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CONTENT

STUDY ON THE PROPORTION OF SHOTS TO GOAL FROM THE DISTANCE DURING THE FINALISING ACTIONS OF „C.S.U. CRAIOVA 2" FOOTBALL TEAM

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Abstract: For this research we have studied 15 football games of „C.S.U. Craiova 2" football team. The study lasted for one competitional year during which we had been interested in the proportion of shots at goal and shots wide because these are an advantage in preparing an attack that could lead to victory, the aim of each game, actually. We took into consideration several parameters of shots to goal from the distance such as: shots from the spot, shots while running, volley and drop.

After the statistical processing of the recorded data for the 4 parameters we got information related to: frequency (number of shots per game); accuracy (number of shots to goal and their proportion out of the total number of shots); shots average. The aim of the research is to emphasize the importance and necessity of consolidating and improving shot to goal from the distance, an aspect that influences the football game and contributes to shaping the game and getting excellent results.

Thus, we intend to present the importance of improving shot from the distance and shot generally during a football game, aiming mainly at scoring.

Keywords: *football, performance, efficiency, shot at goal*.

Introduction

Starting from the truth that shot to goal aims at scoring and that this fact determines, actually, a team's results, we may conclude that every effort during a football game, as well as the training process – a football game has discontinuity in movements and of high intensity [1] -have as a main objective a successful shot to goal and also to prevent the opponent from scoring [2]. Because the defensive system reached a very high level, limiting the opportunities of the opponents to shot to goal and because decisions are harder and harder to make due to the uncertainty and unpredictability of the game itself [3], the phenomenon of inefficacy appeared. If shots to goal represent the climax of a game and goals make the difference, then exercises for shots to goal have to be adequate for games and competitions. It is necessary to state that beside shooting to goal, the problem of efficacy refers to the whole activity of the players inside the finalising area expressed by various tactical manoeuvres. Nowadays, when the dynamics of football game has imposed an increase in the number of technical and tactical actions, 280-300/game, a fact that has led to an increase in intensity [4], the forward players are compelled to shoot to goal in extreme conditions.

Hypotheses of research:

1. The deficiency of individual technique is an obstacle for an efficient shot wide.
2. The central forward have the most finalising actions.
3. The shots from the distance are less probably to succeed against opponents.
4. Shots from the distance can take by surprise the goalkeeper.

The aim of the research

The aim of the research is to emphasize the importance and the necessity of reinforcing and improving shot to goal form the distance, an aspect that leads to a good football game, contributing in the same time to obtaining superior sport results.

Thus, we intend to present the necessity of improving shot from the distance in the football game, aiming mainly at scoring goals.

The structure of research

The research took place at „C.S.U. Craiova 2", during a competitional year, for 15 games in the National Championship, league C, 2017-2018. The games were played only at home. Statistical data were collected together with the technical staff of the team.

We have investigated some parameters of shots to goal from the distance. These parameters are:

1. Shots from the spot

Long distance shots from the spot, with effect and on lace were recorded.

2. Shots while running

Long distance shots while running, from the spot, with effect and on lace were recorded.

3. Volley shots

Long distance volley shots were recorded.
4. Drop shots
Long distance drop shots were recorded.
For all 4 parameters the data about shots from the central and lateral pitch lanes were recorded. We also took into consideration shots to goal and shots wide.
After processing the data recorded for the 4 parameters, we got the following information:
- frequence (number of shots per game);
- accuracy (number of shots to goal and their proportion from total of shots);
- shots average.

Methods

Bibliographic study
Visual observation
Personal questionnaire
Recording
Statistical and mathematical method for data processing

Data interpretation

Unfortunately, these parameters are not recorded in literature for the previous Championships, league C and that is why we cannot evaluate their evolution along ages.
We intend to present the statistical data for each parameter, with the necessary additions and features if needed.

a. Shots from the spot

After data processing and acording to diagrams we can notice that the average of shots from the spot is 5.4 per game, out of which 3.8 shots were shots with effect and 1.6 on lace.
In the first half of tthe game, the average of shots wide with effect is 0.8 per game and 0.2 shots on lace. In the second half, the players of „C.S.U.Craiova 2" recorded an average of 1.2 shots wide with effect and 0.3 shots on lace per game.
Accordingly, during the 15 football games, „C.S.U.Craiova 2" played offensively, with more shots with effect from free kicks than shots on lace. These shots from the spot were finalized, mainly, by the offensive midfields and the attackers who showed a very good technique getting at important resultsin the championship.

b. Shots while running

The average of shots while running recorded in 15 games is 3.5 shots per game out of which 1.6 were shots with effect and 1.8 on lace.
The accuracy of shots during the first half was 0.2 shots with effect and 0.4 shots on lace. During the second half, there was an average of 0.2 shots with effect while running.
Because of the overcrowded defense, the players of „C.S.U.Craiova 2" shot to goal while running from the distance, from different positions and places of the pitch. Shots on lace were more numerous, generally from the central lane of the pitch and they were taken by midfields and attackers.
These shots from the distance were taken when players had the opportunity, whent hey could not pass or combine, taking many times the goalkeeper by surprise.

c. Volley shots

Players of „C.S.U.Craiova 2" , in 15 games, had an average of 0.6 volley shots per game. During the first half, the average of volley shots to goal was of 0.06 shots per game and in the second half, an average of 0.06 shots per game.
Thus, volley shots in 15 games were very few both in the first and in the second game. The shots were taken by the midfielders. The goals scored from volley shots from the distance were very few but quite spectacular.

d. Drop shots

The average of drop shots in the 15 games was 0.5 per game. During the first half and the second half of the game, the average of drop shots to goal was 0.06 per game.
Drop shots from the distance were scarce, both in the first and the second half. Players tried other techniques of shooting to goal from the distance. These drop shots were taken also by the players in the midfield as well as by the attackers when the lateral defenders passed them the ball.

e. Shots from the central and lateral lanes of the pitch

After the statistical processing and data analysis, we found that during the first half of the 15 games, the average of shots from the central and lateral lanes was 4.6 per game. In the first half also, the average of shots from the central lane to goal was 1.0 per game and from the lateral lanes 0.8 shots per game. During the second half of the game, the average of shots from both lateral and central lanes of the pitch was 5.6 shots per game. In the second half also, the average of shots to goal from the central lane was 1.3 per game and the average of shots to goal from lateral lanes was 1.4 per game. From this data we can notice that football team „C.S.U. Craiova 2" took a great number of shots from different lanes of the football pitch. Shots from the central lane are more numerous in the first half of the 15 games whereas shots from the

lateral lanes are more numerous during the second half of the 15 recorded games. These shots are taken from the spot, free kicks and combinations.

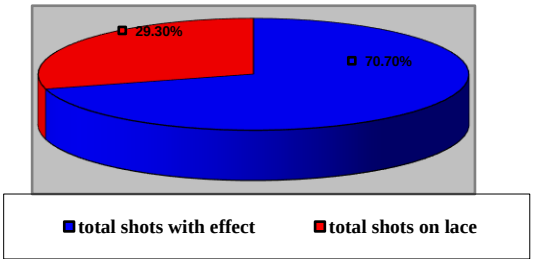
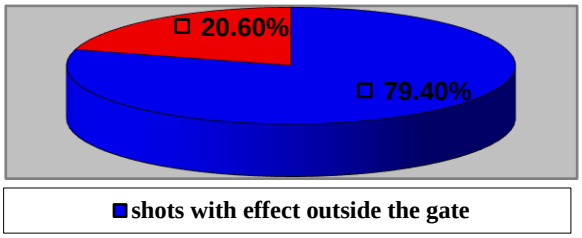


Figure 1 **Total of shots from the spot with effect and on lace**

a. Shots wide and to goal from the spot **with effect**



b. Shots **on lace** wide and to goal from the spot

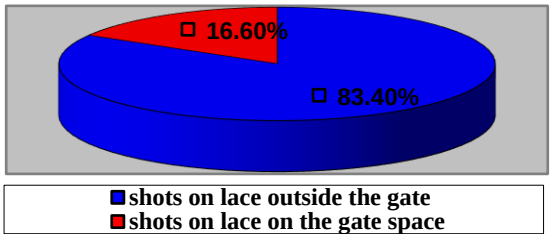
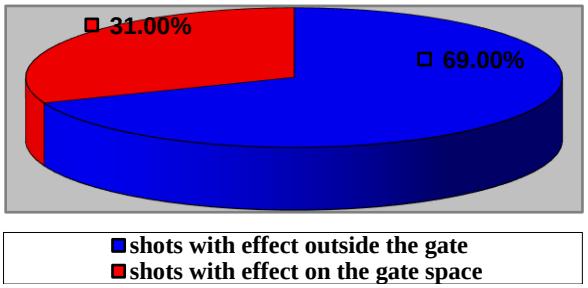


Figure 2 **SHOTS FROM THE SPOT -FOR THE FIRST HALF**

a. Shots wide and to goal from the spot **with effect**



b. Shots **on lace** wide and to goal from the spot with effect

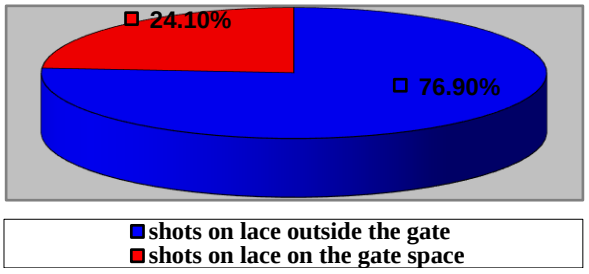


Figure 3 **3SHOTS FROM THE SPOT - FOR THE SECOND HALF**

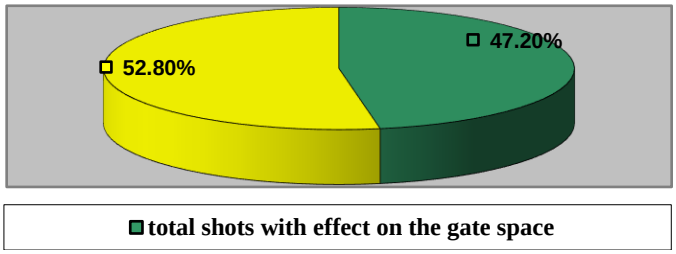


Figure 4 **TOTAL OF SHOTS WHILE RUNNING ON LACE AND WITH EFFECT**

a. Shots while running **with effect** wide and to goal

b. Shots while running **on lace** wide and to goal

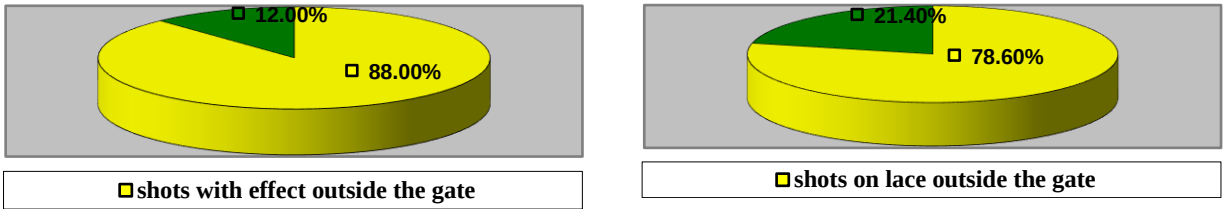


Figure 5 **SHOTS WHILE RUNNING - FOR THE FIRST HALF**

a. Shots while running **with effect** wide and to goal

b. Shots while running **on lace** wide and to goal

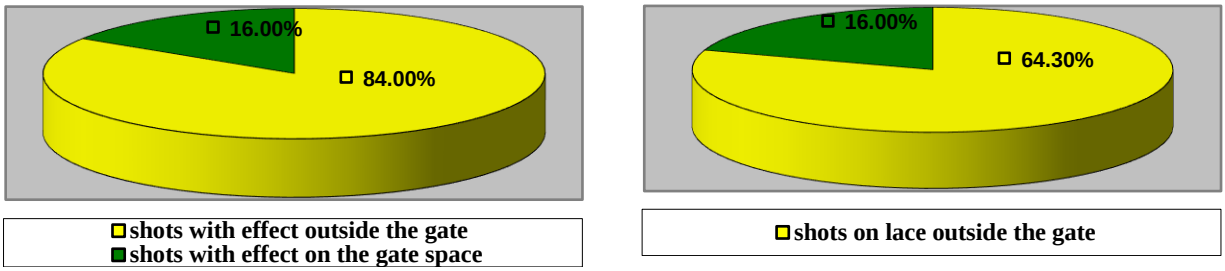


Figure 6 **SHOTS WHILE RUNNING - FOR THE SECOND HALF**

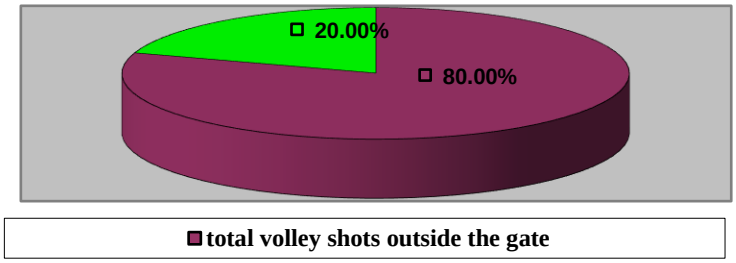


Figure 7 **TOTAL OF VOLLEY SHOTS ON LACE WIDE AND TO GOAL**

A. FOR THE FIRST HALF
a. Volley shots wide and to goal

B. FOR THE SECOND HALF
b**. Volley** shots wide and to goal

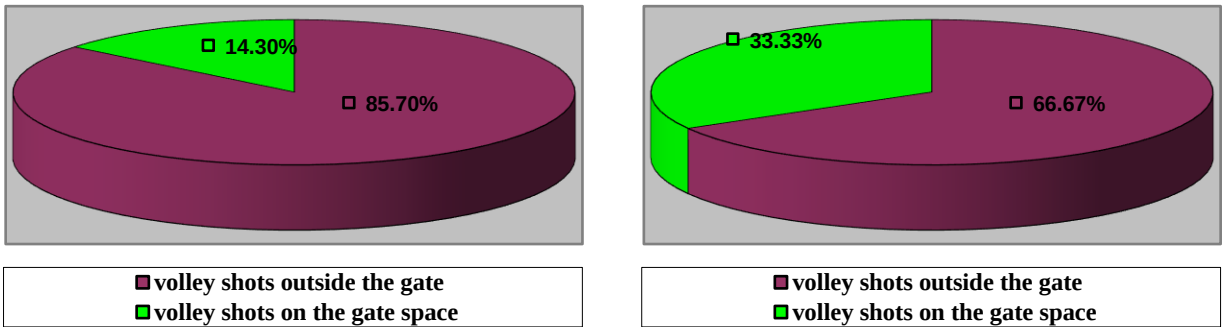


Figure 8 **VOLLEY SHOTS FOR THE FIRST AND SECOND HALF**

Disscution and Conclusions

The requirements of the modern football game, taking into account the lack of time and space

generated by the game [5], have to be supported and prepared in real-like conditions of adversity and attack.

By observing the games of „C.S.U.Craiova 2" football team we noticed that when defenses were crowded and well organized they could be taken by surprise through individual tactical actions on central and lateral lanes. These actions could be finalised with shot to goal from the distance due to the efficiency of cooperation between players [6].

Shot to goal depends not only on technique but also on the way the team speeds up the play in the goal area, on the quality of passes prior to sho, on the player's responsibility.

Whenever you have a powerful opponent, shots from the distance are the best way of finalising because attackers hardly can reach the goal area.

In the case of a similarly equal opponent, the number of shots to goal is less because the opponent team has a good defense, while in the case of a less valuable opponent, shots are numerous as well as goals scored.

„C.S.U.Craiova 2" football team had more shots from the distance, with effect, from the spot than shots on lace and more shots while running on lace than those with effect.

Long distance volley shots and drop shots were very few.

Shots wide were more numerous than shotts to goal and the tendency to take a strong shot leads frequently to less accuracy.

We noticed that the accuracy of shots depends significantly on foot movement (optimal for each player) in relation to the ball.

The players who took most shots to goal and contributed decisively to good results were midfields and attackers, that is players with a good individual technique.

There are some priorities to be imposed during the training sessions related to shots to goal from the distance and not only.

In order to create favourable opportunities of shooting to goal from the distance, we suggest that training sessions should focus on: the quality of passing prior to shot; the speed of shot to goal; the preparation of individual attack actions; the preparation of shooting to goal from the spot; the valorisation of players' qualities; players' adaptation to the existing situations; ball movement with high speed; commitment in attack; going after each ball sent to the opponent goal; to pass without hesitation to the advanced attacker; the rhythm of the decisive pass should be quick; practise shots to goal from different parts of the football pitch in order to increase the efficiency and dynamic of shots; to improve ambidextrous shots especially when there is a lack of time and space in the vicinity of the opponent goal; to train players able to shoot to goal from dificult positions thus taking by surprise the goalkeeper.

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STUDY ON MOTOR QUALITY DEVELOPMENTRESISTANCE THROUGH SPECIFIC MEANS FOOTBALL GAME

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Abstract: The completion of the research was of a longitudinal type covering the period of the 2017-2018 school year and was carried out on a number of 20 children, members of the representative school football team from the *Constantin Gerotă Secondary School* in Calafat, and targeted the following three stages: The **theoretical-empirical** stage - referred to the bibliographic study, which included numerous bibliographic nominations in Romanian, where problems on the development of resistance through specific means of football are addressed. The **experimental stage**, which involved the initial and final testing and measurements on the experiment group. The **final evaluation stage**, which consists in processing and analyzing the results of all tests and measurements in order to allow us to assess the level of effectiveness of the proposed research methodology, to interpret and present the value of the overall result in order to formulate the conclusions and recommendations which led to the completion of the research and its implementation in the present paper.
The aim of the paper is to emphasize the importance and necessity of systematization of the methods and means of development of the football game specific resistance during different training periods of the year.
The proof of the effectiveness of the methods and means used in the experiment is that the students in the experiment group detached from their opponents in the championship matches in the second half.
Keywords: *football, sport performance, specific strength..*

Introduction

Resistance is defined for the football game as the player's ability to make variable game efforts as intensity and volume throughout the match without the fatigue being established [1], which confirms that the specific resistance is achieved by means of resistance general as its morpho-functional substrate [2].
Under the conditions of the current football - when the physical effort made by the footballers during the game has increased greatly, for some of them (the midfielders) the distances travelled almost doubled [3] – it is aimed towards the total football, characterized by the players' polyvalence, a huge waste of energy and in order to support efforts in training and games, the specific resistance is mostly requested [4]. "This is only possible if it acts on the metabolism of muscle fibers through an appropriate effort so as to increase their oxidative capacity, which can be achieved by increasing the number of mitochondria and even their surface [5].
Only by correlating and processing individual data can we reveal the reality, value and ability of the player, on which we can orient the methodic and the most effective means to achieve great performances. "It should be noted that as far as the methods and means of developing resistance it is not enough to refer only to their structure but also to the number of repetitions, the duration and distance of the effort, its intensity and then the number and duration of the rest pauses and relaxation [6] ".
The process of information and knowledge of all the elements and parameters that make up the game and the training for the game leads us to the realisation of the unitary conception of these two aspects, to a causal process between two activities of the same process whose ultimate goal is the quality and efficiency of the game.
By observing the methodical line that leads us from play to training and back to the game, we achieve a system of objectification of a unitary process that is based on real dimensions and data, whose certification allows appreciation of the work done, as well as the issuing of real prognoses for the next stage of training and play [7].
The specific effort of the football game obliges the orientation of the training process towards all the forms of resistance (short, medium and long lasting), aspect which is interpreted by speed-resistance [7].
In football, we talk about the following types of resistance (depending on the duration of the effort and energy sources):

anaerobic resistance - in the case of individual technical – tactics actions: mark-demarcation, ball possession, ball management, finishing, replanting, etc .;
aerobic resistance - specific to the 90 minutes (at least) of the official football game;
mixed resistance - encountered in football due to the alternation of phases and game actions.
"The specific resistance to footballers is of utterly importance for achieving superior performance and for being able to properly support the training efforts" [8].

