.T(sec)	Name	Flamingo I.T(sec)	Flamingo F.T(sec)
S.D.	2,5	3,5	G.C.	1,5	1,6
G. D.	17,6	18	F.A.	1,5	1,7
R. A.	1,5	2,5	Z.P.	2,69	2,7
R. A.	25	25	S.A.	1,3	1,4
O. M.	1,9	2,9	M.M.	0,87	1,5
T.L.	1,3	2,3	B.D.	1	1,5
Average	8,30	9,03	Average	1,48	1,73
Standard deviation	10,35	9,92	Standard deviation	0,65	0,48

In table 2 we present the values obtained by the experimental group and the control group in the

initial testing and the final testing for the „Flamingo” test.



Graphic 2 – Flamingo test average values for initial and final testing

Following initial testing, the subjects scored an average of 8.30 seconds, while after applying the experimental program, the subjects scored an average

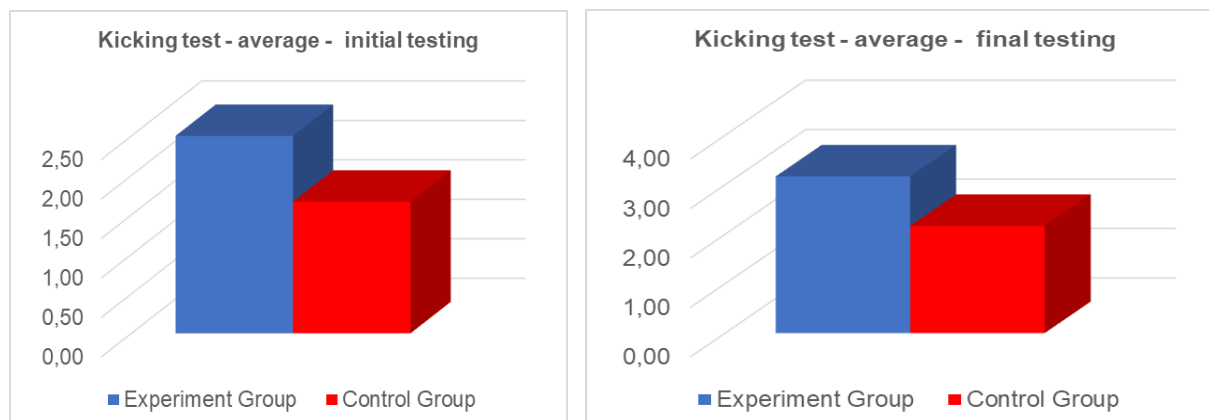
of 9.03 seconds. Thus, we see, by chart number two, a progress of 0.73 seconds.

Table 3. Values obtained in the kicking test

Experimental Group			Control Group		
Nume	Kicking the ball with the wide of the foot I.T	Kicking the ball with the wide of the foot F.T.	Nume	Kicking the ball with the wide of the foot I.T	Kicking the ball with the wide of the foot F.T
S.D.	3 rep	4 rep	G.C.	2 rep	2 rep
G. D.	3 rep	4 rep	F.A.	2 rep	3 rep
R. A.	2 rep	3 rep	Z.P.	1 rep	2 rep
R. A.	2 rep	2 rep	S.A.	2 rep	2 rep
O. M.	3 rep	3 rep	M.M.	2 rep	3 rep
T.L.	2 rep	3 rep	B.D.	1 rep	1 rep
Average	2,50	3,17	Average	1,67	2,17
Standard deviation	0,55	0,75	Standard deviation	0,52	0,75

In table 3 we present the values obtained by the experimental group and the control group in the

initial testing and the final testing for the „kicking” test.



Graphic 3 – Kicking test average values for initial and final testing

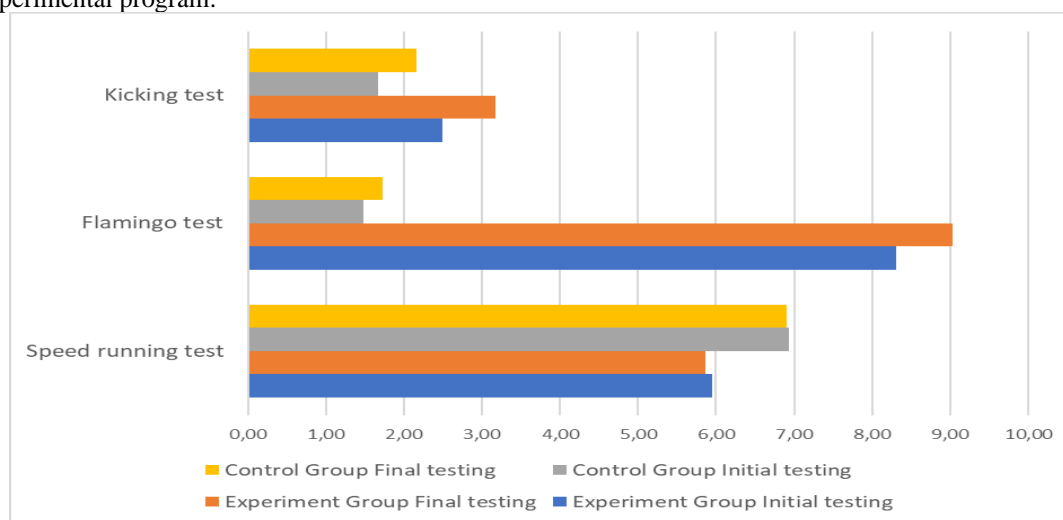
Following initial testing, the subjects scored an average of 2.50 correct hits, while after applying the experimental program, the subjects scored an average of 3.17 correct hits. We can see, by visualizing chart number three, a progress of 0.67 correct hits.

Conclusion

The subjects involved in the research managed to improve their speed, balance and coordination based on the experimental program.

Based on these results, the correlation that is required confirms that the experimental program designed and applied to improve the speed, balance and coordination has been validated in practice.

Graphically, the values of the three tests that led to the obtaining of the higher quality results are presented below in the overall comparison initial and final testing for the three tests performed.



Graphic 4: Overall comparison initial and final testing for the three tests performed

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