„BABEŞ-BOLYAI" UNIVERSITY of CLUJ-NAPOCA

THE FACULTY OF PHYSICAL EDUCATION AND SPORTS

THE DOCTORAL SCHOOL OF PHYSICAL EDUCATION AND SPORTS

IMPLEMENTATION AND EVALUATION OF OPERATIONAL PLANNING MODELS OF THE RUGBY GAME IN TEAMS OF 7 - FEMININE

THE PhD THESIS SUMMARY

Key words: IMPLEMENTATION, EVALUATION, MODEL, PERFORMANCE, RUGBY

PhD Coordinator:

Univ. Phd Prof. MONEA GHEORGHE

PhD student:

POP SERGIU

2017

CONTENT

SECOND PART PRELIMINARY RESEARCH RELATIVE TO THE OPERATIONAL MODELS CREATED TO IMPROVE THE TECHNICAL PROCEDURES OF THE FEMININE RUGBY GAME IN TEAMS OF 7

Chapter 5 – ORGANIZATION AND METHODOLOGY OF RESEARCH

5.1. Organization and methodology of the preliminary research

5.2. Purpose of the preliminary research

5.3. Stages of the preliminary research

5.4. The investigated lot

5.5. Training scheduling and preliminary tests

5.6. Motion investigations on the speed development level of the female rugby players in teams of 7

5.7. Technical-tactical investigations

5.7.1. Video analysis

5.8. Preliminary tests results

THIRD PART PERSONAL DEMARCHE, OPERATIONAL MODELS CREATED FOR THE IMPROVEMENT OF THE TECHNICAL PROCEEDINGS OF THE FEMININE RUGBY GAME IN TEAMS OF 7

Chapter 6 – OPERATIONAL MODELS PROPOSED TO BE IMPLEMENTED IN THE FEMININE RUGBY GAME IN TEAMS OF 7

6.1. Operational models for the technical-tactical development elements of the feminine rugby game in teams of 7

6.1.1. Operational models for the development of speed and techniques, used by the feminine rugby team "U" Cluj during the period 2013-2015

6.1.1.1. Operational models for the development of speed and for the technique improvement during the pre-competitive period – Weekly training plan.

6.1.1.2. Operational models for the development of speed and for the technique improvement during the competition/competitive period – Weekly training plan.

6.1.1.3. Operational models for the development of speed and for the technique improvement during the transition period, available for the feminine rugby players in teams of 7 of "U" Cluj-Napoca

6.2. - Technical-tactical operational models (MOTT)

Chapter 7 – SCOPE, OBJECTIVES, STAGES AND RESEARCH METHODS

7.1. Organization and methodology of research

7.2. Scope/purpose of the research

7.3. Research objectives

7.4. Research stages

7.5. Research methods

Chapter 8 – TRIALS AND TESTS APPLIED WITHIN THE EXPERIMENT

8.1. The investigated lot

8.2. Trainings and tests scheduling

8.3. Motion investigations related to the speed development level of the feminine rugby players in teams of 7

8.4. Technical-tactical investigations

8.4.1. A video analysis

8.5. Results of the motion investigations

8.6. Results of the technical-tactical investigations

8.7. Results of the video testing and their interpretation

Conclusions

Conclusions formulated throughout the research study

Bibliography

Annexes

CHAPTER 1

1.1. 1.1. **Motivation of choosing the topic**

The years spent as a performance sportsman within the Super Rugby League and afterwards the teacher coach profession, the creation of the first team of the history of the town in which the female sports players were legitimated and affiliated to the Sports Club *Universitatea* Cluj, sportswomen at the level of rugby seniors in 7 feminine, the cooperation with other coaches, physical trainers, Methodists of the performance rugby, and also the information explosion via mass-media and via the internet, have laid the foundations of and contributed to the creation of a personal concept of performance sports and especially of rugby game.

An insufficient training of the coordinative abilities would result into a limitation of performance skills, are especially at the level of the feminine rugby in teams of 7.

We have tried to apply a design and to implement operational optimization models and also to evaluate them at the level of the feminine rugby teams of 7 at the performance level.

The main reason of choosing the present topic was the fact that one of the current tendencies focuses on the introduction of certain specific means within the training programs, of certain means of a proprioceptive nature, the object of which is the improvement of a series of specific indicators of neuro-muscular coordination and of the static and dynamic balance even beginning with early ages.

1.1.2. Argumentation and significance of the research

Rugby in teams of 7 is a contact sports of a high intensity, on a playground. The inclusion of rugby in teams of 7, in year 2016 to the Olympic Games has increased the profile of the international sports and places an increasing need of the success factors variation of this sport. The research of rugby in teams of 7 is similar to the research of rugby in teams of 15 because the player's features are analyzed, their game performances and the qualities specific to rugby players. These investigations provide valuable information both for the coach and for the teams ‘staff. Given the dissimilation between rugby in teams of 7 and rugby in teams of 15, the information of the hereby study may not apply to the feminine rugby in teams of 7.

1.2. Importance of the paperwork

Before planning the specific training programs and the instruction programs, the normative deeds, the analysis the technical and the physical requirements of the feminine rugby game in teams of 7, remain unclear, as the operational models implementation becomes imperative at the physical level and also at the technical-tactical level and a method of their evaluation. Understanding the technical

requirements and the physical requirements of the feminine rugby in teams of 7 differs from one tournament to the other, from a competition level to the other, therefore an analysis of the training programs and of the performance objectives becomes compulsory.

The game analysis, the physical profile and the investigation of the relationship between the physical features and the game performance shall be added to the basis of the knowledge referring to the knowledge of the elite of the feminine rugby in teams of 7. As a consequence, the results of the present research could be beneficial to the club teams, to the semi-professional teams and the information connected to the training could help their coaches.