Material and method

The completion of the research was of a longitudinal type covering the period of the 2017-2018 school year and was carried out on a number of 20 children, members of the representative school football team from the *Constantin Gerotă Secondary School* in Calafat, and targeted the following three stages:
The **theoretical-empirical** stage - referred to the bibliographic study, which included numerous bibliographic nominations in Romanian, where problems on the development of resistance through specific means of football are addressed.
The **experimental stage**, which involved the initial and final testing and measurements on the experiment group.
The **final evaluation stage**, which consists in processing and analyzing the results of all tests and measurements in order to allow us to assess the level of effectiveness of the proposed research methodology, to interpret and present the value of the overall result in order to formulate the conclusions and recommendations which led to the completion of the research and its implementation in the present paper.
The aim of the paper is to emphasize the importance and necessity of systematization of the methods and means of development of the football game specific resistance during different training periods of the year.
The hypotheses of the research were:
Increasing the number of sportive classes and introducing an additional number of means - for the development of general and specific resistance within an entire school year -will determine the improvement of resistance indices.
By applying technical-tactical means in football game in the overall sports lessons it will determine, by transfer, the improvement of resistance indices.
In the present research I used the following methods: pedagogical observation; the study of specialty literature; pedagogical experiment; the method of conversations.
For the general and specific physical training of the experiment group, we acted in two ways:
1. For specific physical training only through bilateral games.
✓ school games; theme games; games with "handicap"; bilateral games under regulatory conditions.
2. For the general physical training through complex exercises performed by the different methods from the literature, namely:
✓ the method of continuous efforts; the interval method (short, medium and long); method of variable intensity efforts; the Fartlek method; pliometric method; circuit training method.
In order to evaluate the obtained results, we used a number of six control samples, samples for which rules for their passing were established.
1. Run resistance on a distance of 3200 m. Cooper test
The norm was between 12-12.30 min
2. Run resistance on the distance of 1600m.
The norm was between 6.10 - 6.20 min
3. Running resistance on a distance of 1000m.
The norm was between 3.50 - 4.00 min
4. Running resistance on a distance of 800m.
The norm was between 3.10 - 3.20 min
5. Running resistance on a distance of 600m
The norm was between 2.00 - 2.20 min
6. Run resistance on a distance of 400m
The norm was between 1.10 and 1.30 min

Analysis and interpretation of data:

For samples no. 1 and 2 (see Table 1)

1. For running the 3200m distance
In the initial testing, an average time of 13.07 minutes was recorded, while in the final test an average of 12.9 minutes, the progression being 58 seconds.
2. For the 1600m distance running
In the initial testing, an average time of 6.56 minutes was recorded, while in final testing an average time of 6.14 minutes, the progression being 39 seconds.

Table 1

Sample no. 1 Running on 3200 m distance.		***Sample no. 2. Run on the 1600m distance.***	
Initial Testing	13.7 min	Initial Testing	6.56 min

Final Test	12.9 min	Final Test	6.14 min
Diff. T_f-T_i	58 sec	Diff. T_f-T_i	0.39 sec
The norm was between	*12-12.30 min*	The norm was between	*6.10 – 6.20 min*

Testing table with the results obtained in the initial and final samples of the running distances 3200m and 1600m

For samples no. 3 and 4 (see Table 2)

3. For running the 1000m distance

Initial testing had a mean time of 4.31 min. while in the final test an average of 3.55 minutes, the progression being 36 seconds

4. For running the 800m distance

Initial testing showed an average of 4.4 minutes, while in the final test an average of 3.33 minutes, the progression being 31 seconds.

Table 2

Sample no. 3 Running on 1000 m distance.		***Sample no. 4. Run on the 800m distance.***	
Initial Testing	4.31 min	Initial Testing	4.4
Final Test	3.55 min	Final Test	3.33
Diff. Tf-Ti	36 sec	Diff. Tf-Ti	31 sec
The norm was between	*3.50 – 4.00 min*	The norm was between	*3.30 – 3.40 min*

Testing table with the results obtained in the initial and final samples of the running distances 1000m and 800m

For samples no. 5 and 6 (see Table 3)

5. For running the 600m distance

Initial testing had a mean time of 2.34 min. while in the final test an average of 2.11 minutes, the progression being 23 seconds

6. For running the 400m distance

Initial testing had an average of 1.39 minutes. while in the final test an average of 1.19 minutes, the progression being 20 seconds.

Table 3

Sample no. 5 Running on 600 m distance.		***Sample no. 6. Run on the 400m distance.***	
Initial Testing	2.34 min	Initial Testing	1.39 min
Final Test	2.11 min	Final Test	1.19 min
Diff. Tf-Ti	23 sec	Diff. Tf-Ti	20 sec
The norm was between	*2.00 – 2.20 min*	The norm was between	*1.10– 1.30 min*

Testing table with the results obtained in the initial and final samples of the running distances 600m and 400m

Disscution and Conclusions:

The superior results from the final test to the initial one demonstrate the correctness of the used training methodology, this being the actual way of increasing the quality of the training.

The proof of the effectiveness of the methods and means used in the experiment is that the students in the experiment group detached from their opponents in the championship matches in the second half.

Motor quality - resistance is one of the most easily educated and developed motor skills. This is also due to the fact that for its development we found in the textbooks and the studied materials no less than nine methods. These methods are generally

effective, but most have their well-established place in the periodic exercises.

Increasing workload in training by using aerobics in the specific sports lesson specific to the football game leads to the improvement of players' performance in their effort. The prolonged and fatigued effort experienced by the students of the experimental group in the sport lessons has significantly contributed to their physical training by increasing the effort capacity.

Increasing the workload volume of the training, together with the gradual decrease of the intensity, is a major factor in improving the effort capacity influencing in this way the physical and technical-tactical expression of the players on the field, knowing that the level of technical expression - tactically decreases in the extended effort and the half-time, and the number of mistakes increases proportionally to the level of fatigue.

The correct selection of the technical-tactical means of football play has led to a transfer to achieving superior parameters in terms of effort capacity.

Due to the large number of repetitions in the training lessons and on the basis of a precise planning elaborated with streamlined and standardized means, the team effort and the tactical acquisition of the actions have evolved significantly both qualitatively and quantitative.

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IMPACT OF QUALITY OF LIFE ON STROKE SUBJECTS AFTER USING INDIRECT VIBRATION ASSOCIATED WITH EXERCISE IN PHYSICAL THERAPY

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Abstract: *Background:* Many studies have been conducted on vibration, especially on vibration plates and their effects on performance and recovery. Vibrations associated with exercise can reduce spasticity, thus it can be a good modality for improving the health-related quality of life, especially related to health and ability to move in stroke subjects.
Objectives: The objective of the study is to determine if indirect vibration associated with exercise has a positive effect on stroke subjects.
Patients and Methods: For the experiment participated in a total of 22 stroke subjects dived in 2 groups: 12 subject in the experimental group and 10 subjects in the control group. The Stroke Specific Quality of Life (SS-QoL) questionnaire was utilized for determining the effects of vibrations associated with exercise.
Results: There is a reduction on the score of complete SS-QoL questionnaire and especially on the movement aspect of the questionnaire which indicates a positive effect using vibrations associated with exercise.
Conclusions: Vibrations associated with exercise can be applied as a modality of physical therapy in stroke subjects.
Keywords: *vibrations, physical therapy, functional recovery, spasticity, stroke.*

Introduction

Background

In the specialty literature, there have been different approaches to the concept of quality of life, is associated with the subjective state of well-being, happiness, and satisfaction.

WHOQOL [1] defines the quality of life as "the individual's perception of his / her position in life, in the cultural context and the value system in which he/she lives and in relation to his / her purposes, expectations, standards and its preoccupations."

Quality of Life after Revicki & Kaplan [2]: "Quality of life reflects preferences for certain health conditions that can improve morbidity and mortality and is expressed through a single weighted index - years of standardized life depending on the quality of life.", and in 2000 states that the quality of life is "a wide range of human experiences related to the general welfare."[3].

Staquet et al. [4] defines the quality of life as "an integral indicator of physical, psychological, emotional and social characteristics of the patient, based on a subjective perception that reflects the ability of man to adapt to his illness and allows him to carry out profound multilateral analysis of disease progression and recovery on the basis of treatment. "

According to the World Health Organization [1] the quality of life is a "perception of individuals about their social situations in the context of the systems of cultural values in which they live, and in accordance with their own needs, standards and aspirations." By quality of life is meant physical, psychic and social well-being, as well as the ability of patients to carry out their usual tasks in everyday life.

Păunescu [5] defines the quality of life as "the level of well-being felt by an individual or a group of people". The International Society for Quality of Life (quoted by M. Păunescu,) [6] states that quality of life includes two components: the physical component (health, nutrition, etc.) and the psychic component (the way of managing daily stress, emotions, etc.)

Păunescu [6] describes the quality of life, on the one hand, referring to the objective conditions in which each individual leads his life and, on the other, to the subjective way by which he evaluates his own life (satisfaction, health, happiness, fulfillment).

Improving the quality of life is an important objective and the increase in the number of

articles published on PUBMED (National Library of Medicine, USA) shows this (from the first publication between 1960-1965 to 20.862 in 2010-2015 - *fig. 1*) [7].

Marinescu. & Cordun [8] mentions that physical education and sports teachers, physicians and physiotherapists, as well as the individual himself, participate in this growth through self-education.

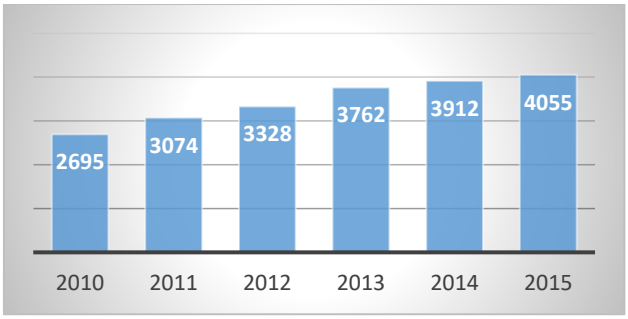

Fig. 1 - Articles published annually in Pubmed in 2010-2015.

The use of tools for assessing the quality of life of subjects with various illnesses helps specialists to choose the appropriate exercise protocols, inform subjects about the possible effects of different recovery means, monitor the progress of applied exercise programs from the point of view of the subject, allows the specialist to design effective and efficient recovery protocols.

In the international literature, the most commonly used tools for assessing the quality of life of the subjects are the questionnaires. One of the scales for assessing the post-stroke quality of life is the Scale SS-QOL (Stroke Specific Quality of Life Scale) [9] with questions grouped into 12 items, the items being grouped in three areas: psychic, social, physical. These measurements are useful in assessing the quality of the recovery protocol and in developing cost-benefit analyzes.

There is a strong link between health and quality of life, but they are separate. Health is more than the normal functioning of the body. Hippocrates, the father of medicine, defines health as "a state of balance between body, mind, and environment."

The World Health Organization defined health as "the state of complete physical, mental and social welfare, that does not reduce to the absence of disease or infirmity."

Epuran [10] believes that health can be maintained or improved through various body activities provided that they are selected, graded, individualized and fit to the interests and motivations of those who practice them.

Exercise is one of the best ways to accomplish this goal.

Objectives:

The aim of the experiment was to determine if indirect vibration associated with exercise has a positive effect on health-related quality of life on stroke subjects.

Materials and Methods

Subjects: A total of 22 stroke subject (61.84 ± 5.3 years) participated in the experiment. The experiment group consisted of 5 female subjects, meaning 58% and 7 male subjects, representing 42%.

The control group consisted of 6 female subjects, meaning 57% and 8 male subjects, representing 43%.

Materials used: The vibration device was an eccentric rotating mass motor (model MG1001 - 150W), which produce mechanical vibration (two selectable levels). Latex elastic band was used, which was tied to the vibration device.

Protocol: All subjects performed a 5 minute warm-up including joint active mobilization and stretching, especially for the lower limb. A classic exercises protocol was applied for the control group and vibrations associated with exercise for the experimental group. The exercises targeted the lower limb and exercise specifically for improving walking ability. The sessions were held 5 times a week for 12 weeks, with an average duration of 50 minutes per session.

Performed tests: Before the experiment began, an initial test was conducted and after 12 sessions (final test) using the SS-QoL questionnaire with 49 items assessed on 5-point Guttman-type scales, scores from 49-245, higher scores indicating better functioning and the average time for applying the questionnaire was 10 minutes.

Results

The score of the complete questionnaire for the control group recorded an average of 2.631 ± 0.946. At final testing, a result of 3.11 ± 0.808

was obtained representing a 15.43% decrease from baseline testing.
The score of the complete questionnaire for the experimental group was an average of 2,699 ± 0.957. At the final test, a result of 3,616 ± 0.801 was obtained representing a decrease of 25.35% from the initial test.

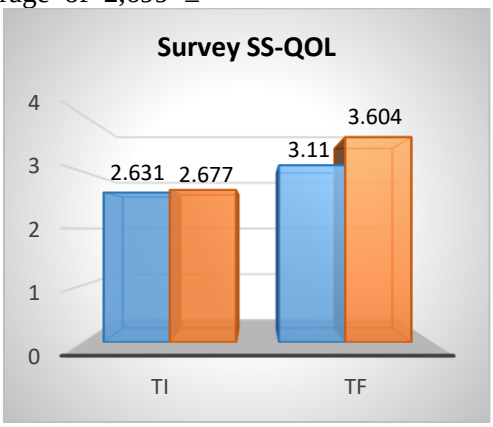

Figure 2 SS-QoL (complete) results

The scoring questionnaire score for the control group recorded an average of 1.917 ± 0.714. At the final test, a result of 2.683 ± 0.0.645 was obtained representing a decrease of 28.58% from the initial test.
The scoring questionnaire score for the control group recorded an average of 2,153 ± 0.739. In the final test, a result of 3.5 ± 0.707 was obtained representing a decrease of 38.48% from the initial testing.

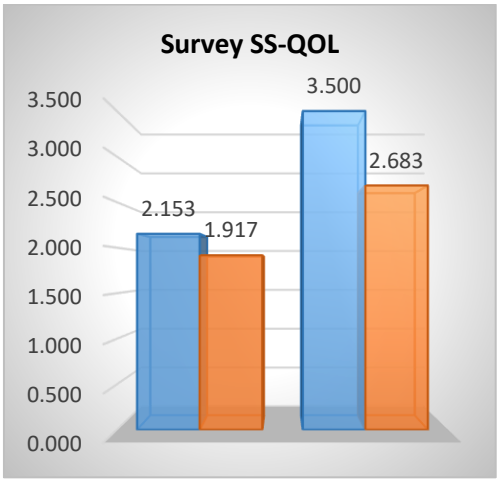

Figure 3 SS-QoL (complete) results

Results

The higher scores indicate better functioning positive effect in increasing the health-related quality of life of subjects with stroke. All test were positive and statistically significant. The test suggests that exercises had overall positive effects on the subjects and especially on the walking ability.

Conclusions

Both groups had positive effects on health-related quality of life, but the experimental group was 9.92% more efficient in the complete questionnaire and with 9.9% more efficient on the movement specific questionnaire.

Discussions

The spasticity influences negatively the health-related quality of life, especially physical functioning and disability. At the International Stroke Conference [11] it described the relationship between increasing spasticity and worsened psychological well-being. Some subjects reported it contributed to anxiety and depression. Spasticity was found to cause embarrassment and loss of sense of control of subjects. Reducing spasticity and improve the health-related quality of life, and indirect vibration associated with exercise can be an effective method in the recovery of stroke subjects. After Peungsuwan et al [12], a

combination of exercise and massage therapy is effective for the reducing of muscle tone, a decrease of pain and improvement of physical functions.

More efficient functional recovery options decrease the costs of treatments and increase the health-related quality of life. The indirect vibrations associated with exercise can easily be applied, dosed and it can be used independently making it an accessible option in physical therapy.

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METHODOLOGY OF MEDICAL RECOVERY IN OSTEOPOROSIS

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Abstract: *Introduction.* Osteoporosis is a systemic skeletal disease characterized by decreased bone density and microarhitectural deterioration of bone tissue, resulting in increased bone fragility and fracture risk. In view of increasing life expectancy, osteoporosis will be a major public health problem in the future. The etiology of osteoporosis includes a number of risk factors that we can not control (age, gender, hormones, ethnicity, heredity, various diseases such as liver, thyroid, kidney, medication), but also risk factors we can intervene (sedentary, daily nutrition).

Content. Osteoporosis can be prevented and treated through a proper lifestyle based on nutrition rich in calcium and exercise that requires the bone periosteum and improves its resistance. The possible complications of this disease, from pain to the impossibility of being functionally independent, require the need for hygiene-dietetic, medication and kinetic treatment.

Conclusions. Specific kinetotherapy for osteoporosis contributes to the formation of the bone matrix and its mineralization, but also to minimizing the risk of fractures by preventing falls.

Kinetic programs improve articular mobility, postural muscle tone and the strength of the entire muscular body. At the same time, proper dosing and individualization of exercise improves motor performance, reeducate the balances and coordination.

Keywords: *osteoporosis, recovery, life style, physical exercise.*

Introduction

Osteoporosis is a systemic skeletal disease characterized by decreased bone density and deterioration of bone tissue microarhitectomy, resulting in increased bone fragility and a marked increase in the risk of fracture [1].

In view of increasing life expectancy, osteoporosis will be a major public health problem in the future.

Decrease in bone mass occurs with age. Until 20-25 years, more bone is formed by the increased number of osteoblasts and is less absorbed, between 25-40 years there is a balance between loss and bone formation, and after the fourth decade of life, both sexes osteoporosis is progressively installed with a loss of bone mass of 0.3-0.5% per year [2].

