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Original article

EXPERIMENTAL STUDY ON COMPONENTS OF PROPRIOCEPTION IN FOOTBALL FOR CHILDREN AGE 10 TO 12

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Abstract

Objectives. The research aims to present the proprioception in the football game at the age of 10 - 12 years, structured on its main components: balance, neuromuscular coordination and speed.

Methods. The pedagogical experiment was conducted on a team of children in the city of Brașov, with a correlation between the level of their technical executions and the balance, coordination and speed indicators of the players. In the initial and final testing, specific research equipment was used and the subjects were being tested on the "bosu ball" for the neuromuscular coordination component, on the balance equilibrium platform for balance indices. Two test specimens specific to the football game were used for the moral quality indexes.

Results. The processing of the results from the final test revealed a direct correlation between the „bosu ball" indices, equilibrium indices (equilibrium platform) and the level recorded in the two specific speed-shifting tests. The results are presented in the tables being processed statistically and mathematically.

Conclusions. The conclusions of the scientific research confirmed the hypotheses of research, highlighting regarding proprioception, direct correlations between the subjects balance, their neuromuscular coordination and the motric quality indexes.

Keywords: proprioception, equilibrium, neuromuscular coordination, speed.

Introduction

Proprioception (kinestezia) is the sense in which we perceive at the same time the position and movement of our own body, including the sense of stability and balance. (Jones, 2000) (https://www.sciencedirect.com/topics/neuroscience/proprioception)

Proprioception originates from the Latin "proprius" which means "own", "individual" and perception, meaning the sense of the relative position of the neighboring parts of the body and the force of the effort involved in the movement. The brain thus integrates the information received from the proprioceptors together with the vestibular system in a general sense of position and movement (acceleration and deceleration).(Mosby's Medical, Nursing and Allied Health Dictionary. 1994)

We find five senses that are discussed and learned from the earliest ages: seeing, hearing, taste, touch and smell. The conscious part of the brain or function-I is very responsible for these senses. It voluntarily checks the information gathered by them to know the environment, but also for the moments when there is a strong external stimulus that draws attention to one of these senses working equally in order to ensure good functioning of the human body. However, they are not so familiar with function-I as the nervous system keeps them in the subconscious.

One of the overlooked senses is proprioception that is as important, or perhaps even more important than the others, being directly responsible for the normal functioning of the body. Proprioception is known as the process by which different body muscles can contract in response to an external factor acting immediately, using the tensing muscle receptors to keep the joints in place. (https://serendipstudio.org/exchange/serendipupdate/proprioception-how-and-why)

Balance is the ability of a man to stand upright in control of body movements, coordinating being the ability to move two or more parts of the body smoothly and efficiently.

Specialty literature tells us about two types of balance: static and dynamic. Static equilibrium refers to keeping balance at the moment of stagnation, while dynamic balance helps us in the moment of movement. We use our eyes, ears and sense of stability to keep our balance. (Enoiu;, 2015)

Coordination is a complex skill that requires not only a very well-developed balance but also a high level of strength and agility. Balance and coordination can be improved by training specific to the sporting industry where the athlete works (Enoiu, Enoiu, Flavius; 2009).

Balance and coordination are two of the basic components of fitness, a success factor in most

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sports. (Roxana Enoiu, Răzvan Sandu Enoiu; 2008) Some sports such as gymnastics, swimming or even surfing depend more on balance, being the most important physical skill. (Marinescu; 2002, Enoiu; 2006) Good coordination is also vital in sports involving the hitting of objects. Also, in many other sports games, mainly team sports, balance and coordination are very important in skills development. (https://www.topendsports.com/fitness/balance.htm, Enoiu; Braşov 2006)

Soccer players need very good foot-eye coordination to focus on the ball that is moving most of the time to take possession and maintain it, but especially to move and to score. To be able to practice this sport, high accuracy is needed when the athlete is in possession of the ball. (Oancea, Enoiu; 2002)

A very well-developed balance can provide a subtle advantage on a field during a football game, an advantage that can make a difference in the important moments of the game when the team needs a glimpse. Take, for example, the moment when the athlete runs and an opponent tries to dispossess it. In these moments, the balance speaks its word, the athlete being forced to move his body weight so that it does not lose possession of the ball. (https://www.soccer-training-info.com/balance_exercises.asp)

It is very important that the balance be developed from the earliest age. Players are required to perform game tasks using one foot at most. Birding, picking, kicking, overtaking and dribbling are all accomplished in balance on one leg. Most of the players and coaches ignore the balance and take it as such. However, it is like any other skill, must be constantly improved to have performance. The most valuable players in the world have a very well-developed balance, which gives them the opportunity to perform high-speed football-specific tasks without losing possession.