1.3. General objectives of the topic

CHAPTER 2 – FUNDAMENTAL ISSUES OF THE RUGBY GAME EVOLUTION – GENERAL LANDMARKS

2.1. A history of the rugby game

2.2. A history of the feminine rugby game

a) 1984 the National Feminine Rugby League in Italy;
b) 1988 The Japanese Feminine Football Rugby Union is created;
c) 1990 The first club is created in Ireland, www.worldrugby.org

2.3. A history of the feminine rugby game in Romania

In Romania the first feminine rugby team in XV was created on the 1st of July 1996 in Piatra Neamț. On August, the 15th, the affiliation to the Romanian Rugby Federation was signed. The first feminine rugby game of the country was played in Cluj-Napoca, in year 1996 between Venus and the team of the University/ Universității, and Venus won by 24-5.

2.4. Related sports, which can apply performance optimization operational models

2.5. The specialty literature related to the rugby game in teams of 7

The rugby game specialty literature is well represented especially in the countries with tradition (the British countries, France, South Africa, Australia, New Zealand).

Rugby needs information, rugby game is by excellence a modern sports game. Rugby was invented more than a century and a half ago in a college of the English town Rugby, it has therefore successfully extended in France, being later on adopted by the Romanian students whou would study

abroad and who have promoted it in the country (Ianusevici, 1991, *Manual pentru perfecționarea elementelor ethnic/Manual for the development of the technical elements).*

CHAPTER 3 – FEATURES OF THE RUGBY GAME IN TEAMS OF 7

3.1. The rugby game technique

3.1.1. General technique

3.1.2. Specific techniques

3.2 Requirements of the rugby game in teams of 7

3.2.1. **Differences between the rugby game in teams of 7 and rugby in teams of 15**

3.2.2. Relationship between the physical measurements and the game skills

Rugby in teams of 7 requires a blending of the physical skills with the tactical skills, with the game experience and with the awareness tactics to get better performances during the games. It is the reason for which an inquiry of the physical measurements and the qualities specific to the rugby game in teams of 7 is required.

CHAPTER 4 –CURRENT OPERATIONAL MODELS IN THE RUGBY GAME IN TEAMS OF 7 AT AN INTERNATIONAL LEVEL

The operational models of the rugby game in teams of 7 at an international level, the study conducted by Alex Ross, become a starting point of our research study as they have dwelt on both the technique and the physical training of the rugby players in teams of 7 and in teams of 15 both masculine and feminine. The study in question has helped us establish the objectives of our research study, nevertheless adapted to the lot under investigation, based on the investigated lot, on the research means, on the measurement devices and on the target group.

4.1. Technical-tactical requirements and objectives of the rugby game

While establishing the performance profile, for the identification of the game success factors it is important to trace the tactical and the technical objectives of a game.

The objectives of the research study are as follows: (1) an introduction of the individual requirements of the players who have participated to the World Championship of Rugby in teams of 7

(IRB Sevens World Series); (2) determination of the differences between the game posts; and (3) determination of the existing differences between the tournament stages.

4.2. Specialty investigations existing at an international level in the rugby game

Their main purpose is to describe the individual running requirements and the game actions for the rugby players in 7 international.

4.3. Movement analysis in the rugby game

The movement analysis is a method frequently used by team sports. Counting the game movement such as the total run distance, the average speed, the distance and the number of sprints are essential in evaluating the specific requirements of the rugby game.

Research results

The individual running requests and the game activities of the Backs and of the international foregoers of rugby in teams of 7 according to Ross, A., ş.c., 2014, The match demands of international rugby seven, Journal of Sports Sciences 1-7.

PRELIMINARY RESEARCH RELATIVE TO THE OPERATIONAL MODELS CREATED TO IMPROVE THE TECHNICAL PROCEDURES OF THE FEMININE RUGBY GAME IN TEAMS OF 7

CHAPTER 5 – ORGANIZATION AND METHODOLOGY OF RESEARCH

5.1. Organization and methodology of preliminary research

By this experimental research study we have intended to approach theoretical, methodical and practical issues specific to the sports training extended issues of the game of feminine rugby in 7. We have tried to implement and evaluate the operational models for the optimization of the trainings of the feminine rugby in teams of 7.

The achieved demarche intended to be coherent and explicit by using a series of theoretical information, offered by the specialty literature which is faintly represented, if not almost inexistent in our country, by our personal experience and by the applied experiment.

Based on the notions thus introduced, by proposing a design with an implementation of operational models for the optimization and the evaluation of the game of feminine rugby in teams of 7 at the level of performance.

The determined premises of approaching this topic are s follows:

- information selected from the specialty literature;

- the failures caused by neglecting the importance of the players; specific preparation/training;

- the need of efficiency of these training programs specific to the players of feminine rugby in teams of 7.

- we suggest and formulate the proposal of a design of several operational models meant to optimize the trainings specific to the game of feminine rugby in teams of 7 and of evaluation, as we have as a solid argument the existing positive achievements, respectively the promotion of an important number of players at the level of the national lot of the European Championships and of the Olymic Games of year 2016.

At present I am a coach of CS "Universitatea" Cluj team, formed of 21 players, 10 among whom there are also players of the national lot. The 10 players of the club complete the total number of 14 sportswomen who represent Romania at the European Championship and who are in training for the Olympics of 2016.