Women are more affected after menopause than men due to lower estrogen levels that cause bone imbalance by increasing osteoclasts [3].

Moreover, women lose 0.5-1% of bone mass in the first 20 years post-menopause, and this process slows down after the age of 65 [4].

The decrease in bone density leads to an increase in the number of fractures caused by minor traumas and even daily activities.

In recent years, there has been a decrease in the mean age of osteoporosis and fractures.

The etiology of osteoporosis includes a number of risk factors that we can not control (age, gender, hormones, ethnicity, heredity, various diseases such as liver, thyroid, kidney, medication), but also risk factors we can intervene (sedentary, daily nutrition) [5].

In this context, we consider it necessary to intervene early to prevent the disease and, where it is installed, a rational lifestyle based on drug therapy, balanced nutrition and well-structured and dosed kinetic programs is required.

Studies have shown that bone mass can be improved by exercise until the age of 80[6].

Specific kinetotherapy, adapted to the particularities of patients with osteoporosis, contributes both to their prevention and recovery.

Under the conditions of the presence of a secondary cause of osteoporosis (endocrine and gastrointestinal diseases, diseases of the hematogenous marrow, drugs, chemotherapy, alcohol, immobilization, rheumatoid arthritis), the specific treatment has the purpose of removing the cause [7].

Content

The progression of osteoporosis is slow and silent, most often the first sign being an unexpected fracture. Clinical manifestations of osteoporosis include general non-specific symptoms: diffuse or migraine pain in bone, periostal and articular, physical asthenia, and symptoms related to deformities due to skeletal and articular misalignment in advanced phases of the disease [8].

Osteoporotic areas are the spine, the hip, the carpian joint [9].

Rehabilitation treatment aims at achieving the following general objectives [10]:

- Stimulation of osteoform cells,
- Stimulation of correct body alignment,
- Stimulation of bone metabolism,
- Maintaining musculoskeletal integrity.

To achieve these goals, it is recommended:

1. Hygiene-dietetic treatment to prevent the appearance and worsening of bone demineralization. For this purpose, foods rich in calcium and vitamins A, C, D are introduced into the diet to help with its absorption:

- Fruits, vegetables, carbohydrates such as bread, rice, pasta, potatoes,
- Protein represented by eggs, dairy products (cheese, yogurt, milk), fish and seafood,
- It is recommended to limit the consumption of caffeine and carbonated drinks,

2. Drug treatment shall:

- Calcium administration at different doses, by gender: for female subjects 1000-1500 mg, and for male subjects 800-1000 mg daily,
- Inhibition of bone loss by the administration of estrogens, bisphosphonates, anabolic steroids, testosterone, calcitonin,
- Stimulation of bone mass formation by administering vitamin D and its derivatives.

3. Surgical and orthopedic treatment is required to prevent or correct morphological deformations and limit or compensate for functional deficits. For back pain, result of spinal compression or cipho-scoliotic changes, stiff half lumbar support, and for those with hip pain, the walking stick can be used in the hand opposite to the painful hip.

In fractures, surgical treatment involves bone reassignment by orthopedic or surgical reduction with osteosynthesis material.

4. Kinetic treatment is applied for prophylactic and curative purposes because physical exercise acts as a stimulus to the periosteum by producing an electrical potential called piezoelectric effect by slipping the bones of collagen to one another, generating increases in bone mass[11].

The objectives of kinetotherapy are:

- Improvement of pain and restant inflammation,
- Improvement of paravertebral contractions,
- Toning of deficient muscles (especially abdominal and paravertebral),
- Reeducation of articular mobility,
- Reeducation of coordination and balance,
- Increasing the quality of life of the patient, with the normal course of daily activities.

The means used to achieve the set kinetic objectives are:

- Walking and / or running according to the patient's effort, on a flat ground at first,
- Therapeutic sports, the most recommended being swimming and cycling, without being practiced in competitive mode,
- Avoiding loud and creeping posts along with avoiding head bowing[12],
- Educational therapy represented by:

1. Keeping the patient in good position in orthostatism, sitting and lying down, a bad posture leading to pain and instability,
2. Patient compliance with the Principles of the Back School, requiring correct posts to lift, push, pull and carry objects [13],

- Combination exercises with gravity loading, either with your own weight or with extra weights.

The actual kinetic program can include three types of exercises: the warm-up exercises, stretching exercises and exercises to tone the whole body muscles and improve balance. To these can be added breathing exercises with a relaxing role.

We recommend the following exercises in the seating:

- Lift shoulder towards ears and lower shoulder, 8-12 repetitions,
- Roll shoulders forwards, upward and then backwards and down, 8-12 repetitions,
- Swing one arm forward to approximately shoulder height, and swing it back behind as far as is confortable, 8-20 repetitions on alternate arms,
- Dig the heel od the foot towards the floor with the toeslifting upward, then point the toe towards the floor, and lift the heel away from the floor, aim for the feel and toe to land in the same place to ensure the full range of motion in the ankle is achieved, 8-12 repetitions on each foot,
- Bring both arms to cross in front at chest level, smoothly and gently open both arms out to the sides and sligtly back, return the arms to the front, 8-12 repetitions,
- Place one arm on the side of the chair, lift other arm up, bend over slightly towards the side with the supporting arm, stretch only to a point where a mild tension is felt at the side of the trunk, keep a space between shoulders and ears and lengthen the neck, hold the stretch for 8-12 seconds,
- Hold a rolled-up towel in the hands, with one hand above the other, rotate both hands in opposite directions as though wringing the towel, pull the hand apart slightly before returning them to the starting position, 8 repetitions,

We recommend the following exercises in orthostatism:

- Bend directly to the side in a controlled manner and return to the central position, bend directly to

the other side in a controlled manner and return to the central position, 8-16 repetitions on each side, alternating,

- Squats with arm circles, 30 seconds,
- Lift alternate the knees in front of the body, keep the chest lifted and do not allow the body to bend forwards as the leg lift, perform for 1-2 minutes,
- Walking for 2-4 minutes,
- Hamstrings stretch: step forward-a shoulder-width stride, bend the back knee and rest the hands lightly on the tigh of the bent leg, the other leg should be extended in front of body, but do not lock the knee, bend forwards from the hips, supporting the weight with the hand on the bent leg, until a mild tension is felt at the back of the straight leg, hold the stretch for 10-12 seconds on each leg,
- Quadriceps stretch : raise the heel od the opposite leg towards the buttocks, use the hand to hold the leg in place, hold the stretch for 10-12 seconds,
- Calf stretch, triceps stretch, chest stretch,
- Stand behind a sturdy chair and rest the hands on the back of it, place the feet hip width apart, raise onto the toes and lower to the starting point, keep an upright posture throught, 8-12 repetitions,
- Biceps curl with weights, 8-12 repetitions and gradually build up to 16-24.

Conclusions

Osteoporosis is a public health issue and is clinically expressed by vertebral compression, fracture of the fist and femoral neck.

Specific kinetotherapy for osteoporosis contributes to the formation of the bone matrix and its mineralization.

A properly dosed kinetic program prevents falls and minimizes the risk of fractures..

Early rehabilitation treatment improves the muscular strength of the whole body in conditions of joint mobility.

Kinetic programs maintain and improve motor performance, reeducate balance and coordination.

Proper recovery treatment contributes to maintaining the functional independence of patients with osteoporosis and improving their quality of life.

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SCIENTIFIC APPROACH OF TACTICAL TRAINING IN FOOTBALL GAME WITH CHILDREN AND JUNIOR PLAYERS

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Abstract: The football game constantly undergoes important changes in, whenever field practitioners consider it necessary, depending on the own players, the opponent, the need to change the game plan in order to hide the tactical intentions of approaching a certain official game.
The game conception, the system, the tactical plan, methods and means used are tools with which a team coach can juggle to achieve his goal in one match or more, but the strategy of teaching into a children's and juniors' center for a long time, must be adapted to the characteristics of age, specific to the junior footballer and to the way of effective understanding of the theoretical information he will put into practice on the playing field.
The purpose of the research is to make an exposure regarding the differential treatment of tactical training in stages, from the moment the child comes to football until he takes the step to senior teams. All stages of training will be approached scientifically according to the player's level of development and training and to the logical understanding of the information transmitted to the player, in particular. Also, creating an approach with age-specific means can be a priority, which will influence a science-based and modern training.
Research hypothesis - If we follow a methodical training course based on theoretical and practical information tailored to each age group, the percentage of integration into the high performance of junior football players will certainly be higher.
In conclusion, tactics will be the basic component, the central element of building the game model for each age. Such a methodical route, scientifically directed in an obviously modernized and constantly updated version is the key to success in gaining football performances.
Keywords*: football, training, tactics, children and juniors*

Introduction

The football game constantly undergoes important changes in, whenever field practitioners consider it necessary, depending on the own players, the opponent, the need to change the game plan in order to hide the tactical intentions of approaching a certain official game.
The game conception, the system, the tactical plan, methods and means used are tools with which a team coach can juggle to achieve his goal in one match or more, but the strategy of teaching into a children's and juniors' center for a long time, must be adapted to the characteristics of age, specific to the junior footballer and to the way of effective understanding of the theoretical information he will put into practice on the playing field.
What is the tactic? Who is it addressed to? When should it start being taught? How will it be taught? How long? What does it contain? These are just a few questions we will try to get an answer to. One thing is clear: practice is based on the theoretical information of the sport field, in general, and of soccer, in particular. Some infusion and an invasion of foreign literature into Romanian literature ha been noticed lately, which cannot be neglected. It is based on the work of great specialists, which has been checked in the world's biggest competitions such as the World and European Football Championship, the Champions League or the European League, etc. taken over by the Romanian Football Federation and by our coaches and put into practice in the Romanian football teams. We are dealing with a new way of approaching terminology, administrative organization and special training. The tactical periodization has replaced the instruction focused on physical training, obviously a much easier model accepted by the players and mental involvement reached levels that often decide the course of a game.

Material and method

The purpose of the research is to make an exposure regarding the differential treatment of tactical training in stages, from the moment the child comes to football until he takes the step to senior teams. All stages of training will be approached scientifically according to the player's level of development and training and to the logical understanding of the information transmitted to the player, in particular. Also, creating an approach with age-specific means can be a priority, which will influence a science-based modern training.
Research hypothesis - If we follow a methodical training course based on theoretical and practical

information tailored to each age group, the percentage of integration into the high performance of junior football players will certainly be higher.

Scientific approach to tactics in children and juniors

Tactics brings together a system of principles, ideas and rules for approaching the competitions by the athlete, through which he exploits all his technical, physical, and psychic abilities in order to solve the problematic situations (in contests) created by opponents, teammates and ambience, in order to achieve success [1].

The period in which a child enters, develops, then integrates into the great performance (1st league, strong teams from abroad, junior, youth or senior national teams) lasts approximately from 10-15 years to 30 years on the football field. Thus, the athlete undergoes several stages, all extremely important. Each stage of development will have clearly defined game-oriented goals.

Considering them as a starting point, each coach will elaborate another goal according to his own team's knowledge and skills as well as to the pedagogical and performance objective. Taking into account the fact that the training model on the basis of tactical periodization was global, we considered that such tactical approach would be really necessary from the youngest ages.

Tactical periodization is considered a new paradigm of understanding football. It is not only a training methodology, but also a way of understanding football. But people could ask: Is tactical periodization the best football training methodology? First of all, we need to understand that we must always adjust and adapt training methodology to the reality of our level, and then rely on this context. We try to develop our training with the issues we consider to be the most appropriate to get the maximum performance in our players, in our team [2].

Therefore, the stages of football training for children and juniors can be as it follows:

1. The first stage - the attraction and screening is important in the regard that we will have to find and bring children that have good motricity, which from the genetic point of view corresponds to the requirements of high performance sport. It is vital to have great basis of selection, many groups of 5-6- year-olds, the main objective being to develop and cultivate the pleasure of practising football.

There is NO tactical approach to training.

Ex. 1: driving the ball into a limited space (20 / 20m), 8 children have a ball and 2 do not. The 2 players will try to take the ball from any of those who have the ball and lead the ball. Those who will be deposed of the ball will also try to get a ball.

2. The second stage, the construction - development period is a period of approximately 4 years, corresponding of the 4 years of the primary school cycle (1st - 4th grades), where the focus is on the acquisition of the technical elements specific to the football game, the ability to practise football with fewer players on small ground - 4vs4 + goalkeeper and then 6vs6 + goalkeeper.

The player will have to work very analytically at this age; at the end of the period he will be able to put into practice correctly all the elements of transmitting the ball, of entering and keeping the ball, so that in the 1vs1 relationship he can easily find solutions to overcome the opponent directly and score goals.

A. Age group: 7-8 years old

It will begin analytical teaching of tactics and learning-strengthening exercises of passes in two or three players will be designed, acting within gaming systems, aiming for players to have:

- *Game skills*: Tactical sense in possession of ball and without; integration into the collective; creativity; technical performance; overall performance during the match; the ability to play in multiple positions; advanced psychological features.
- *Speed and efficiency*: anticipation; perception; processing the information; decision-making;

movement and action; technical and tactical skills displayed in simple and complex contexts; adaptation to unexpected situations.

- Objectives:

- Game system: 1-1-2-1, player's position is not important, it can be changed to observe the player's ability to act and his orientation in the playing area;
- Developing motor skills by playing with the ball,
- Developing pleasure to relate to children of the same age,
- Learning and consolidating technical procedures: striking and taking over the ball, improving the control of the ball with both feet; learning simple flips done through driving the ball.

Dynamic games play an important role in the development of motricity, but also in the combined motor skills with the emphasis on:

- Speed and skill games, games on small field from 1vs1 to 4vs4 - 5vs5 maximum; working space adapted to age and level of accumulations, with goals of 1/1m, 2/2 m, 2/1m, 3/2 m; all games with theme;
- Educating group interest (attitude, integration).
- Do not work from static positions.
- Clear explanations, followed by demonstration.

Taking into account that speed and skill are hereditarily stable qualities, genetically determined and possible to be developed at this age, tactical priority *is given to the following individual and collective actions*:

- *Individual*: 1x1 relationship (individual overtaking); demarcation, free kick and various elementary tasks in positions.
- *Collective*: pass, the basic element in the construction of the game; compartment, functional unit of the team:

- Passes in twos (with and without pick-up), with position exchange, with one active defender, finalisation;
- Attack structures with finalization through centering in front of the gate;
- Passes in threes with and without pick-up, in 15x15 m. squares, without and with defender;
- Passes in threes with position change, with finalization;
- One-two, support, ball and ballless circulation;
- Possession game, 2 vs. 1, 3 vs. 1 and 4 vs 1 in squares or circles of 25-50 m2;

Ex. 2: 3vs1 positioning game (2vs1 / 4vs1) - 3 (4.5.6) consecutive passes, followed by shooting at the goal, 5 minutes. After every action the defender is changed.

B. Age group: 9-10 years old

Tactical training is done in isolated game conditions or active game, by possession and positioning from 1vs1 to 8vs8 with a passive, semi-active or active opponent. Depending on the goal of the training, the workspace will be adapted to the technical and tactical training requirements that will take into account the peculiarities of the team, with focus on improving individual overtaking, ball transmission, finalization from elaborate tactical combinations, marking, pressure and pressing.

- Objectives:

- Game system: 1-3-2-1;
- Special emphasis on the systematic development of basic motor skills;
- The formation of the basic technique becomes the most important, also taking into account the increased concentration capacity;
- Correcting the mistakes is another concern of teacher-coaches in order to avoid making mistakes;
- The possession of the ball in all positions - static, then dynamic, without and with feint;
- Driving the ball rapidly with change of direction;

- Combining the technical procedures for transmission, taking into possession and keeping possession, on the ground and above.
- Training the player to engage in both attack and defense.
- All information transmitted progressively will aim to develop tactical thinking;
- Forming correct orientation in space, anticipating the movements of his opponents and teammates;
- Encouraging imagination and creativity, trust in his own power and in team force, creating team spirit and the willing to engage in combat;
- The main goal of the game will be to practise offensive football;
- Filming and viewing your own training or other exercises and games from other clubs to make comparisons.

U10 Player Profile [3]:
- Dribbling moves under pressure;
- Role of first and second defenders;
- Use of both feet consistently;
- Delivering longer balls;
- Learning to serve and properly receive flighted balls consistently;
- Supporting runs off the ball and more sophisticated combination play;
- Recognize roles and responsibilities by position;
- Awareness of the numerical positioning system employed;
- Introduction of catching the ball and angle play with the keeper.

Ex. 3: 4vs4 + 2 jolly (amplitude edges and depth gauges, inside for construction).

3. The third stage - the specialization, begins at the age of 11 and lasts up to 15, the stage in which the logical thinking appears in the children, so we can gradually introduce the child into individual and collective tactics, we will be able to teach him the phases and forms of attack and defense. On the basis of individual and group creativity, we will try to familiarize him with finding the best solutions to reach the opponents' goal, based on group communication, depending on the position and the way the opponent reacts. Basically the athlete is able to think logically about why he is acting in a certain way on the ground.

C. Age group: 11-12 years old

Tactical preparation involves actions based on a constructive-collective game, balanced on both phases - defense and attack, in the context of elaborate and thoughtful game:

- Objectives:
- Game system: 1-3-2-3;
- The systematic development of basic motor skills;
- Consolidation and improvement of the basic technique in the context of collective game;
- Attack actions will be run smoothly, simply across the entire surface of the field as variously as possible, with maximum and effective acceleration to score goals;
- Ballless play is continuous, with permanent startups and demarcations;
- Offensive actions will be oriented especially on the edges of the field, with the change of the direction of attack;
- Players with offensive tasks will be separated into free spaces, pass without take over, one-two learning, and demarcation after passing;
- Allow and encourage individual actions, dribbling, if possible;
- Defense actions begin immediately after loosing the ball to stop the opponent's attack;
- Particular attention will be paid to fixed phases through a wide range of executions;
- Acquiring the courage and responsibility to shoot at the goal;
- Appropriate placement for free kicks, corner, out; getting the placement in the defense phase between opponents and the goal;
- The fight for defeating the ball and preventing the opponent from shooting at the goal.

Ex. 4: 3vs3 + 3 jolly with finalization. Search for solutions for construction and finalization, taking the ball, transition, progression.

D. Age group: 13-14 years old

From the motor point of view, the speed is very good, the coordination abilities are very well developed, mobility has the lowest levels, the body carries medium-term efforts. It is good to schedule training sessions for the development of muscles.

- Objectives:

- Playing on the normal field, specializing in positions (defenders, midfielders, attackers), improving tactical combinations and play relationships.
- The game system chosen within the club's own philosophy appears;
- Clear tasks specific to the players on the positions they play;
- Active work is done to develop strength and endurance according to the age of the athletes;
- Developing tactical thinking and skills specific to football;
- Development of general and specific motricity to be achieved through specific exercises of possesion and positioning executed in isolated game conditions, but also real games, relay and ballless competitions;
- The technical objective further aims at strengthening and refining complex technical elements and procedures.