Equilibrium is the equal distribution of weight that keeps the body in the right position. Some key elements that athletes need to keep in mind to have a high balance are:

- The center of gravity must be kept down. This can be achieved by adopting a position on the heel, slightly bent forward and flexed knees.
- The arms should be used to create a lever for the rest of the body so that it stays in balance, but the arms should not have a chaotic motion.
- When the athlete has possession of the ball, there are ideal steps and as many touches of the balloon.

Improving leg strength is one of the most important factors in the development of balance. (https://www.amplifiedsoccerathlete.com/coachguide/develop-your-balance-it-is-an-important-skill-often-overlooked)

Methods

The working hypothesis of the research consists in the application in the training of the junior football players of 10-12 years of the experimental program designed to train the components of proprioception, whereby we assume that we will achieve superior results both for maintaining the balance and for developing the coordination.

The experimental period was eight weeks. The research took place on five 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, subjects being tested on the "bosu ball" for the neuromuscular coordination component and on the balance equilibrium platform for balance indices. The research was designed on two categories of control samples. The first category of control samples (control sample number 1) contains three specific tests performed on equipment that has been used to investigate balance and coordination parameters. The second category of control samples (control sample number 2) was carried out on a specific research equipment (equilibrium platform), through which the ability to concentrate relative to the sense of balance (proprioception) The control number 1 test consisted of a series of three athletes' tests using "bosu ball" as follows:

Test 1 - the athlete is facing the "bosu ball", from the stand, to the sound of the coach, the player jumps with both feet on the "bosu ball", kicking the ball with his head, handed by a teammate. Five repetitions will be performed and only those in which the athlete sends the ball with his head back to his colleague's arms will be scored

Test 2 - the athlete is facing the "bosu ball" from the stand, to the coach's beep, the player jumps with the left foot on the "bosu ball" and with his right foot strikes the ball (through the handwheel) by a teammate. 5 repetitions will be performed and the executions in which the player passes the ball back to the colleagues will be scored.

Test 3 - the athlete is facing the "bosu ball", from the stand position, to the coach's beep, the player jumps straight to "bosu ball" and his left foot strikes the ball (through the handwheel) by a teammate. 5 repetitions will be performed and the executions in which the player passes the ball back to the colleagues will be scored.

Sample 2 consists of applying a pre-set exercise consisting of two iterations, each of one minute, on

the equilibrium platform. Data recording is triggered when the start button is triggered and automatically finishes at the end of the working time. In this test, the post-rabble was interpreted

Results

We present in the tables below the values recorded by the five subjects and their averages in the samples used.

In the first test, after the three tests were performed, we obtained the following data, quantified in a number of repeats.

Initial Test Data – Table 1

Name	Hitting the ball with the head	Kicking the ball with the dominant foot	Kicking the ball with the weak foot
P.D	2 rep	3 rep	2 rep
D.R	3 rep	3 rep	3 rep
V.A	3 rep	4 rep	2 rep
B.R	4 rep	3 rep	2 rep
G.M	3 rep	2 rep	3 rep
Average	3 rep	3 rep	2,4 rep

Final Test Data – Table 2

Name	Hitting the ball with the head	Kicking the ball with the dominant foot	Kicking the ball with the weak foot
P.D	3 rep	4 rep	3 rep
D.R	4 rep	4 rep	4 rep
V.A	3 rep	5 rep	4 rep
B.R	4 rep	4 rep	3 rep
G.M	4 rep	3 rep	5 rep
Average	3,6 rep	4 rep	3,8 rep

Data Average – Centralising Table – Table 3

Sample	Initial testing	Final testing	Final average	Progress
Hitting the ball with the head	3 rep	3,6 rep	3,3 rep	0,3 rep
Kicking the ball with the dominant foot	3 rep	4 rep	3,5 rep	0,5 rep
Kicking the ball with the weak foot	2,4 rep	3,8 rep	3,1 rep	0,7 rep

Following the initial test, subjects scored an average shot of the ball with the head 3, while after

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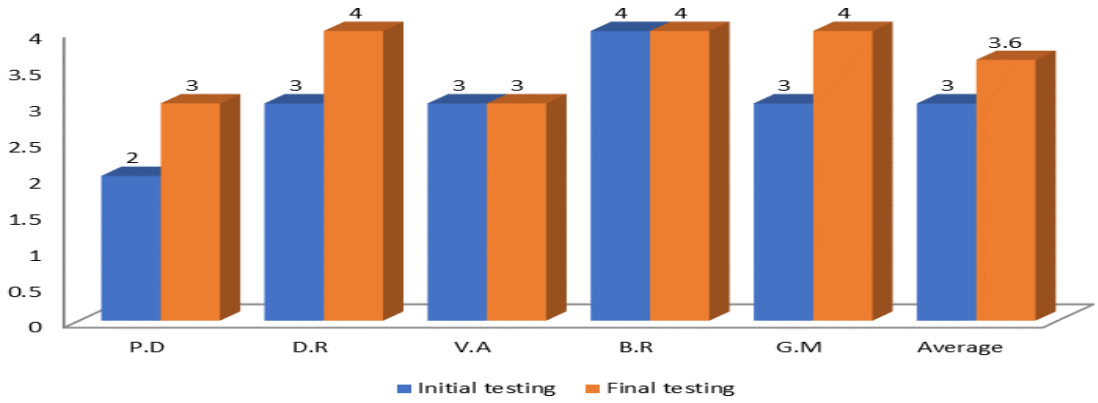
applying the experimental program, the subjects reached an average shot of the ball with the head at the final test of 3.6 correct executions.