Romania's representative is part of the second value group formed of 16 teams, the first two with real chances to advance to the first group, along with the great powers of rugby (England, France, Wales, Spain, Holland, etc). In year 2015 the 14 sports women missed the last qualification series to the Olympic Games of 2016 in Rio, being defeated by Germany and Russia. A part of the 10 sportswomen have become part of the national lot, passing through the optimized operational models of the trainings specific to the game of feminine rugby in teams of 7.

5.2. Scope of the preliminary research

The scope of the preliminary research is to create a starting point of the entire theoretical-methodical demarches, to optimize the training methods and to implement operational models both at the physical level and also at the physical-tactical level specific to the game of feminine rugby in teams of 7.

Considering the situation in which the feminine rugby in teams of 7 finds itself in Romania, we have decided to analyze the training means of the team C.S. Universitatea Cluj, during the competitional season 2013-2014; 2014-2015 the positive evolution as far as the technical tactical issues are concerned.

5.3. Stages of the preliminary research

- The first stage of the preliminary research is the trainings and the tests planning;
- The second stage: motion investigations related to the development level of the players of feminine rugby in teams of 7;
- The third stage: technical-tactical investigations
- The fourth stage: the movement analysis by video analysis.

5.4. The lot under investigation

The research study developed within the rugby team *Universitatea* Cluj-Napoca, (a team activating within the National Division), during the period 08-13 April 2013. We mention that the team will participate to the National Seniors' Championship, the competitive year 2012-2013. The subjects under research are the players of the feminine rugby team in 7 *Universitatea* Cluj-Napoca, with ages between 19 and 21.

Table 5.1 – The table with the players of the feminine rugby team in 7 *Universitatea* Cluj-Napoca, subjects of the investigation

No.	Last, first names	Year of birth
1.	B. G. S.	1993
2.	C. B.	1992
3.	D. A.	1991
4.	D. A. I.	1992
5.	F. C.	1992
6.	F. M.	1993
7.	H. M. L.	1993
8.	H. A. I.	1993
9.	H. I.	1992
10.	I. R.	1992
11.	L. N.	1991
12.	M. L.	1993
13.	M. A. M.	1993
14.	R. A.	1992
15.	R. M. C.	1993
16.	S. I. Z.	1992
17.	S. E.	1992
18.	S. R. R.	1991
19.	T. N. G.	1992
20.	T. B. N.	1992

5.5. Stage 1-a: Planning the preliminary trainings and tests

ORGANIZATION OF THE RESEARCH IN THE FIRST COMPETITIVE YEAR

(THE NATIONAL CHAMPIONSHIP, THE 2013-2014 EDITION)

TOUR-RETOUR

- Testing (T_p)	08-13 April 2013	Physical testing Technical-tactical testing
- Training period (PP_1)	15 April -11 May 2013	Training plan 4 weeks
- Competitive period (PC_1 = TUR)	13 May-8June 2013	Competition plan 4 weeks
- Transition period (PT_1)	10-22 June 2013	Transition plan 2 weeks
- Training period (PP_2)	22 July-17 August 2013	Training plan 4 weeks
- Competitive period (PC_2 = RETUR)	19 Aug.-14 Sept. 2013	Competition plan 4 weeks
- Testing (T_2)	16-21 Sept. 2013	Physical testing Technical-tactical testing
- Transition period (PT_2)	23 Sept.-5 Oct. 2013	Transition plan 2 weeks

5.6. Stage 2: Motion investigations relative to the speed development level of the feminine rugby players in 7

- Speed running on a distance of 40 m
- Speed running on a distance of 20 m
- Unbounced long jump
- Speed as an endurance/ resistance running
- The technical skills test
- Lifts from the back to the sitting position (situps)

5.7. Stage 3: Technical-tactical investigations

- Exercise Test 1 (ET1)
- Exercise Test 2 (ET2)

5.7.1. Stage 4: Video analisis

5.8. results of the preliminary tests

All the results obtained from the measurements were inserted in Excell the Office 2010 extension and analyzed by using the *ANOVA Variance Analysis* and the *Descriptive Statistic Information.*