Tactical training involves:

- Game system: 1-4-2-3-1;
- Training individual and collective tactical basic skills for attack and defense;
- Choosing the best passing solutions;
- Searching for and finding the most prolific finalization situations;
- Learning 2-3 situations of construction and development of the offensive game;
- Learning positioning and achieve a defensive balance within the new system on normal ground;
- Use of exercises performed in play conditions with rapid execution, semiactive or active opponents, numerical superiority and high speed.
- Psychological and mental improvement in specific situations of play;
- The great effort implies a wider development of motor skills and adaptation to any game situation - marking, doubling, pressing;
- Rapid execution of defensive and offensive transitions;
- Improving players' behaviour in fixed phases;
- Rapid adaptation to the solutions proposed by the system transformation, both defensive and offensive.

Ex. 5: build-up - construction from the goalkeeper - 4 + 2vs4 - solutions;

4. The fourth - performance stage lasts about 4 years, from 15 years old and until the junior becomes senior at the age of 19. It will target players with real qualities of integration into great performance, when they are selected to be part of the senior and national teams.

During this period, the fundamental roles of the four positions existent in a team (goalkeeper, defender, midfielder and striker) are extremely complex and differentiated. Running players on different areas of the field, either on the left or right side, in attack, in the middle or in defense, is absolutely necessary. Creating future automatisms

related to a particular post may lead to the junior's accomplishment of the role of the post only, which will make his adaptation to a team of seniors in the future harder.

It is the time when the diversification of the training has a decisive role. Exercises (games) of possession, positioning, finalization, etc. will be designed and applied to team players in order to develop their creativity and ability to understand and adapt to new problematic situations during the game.

Towards the end of the junior stage, the coach has to finalize the form of the athlete's evolution to a certain role he can best perform in the team.

E. Age group: 15-16 years old

The tactical training at this level aims at consolidating the individual and collective elementary tactical repertoire, by using in preparation a set of technical and tactical structures that contribute to the formation of basic skills (universalism) and the transition towards the actual specialization in positions.

It will seek to improve the elements of attack and defense:

- Game system: 1-4-2-3-1 and its variants in attack and defense;
- Creating an appropriate and coherent model of player participation in attack and defense, with clear tasks for each player;
- Strengthening and refining the skills and knowledge of individual and collective tactics for attack and defense;
- Developing the capabilities of players in possession of the ball to become game coordinators;
- Orientation towards a simple game with executions in the direction of attack - progression;
- Attack on the whole width of the field - amplitude;
- Positioning in the field without the ball;
- Developing the sense of anticipation (intuition);
- Practising pressing - pressing area;
- Easy and permanent participation in offensive and defensive transitions;
- Realizing a model with different ways of participating in the fixed own phases and the opponent's;
- Training and developing the ability to choose the most technical variants in relation to the game situations;
- Forming the model player for the team and club.

Ex. 6: 10vs6 development exercise with superiority in quadrants - search for offensive / taking the ball solutions, transition 3,4,5 passes;

F. Age group: 17-18 years old

Building the training model is complete. The set requirements will be known in detail by each player who at this age can be assimilated into performance teams. Basic and combined motor skills can be developed at the highest level in all their manifestations required primarily by modern football. Technical and tactical skills and knowledge - the technical processes and individual and collective tactical actions in attack and defense are at the highest level.

All the goals set for the previous training level remain valid.

- Objectives:

- Game system: 1-4-2-3-1;

When we prepare the offensive phase in this system, we will consider [4]:

- If the offensive action takes place after taking over the ball, the loss of the ball by the opposing team, the subsequent attack action, the type and duration will be made depending on how the opponent is positioned;
- If the offensive action is a counterattack, we will search precisely for the spaces generated behind the line of defense, with one aim: to surprise the opposing team;
- Improving the player's ability to react to the challenging situations of opponents and teammates;
- High ability to anticipate the opponent's reactions;

- Work to the virtuosity of many tactical situations in attack and defense, fixed moments of play (placement and technical execution).
- Clairvoyant observation of tactical situations in the manner of practising the total game;
- Formation and development of the mentality of a winner.

Ex. 7: complex positioning game 11vs11 - great principles;

Conclusions

Tactics will be the basic component, the central element of building the game model for each age.

Such a methodical route, scientifically directed in an obviously modernized and constantly updated version, is the key to success in achieving football performance.

Without a coherent, scientific and broad selection we cannot reach high performance.

Without committed and educated coaches who have concrete knowledge there will not be maximum progress in training.

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JUMPS POLYVALENT TRAINING FOR 3rd STAGE JUNIOR ATHLETES

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Abstract: The polyvalent training must ensure the developing of a body which is capable to adapt quickly and rigorously, in the following stage, to any effort necessary for an athletic task, especially jumps, based on various available motor skills. The content of a polyvalent training views endowing the athlete with an increased motor capacity in the context of a larger range of general motor features and a complex system of motor skills which are specific to jumps training. The athletic polyvalent training in jumps ensures both the complete development of the body's effort capacity and the improvement of the motor system (psychosensoriality), psychomotricity and, implicitly, the learning capacity and motor improvement.
Keywords: *training, polyvalent, jumps.*

Introduction

The concept of polyvalent athletic training encompasses:

- the balanced development of all physical qualities in relation to age particularities;
- the formation of a stock of motor skills specific to athletics, including learning the techniques of running, jumping and pitching;
- practicing tests like poliathlons in competitions.

Conceived in this way, polyvalent athletic training accomplishes both the complete development of the body's effort capacity and the exercise on multiple levels and on this basis the improvement of the motor apparatus (improvement of psycho-sensitivity), the psychomotricity and, implicitly, the learning skills and motor improvement ability [2,3,8].

The goal of polyvalent athletic training is to broaden the scope of the future athlete's fitness state for performance athletics [4,5].

Theme Choice Motivation

It is considered that in the age of children, juniors III (11-14 years), the emphasis should be on a poly-athletic training that constitutes the platform for launching specialized training and not damaging the health of the athlete, such as an exclusive specialization on a particular test.

The aim of the paper

This paper seeks to ascertain the particularities of the polyvalent training of children and juniors, as well as the particularities of specialization in a certain test (tests) at junior III level based on the distribution of the means of action in the annual plan, as well as the norms and tests of control in the specialization of jumping tests

Work hypothesis

We need to find out if there is a relationship between the process of specialization and the level of somatic development, the degree of multilateral physical training and the selection for the chosen sample.

Research tasks

- Selection of the means of action and their distribution during a competitive year with an eye to polyvalent preparation;
- Knowing the level of motor capacity through the norms and control tests applied in training and contests at children's level;
- Knowing the level of motor capacity through norms and control tests for presumptive junior level III specialization, in a group specialized in jumping;
- Establishing the drafting data of the paper;
- Writing the paper and presenting it for obtaining the principle approval, provisional conclusions;
- Finishing the paper; drawing up annexes, tables, lesson plans, protocols, graphs, etc.

Research methods

a. The method of the study of specialty bibliography and of the documents for planning and evidence.

We used the method in order to specify the field in which the research is carried out and to support with scientific data all the particular aspects resulting from the planning and drafting evidence documents.

b. The method of statistical data processing and interpretation.

This method offers the possibility of all methods related to the training, morphological and functional development of the subjects, contests' results, control tests, checks as well as training, after which, based on processing through statistical indices, allows general or particular assessments to be made on the studied

phenomena. We used a basic statistical index, in data processing, we then illustrated them in a series of tables with the role of making the statements, the conclusions formulated more prominently.

c. The test method used to measure the performance obtained through a series of tests and control tests.

d. The direct observation method - it is applied in the training process as well as in competitions.

e. The experiment method - is the basic method of scientific research, it has acquired customization for the basic work by using the experimental observation. All the data obtained from the initial, intermediate and final tests were compared with the baseline indicators established by the FRA model for this level of work and for recording the results of the control tests (carried out periodically, on preparatory stages) as well as based on the results obtained at the most important competitions. We have tried to determine the effects of the methodical orientation chosen on sport performance, as well as the implications of the dynamics of the main parameters of effort on sport performance.

Theoretical Foundation of the Work

The development of motor skills is of great importance both for the improvement of the biological potential of the body and for the practice of a sporting branch as a basic condition in achieving superior results. Therefore, it is necessary that in the activity of physical education and training, regardless of age, specialization or sports qualification, special attention to be paid to the development of motor skills [6,12].

In the specialized training of performance athletes, the methods and means used to develop the motoring qualities must be chosen in accordance with the particularities of the specific exercise of the sporting branch.

Multilateral training and specific orientation are important methodological issues that need to be addressed in a differentiated way in the training of professional athletes [13].

Thus, with beginner athletes, multilateral training must be seen as a prerequisite for achieving outstanding future results [7].

In the case of specialized, experienced athletes, the way to obtain valuable results is that of a thorough specialization which implies the improvement of those motor skills and the use of means corresponding to the specificity of the test [10,11].

In athletic tests - jumping, in which athletes are specialized, the motor skills are speed, strength and skill [14].

Research Organization

The Subjects

In this paper we used athletes from LPS "Petrache Triscu" from Craiova from the athletics section, current third category juniors corresponding to the age of 14-15 years.

We checked their training through the given control norms and tests, as well as their best results obtained in the basic tests as a presumptive specialization at junior level III.

Athletic Training Objectives. Means Used

Both specific and non-specific means can be used. Within non-specific means there can be various games that engage in the effort as many muscles as possible, to strain the development of motor skills [1,9].

I. Training Objectives:

1. Improvement of the technique in presumptive specialization tests.
2. Development of alactacid and lactacid anaerobic velocity, strength and resistance.
3. Improving the elements of the running, jumping and pitching school.
4. Improving performance capacity on combined tests.
5. Continuing polyvalent training.

II. Training Tasks in speed running:

1. Improving running with acceleration;
2. Improving the speed step;
3. Improving the bottom start and the launch from the start;
4. The finish and the attack of the arrival line.

III.Means Used:

1. Running with acceleration on a 80-120m distance with 80-100% intensities in a straight line and in turning;
2. Launch run on a distance of 10-30m, with 90-100%, intensities in a straight line and in turning;
3. Bottom starts with launch from the start at 50m distances, individually and in groups, in a straight line and in turning;
4. Repeating the finish and the attack of the line, individually or in groups;
5. Running with acceleration on progressive distances of 40, 50, 60, 70, 80 meters, with an intensity at the end of the distance of 80-95%, in order to develop the sense of acceleration, in a straight line and in the turning;
6. Running with acceleration on distances of 30, 40, 50, 60, 70, 80 meters in the form of a contest.

IV. Training Tasks in Obstacle Course Running:

1. Improving the step over the fence;
2. Improving the bottom start, the launch to the first fence, individually and in groups;
3. Improving the passage over the last fence and finish individually and in groups.

V. Means Used:

1. Exercises to learn how to attack while walking and easy running against the wall, free and above the height of the fence
2. Exercises to imitate a trailer foot from a wall, free and over the fence;
3. Running from stand-up position, with 8 launching steps to the first fence, crossing over 3-5 fences with 3 steps between the fences, with emphasis on attack, on the action of the trailer foot or globally;
4. From easy running, running with a rhythm of 3-5 steps between fences, initiating the attack near the fence and passing the trailer foot over the fence;
5. Running from stand-up position 3-5 fences, with 3 steps between the fences, with an emphasis on the rhythm of running between the fences and the start and launch to the last fence;
6. Running over 4-5 fences starting from down position, focusing on the rhythm of passing over the last fence and running to the finish line;
7. Downhill running on distances of 50, 60, 90, 200m, fences at height and with regular intervals in the form of a contest.

VI. Training Tasks in Jumping:

1. Improving acquisitions from the jumping school;
2. Improving the jumping technique in length by 1 and ½ steps in the air;
3. Improving the high jump technique with dorsal tipping.

VII. Means Used:

1. Successions of steady steps;
2. Successions of jumping steps;
3. Steady steps with intermediate rhythmic motions of even and odd steps;
4. Jumping steps with intermediate rhythmic motions of even and odd steps;
5. Combinations with alternations of steady steps and jumping steps;
6. Long jump without running;
7. Jumping on and over various obstacles with 3, 5, 7 steps, landing on either or both legs;
8. Detachment in "maintained" step, with a spring of 7, 8, 9, 11 steps;
9. Long jump with 1 and ½ steps;
10. Calibration of small, medium and long springs;
11. Long jumping with 1 and ½ steps with threshold pattering, with calibrated spring;
12. Detachment in jumped step with a spring of 7, 9 steps with landing on a high surface
13. Long jump with 1 şi ½ steps in competition conditions;
14. Advancement of the attack leg and the arms with a 90° swing towards the foot with a 10-15 steps, projecting the pelvis forward and putting the foot fast on the ground;
15. Running in a circle with a radius of 10-15m; pattering, detaching, 90° turn to the pattering leg, landing on the place of detachment;
16. Sitting with the back to the mattress, detachment of both feet up and back, landing on the back;
17. The same exercise with detachments from the ground, from the gym bench, from the trampoline;
18. Same exercise with the bar raised progressively;
19. Jumping over the bar with 3-5 steps spring;
20. Improving the pattering in the conditions of more and more rapid springs;
21. Improving the passage of the bar in the conditions of a short spring and in the conditions of a complete spring;
22. High jumps in the form of a contest.

VIII. Training Tasks in Pitching:

1. Improving items from the pitching school;
2. Improving the weight throwing technique;
3. Learning and consolidation of the javelin throw;
4. Learning and consolidation of the discus throw.

IX. Means Used:

1. Distance standing throws with different light objects;
2. Standing two-hand and one hand chest pushes, with the medical ball;
3. Standing launches of gymnastics sticks;
4. Throws and pushes with 3 steps spring, then from running with double support release;
5. Throws from sitting sideways, with the left side towards the weightless throw direction;
6. Sloping slides, imitating the final effort
7. Sloping jumps, with the weight on the neck, without throwing;
8. Weight throwing with spring in race conditions;
9. Javelin practice exercises, for learning the grip and how to carry the javelin;
10. Dropping of the javelin at 6-8m from the standing position facing the throw direction, the right arm is held back, above the shoulder level;

11. Sticking the javelin at a distance of 8-10 m from the left side in the direction of the throw, the right arm is held back, above the shoulder level;
12. 2-step throw away; right-left and throw, starting from the left-hand position towards the direction of the throw, with the right arm stretched back in the shoulder extension, with the tip of the javelin at temple level;
13. Sequences of 4-6 steps with structures similar to the two steps of the previous exercise;
14. Standing in the direction of the throw, with the weight of the body on the left front foot, with the javelin above the shoulder, 4 throwing steps are performed;
15. Throwing the javelin with a spring, in competition conditions;
16. Discus practice exercises for learning the grip and the imitation of the discus' rotation movement at the launching moment;
17. Throwing the discus from a standing side position facing the direction of the throw, from a high position and then a clustered one;
18. Throwing the discus from the side with the left side toward the direction of the throw, from a high position and then a grouped one;
19. Throwing the discus from the back towards the direction of the throw, from a high position and then a clustered one;
20. Execution of the pivot, without a throw, starting from a standing position;
21. Execution of the pivot, without a throw, starting from a standing lateral position with the left side toward the direction of the throw;
22. The last two exercises performed with the discus held, without release, then with release;
23. Discus throwing with spring in competition conditions

X. Developing motor skills. Tasks:

1. Speed development in all its forms, speed remaining a priority quality regardless of the presumptive specialization test;
2. Development of dynamic force and detention;
3. Developing aerobic, mixed and local resistance.

XI. Means Used:

1. Running with standing start for10-60m, with intensity of 95-100%;
2. Running with down start for 10-50m, with 95-100%;
3. Running with launched start 10-30m, 95-100%;
4. Running drills 10-30m, 95-100%;
5. Running with knees up for 5-6 seconds, 95-100%;
6. Downhill running (3-5 ° slope)for 20-40m;
7. Running with handicap, in competition conditions on a distance of 40-60m;
8. Different speed exercises: attention, reaction to various signals;
9. Running over 1-3 fences with down and standing start, with an intensity of 90-100%;
10. Throws with and without spring, made with lighter objects, compatible with an explosive type of effort;
11. Relay race for 30-60m, 95-100%;
12. Alternations of race walking with moderate tempo running for 10-15 minutes;
13. Running for 10-20 minutes at a rate of 4.40 +/- 10sec, the reference heart rate after exercise being of 160-170 pulses per minute;
14. Running on varied terrain for 15-20 minutes;
15. Accelerated run on 80-120m, repetitions with intensities of 80-90%, break of 5-7min;
16. Repeated running in uniformed tempo over distances between 150-600m, with 5-7min pause;
17. Running drills pushing the opposing partner 20-30min.;
18. Running drills with weights (sand bags) pe 10-20m;
19. Running drills uphill or on steps 10-20 min.;
20. Running with knees up uphill or on steps 10-20 min.;
21. Running with knees up with weights 10-20 min.;
22. Lifting up toes from a standing position, with weights;
23. Step ups with weights (5-10kg), on 15-20m;
24. Up hill step ups (stairs), 3-5°, on 15-20m;
25. Repeated jumps from one leg and on both feet up hill or in the sand;
26. Jumping like the ball, various jumping on the spot and in movement, on and off obstacles, over different obstacles;
27. Combination of steady steps and jumping steps;
28. Rope Jumps;
29. Jumps on one leg and both legs over the fences;
30. Semi-squats with vertical detachment.

Research results and their interpretation

TESTS AND CONTROL NORMS RESULTS

Table no. 1 Results obtained in the pentatlon at junior level III

Tests and Control Norms Name and Surname	Long jump without spring (m)	30m a.s.p.	30m a.s j.	50m a.s.p.	120m a.s.p.	300m a.s.p.
A.I.	1,80	5.10	5.25	7.4	22.5	50.1
H.M.	1,60	4.70	4.95	7.2	20.3	42.4
L.A.	2,15	3.90	4.10	6.5	17.5	37.5
L.C.	1,70	4.80	5.10	7.3	21.3	48.7
L.L.	1,80	4.30	4.55	7.0	20.2	43.5
M.M.	1,75	4.90	5.15	7.2	21.7	49.6
V.A.	1,65	4.90	5.30	7.7	22.9	49.3

Table no. 2

Control Tests Name and Surname	800m	60mg	Length	Throwing the oina ball
A.I.	2.30	10.9	4,53	37,20
H.M.	2.18	9.3	4,70	45,75
L.A.	2.06	8.7	6,21	65,80
L.C.	2.25	10.8	4,24	35,10
L.L.	2.20	9.9	4,65	44,90
M.M.	2.24	10.1	5,01	50,40
V.A.	2.27	10.0	4,25	38,25

By correlating the performance obtained at the presumptive specialization test 300 m flat of the L.A. athlete with the results obtained at the control tests, these are divided into:
- tests regarding multilateral physical training;
- tests regarding poly-athletic training.