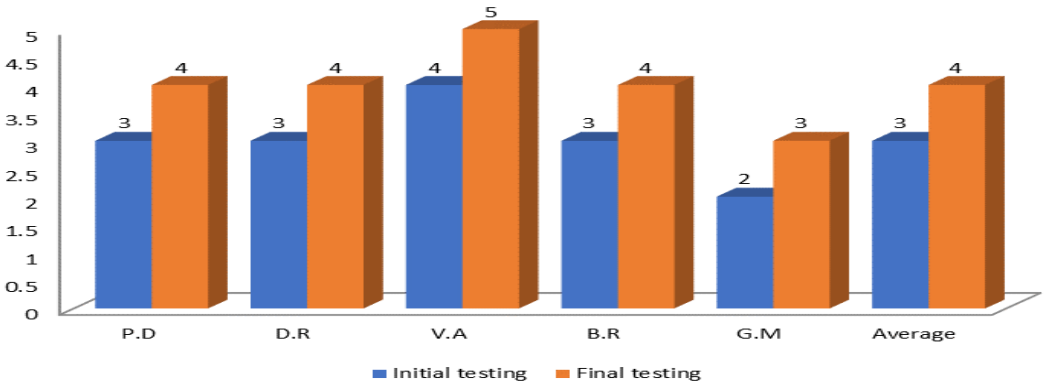
It can be seen by plotting graph 1, a progress of 0.3 in the final test, the correct execution.



Graphic 1 – Comparison initial results vs. Final results – hitting the ball with the head

Following initial testing, subjects scored a 3-in-foot bumping average, while after applying the experimental program, the subjects scored an average shot of the ball to the final test of 4 correct executions.

Thus we see, by chart number 2, a progress of 0.5. correct executions.



Graphic 2 – Comparison Initial Results vs. Final Results – hitting the ball with the strong foot

Following initial testing, subjects scored a strike average of the ball with a clumsy foot of 2.4, while after applying the experimental program, the subjects scored an average shot of the ball to the final test of 3.8 correct executions.

We see this, by visualizing chart number 3, a breakthrough of 0.7 correct executions.

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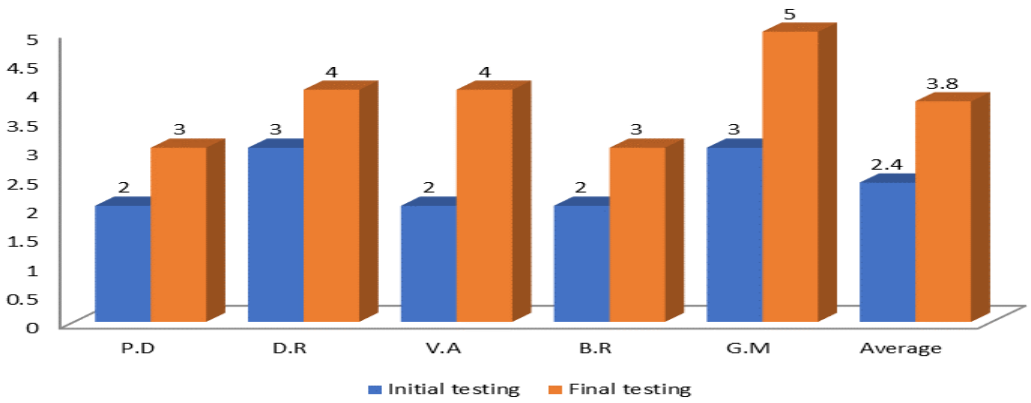

Graphic 3 - Comparison Initial Results vs. Final Results hitting the ball with the weak foot

At the second control sample - pre-established exercise on the equilibrium platform, the subjects of the research carried out two repetitions of one minute, after which the analysis of their final post-rammas, the determination of the pressure center route, as well as the determination the outline of the route.

Interpretation of the results obtained in this test by the subjects of the research reveals that, following the specific program during the experimental research, the subjects were able to obtain superior qualitative indicators for the determination of the pressure center route.