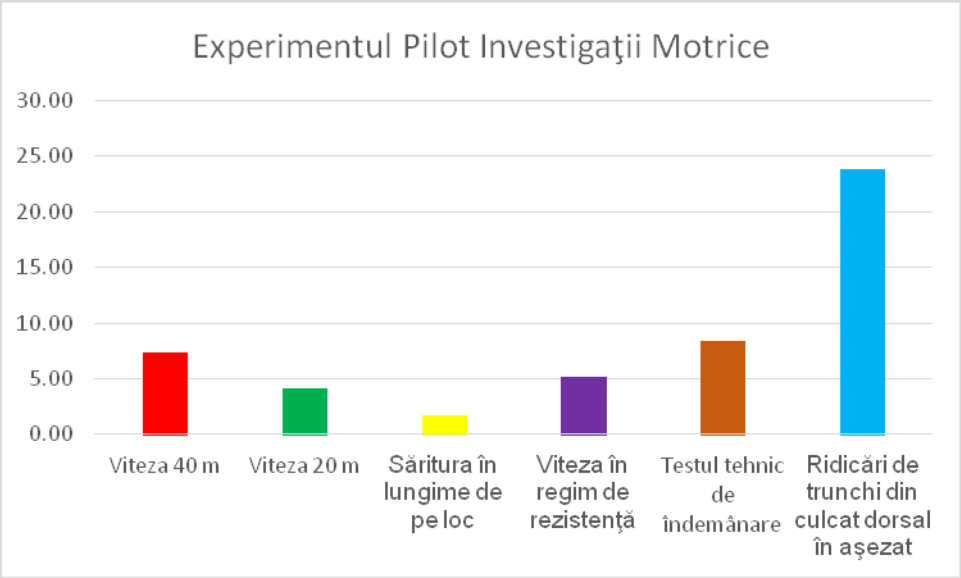

Figure 5.5. – Chart results Preliminary testing – Motion investigations

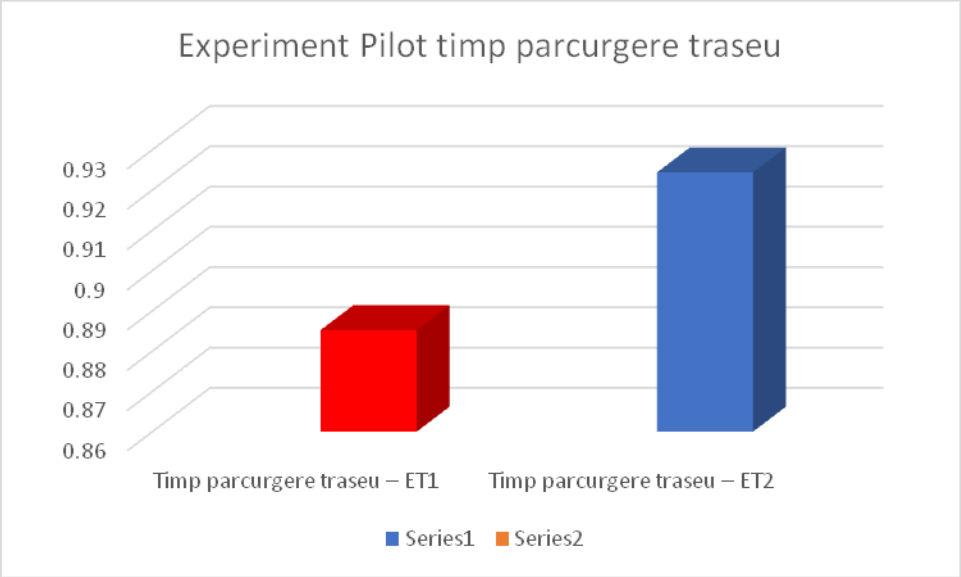

Figure 5.6. - Chart results Preliminary testing – Technical-tactical investigations (The itinerary run time)

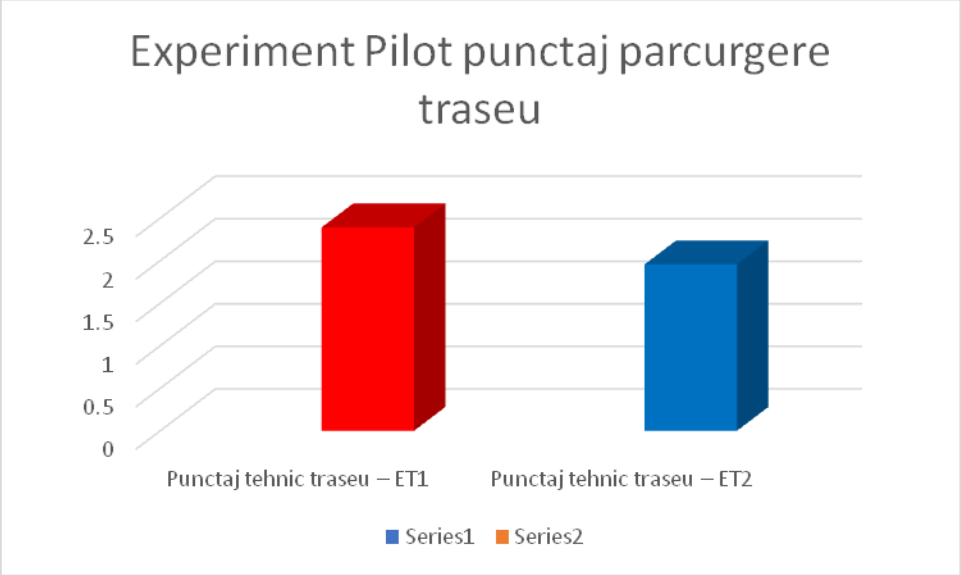

Figure 5.7. - Chart results Preliminary testing - Technical-tactical investigations (Itinerary technical score)

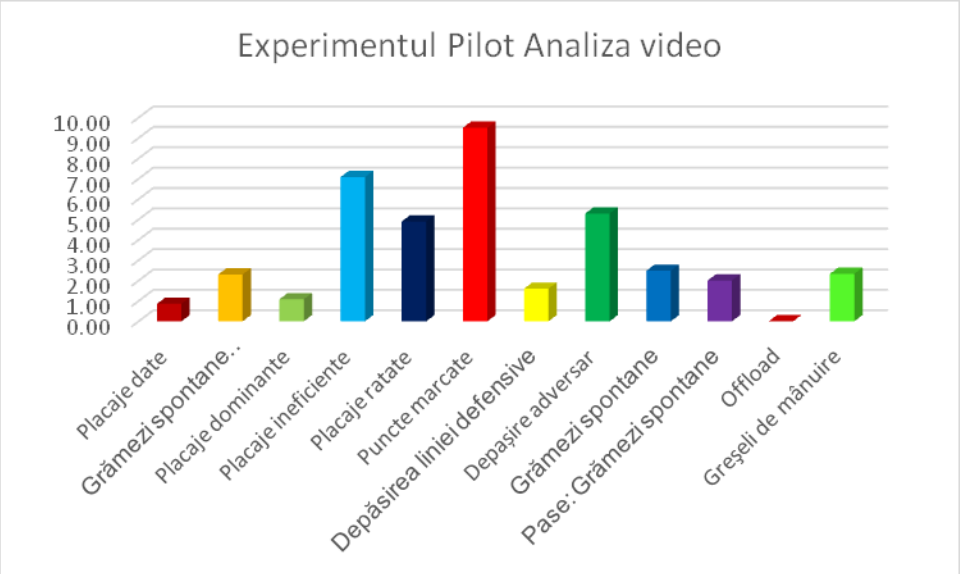

Figure 5.8. - Chart results Preliminary testing - Technical-tactical investigations (The video analysis)

The information thus gathered by the pilot Experiment shall be compared with the following tests to establish whether the methods implemented are or not beneficial for the game of feminine rugby in 7.