In this respect, the following correlations have been noted in the case of multilateral physical training:
- moderate correlation with long jump from a standing position (r = 0,50)
- low correlation with 30-meter running, running from stand-up position (r = 0,28)
- significantly high correlation with 30-meter running, running starting from down position (r = 0,71)
- almost negligible correlation with 50 m running, running from stand-up position (r = 0,15)
- small but present correlation with the 120 m running, running from stand-up position (r = 0,25)
- Significantly high correlation with 300 m running, running from stand-up position (r = 0,81).

These are listed in the following table:

Table no. 3

Name and Surname	The Basic Test and the Best Result	Tests on Multilateral Physical Training	The Resulting Correlation
L.A.	300mp. 36”46	Long Jump without spring	r=0,50
		30 m a.s.p.	r=0,28
		30 m a.s.j.	r=0,71
		50 m a.s.p.	r=0,15
		120 m a.s.p.	r=0,25
		300 m a.s.p.	r=0,81

In the case of polyvalent training we have the following correlations:
- moderate correlation with 800 m running, (r = 0,46)
- moderate correlation with 60 m obstacle running (r = 0,51)
- low correlation with 60 m flat running(r = 0,40)
- low correlation with long jump with running (r = 0,25)

- almost negligible correlation with Throwing the oina ball (r = 0,09).
These are presented in the table below:
TABLE NO. 4

Name and Surname	The Basic Test and the Best Result	Tests on Multilateral Physical Training	The Resulting Correlation
L.A.	300 mp 36”46	800 mp	r=0.46
		60 mg	r=0,51
		60 mp	r=0,40
		Long Jump	r=0,25
		Throwing the oina ball	r=0,09

Conclusions

The study, the data obtained confirm our hypothesis that the result of the presumptive specialization test is strongly determined by the degree of multilateral physical training and the level of polyvalent training

There are differences in the medium value of the correlation coefficient for each group of control tests in both categories (physical training and polyvalent training) in the sense of some values of very high significance, in similar or even identical tests.

At the same time, it is worth noting the rather low values of some tests (especially pitching tests, resistance tests), which makes for the perspective of a similar study for the groups of tests in which the future performers could be specialized.

Clearly, at this level of training, it is recommended to simultaneously approach the training process to develop all basic motor skills, respecting the physiological and methodological particularities of sports training.

The value of polyvalent training for athletes in this stage of training is also highlighted by the specialized federation that has shaped the competitive system of beginners (children and juniors III) especially on the polyathlones (triathlon, tetrathlon, pentathlon).

The results obtained provide indicative data on the selection process (a permanent process) as well as on the use of the most effective means of training in the training of young athletes for these tests.

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ATHLETICS SPECIFIC MEANS OF IMPROVING PHYSICAL ENDURANCE IN SECONDARY SCHOOL STUDENTS

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Abstract: Physical Education in schools is regarded as an activity of national interest due to its aims of strengthening the physical state, building and enhancing positive features of character as well as developing basic motor skills, especially endurance and speed.

Physical endurance is a motor feature which can be developed with the help of athletics specific methods and means.

The whole variety of motor actions performed by each primary school student - their daily and sport activity - reaches high standards only if it is based on strength development.

Keywords: *endurance, students, methods, exercises.*

Introduction

It is obvious and practice has shown that the level of development of endurance determines the fulfilment of the requirements of the physical education and sport syllabus, provided by the curriculum, which is related among others to the widening and refinement of knowledge, abilities and motor skills systems, and motor skills development [2,3].

Endurance is an accessible and improvable quality for all ages and for this reason it appears in all classes, thus being paid greater attention [6].

It is also known the fact that children can more easily sustain their long-term efforts to the detriment of the intense ones [1].

Motivation of the chosen themes

Developing endurance through means specific to athletics is a very attractive method for students, and we wanted to exemplify this by using the most popular and accessible exercises.

The purpose of the paper

Starting from the idea that endurance is an important motor quality, we have proposed that in the paper we should pursue and obviously see if endurance, meaning the ability to perform effortlessly, can be a preoccupation of the teacher at the secondary school cycle, in our case eighth grade, that is, at the age of 14-15 years old.

We also wanted to determine to what extent age particularities can and must influence choice of means in the development of endurance and their two characteristics: volume and intensity.

Work hypothesis

Endurance, an important motor quality, has good development conditions in the secondary school cycle, especially in the eighth grade, using methods and means specific to athletics.

Research tasks

- Detection of general and specialized works regarding the subject: compilation of the bibliographic index;
- Study of bibliography, documentation sheets, translations. Establishing and organizing the experiment team, choosing work places; fixing work conditions;
- Establishing and specifying the methodological data of the experiment (exercises, planning, dosing, preliminary and on-going checks, etc.) in relation to the structure of the school year;
- Conduct, systematization and analysis of the data obtained by the experiment;
- Establishing the drafting data of the paper;
- Drawing up the paper and presenting it for obtaining the approval in principle, provisional conclusions;
- Finishing the work; drawing up the annexes, tables, lesson plans, protocols, charts, etc.

Research methods

Several methods were used in the research to provide the ways to solve the proposed tasks. These methods were:

- Documentation method.
- Observation method.
- Experimental method.
- Test method.
- The statistical-mathematical method of processing and interpreting data.

Theoretical foundation of the work

The development of psychomotor skills is of particular importance in the activity of physical education and sport.

In multilateral physical training an important place is the development of endurance, the high level of which is the necessary condition for the subsequent practice of all sporting branches without exception, and especially of the athletic ones, claiming higher requirements for the manifestations of this quality [4,5].

Physical endurance is a perfectible driving quality as a result of a systematic, continuous follow-up of certain rules, of specific physical exercises, keeping oneself at the value achieved for a long time [10].

Research organization

Subjects

The experiment was attended by students from the eighth grade, from the Secondary School Nr. 21 Craiova, Dolj County, who studied in the school year 2017-2018 – control group and experimental group.

The level of training in these classes was good and it improved continuously throughout the research, reaching the end of the research at a very good level of training in the development of endurance.

Frame pattern of action on the development of endurance in the eighth grade

This pattern is the result of our activity along the experiment, of the recorded and obvious results of the experiment. Their good value has strengthened our conviction that we have chosen the action systems, methods and exercises well.

Exercises for the development of endurance were scheduled in each lesson at the end of the lesson, with a time not to hinder work to accomplish the other lesson objectives.

Exceptions to this plan are the lessons in which the passing of general or special test was scheduled.

Given the long time spent on the development of endurance and the structure of the school year, we could set a number of methodological objectives such as [7, 8, 9]:

Objectives:

- gradually becoming accustomed to the endurance effort;
- developing aerobic capacity and habituation with the planned training time;
- development of mixed (aerobic-anaerobic) or anaerobic lactacid capacity;
- getting used to the sporting competition by organizing various competitions.

The first semester begins with a week of resuming and adapting to the effort of physical education lessons; follows a week of passing tests; the following weeks are reserved for the development of aerobic capacity by what we call "long-lasting running in tempo pace", the continuous increase of the distance and the constant preservation of the intensity (tempo). In the last week we tested the endurance strength for the second time through the 800m flat test for girls and 1000m for boys.

Methodical procedures: "Long-lasting running in tempo pace with continuous increase of distance and constant preservation of intensity" (of the tempo).

In the last week we tested the endurance ability for the second time through the 800 m flat test for girls and 1000 m for boys.

This is the structure of the school year in the experimental classes: the number of weeks was in the first semester of 18, so the number of lessons was 18, hence 18 hours. The second semester consisted of 17 weeks and 17 lessons-hours.

We started the experimental activity after assigning the leaning units (in the eighth grade) the number of lessons to each one, knowing that a lesson can have several learning units (themes.

Under these circumstances we planned and programmed endurance development activity both in the first and second semesters.

In this way, we believe that we have achieved the objectives proposed for the first semester, namely resuming and accustoming to the effort made during the lessons, and also the development of aerobic capacity. This statement will be certified by the results obtained in the tests.

In the second semester we insisted on solving the third proposed methodical objective: developing the anaerobic lactacid capacity (in the mixed area).

Methodical procedures: Long-lasting running in tempo pace with continuous and progressive drop in running distances and strength intensification (of the tempo) with sufficient and bearable growth rates.

For this we used the following options:

- Long-lasting running in tempo pace with the continuous and progressive decrease of the running distances;
- strengthening the intensity (tempo pace) with sufficient and bearable growth rates;
- repeated running over 100, 200 and 300 m distances in tempo pace, reinforced from week to week, using the repetition method.

We also used in the training of the students, the motion games and the athletics specifics we have presented below.

Research results and their interpretation

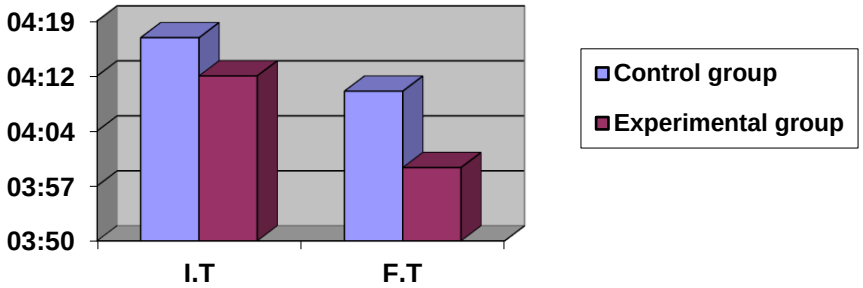
Endurance running 800 m flat – girls and 1000m flat - boys.

- INITIAL ANF FINAL TESTS GIRLS Table no.1

No.	CONTROL GROUP			EXPERIMENTAL GROUP		
	Surname and name	Endurance running 800m (min)		Surname and name	Endurance running 800m (min)	
		I. T	F.T		I. T	F. T
1	A.O	4:25	4:20	P.O.	4:25	4:00
2	A.D	4:19	4:14	D.M.D.	4:19	3:54
3	B.A	4:43	4:30	G.M.	4:43	4:10
4	C.S	4:23	4:14	P.G.	4:23	4:04
5	C.C	4:32	4:25	D.M.I.	4:29	4:05
6	E.F	4:10	4:05	T.A.	4:54	4:05
7	G.R	4:09	4:00	U.A.	4:24	4:00
8	I.O	4:47	4:25	C.L.M.	4:27	4:02
9	I.N	4:29	4:15	T.E.	4:07	3:44
10	U.S	4:54	4:25	T.A.	4:12	3:52
11	T.I	4:24	4:10	U.A.	4:22	4:03
12	B.E	4:27	4:12	x	4:12	4:00
13	D.A	4:19	4:02	σ	3,10	3,30
14	F. C	4:26	4:12	cv	1,22	1,42
15	N.O	4:07	3:54			
16	R.A	4:12	4:02			
	x	4:17	4:10			
	σ	3,00	1,02			
	cv	1,02	1,0			

Endurance running 800m - girls

Arithmetic average



The averages obtained in the two tests during the experiment: I.T. – 4:17 and 4:10 at F.T. for the control group. The growth rate is significant, meaning 7 seconds between the first and second test.

In the experimental group, the following results were obtained 4:12 in I.T. and 4:00 in the final test, so a steeper increase of 12 sec.

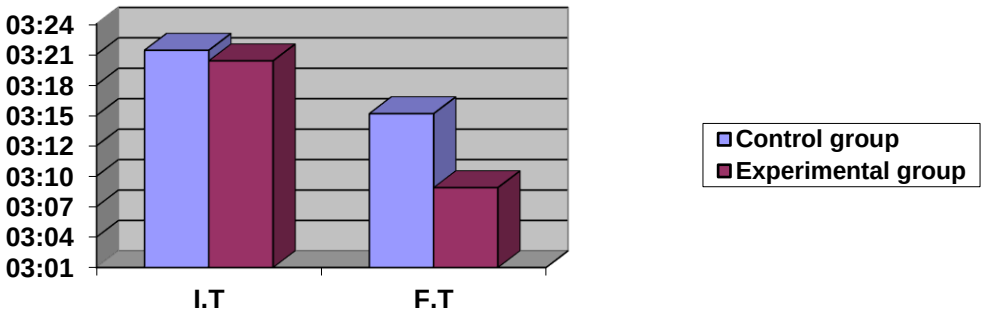
The variability coefficients indicate high homogeneity in the two tests. We can still state at this stage that the main purpose of our work has been achieved, even if at first sight the growth rates would seem insignificant.

We also notice that a number of 3 girls have reached the limit of 4 min/800 m in the control group and 10 girls in the experiment group. The best of them got even 3:40 in that test.

- INITIAL AND FINAL TESTS BOYS Table no. 2

No.	CONTROL GROUP			EXPERIMENTAL GROUP		
	Surname and name	Endurance running 1000m (min)		Surname and name	Endurance running 1000m (min)	
		I.T	F. T		I. F	F. T
1	B.A.	3:24	3:10	A.G.	3:23	3:04
2	B.C.A.	3:27	3:12	B.C.	3:32	3:25
3	B.M.	3:19	3:02	C.C.	3:30	3:05
4	D.I.	3:26	3:12	P.G.	3:19	3:00
5	I.A.	3:07	2:54	E.G.S.	3:57	3:05
6	I.S.T.	3:12	3:02	G.S.	3:39	3:15
7	F.A.	3:42	3:23	N.F.S.	3:54	3:05
8	G.T.	3:34	3:14	P.D.	3:34	3:10
9	G.G.	3:54	3:25	R.V.N.	3:37	3:12
10	N.A.R.	3:24	3:10	R.D.	3:29	2:52
11				T.C.	3:26	3:12
12				N.B.	3:27	2:54
13				S.I.	3:22	3:02
14				Z.C.A	3:42	3:13
	x	3:22	3:16	x	3:21	3:09
	σ	3,30	1,12	σ	3,00	1,02
	CV	1,42	1,17	CV	1,02	1,0

Endurance running 1000m - boys
Arithmetic average



The students in the control group obtained in the initial test a value of the arithmetic average of 3:22, and in the final test a value of 3:16, so a difference between the averages of 6 sec.

The students in the experimental group who used in the physical education and sport class motion games and relay games specific to athletics achieved an average of the results of 3:21 in the initial test, very close to the value of the control group, but at the final test they obtained a lower average of the results with 12 seconds, that is 3:09.

Of the students in the control group, 3 reached the results of almost 3 minutes, one just under this scale, and 8 of the experimental group came to the value of 3 minutes and the best performance was 2:52.

Conclusions

- The end of our experiment, the observations made in the specialized literature suggest that we can draw some pertinent conclusions.
- First of all, we have to say that, in our opinion, the research hypotheses have largely confirmed what allows us to appreciate that the experiment carried out in good conditions has been effective.
- In the gymnasium cycle, especially in the eighth grade, resistance is proving to be an important quality not only for physical education lessons. Resistance development is achieved by applying program content and special programs. Endurance has in the eighth grade good development conditions.
- As we have proposed, we managed that the increased concern for the development of

endurance in physical education lessons not to negatively influence the development of other motor skills and the achievement of other instructive-educational objectives.

- At the end of our study, the results obtained allowed us to achieve a level of endurance development that is very good in our opinion, being above the level of the grade 10 in many cases.

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ERGONOMICS, POSTURE AND MUSCULOSKELETAL DISORDERS IN DENTAL PRACTICE

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Abstract: The position of the operator in dentistry is very important for the good outcome of the dental treatment. However, many times a good visibility means a twisted body of the operator and maintaining a position that is unhealthy for a prolonged period of time, and that can lead to muscle pain, joints pain and physical impairment of the operator. Therefore, respecting the ergonomics in the dental office is important for the benefit of the operating team.
Keywords: *ergonomics, musculoskeletal disorders, posture, back pain.*

Introduction

International Ergonomic Association defines Ergonomics (or human factors) as "the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design, in order to optimize human well-being and overall system." Ergonomics is the science of matching working conditions and human capabilities.

The goal is to allow people to perform work or other activities safely and efficiently. The basic principle in ergonomics is to match tools, equipment, and work methods to the needs of the worker in order to enable him/her perform comfortably to his/her best. Thus, the need is to recognize conditions that lead to discomfort and implement changes to minimize or eliminate those conditions.

Modern ergonomics is an interdisciplinary applied science that studies the optimization possibilities of the man-machine system design by knowing the human's physical and mental possibilities and limits, his/her capacity to learn, the factors generating errors, the work, the physiology, the human behavior as an individual and within a team, the managerial possibilities, the organizational culture (interdisciplinary study of anatomy, physiology, psychology, management), and the technical and designing possibilities (engineering, design). [1]

The chair height and position, even the chair type can help the operator. Having a chair that adjusts to the proper height will greatly increase your ability to maintain good posture. The height of your seat should be approximately the length of your tibia (the bone in your lower leg between the knee and ankle) so when you sit your knees bend at a 90-degree angle. The seat depth should allow approximately one to three inches of space between your knees and the edge of the chair. The width of the chair should be at least two inches wider than your buttocks so you have adequate support while working. A good chair is one that is referred to as ergonomic. The ergonomic chair will support your upper back (thorax), lower back (lumbar), sitting bones (ischial tuberosities), thigh area, the area behind the knees, and your feet. A well-designed chair with correct lumbar support ensures that the region from your thorax to your neck is straight and slightly forward. It will provide extra support to your lumbar region and help maintain the natural "S" curve of your spine. A properly contoured seat supports the ischial tuberosities, relieving upward pressure that may distort the tailbone curve, and it enhances support to the thighs. A sloping edge to the seat will increase contact with your thighs, reducing pressure behind the knees and ensuring proper blood circulation.

Proper seat height ensures your feet will be flat on the floor and reduce pressure on your knees and feet. The position of the patient and operator should provide maximal accessibility to the area of operation. Improper positioning and chair height will lead to premature tiring of the operator and diminishes his effectiveness. [2]

Proper positioning of the patient and the operator, illumination and retraction for optimal visibility are fundamental to proper dental treatment. The correct positioning of the operator is very important to help him to have a good visibility and accessibility of the oral cavity.

Dental operators have long battled the problem of musculoskeletal pain, which is usually caused by

maintaining poor posture during treatment. Because of the volume of patients that the dental operators have to treat, and the duration of the procedures, pain and discomfort are inevitable. When operators adjust in order to treat hard-to-reach places in a patient's mouth, often holding these positions for long periods of time, musculoskeletal pain can develop in the wrists, elbows, shoulders, back, neck, and even the hips. Studies have shown that anywhere from 60-90% of dental operators have experienced at least one source of musculoskeletal pain.