It was also found that in the case of final tests, the contour areas of the subjects' paths underwent changes in order to concentrate their values and to determine higher quality contour areas.

Conclusions

The subjects involved in the research have improved their proprioceptive capacity based on the experimental program. The conclusions of the tests from the control sample 1 were synthesized in the diagram below, which shows the superior quality of the results of the final tests, following the application of the experimental program.

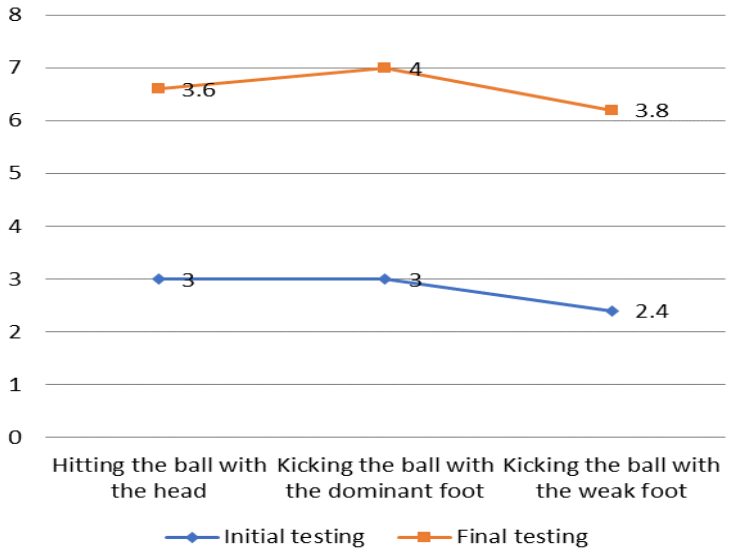

Diagram 1 – Comparison Initial Test vs Final Test

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

The results obtained in the first three control tests (sample 1) were correlated with the higher indices recorded by the subjects at the second test sample in the final tests, which justifies us to assert that the research hypothesis was validated in practice on the basis of experimental research. Schematically, the concentration of the values in the final tests that led to the obtaining of the higher quality contour areas, the results of the two tests can be presented as follows:

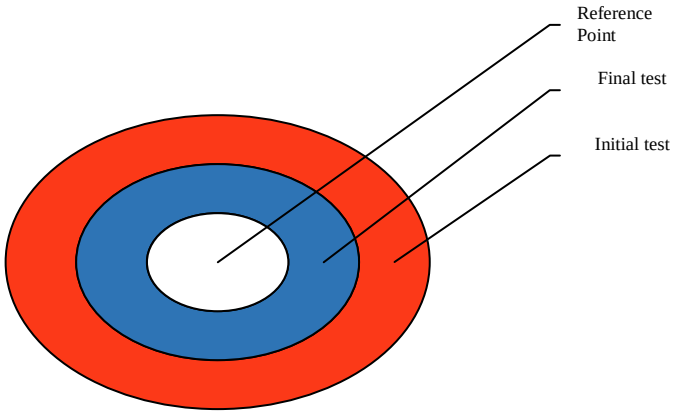

Diagram 2 - Concentration of Initial Values vs Final Values

Bibliografie:

Departamentul de Performanță Motrică, Universitatea Transilvania din Brașov; Universitatea Dunărea de Jos din Galați, Strada Universității nr 1, Brașov, România, E-mail razvan.enoiu@unitbv.ro

Enoiu R.S., Bazele Generale ale Antrenamentului Sportiv. Generalități, Editura Universității

Enoiu R.S., Enoiu R., Țurcanu F., Musculație, Editura Universității „Transilvania" din Brașov, 2009.

Enoiu R.S., Manual Pentru Învățarea înotului; Editura Universității „Transilvania" din Brașov, 2006.

Enoiu R., Enoiu R.S., Activitățile de Educație Fizică în Universitatea Transilvania; Editura Universității „Transilvania", Brașov, 2008.

Enoiu R.S., Vâslit Aplicativ Noțiuni de Bază, Editura Universitatea „Transilvania", Brașov, 2006.

Marinescu Ghe., Natație Tempo și Ritm; Editura Dareco, 2002.

Oancea V., Enoiu R., Fotbal. Considerații Asupra Factorului Fizic, Editura Omnia Uni S.A.S.T, Brașov, 2002.

https://www.amplifiedsoccerathlete.com/coachguide/develop-your-balance-it-is-an-important-skill-often-overlooked

Mosby's Medical, Nursing and Allied Health Dictionary. 1994.

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https://www.soccer-training-info.com/balance_exercises.asp

https://www.sciencedirect.com/topics/neuroscience/proprioception

https://serendipstudio.org/exchange/serendipupdate/proprioception-how-and-why

https://www.topendsports.com/fitness/balance.htm