I have used as a control group the same sports women as in the group under investigation in the preliminary tests as I have considered that the representative number of the game of feminine rugby in 7 is the entire team with a minimum number of sports women. Within the pilot experiment the information was recorded and graphically represented to observe the level from which the players' analysis begins.

THIRD PART PERSONAL DEMARCHE, OPERATIONAL MODELS CREATED FOR THE IMPROVEMENT OF THE TECHNICAL PROCEEDINGS OF THE FEMININE RUGBY GAME IN TEAMS OF 7

Chapter 6 – OPERATIONAL MODELS PROPOSED TO BE IMPLEMENTED IN THE FEMININE RUGBY GAME IN TEAMS OF 7

6.1. Operational models for the improvement of the technical-tactical elements of the feminine rugby in 7

The players' physical, technical and tactical training requires a detailed planning, reason for which we consider as an important point of our research the drafting of an Annual General Training Plan (Table 6.1.). As a first stage of the research we have used the Annual Planning (Table 6.2. and Table 6.3.), the Competition Calendar (Table 6.4.) the weekly Planning (Table 6.5.- 6.14.) which are essential for the beginning of the competition calendar in which we have included the preliminary testing and the other three tests;

- the weekly plan which has taken into account the period, the intensity, the volume, by inserting the technical-tactical operational models and the exercises Test 1 and Test 2 which are in fact assemblies of exercises created and used by us in order to get positive results as for the performance operational optimization models in the feminine rugby game in 7.

These plans are presented as follows:

6.1.1. Operational models for the development of the speed and of the technique, used by the feminine rugby team "U" Cluj , in the period 2013-2015

While drafting the speed development operational models, the following general requirements and recommendations shall be taken into account:

- Development of the reaction speed, which is basically the start reaction, in performing the various movements and under the form of selective reactions, in choosing and performing the most opportune technical-tactical actions in the complex relationships with teammates and opponents;
- Development of the execution speed, which is basically the execution, over a minimum period of time, of a single movement, taking into consideration the fact that it depends on the technique acquisition level;

- Development of the travelling speed over short, medium and long distances, in tight coordination with the specificity of the technical-tactical actions of the post and line and with the features of the competition effort;
- The length of an exercise (repetitions) shall not exceed 10-15 seconds the effort shall be maximal;
- The breaks between the repetitions shall be sufficiently long to allow the oxygen compensation and to resume the next effort of maximal intensity;
- The speed efforts shall be placed at the beginning of each fundamental part of the training lesson and following the rest day within the weekly cycle;
- When the development of maximal speed is aimed at, the training proceeding without balloon shall be used (allowing the speed potential maximal mobility) exercising a positive transfer over the speed exercises practiced by the balloon;
- Development of the strength indexes – speed (detente) of the muscular categories involved in the speed efforts, being an objective requirement of increasing the speed;
- Repeating the maximum speed efforts shall provide the basic method of developing speed.

6.1.1.1. Operational models for the development of the speed and technique during the pre-competition time

6.1.1.2. Operational models for the development of the speed and technique during the competition time

6.1.1.3. Operational models for the development of the speed and technique in the transition period, made available to the players of the feminine rugby team in 7 "U" Cluj-Napoca

The transition period objectives focus on removing fatigue and on replenishing energy during the active rest period.

It is a period in which the injured players must medically recover whereas all the players must attend programs of strengthening and compensation.

The transition period is referred to by some of the specialists as post-competition or extra-season. The objectives of this period focus on biological recovery and on the psychological rest. At present, this transition period does not last longer than 6-8 weeks because the players shall visibly lose issues of their physical preparation.

During the transition period sportsmen must train 2-3 times a week to keep 40-50% of their physical condition.

A total interruption of the anaerobe effort over a 4-5 week period causes a diminution of the body's ability to cope with the required efforts (it leads to an adjustment to rest, to a *latent state* which appears faster than the adaptation to effort).

During the transition period we have maintained the speed parameters by using athletics-specific means as well as complementary games (handball).

6.2. Technical-tactical operational models (MOTT)

$MOTT_1$ – Athletes/sportsmen are divided in two groups, a single ball is played, the team with the balloon must execute a number of ten passes, forcing the opponents to execute a punishment of 5 pushups or 10 squats. In all this time, the opponents must steal the balloon or to interrupt the game by taking either the balloon or the player outside the playground.

$MOTT_2$ – A playground is marked as a square or a circle. Two of the players shall have just one single balloon and they will have to touch by passing it the rest of the players, being allowed to take just one-step after having received the pass. The player touched by the ball shall join the team of two.

$MOTT_3$ – A small-dimensioned playground is set up. All the players shall stay outside the playground. By the order of a player who would tell the number of the attack and of the defense players, they shall have to identify the suitable means to score and to defend themselves.

$MOTT_4$ – Over the entire surface of the playground, sportsmen spread in equilibrium, in three teams and shall position on the 22 meter lines, respectively the center line. One of the teams positioned on the 22 meter line shall have a balloon and shall attack towards the center of the playground. The team at the center of the playground shall defend itself, and after crossing the defense line and towards the center line shall launch the balloon towards the other team positioned on the 22 m line, which will continue the exercise by attacking the center line.