Over the course of a dental operator's career, this pain can lead to:

- Decreased career longevity
- Inability to treat more patients more frequently
- Increased pain and discomfort
- Absenteeism and medical leaves
- Seeking medical treatment and pharmaceutical remedies
- Possible disability

For the patient, a dental visit typically involves sitting in a reclined or even supine position, and the dentist often has to contort the body to perform the oral work. From a physical effort standpoint there are many similarities between the work of dentists and surgeons: both professions typically involve working in a standing posture, both require prolonged stooping over a reclined or supine patient, both must use a variety of hand tools in a delicate manner, and both occupy extended periods of time, typically less than an hour per patient for a dentist and often considerably longer than an hour for a surgeon. The kinds of posture-related musculoskeletal problems reported by dentists and surgeons are comparable to those found in other professions involved prolonged standing work in poor postures.

In the field of ergonomics applied in dentistry one of the most discussed theme is the working posture of the dentist. The special attention on this topic is explained by the widely recognized and accepted fact that posture is the key of preventing the musculoskeletal disorders. The meaning of the posture in ergonomics is the manner in which different parts of the body are located and thus the reports established between them in order to allow a special task execution. In dentistry, the working position represented by the spatial arrangement of the dentist's entire body around the patient must be distinguished. This differentiation is useful to understand the working conditions. The ideal posture of a dentist gives him on the one hand, optimal working conditions (access, visibility and control in the mouth) and on the other hand, physical and psychological comfort throughout the execution of the clinical acts. Preserving the balanced posture and its symmetry throughout the clinical act is largely conditioned by the relationship established between the dentist and the intraoral working field. In an ideal situation, the surface of the treated teeth should be parallel to the front of the dentist and his view oriented perpendicular to the working field. It is recommended that the distance between the working field and the dentist's eyes is of 35-40 cm or slightly higher for very tall dentists. When this relationship is not established or it is lost during the clinical act, the dentist's eyes will look for it and the dentist will depart instinctively from the balanced posture. To establish such a relationship, it is important to pay attention to the dentist's position around the patient and the patient's head position on the headrest. [3]

Musculoskeletal disorders result in loss of work efficiency among dental surgeons, and the prevalence and severity of these disorders decrease by adopting ergonomic interventions. Interventions or prevention strategies require an awareness of "how to fit the job to the worker and not the worker to the job." Applying ergonomics to the practice of dentistry not only could provide safety benefits, but a practice might also improve performance objectives through greater productivity. The ergonomics and healthy workplace help the dental surgeons increase their performance without putting at risk their own health. One of the main goals of ergonomics in dentistry is to minimize the amount of physical and mental stress that sometimes occurs day to day in a dental practice.[4]

Musculoskeletal disorders come in a variety of forms:

Lower Back Pain

Between 70 and 90% of people have recurrent episodes of pain, and one-third of patients continue to have persistent, recurrent or intermittent pain after their first episode. In addi-tion to the difficulty with healing, the degenerative process is ongoing with age, and many patients do not minimize potential risk factors. All of this can contribute to continue episodes of low back pain (LBP).

The cause of LBP is often multifactorial but combined motions of lumbar flexion with rotation increase risk to the lumbar disk. This is further exacerbated by inflexibilities around the hips and pelvis as well as relative weakness of the

stabilizers of the lumbar spine, including the abdominal and gluteal muscles. Furthermore, back pain can exist due to abnormal postures, relative weakness and decreased endurance, and then exacerbated by a 'specific' injury.

Upper Back Pain

While not as common as lower back pain, some individuals report extensive pain in the mid and upper back. The thoracic spine is designed for support in standing and for caging the vital organs and is quite strong. It only rarely experiences symptoms of degeneration since there is little movement and great stability.

Probably, a more frequent cause of mid back pain is muscular pain from the postural muscles and scapular muscles. The contributions of abnormal posture, static postures, poor strength and endurance, and overall individual conditioning need to be taken into account.

A predominant cause of repetitive motion hand disorders is constant flexion and extension motions of the wrist and fingers. Chronic, repetitive movements of the hand and wrist, especially with the hand in 'pinch' position, seem to be the most detrimental. Other common contributing fac-tors to hand and wrist injuries include movements in which the wrist is deviated from neutral posture into an abnormal or awkward position, working for too long period without allowing rest or alternation of hand and forearm muscles; mechanical stresses to digital nerves from sustained grasps to sharp edges on instrument handles, forceful work and extended use of vibratory instruments. [5]

Using Sports Medicine approach, dentistry may be viewed as a profession much like a "sport." There is an abundance of dental surgeons with work-related pain and dysfunction. Dentistry poses a huge challenge because of the ergonomics of dental work. The biggest risk factors are the awkward prolonged seated postures with no back support and the limited range of motion and isometric muscle contraction created by working in a confined area, namely the mouth. The physiologic effects of these elements are patterns of muscle imbalance and neuromuscular inhibition causing dysfunction and/or pain. Advances in ergonomics continue to ease the physical challenges of the dental profession. Use of office ergonomics does not replace the basics of a body being physically conditioned. However, one must try to learn how to work around the various risk factors. The ultimate goal should be to prevent injuries and maintain the health of the dental surgeons by rehabilitative exercises. [6]

Four handed or close support dentistry involves the operator and dental nurse working as efficiently as possible whilst both maintaining correct posture. Essentially the dental nurse carries out as many non-operative tasks as possible while the patient is undergoing treatment.6 In its purest form, all the instruments are kept on the dental nurse's side who then passes them to the operator when they are needed. In theory the operator should not need to move their eyes from the patient's mouth, avoiding having to bend and twist to reach instruments. With practice the dental nurse should be able to anticipate which instruments are needed in the correct order so that treatment can proceed without any interruptions. This should enable treatment to proceed as efficiently as possible.

As well as being actively involved in instrument exchange the dental nurse also plays a big role in ensuring the operator has good vision by retracting tissues and aspirating. Not only does this improve the efficiency of treatment but it also promotes good posture in both the operator and the dental nurse.[7]

A recent book titled "Ergonomics and the Dental Care Worker" [8] describes results from several different surveys of dentists in Nebraska, South Carolina, Canada, Denmark, Poland and Norway, which consistently showed that around 40%-60% report cervical symptoms and low back pains. Using a mail questionnaire, the prevalence of subjective complaints among 54 male orthopedists and 63 male general surgeons was investigated. Respondents were asked about their subjective musculoskeletal complaints. On average the age of the surgeons was in the early 40's, and they had worked as surgeons for between 16 and 18 years. They worked an average 9.5-hour day. Results showed a higher prevalence of musculoskeletal complaints among the orthopedists than the general surgeons. Shoulders and lower back pain symptoms were the most frequently reported complaints, followed by neck problems. Together, research results show that back disorders are relatively commonplace among dentists and surgeons, and this problem relates to their working postures, equipment design and duration of working. Fortunately, there are steps that can be taken to minimize back problems.

Serbian researchers made a study on ten right handed dentists with mean age 33 ± 3.4 and minimum 3 years of work experience. 60% preferably performed in standing working position. They recorded activities of back, shoulder and neck muscles and inclination angles

of the back. EMG (electromyography) was used to record the descending part of the upper trapezius muscle bilaterally as well the flexor and extensor muscles of the right forearm. They concluded that in everyday practice, dentists are fully committed to their patients in order to provide them with adequate treatment. During dental work potential fatigue can occur. It is hard for dentists to be concentrated to fine, controlled dental work, and to maintain good balance and adequate working posture at the same time. That indicates that it is important for dentists to pay more attention to potential fatigue during work, and to alternate their postures in order to prevent an MSD. This study indicates that there is also a great opportunity for further research and improvement in this area. This is a posture study, and its results indicate a need for creation of a Holter system for dentists, which they can wear during work, with the ability for warning when the same risk position is assumed for too long. The Holter system could also be able to detect muscular loads during different dental procedures. [9]

During work, different muscle groups were used in the standing than in the sitting position [10]. In the standing position fatigue can occur in lower extremity muscles. However, the main parts of the body which are affected by pain during dental work are back, shoulder and neck muscles. Optimal working positions are still disputable and alternating between sitting and standing could be suggested. Static muscle activity during dental work is the factor with most influence on development of MSDs [11]. Many dentists have experienced musculoskeletal pain in their shoulders and neck, hands and wrists, low back, or forearms and elbows. Further studies need to be conducted on the impact of dental work on the development of nerve and muscle pathologies, which would prevent dentists from providing the highest quality of service and could threaten their professional careers [12].

It is indispensable to change the tiresome working habits in the dental profession. According to Newell and Kumar [13], dentists can diminish the risk of developing MSDs by using suitable body posture and positioning during clinical procedures, integrating regular rest breaks, sustaining good general health, and carrying out exercises for the affected regions of the body. Furthermore, they emphasized that regular physical examinations of the dentists would provide more detailed information and early diagnosis of MSDs.

In different countries dentists reported having poor general health and suffer from various health related problems. In Romania, according to Stanciu et al. [14] for the subjects of their study associations between risk factor and musculoskeletal complaints are significantly revealed. The dentistry has always been known as uneasy occupation therefore one must take into account serious difficulties before attending course. First of all, students must be aware of the health risks in dentist's job. Talking about musculoskeletal disorders it might be assumed that knowledge in ergonomics may be of some use. Secondly, all sorts of protection must be used during treatment in order to prevent infectious diseases and other injuries.

Furthermore, dentists must be taught about coping with stress patterns. There are some points in preventing psychological discrepancies. To enjoy and be satisfied with their professional and personal lives, dentists must be aware of the importance to maintain good physical and mental health. Keys to success in preventing neck and shoulder injuries and pain include maintaining a neutral head posture, maintaining a neutral shoulder posture with the patient positioned at an appropriate height, developing muscle endurance, using indirect visions, taking frequent breaks and stretches. [15]

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DEVELOPMENT OF MUSCLE TONUS AND POSTURE IN CORELATION WITH LONG-TERM KINESIO® TAPING APPLICATION IN CASE OF PREADOLESCENTS WITH SCOLIOTIC ATTITUDE

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Abstract

Background: In the century of technology, posture plays an important role in the development of children's body. Our goal for this study was to prevent the evolution of vicious attitudes such as scolitic attitude with the help of modern recovery methods such as complementary Kinesio® Taping therapy.

Methods: The study included 13 patients between the ages of 8 and 10 years, diagnosed with postural deficiency in the area of functional scoliosis. The main postural evaluation method included the GPS (Global Postural System), which registered the postural deficiencies by using a special software, that shows anterior and posterior angulation, also anterior and posterior translation. For muscle tonus, Myoton device measured the elasticity and tonus parameters. We followed the effect of the complementary method Kinesio®Taping, used for a period of 4 months, applied once every two weeks. The subjects had an initial evaluation and a final evaluation after 4 months.

Results: The results showed an improvement in the case of Longissimus Lombar muscle for the elasticity parameter. This result indicates that Kinesio®Taping applications influences muscle tonus, with the mean difference being statistically significant at a threshold of $p < 0.05$. In case of postural evaluation, GPS recorded a modification of posture in both anterior and posterior view, the most significant being the posterior angulation, at a threshold of $p < 0.05$.

Conclusion: In the case of functional scoliosis, it seems that, with a proper application a complementary therapy such as Kinesio®Taping, could indeed have an influence on posture and muscle tonus, making possible an intervention in the case of long-term treatment and correction of postural deficiencies.

Keywords: *Kinesio®Taping, functional scoliosis, muscle tonus*

Introduction

In clinical practice, postural deficiencies are well known and treated. Literature review estimated that more than 80% of cases are diagnosed with postural deficiencies, but not all of this cases are being treated so that the problem will not evolve.

Gravitational forces move along the spine and may cause changes in posture that can lead to postural deformity including scoliosis, lordosis and kyphosis [1]. Scoliosis is the most common type of spinal curvature disorder, and is classified as structural or functional depending upon whether or not the change is fixed [2].

Unlike structural scoliosis, functional scoliosis (scoliotic attitude) has not been given the same importance. Many studies show the importance of physical therapy in case of structural scoliosis with different kind of methods and approaches, while functional scoliosis has been less valued, though it can also have a rapid and important impact upon a child's development.

While children grow until they have fully matured, there are certain times with more or less growth during childhood and adolescence and curvature progression is more or less probable during different phases of growth [3]. This are considered the breaking points in introducing treatment programs for this kind of postural behavior. The most common of this postural behavior is called idiopathic scoliosis.

The treatment of the so-called idiopathic scoliosis is determined by the deformity itself. As most of the scoliosis progress during growth, some also in later life, the main aim of any intervention is to stop curvature progression [3].

The purpose of this study was to provide the same type of interest for functional scoliosis as in the case of structural scoliosis. The treatment provided new and modern methods of treatment for functional scoliosis, just as Kinesio® Taping technique.

Kinesio® Taping (KT) developed by Dr. Kenzo Kase in the 70s is currently manufactured by one company and is a thin, cotton, porous fabric with acrylic adhesive that is non-mediated and latex-free [4]. Although KT research is limited, several studies have supported the efficacy of this treatment technique for addressing acute injury inflammation, promoting a faster return to activity, enhancing proprioception training, reducing pain, promoting neurological function post injury, and reducing muscle imbalances [5].

An incredible advantage of this method is its 24-hour continuity, and it is sometimes described as a round-the-clock presence of the therapist's hand touch. Kinesiology taping was developed with the idea of relieving pain and providing support to accelerate recovery of overstrained soft tissues, and its suggested effects include proprioceptive facilitation, inhibition of pain, and normalization of muscle tone, oedema therapy enhancement, and blood circulation improvement [6].

Materials and methods

The research covered 13 patients between the ages of 8 and 10 years, diagnosed with postural deficiency in the area of functional scoliosis. The main postural evaluation method included the GPS (Global Postural System), which registered the postural deficiencies by using special software that shows anterior and posterior angulation, also anterior and posterior translation. (fig.1, fig.2, fig. 3, fig.4)

Fig.1

Fig.2

Body Region	Anterior Translation	Anterior Angulation
Head	0,69" left	0°
Shoulder	0,24" left	0°
Ribcage	1,21" left	n/a
Hip/Pelvis	2,54" left	5,9° left
Knee	n/a	n/a

Fig.3

Body Region	Posterior Translation	Posterior Angulation
Head	1,65" right	1,3° right
Shoulder	5,41" right	4,9° right
Ribcage	3,31" right	n/a
Hip/Pelvis	5,73" right	4,9° right
Knee	n/a	n/a

Fig. 4

For muscle tonus, Myoton device measured the elasticity and tonus parameters. Myotonometry provides an objective way to quantify physiological properties of muscle tone. In our study we focused mainly on muscles that imply a modification of posture. The measures were made only after the subject was well aware of the measuring technique, and with the subject lying first in prone position, we could evaluate the fallowing muscles: *erector spinae, longissimus lumborum, trapezius superior.* After measuring the back muscles, the subject turned into supine position for the evaluation of *pectoralis major* muscle.

The non-invasive method registered the information of muscle activity and all data were calculated with the device's software, releasing a PDF format that contains graphs with values for *frequency* and *decrement* parameters related to the muscle groups that have been evaluated.

Kinesio® Taping was applied after the evaluation and it included a procedure that has been refined in years of experience and research, and has taken into account the muscles involved in the appearance of the vicious postural attitude in the scoliosis area. The characteristics of the affected muscle were evaluated, taking into account which muscles are shortened and which muscles are elongated in the case of functional scoliosis.

The applications were made for 4 months, once a week, twice a month, giving the opportunity for the muscles to get used to the extra layer of skin that was represented by the kinsiotaping.

All taping was applied by the primary author, an experienced kinesiotaping practitioner.

Standard 5 cm colored tapes was used for the experimental group. The length of the tape was individualized and added on the connective tissue, corresponding to the affected muscles, as fallowed:

- For the *errector spinae* and *longissimus lumborum* muscles, considered to be weak muscles, the application was applied from the proximal to the distal (origin-insertion), the application being to facilitate the weak muscle. Tape tension was 35%,
- For the *trapezius superior* muscle, considered to be a tense muscle, the application has been designed to inhibit overworked muscles, so it was applied from distal to proximal (insertion-origin). Tape tension was 25%,
- For *pectoralis major* muscle, also considered to be a tense muscle, the application has been designed to inhibit overworked muscles, so it was applied from distal to proximal (insertion-origin). Tape tension was 25%,
- The added high hip projection (as seen in most of scoliosis) tape, was applied so that it will translate the hip, avoiding a compensatory postural projection.

All of the applications were made in standing position, with a stretched tissue, adding in this way a proprioceptive factor with the purpose of influencing a correct posture by using neuro-proprioceptive input. (fig.5)

Fig.5

Results

Non Parametric test, Wilcoxon, was used in order to highlight the differences in the initial and final testing, the significant level being at p<0.05, which shows us if there is a significant difference / association in our study.

Table 1 presents comparative results between the initial postural assessment before applying Kinesiotaping and final postural assessment after 4 moths of wearing Kinesiotaping applications. Final results show an improvement in the evaluation of *posterior view*, for ***posterior angulation***, which is the sum of the postural changes by modifying the postural angle, or in other words, the inclinations appearing at the topographical level of the head, shoulders, thorax, hips / pelvis. Using the Wilcoxan test, a value framed at a threshold of significance p 0.05. This result indicates that the complementary method represented by Kinesiotaping, applied to the scolitic attitude shows an improvement in the posterior angulations, the mean difference being statistically significant at a p <0.05 threshold.

Table 1. Results showing the comparison between the initial and final (after 4 months) evaluation of postural assessment

	Before	After	Wilcoxan (p)
Anterior Translation	10.38 (3.73/17.17)	6.32 (3.50/8.10)	0.10
Aterior Angulation	6.70 (4.20/9.70)	3.70 (2.70/7.40)	0.09
Posterior Translation	10.97 (4.41/16.07)	7.18 (4.24/10.87)	0.10
Posterior Angulation	8.7 (5.6/9.6)	5.80 (3.10/7.10)	***0.05***

Table 2 represent the comparison between the first tonus evaluation, before applying Kinesiotaping, and the final evaluation of tonus, after 4 months of Kinesiotaping applications. In the case of tonus evaluation, results show significant improvement in the *decrement parameter* for *longissimus lumborum* muscle, by applying the Wilcoxan test, a value is assigned to a significance threshold of p 0.03. This result indicates that kinesiotaping applications recorded an improvement in elasticity parameter, the mean difference being statistically significant at a p <0.05 threshold.

Table 2. Results showing the comparison between the initial and final (after 4 months) evaluation of muscle tonus

	Before	After	Wilcoxan (p)
Frequency of m. Erector spinal	2.44 (0.28/5.99)	0.67 (-1.57/3.18)	0.15
Decrement of m. Errector spinal	7.30 (3.23/12.76)	12.76 (10.35/15.98)	0.13
Frequency m. Longissimus lombar	0.81 (-3.10/1.63)	1.13 (-1.28/3.35)	0.17
Decrement m. Longissimus lombar	-3.26 (-6.45/0.00)	4.68 (-1.20/8.71)	***0.03***
Frequency m. Marele pectoral	-0.95 (-3.38/1.02)	-3.12 (-6.12/2.62)	0.13

Decrement m. Marele pectoral	0.00 (-8.40/4.59)	-3.09 (-5.19/4.26)	0.65
Frequency m. Trapezul superior	-7.23 (-8.61/1.23)	-2.44 (-12.00/4.40)	0.80
Decrement m. Trapezul superior	-0.40 (-6.33/4.60)	-4.73 (-12.94/-0.37)	0.19

Conclusion

Kinesiotaping applications led to improvements within the evaluated parameters regarding the posture of the subjects in the experimental group, yet the differences are statistically insignificant.