$MOTT_5$ – Over a small-dimensioned playground, one of the teams shall attack trying to score, being allowed an indefinite number of attacks. Even if they mistake by either dropping the balloon or by stealing it, the opponent for 7 minutes, the moment when the team arrives at the end of the ground, changes the direction and continues the game until the expiration of the allotted time. Once the time has ended, the two teams change roles.

$MOTT_6$ - Athletes/sportsmen are divided in two teams. One of the two teams is in the possession of the ball and hits it towards the opponents, forcing them to catch the flying ball without dropping it, and whether they drop the ball, the player guilty of dropping the ball must hit it back by foot, in a clumsy way. Whether one of the teams reaches a position from which they consider to be able to score from

dropgoal, they have the right to try and whether they can the team shall score one point and the game shall be resumed from the center of the ground, with the scoring team having the first hit. Whether it misses the hit, the point shall be scored by the opponent team, and the ball shall be hit by the other team first.

MOTT$_7$ - Athletes/sportsmen are placed in pairs, one of the two sportsmen shall have a scarf knotted on their back, and his mate shall have to take the scarf by using just the hands, whereas the two shall have to stay all the time face to face. Once the scarf is taken, the two change roles.

MOTT$_8$ - Athletes/sportsmen are divided in groups of 5; 4 of them shall have a ball each and shall sit in a semicircle, whereas the 5th shall sit in the middle of the semicircle his back towards the balloon bearers, and, by the order of one of them he will turn and will have to pay attention to get the ball from one of the 4 balloon bearers. The game shall continue as such for one minute, then the player in the middle shall change places with another one.

MOTT$_9$ – Three columns are created and a 5 meter distance is marked on the ground. One of the players of the side column has a ball. He starts and the moment he reaches the 5 meter line he will have to give the ball to the player of the middle column who, in his turn, will run the 5 meters, then he will pass the ball to the players of the other side column and will continue the exercise. The players who have passed the ball shall go to the end of the line and the exercise shall be executed so as each player shall pass the ball 5 times.

MOTT$_{10}$ - A 10 x 5 m run (the shuttle)

- The trial shall be performed on the running track;
- Mark two parallel lines at a 5 m distance;
- The start is taken from a standing position;
- The player starts from the starting line, being required to pass the following line with both legs.

Exercise Test 1 (ET1) – is used as an exercise meant to improve the technical elements, the tactic elements and the motion skills, the travelling and the execution speed.

Exercise Test 2 (ET2) – helps the sportsman progress and pass through all the main proceedings of the rugby game by using their skills, the travel and execution speed.

The technical proceedings shall be scored based on their efficiency and accuracy. The time for the itinerary execution shall be scored based on the time against the clock because in the rugby game in 7, it is highly important to score a large number of hits/essays to gain the points advantage, whereas to

do that you need sportsmen able to meet these requirements: speed and the reaction speed. Both exercises (ET1 and ET2) were used in the last two days of training before the competitions.

CHAPTER 7 – SCOPE, OBJECTIVES, RESEARCH STAGES AND METHODS

7.1. Organization and methodology of research

By our experimental demarche we have intended to approach specific theoretical issues, methodical and practical issues of the sports training of the feminine rugby game in teams of 7. We have aimed at implementing and evaluating operational optimization models meant of the feminine rugby trainings in teams of 7.

The research work is based on a research study performed by A. Ross (2014) who analyzes the rugby players of the Southern hemisphere, both boys and girls, to be able to observe the technical-tactical elements and the physical training elements required by the modern rugby game. The research study performed by A. Ross was the starting point of the hereby work as he has enumerated and registered essential information related to the video analysis, using as measurement and registration devices more advanced technologies and a larger number of subjects, as rugby is better developed within the Southern hemisphere. What we could not find within the research study made by A. Ross, and what we have considered to be the essential, was the annual and the weekly planning. The analyzed motion elements were the same, by using different techniques and methods, because the players' competitive and the personal program did not allow the use of the same control rules.

As a result of the already mentioned issues, we shall hereinafter propose a design for the implementation of optimization and evaluation operational models of the feminine rugby game in 7 at a performance level.

The determined premises of the approach of the present topic are favored by the following:

- information extracted from the specialty literature;
- failures caused by neglecting the importance of the players' specific preparation;
- the need to render efficient these training programs specific to preparing female rugby players in 7.
- we propose a design of optimization and evaluation operational models of the trainings specific to feminine rugby in 7, as we shall take as an efficient argument the already registered positive achievements, respectively the promotion of an important number of players to the level of the national lot for the European Championship and for the Olympic Games of year 2016.

7.2. Scope of the research

The purpose of the entire theoretical-methodical demarche is to optimize the training methods and also to implement at both the physical level and to the technical-tactical level operational models specific to the feminine rugby game in teams of 7 so as to improve the players' performance, by focusing on the design.

The specialty literature does not offer sufficient information related to the training methods specific to the feminine rugby game in teams of 7, where players must have certain skills and qualities and perform the technical and tactical preparation programs. In our country rugby in 7 is still in its beginning phases and under development, as we have only 7 senior teams and 8 junior teams, as compared to the other countries which Romania frequently meets during the European Championship. Let's take for example the Czech Republic (2 groups of 8 teams), Switzerland (3 groups of 6 teams), Germany (1 group of 9 teams) and all this only at the level of the senior players.

7.3. Objectives of the research

Our demarche has focused on ascertaining, within the experiment, the following assumption statements:

- Whether the planning design and the operational models created for the physical training used by this paperwork determine the optimization of the physical indicators of the feminine rugby players in teams of 7.
- By implementing the proposed technical operational models a higher technical development is achieved.
- By using the tactical combinations which the hereby paperwork proposes, well-coordinated and target-oriented, we could significantly influence the performance of the feminine rugby players in teams of 7.

7.4. Research stages

The specialty literature study was a long-term activity, by which we have intended to identify the following main issues:

- requirement of the feminine rugby game in teams of 7;
- the creation of operational models at the specific qualities development level;
- the physical, technical and tactical features of the female rugby players in teams of 7;
- the operational models design for the tactical-technical development, specific to the feminine rugby game in 7.
- the movement analysis;

- the feminine rugby game evolution in 7 analyzed worldwide and in our country;

7.5. Research methods

The method of the specialty literature study

The observation method

The experiment method

The modeling method (in the operative research)

The statistical and mathematical processing method

The graphical representation method

CHAPTER 8 - TESTS AND TRIALS APPLIED BY THE EXPERIMENT

8.1. Examined lot

We shall reiterate that the used control group includes the same players as the group investigated through the preliminary testing. The subjects under research are the players of the feminine rugby team in 7 *Universitatea* Cluj-Napoca.

8.2. Trainings and trials testing

Table 8.1. - Tests/trials schedule

Control trials	PRELIMINARY Testing	Testing 2	Testing 3	Testing 4
Speed over 40 m	08.04.2013	16.09.2013	07.04.2014	15.09.2014
Speed over 20 m				
The unbounced long jump	10.04.2013	18.09.2013	09.04.2014	17.09.2014
Speed as endurance/resistance running				
Lifts from the back to the sitting position (situps)				
Technical skill test	12.04.2013	20.09.2013	11.04.2014	19.09.2014
Exercise test 1 (ET1)				
Exercise test 2 (ET2)				

The medical testing date	Place
07 May 2013	The Sports Polyclinic Cluj-Napoca
05 December 2013	The Sports Polyclinic Cluj-Napoca
06 June 2014	The Sports Polyclinic Cluj-Napoca
05 November 2014	The Sports Polyclinic Cluj-Napoca

The experimental research developed during the period s 8.04.2013-20.09.2015, being structured on the length of two National \Rugby Championship, tour and retour.

The experimental demarche developed at the sports basis *Iuliu Haţieganu* Sports Park (a rugby ground, the running track, the gym).

Based on the competitive development method, the team's training was structured on two preparatory periods and two competitive periods.

Our intervention was conducted over two years, time in which we got a series of four testing, with motion and technical-tactical investigations, planned at the beginning of each competitive period, respectively at the end of the second championship.

We further on mention that the second testing was run at the beginning of the first championship, the second testing took place at the end of the first championship, the third testing was performed at the beginning of the second championship and the final testing developed at the end of the second championship before the players' training for the playoffs for the qualification to the Olympic Games.

The tests were conducted at the sports ground *Iuliu Haţieganu* Sports Park, on the rugby ground, the running track and the gym, whereas the medical tests were performed by the Sorts Cluj-Napoca.

8.3. The motion investigations on the speed development level of the feminine rugby players in teams of 7 s-were conducted in the same conditions as the Pilot Experiment

The speed running over 40 m, respectively over 20 m

The analysis of the motion investigations was performed by using a photocell measuring device called *microgate*, which allowed us to register each player's start and finish; s-it was double-checked by the hand timer. The photocell device was used to eliminate errors sand to avoid favoring the players as for the time scored over the 40 m, respectively over the 20 m distances.

The unbounced long jump: testing was performed on the running track; jumps were measured by using the ruler/measuring tape; measurement was made as follows: the start line was traced, then the distance from the start line was measured up to the closest to the line trace of the body after landing. The players had two jumps for each testing, the best of them being registered.

Speed as endurance/resistance running The test investigates the speed capacity as endurance/resistance and coordination; the subject shall have to take a tour, to back/brake the running to start, changing the running direction at full speed, they shall then stop at the marking line and shall quickly start running again to the opposite direction. SA ruler/measuring tape was used to exactly measure the distance, each turning point, start and stop point being marked by different color cones. The time was measured by the

timer,, a second person verified it by using another identical timer. The protocol of this trial focuses on running at full speed, type shuttle (round run).

The technical skills test

The test was applied by a technical structure, against the clock, developed by speed parameters, as a body resistance/endurance test, within the entire playground, by using technical means specific to the rugby game: running with and without the balloon, direction changes, lateral passes, ball pickups (ball pickup), stops and finalization in the target ground, by plunge. The score of the technical skills test were registered into the Observation File – granting a certain score.

Lifts from the back to the sitting position (situps)

The trial determines the level of the development of the abdominal muscular strength. The result shall be expresses in the number of the correct executions achieved in 40 seconds. A hand timer was used together with a mechanical counter to count the number of the lifts from the back to the sitting position. These equipments were verified by other two similar equipments.

8.4. The technical-tactical investigations were developed under the same conditions as those of the Pilot Experiment.

Simple and complex games are means (exercise) meant to help the players progress over a short period of time.

In order to check the players' techniques and tactics, the players must go through a trial itinerary/tour containing all the main elements of the game of rugby in 7. It shall be run against the clock, finished in the shortest possible time, the technical elements shall be given scores and it shall be finalized by scoring an essay.

Exercise Test 1 (ET1) **-** this trail/tour – is used as an element for the improvement of the technical, tactical elements and also for the improvement of the players' motion qualities, their running speed and their execution speed.

Exercise Test 2 (ET2) **-** is a tour exercise by which the player is helped to progress and to pass through all the main proceedings of the rugby game by using their skills, the running and the execution speed. The technical proceedings shall be scored based on their efficiency and accuracy. The tour execution time shall be scored based on the time against the clock.