Relatively small progress in its value may have various determinations, such as the insufficient number of cases for the statistical certification of hypotheses formulated, the mode of application of the kinesiotaping method that can be approached in another way, the tension in the applied band that can influence in various ways subject's perception of treatment.

However, statistically improved postural evaluation results, improvements with favorable values in the *posterior angulation*, have been recorded, as evidenced by the Wilcoxan test, which records a value at a significance threshold of p 0.05. This shows that even though the tape cannot have a significant influence on global posture it can, in fact, improve certain posture deficits like *angulation*.

In the case of its influence upon muscle tonus, kinesiotaping can create a movement in the fascia corresponding to the muscles implicated in the postural deficiency, improving the *decrement parameter*, showed with the Wilcoxan test, which records a value at a significance threshold of p 0.05.

Taking all the results in consideration, we can find kinesiology tape useful in the approach of functional scoliosis, and we encourage more research upon this topic, to evaluate its effect on long term upon postural deficiencies.

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CORRELATION BETWEEN PHYSICAL EFFORT AND CEREBRAL ACTIVITY AT SPORTSMEN

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Abstract: Our study objective, was to establish a real correlation between physical effort and cerebral activity at sportsmen, both, by using one of the electroencephalographic (EEG) indexes, the edge frequency, which characterise most relevant EEG changes, specific to studied sport activities and statistically comparing the obtained results.
Studied group was composed of 27 professional athletes, both genders, with same medium age, height and weight and similar professional training , which practice fence, volleyball or handball, for at least 6 years.
Electroencephalographic evaluation (line spectral and indexes) was realized by using the Nihon-Kohden EEG-9200 device, the EEG MAPPING QP-220AK programme, applied to the studied sportsmen during all tested moments (R1, A, R2, B, R3, C, R4, D R5), activities that can emphasize possible specific cerebral patterns.
The p values of Student test, obtained by the inter-sports statistical comparison of edge indexes, measured for each of the tested moments, were represented by cerebral mapping.
Were emphasized significant differences between the three studied sports, depending on the activated cerebral area specific to each sportive discipline and correlated with the test moments, especially in the parietal and frontal cerebral areas.
EEG differences recorded for each sportive discipline, outlined a real correlation between physical effort and cerebral activity, due to cortical adaptation to long term effort, emphasised through functional plastic cortical changes.
Keywords: *sport disciplines, professional training, edge frequency, cerebral mapping.*

Introduction

Our study objective, was to establish a real correlation between physical effort and cerebral activity at sportsmen, both, by using one of the electroencephalographic (EEG) indexes, the edge frequency, which characterise most relevant EEG changes, specific to studied sport activities and statistically comparing the obtained results.
The relevant studied parameter for the research, represents the frequency from which all inferior frequencies represent 90% of whole EEG line length.
Electroencephalography (EEG) represents the technique of cerebral electrical activity acquisition during a period time, through electrodes put on the scalp [1, 2, 3].

Material and methods

Studied group was composed of 27 professional athletes, both genders, which practice fence, volleyball or handball, 9 fencers, 9 volleyball athletes and 9 handball players for at least 6 years.
Considering that, the investigations took place in equivalent conditions for all subjects, we can state, that the determining factor, for the different behaviour of the administered tests, were the cerebral changes, induced by the sports practice for a long period of time, as a result of repeated complex movements performed during specific training [4, 5].
The testing was performed under current ethical rules, each participant being informed of the experimental processes.
Electroencephalographic evaluation (line spectral and indexes) was realized by using the Nihon-Kohden EEG-9200 device, the EEG MAPPING QP-220AK programme, applied to the studied sportsmen during all tested moments (R1 - initial repose, A- right hand contraction, R2 - repose after right hand activity, B - left hand contraction, R3 - repose after left hand activity, C - right hand contraction mental exercise, R4 - repose after right hand contraction mental exercise, D - left hand contraction mental exercise, R5 - repose after left hand contraction mental exercise), activities that can emphasize possible specific cerebral patterns.
The EEG response was registered with surface electrodes which have a letter to identify the lobe (F frontal, T temporal, P parietal, C central, O occipital) and a number to identify the hemisphere location (even numbers refer to electrode positions on the right hemisphere, odd numbers to those on left hemisphere), placed on the scalp according to the electroencephalography 10-20 system, bipolar acquisition, 16 channels, the reference being the two ears (A1, A2), using a time constant of 0,3 seconds and a filter below 50 Hz [6].

For a correct identification of cerebral adaptations, specific to commanded actions apparition, was used amplitude and frequency cerebral mapping (Figure 1).

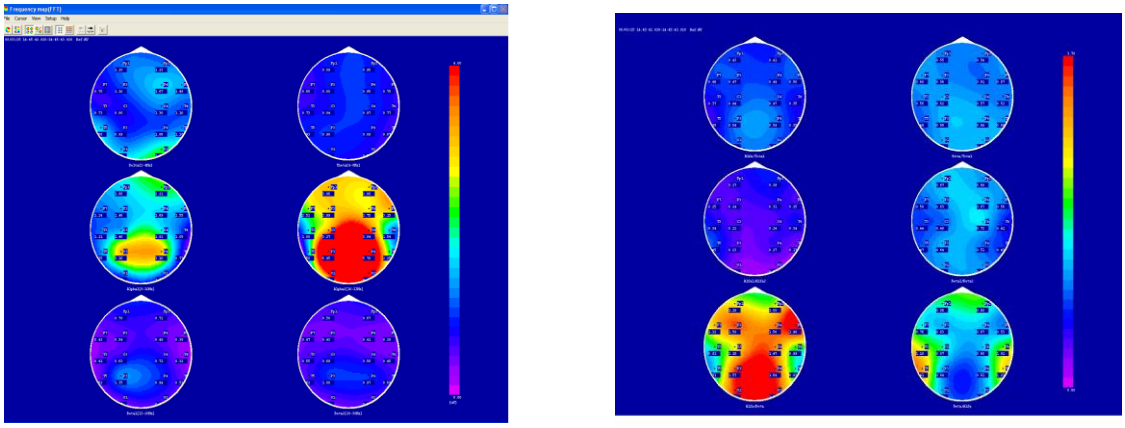

Figure 1. Cerebral mapping changing aspect as a new activity is performed

The used EEG MAPPING QP-220AK programme offered beside the frequencies spectrum, also synthetic indexes (peak frequency, median frequency, average frequency, edge frequency) suitable for statistic study. Because from the mentioned ones, the edge frequency characterizes most relevant the EEG modifications specific to each sport discipline, we choose to study this one.

For statistical comparison of the obtained data, the Student (t test) was used.

Results

For a better analyse, the p values of Student test, obtained by the inter-sports statistical comparison of edge indexes, measured for each of the tested moments, were represented by cerebral mapping.

Observing this graphic representation, were remarked the presence of significant differences between handball and fence, for most of the experiment moments, in the area of the P4 electrode – right parietal, emphasized like specific element.

Significant differences illustration between handball and volleyball, revealed most of the areas with significant p values, constant p values being the F3, P3 and P4 electrodes areas.

Fence - volleyball comparison, from the edge differences point of view, emphasized significant differences for all test moments, for different cortical areas, but constant values were P3 area for most of the moments test (Figures 2 -10).

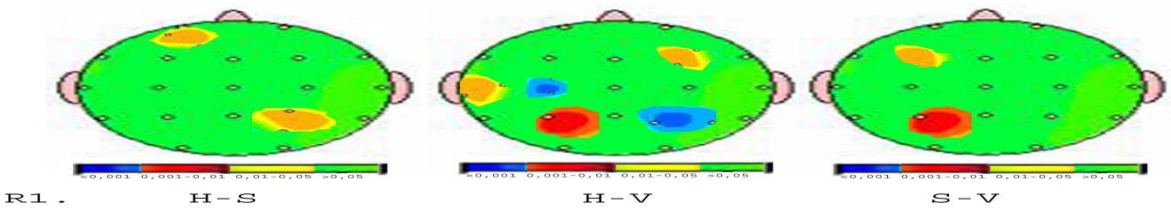

Figure 2. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment R1 for all sports

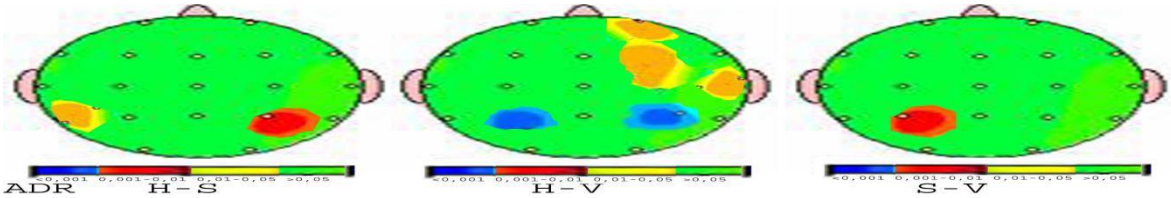

Figure 3. Mapping graphic representation of significant differences areas at comparison of edge indexes averagevalues for moment A for all sports

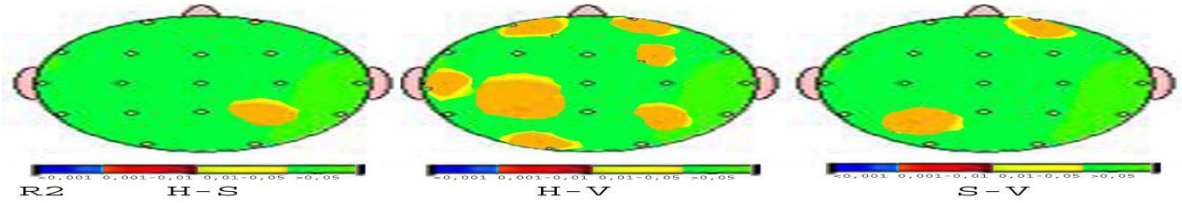

Figure 4. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment R2 for all sports

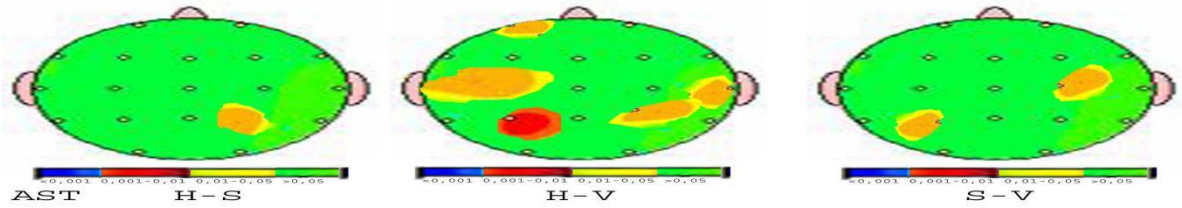

Figure 5. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment B for all sports

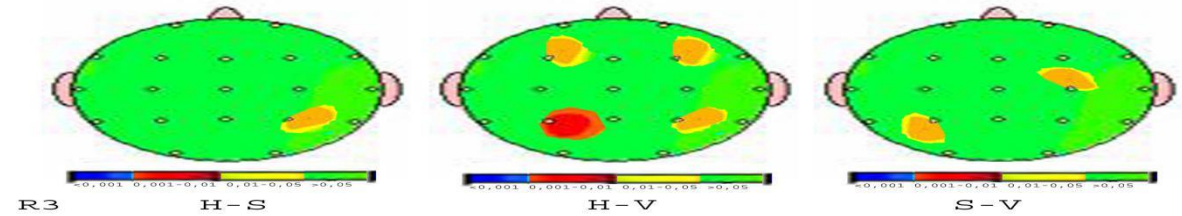

Figure 6. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment R3 for all sports

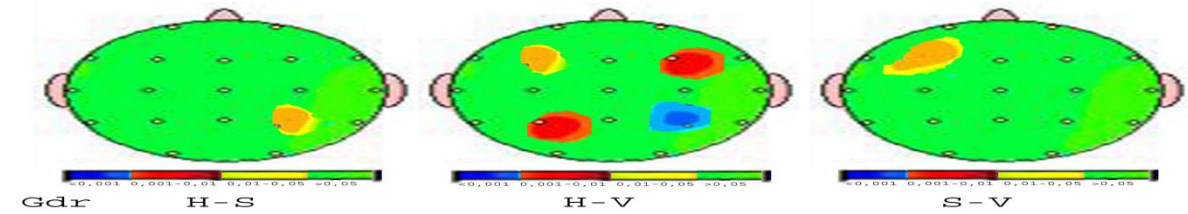

Figure 7. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment C for all sports

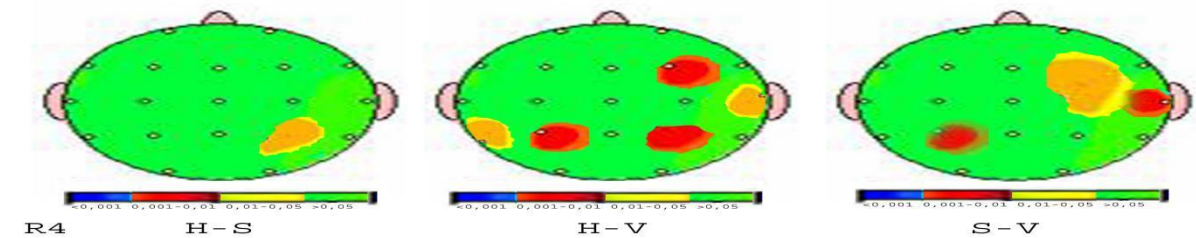

Figure 8. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment R4 for all sports

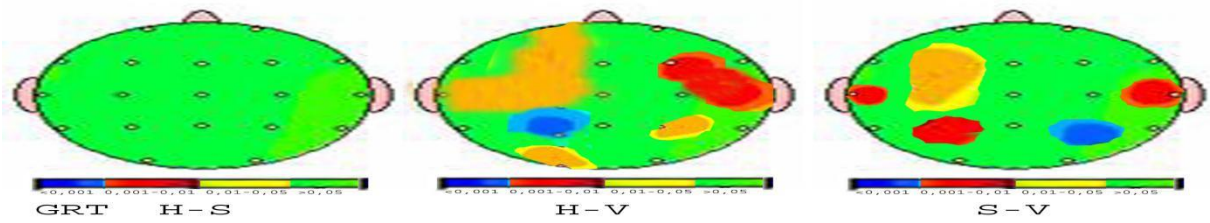

Figure 9. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment D for all sports

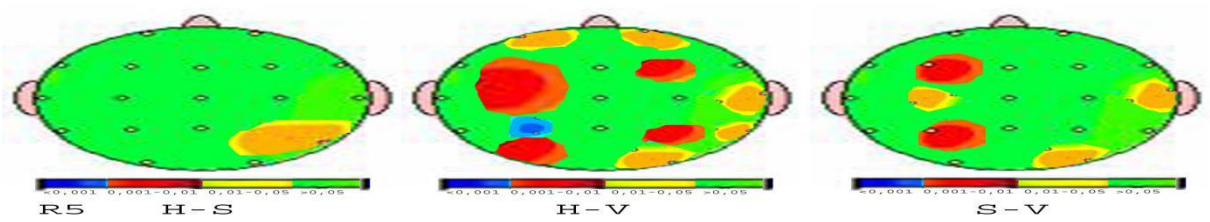

Figure 10. Mapping graphic representation of significant differences areas at comparison of edge indexes average values for moment R5 for all sports

Discussions

Present study aimed to emphasize EEG changes, produced by different actions (fists successively contractions, movement thinking without perform it), in comparison with the relaxation moments between actions, at sportsmen.

Following the electroencephalographic activity of each studied sportive discipline, we observed different response patterns, but constant for the same group of athletes.

Due to the particularities of each sportive discipline, is pointed out, the idea of some athletes presenting a performed movement imagination bigger than the one of other tested sport, which is produced by structural cerebral changes [8].

Despite, the speciality literature [8, 9, 10] had described many data, regarding the sportsmen motor memory, proving the cerebral differences inter-sports, produced by the long term specific physical exercises, remains an original aspect, enough conspicuous outlined by the previous electroneurophysiologic studies, that we have tried to achieve through our study.

Conclusions

Were emphasized significant differences between the three studied sports, depending on the activated cerebral area specific to each sportive discipline and correlated with the test moments, especially in the parietal and frontal cerebral areas.

EEG differences recorded for each sportive discipline, outlined a real correlation between physical effort and cerebral activity, due to cortical adaptation to long term effort, emphasised through functional plastic cortical changes, specific to each studied sportive discipline, characterized by different values of the edge frequency index.

Author contribution

All authors have contributed equally to this article.

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RELEVANT ASPECTS OF NEUROPHYSIOLOGIC PATTERN AT ATHLETES

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Abstract: Purpose of our study was to outline some aspects of physiologic pattern at athletes, including the selection of future sportsmen, objective evaluation of training quality and highlights of sub-clinical lesions existence, that may influence sportive performance, with the help of some electroneurographic parameters, muscular response and nervous conduction velocity, in order to emphasize the differences between sports and athletes' gender.
The study included 27 athletes, 14 boys and 13 girls, with an average age of 17 years, who practiced professional handball, volleyball or fence, sportive disciplines, where the use of upper members is asymmetrical.
By stimulating the median nerve, of each subject of the studied group, were recorded symmetrically, at right and left hands, the muscular response and nervous conduction velocity, by using Nihon-Kohden MEP-9600 device.
When comparing the group of sportsmen with that of the sportswomen, were recorded numerous statistically significant differences, for both studied parameters.
Thus, when comparing data obtained for the entire group with the subgroups of tested sports, as well as between sports, significant differences for amplitude, area and duration of muscular response were recorded and only the ones, of the handball-fence subgroups, were different, when comparing the values of nervous conduction velocity.
Present study revealed specific functional neurological and muscular adaptations, determined by professional training, which represent different aspects of athletes' neurophysiologic profile, so important and necessary to obtain high sportive performance.
Keywords: *motor response, motor conduction velocity, athletes, neurophysiologic pattern.*

Introduction

Nervous conduction velocity (NCV), coordination and reaction time, influence the level of sportive performance, therefore, is essential to determinate and track them in sporting activities [1,2].
Purpose of our study was to outline some aspects of physiologic pattern at athletes, including the selection of future sportsmen, objective evaluation of training quality and highlights of sub-clinical lesions existence, that may influence sportive performance, with the help of some electroneurographic parameters, muscular response and nervous conduction velocity, in order to emphasize, the differences between sports and athletes' gender.
Soudmand et al. [3] have signalled an inverse correlation between NCV and the subjects' height for the lower members; however, this study has not shown a similar correlation for the upper members, which was also presented, by Lang and Bjorkqvist, ten years before [4].
Present study was performed by the necessity of assuring a neurophysiologic characteristic for a sportive discipline, which would be useful both in selecting those, that practice the respective sport and for following the efficiency of specific training, while avoiding over training [5, 6].
In 1991, Takano et al, obtained clear results, due to the large number of investigated subjects, on the correlation of nervous conduction velocity with the tested subjects' height, higher velocity being present at lower height individuals and establish a relation between NCV and the diameter of nervous fibbers (those with a large diameter have a faster NCV) [7].

Material and methods

Nervous conduction velocity (NCV) was tested, by stimulating the median nerve, at three levels: radiocarpian articulation (1) between the tendons of the flexor carp radial and palmary long muscles, elbow (2) near the brachialis artery and bicipital groove (3), successively, for both arms, at a group of 27 athletes, 14 boys and 13 girls, the average age for the tested group was 17 years.
Every athlete was initially screened for any history, signs or symptoms of either peripheral neuropathy or compression syndrome of the upper extremities and were informed about the study procedure, purposes and known risks and gave their informed consent., this study being conducted according to the guidelines of the Declaration of Helsinki.

Percussion tests of the nerves along their course were performed, subjects were asked about the presence of any pain during training.

We performed a bipolar percutan stimulation of the median nerve, after previously degreasing the area, at the three levels previously mentioned, with rectangular impulses, of a duration of 0,1 ms and an intensity value necessary to obtain the maximal muscular response. The stimulation device was provided by the Nihon-Kohden firm, for the apparatus MEP-9600 used for this test. Muscular response, was recorded at the level of the tenar muscles (abductor pollicis brevis), using surface electrodes, with a diameter of 8 mm and a distance between them of at least 20 mm. Stimulation was made at a distance, of at least 70 mm from the proximal recording electrode. Skin temperature was measured at the level of lower third of the forearm.

Recordings were made in the morning, before trainings, on an ambient temperature, that did not vary significantly, from one recording to the next [8].

Reference temperature for correcting nervous conduction velocity was of 32,5 degrees Celsius, literal correction for this value, was automatic made, through the program provided by the menu of the utilized device. Data obtained by recording the muscular response was processed separately, providing values for: latency, duration, amplitude, area. The utilized software was also used in computing the latency differences of muscular responses, obtained by stimulating the three levels: distal (radiocarpian articulation = level 1), elbow=level 2 and proximal (bicipital groove=level 3), thus, by stimulating the mentioned three levels, the following information was obtained: for level 1 muscular response latency, the actual NCV values being obtained through latency difference 2-1 (distal NCV) and 3-2 (proximal NCV).

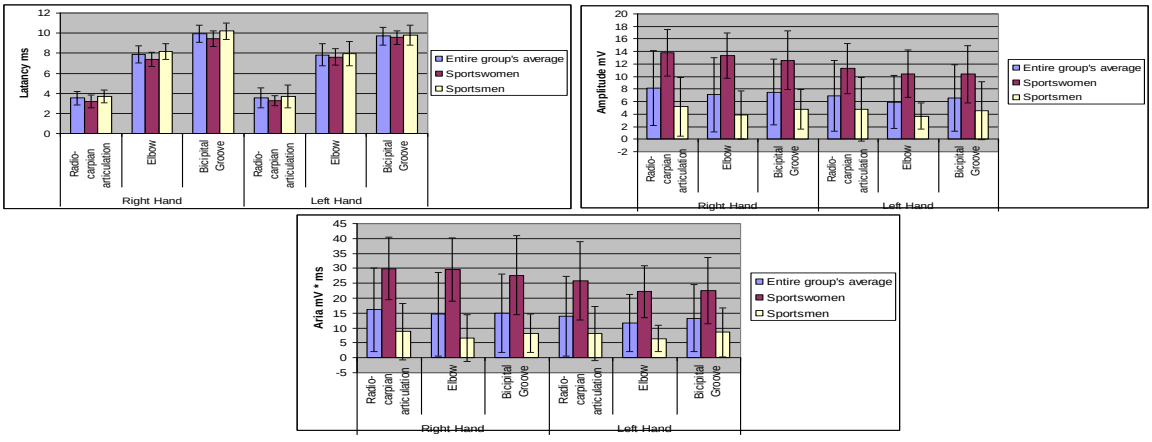
The interval, as shown by the program for level 1 is, in fact, the latency of the muscular response, followed by the levels 2 and 3, which are the only ones, that show the actual latency difference.

For statistical analysis, of the values obtained by processing the recordings of the muscular response and NCV testing, were used Student test and Pearson correlation coefficient.

Results

The following parameters of muscular response were analysed and statistically processed: latency, duration, amplitude, area, interval (last one represents difference between latencies from segments of the same limb).

Unlike the latency for muscular response, which presents significant differences between the two subgroups (boys-girls), only when stimulating the elbow and bicipital groove, for the right hand, the values of amplitude and area, presented highly significant differences, for all levels of stimulations, at both upper limbs, as shown in Figures 1- 3.



Figures 1-3. The average values of muscular response latency, amplitude and aria for the entire group

As for the duration of the muscular response, when comparing sportsmen with sportswomen, significant differences, are only recorded for stimulations, of the left hand elbow, as presented in Figure 4).

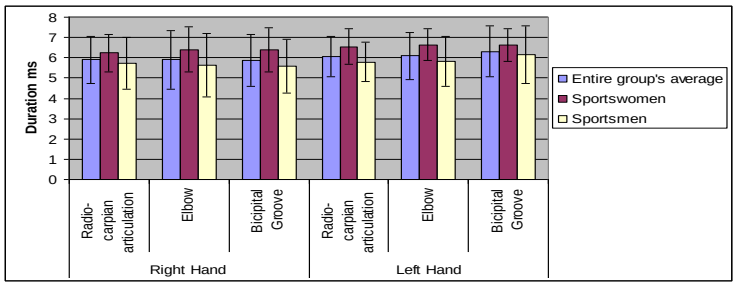
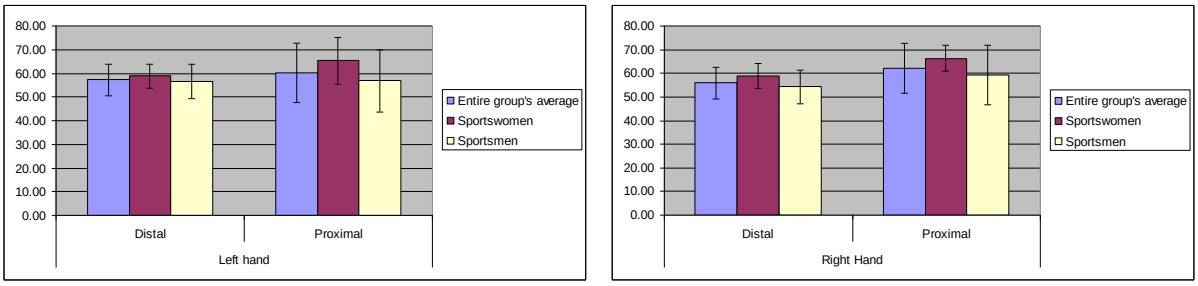


Figure 4. The average values of muscular response duration for the entire group

When comparing various sports, for each gender, there were no significant differences for boys, with the exception of the duration parameter, right hand, elbow stimulation, when comparing fencing-volleyball on left hand, distal level stimulation and elbow stimulation, when comparing fencing-handball.
For girls, there were a higher number of statistical differences, which were presented for: area parameter, right hand, stimulation at three levels and amplitude one, same hand, only for proximal and distal stimulation.
Statistical processing between sportive disciplines, for the interval values, does not show significant differences, both when comparing each sport with the entire group and when comparing handball, volleyball and fence between them, the exception being handball, compared with the entire group, right hand, proximal stimulation.
When comparing handball, the entire group with the subgroup of boys, following stimulation on the right hand, proximal level, significant statistical differences were present.
The average values of nervous conduction velocity, obtained by proximal and distal stimulation of the left and right hands, were not significantly different (Figures 5 - 6).



Figures 5-6. The average values of NCV obtained by proximal and distal stimulation

In the case of inter-sports comparisons, the only significant differences, for the values of nervous conduction velocity, were present, following stimulation of the proximal segment of right hand, at handball and volleyball subgroups, as indicated in Table 1.

Table 1. The values of NCV for the studied groups

		Right hand		***Left hand***	
		Distal	***Proximal***	***Distal***	***Proximal***
Entire group	Average	54,84	61,16	56,17	61,12
Fence	Average	55,42	67,74	55,68	62,43
Handball	Average	51,74	58,51	58,81	60,22
Volleyball	Average	56,53	60,18	55,79	59,30

Analysis of NCV values obtained in the case of sportswomen, did not show significant differences, with the exception of fence-handball, at the forearm level (2-1=elbow-distal), left hand, modifications which were not present, when analysing the sportsmen subgroup.

Discussions

Our research aimed to emphasize the adaptations and differences of NCV, depending on the specificity, of each of the three studied sport disciplines: handball, volleyball, fence, with varied degrees of upper limbs' use, by studying, both muscular response and NCV, which brought additional aspects to the electroneurophysiologic pattern of athletes..

As shown previously, the latencies of the muscular response, when comparing sportsmen and sportswomen, shows significant differences, only when stimulating the median nerve, at elbow and bicipital groove, with girls, presenting lower latencies than boys and slightly higher NCV values.

In case of NCV values, the significant differences between sportsmen and sportswomen, can be partially explained, by gender characteristics and height differences [9,10].

What is also, interesting to reveal, when comparing boys-girls, are the statistic differences, between the values of amplitudes, areas and the duration of the muscular response, obtained at all three levels of stimulation, for both upper limbs. The higher values recorded for sportswomen, compared to sportsmen, can be explained by possible functional adaptive modifications (muscular hypertrophy) [11], that are reduced for girls, allowing the stimulation, of a higher number of fibbers, which produce the increase of muscular responses, of a higher duration and evidently, on a larger area at sportsmen.

These differences between genders, can also be commented on, in the light of discoveries made during games and contests of fence, where the sportsmen, require higher force and engagement, with a heightened risk of lesions, even if only, sub-clinical [12, 13].

So, these more numerous sub-clinical lesions occurring for boys, can take part, in explaining the lower values of amplitudes, areas and durations recorded on them. This aspect, is in concordance, with that observed by Stecker, [14], whose experimental research, has shown the sensibility of NCV parameters to minimal compression, finding decreases, of up to 50 % of the muscular response amplitude, for the same level of compression, the author, did not signal, NCV modifications bigger than 5 %.

The inter-sports analysis of values characteristic to the muscular response, did not show statistic differences between the subgroups handball-fence and handball-volleyball. When comparing data of the volleyball subgroup with the fence subgroup, statistic differences were recorded, when stimulating the left hand, proximal and elbow level, for the amplitude and area parameters, higher values recorded by the fence subgroup, being in concordance with the characteristics, of the effort type, sustained by the practitioners of respective sport activity.

Boys-girls inter-sports comparison, showed the presence of functional modifications, specific to each sport, for both girls and boys and thus, significant gender dependant differences.

Conclusions

The specific physical effort, induce both structural and functional modifications, which influence the values of NCV and implicitly, of muscular response, very important informations, which can help establish an efficient level of training, appropriate to the athlete physical capacities, in order to obtain sportive performance, avoiding over training and extenuation of the athlete.

In the same time, these determinations can emphasize functional changes, which represent sub-clinical neuropathies present at professional sportsmen, thus, these affections can be treated in advance, the complications can be prevented and in many cases, the athletes can restart their physical activity.

Present study revealed specific functional, neurological and muscular adaptations, determined by lng professional training, which represent different aspects, of athletes' neurophysiologic profile, so important and necessary, to obtain high sportive performance.

Author contribution

All authors have contributed equally to this article.

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METHOD OF MEASURING THE COXOFEMURAL JOINT'S FLEXIBILITY IN 8-12 YEARS KARATEKA

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Abstract: One of the important motor abilitiesin karate iscoxofemural joint's flexibility and therefore it was considered that scientific measurement provides a valuable tool for tracking the evolution of karateka, comparing them and evaluating the effectiveness of applied sports training programs. The method of measuring the coxofemural joint's flexibility in 8-12 years *karateka* relies on image-processing software Kinovea with which it highlighted and measured the size of the execution angle at the *lateral split* testing. For a group of *children* aged 8-12 years it was calculated the execution angle at the initial and final lateral split testing after applying for three months sports training programs specially designed for the development of thecoxofemural joint's flexibility and it highlighted results in photos, a table and a graph.

Keywords:*karateka, flexibility, coxofemural, joint.*

Introduction

Karate Do is a sport that enjoys a high level of popularity amongst a lot of categories of people, from children to elderly people, men and women practicing it, for pleasure or for competition [1].

The standard of competition at European and world level is so high that if Romania wants to have remarkable results, it must adopt a medium and long-term training strategy, focusing on the athlete, especially the lower echelons, where training programs can be implemented which are based on scientific investigations that provide objective data on the sources to be activated.

The demands of competition and training over the years to come can only be countered by those athletes who have the ability to easily accumulate the techno-tactical knowledge and use them effectively, those youngsters who have a superior psycho-motor potential adapted to karate -do.

Coxofemural joint flexibility is one of the most important karate motor qualities, which is why we started testing the scientific measurement, providing a valuable tool for tracking the evolution of karateka, comparing the effectiveness of the preparatory applied programs.

Lateral split test is an eloquent test of the center of the coxofemural articulation mobility. [2]

Achieving the integral performance of a motor act [3] depends both on the level of the other basic motor qualities [4] and on the correctness with which the karate technique [5] is performed, correctness which in the technological processes at the level of the inferior members is due to the mobility of the co-femoral articulation.

In the specialized literature, less determinations have been made of this kind for the domain of karate, the main reason being the limited access to the complex, expensive measuring equipment, which uses applied sensors on the body.

The measurement method we used is simple, easy to apply, inexpensive and accessible to most coaches in karate, and can provide a tool for evaluating the programs and the work done in the training. In order to achieve the proposed approach, we chose a group of thirteen children aged between 8 and 12 years who were monitored on motor behavior and on the level of development of motor skills, starting from the consideration that through specific physical training, using predominantly the usual techniques in the competitive activity, it is possible to obtain noticeable improvements and the mobility of the coxo-femural joint, with the mention that all these should take into account the age peculiarities of the subjects and the competitive requirements.

Method

In order to correlate the results of the control tests, we conducted an initial test in March 2015, after which we developed a series of training programs that we applied during April, May and June, at the end of the program, we gave a final test where we used the same tests as with the initial testing.

One of the tests used is the lateral split, where we will further exemplify how to measure the angle of execution. This method aimed at using Kinovea [6], a program that allows the analysis of an athlete's movement. The software was developed in France by the Kinovea Organization and allows a redefining of normal speed by 200%, and the

fragmentation of the motion sequences can be achieved.
Kinovea is a video analysis software specially dedicated to professionals in the field of Sports Science, coaches and athletes and medical professionals. Supported files are displayed and can easily save videos or can be accessed later.
The movie can be viewed in slow motion, so images can be viewed by frame. Lines and arrows can be added to the image using the drawing tool. [7]
In order to process the data recorded in the preliminary research, we used SPSS statistical analysis program, 21, through which we analyzed the descriptive statistics (arithmetic mean, standard deviation, minimum value and maximum value) as well as the T test for the pair samples in order to identify the significance of the mean difference recorded in the initial and final testing.

Results

Table 1 Results of the flexibility test

Assesment/Statistic	**Flexibility (degrees)**	
	Ti	Tf
Average	146,15	153
Stdv	17,72	14,76
Min	124	136
Max	180	180
T-test	-5,76	
p	0,001	

The test that targeted coxofemural mobility by performing the lateral split (Table 1) had an average of 146.15 (± 13.22 degrees) at the initial test, the values being between 124 and 180 degrees. After applying the means of work, this parameter improves, the average value rising to 153 degrees, with values ranging between 130 and 180 degrees. Applying the T test between the averages of the two tests, a value of $t = -5.76$ was obtained, the mean difference being significant at a threshold of $p < 0.05$, so that the exercises applied significantly influenced the evolution of coxofemural mobility (Fig.1,2).

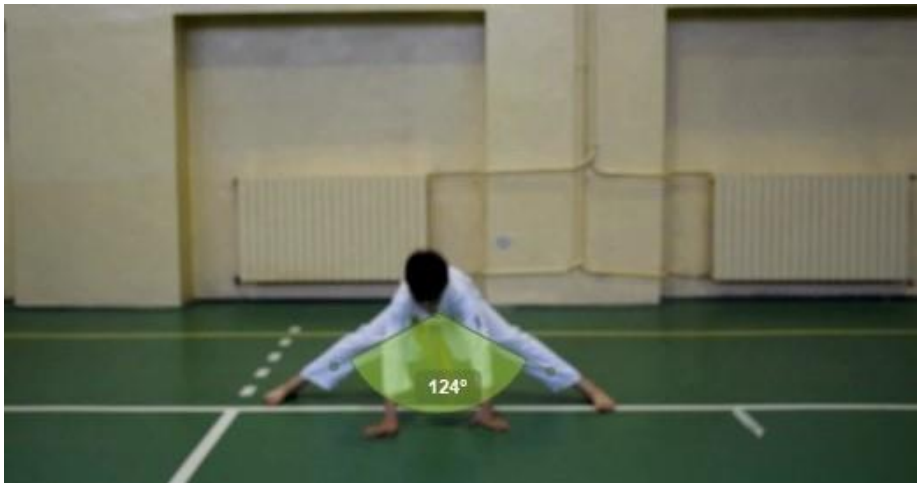

Figura 1. Initial testing of coxfemural mobility

Figura 2. Final testing of coxofemural mobility

Disscutions and conclutions

In the lateral split test, due to the proposed video analysis system, we were able to accurately measure the angle of execution. In conclusion, this method allows for measuring with an accuracy of ± 1% the angle of execution, which is important for the orientation of the programs applied to increase mobility in the coxo-femural joint and implicitly karate sports performance. The great advantage of the Kinovea video image processing method is, against other methods, that it does not introduce disturbing factors during testing, it has reasonable costs and is simple to perform.

Other scientific research using video analysis software has focused on the temporal features of various techniques, such as: the capoeira kick [7] or the karate strikes [8,9,10]. The movement analysis is used in martial arts, too, to determine the risk and causes of the injuries [11]. Appropriate use of this information by coaches and athletes allows for correction or elimination of errors as well as reduction of injuries, which can have a positive impact on improving the efficiency and effectiveness of the karate training process.

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