Exercises Test 1 and Test 2 are an assembly of exercises which we have conceived in order to experiment the training methods efficiency. These exercises cover the important basic technical elements of the rugby game, which are vital for the development of rugby games or competitions. These exercises are conceived in such a way as to follow a logical development of events, to have continuity so

as the player should go through the trial tour in the shortest possible time, getting the required score. The hand timer was used.

8.4.1. The video analysis s-a followed the same criteria and conditions as the Pilot Experiment did.

The games used by the video analysis were the games played before the tests, as follows:

- Preliminary testing – the retour game of the 2012/2013 Championship
- Testing 2 – the tour game of the 2013/2014 Championship
- Testing 3 – the retour game of the 2013/2014 Championship
- Testing 4 – the retour game of the 2014/2015 Championship

The present investigation has focused on the balloon during the game, on avoiding the stops, on crossing the advantage line, on the number of essays, on the positive and negative passes, on the number of players involved into the spontaneous piles, into the decisive stops, into the passive stops and on the number of missed stops.

The players' analysis during the game phase is relatively facile as their number is small over the playground surface, nevertheless the phase during the game happen extremely rapidly, reason for which small errors may occur, errors which, by the video analysis program SportsCode and Sportstech, allow the phases analyses in slow motion, to eliminate the possible errors.

The video analysis was performed by using the SportsCode program, the 8.9. version, by using a laptop. The program can count the elements selected by the operator and calculates their average. In order to check the errors of SportsCode we also used a program which offers mainly the same information, namely Sportstech.

8.5. Results of the motion investigations

SPEED RUNNING OVER 40 M DISTANCES

The trial focuses on the players' acceleration capacity and on maintaining the running speed over 40 m distances, a speed usually specific to the rugby players in 7.

- the average values obtained by the players of the rugby team in 7 “U Cluj” , underlines a diminution of the times from 7,38 seconds, within the preliminary testing (T_p) to 7,28 seconds in the T_2 testing during the first competitive year. During the second/ II competitive year an improvement of the average time from 7,17 seconds in the T_3 testing to 6,86 seconds in the T_4 testing.
- the variability coefficient of values ranging between 0,33% in the preliminary testing (T_p) and 0,30% in T_4 testing reflects an extremely good homogeneity of the group.

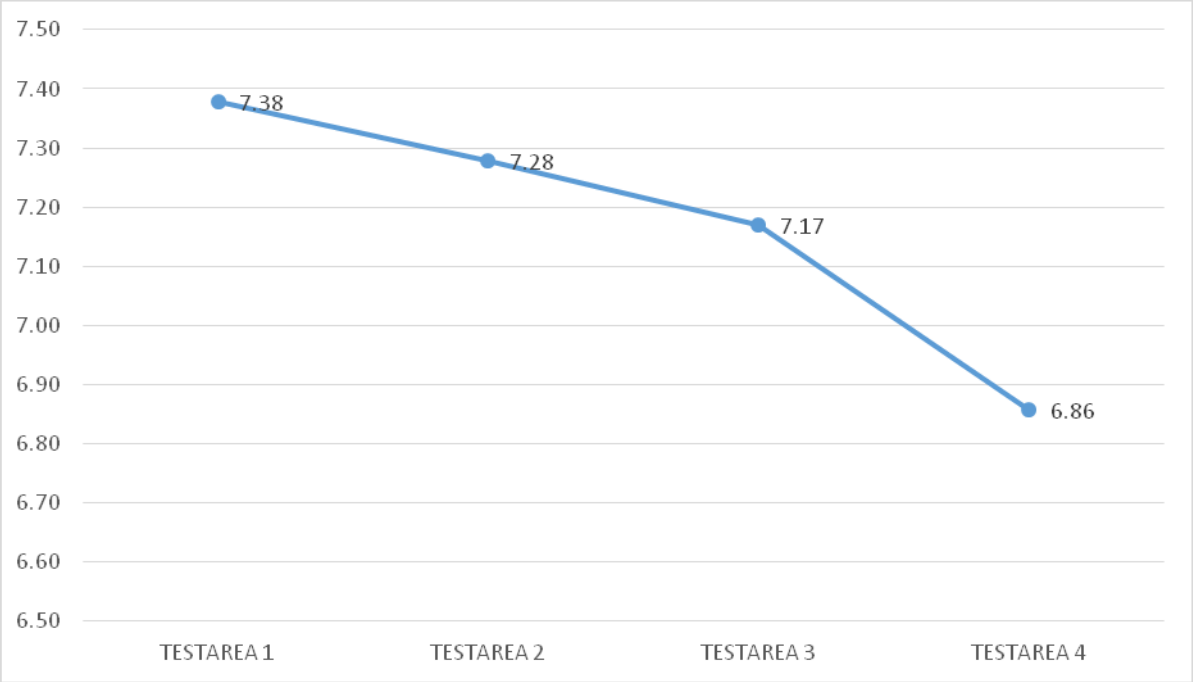

Figure 8.1. - Comparative diagram of the average values – 40 m speed running

Based on the comparative diagram of the average values of the 40 m running we shall notice a diminution of the running time between the preliminary testing T_p and the testing T_4 (0,52). The diminution of the running time between the two testing trials, the T_p preliminary testing and the T_4 testing was determined by the improvement of the strength development between at the level of the lower limbs, due to the operational models implemented in the experiment.

SPEED RUNNING OVER 20 M DISTANCES

The trial investigates the reaction ability and the running acceleration rhythm.

- the average values got by the players during the four testing trials, underline moderate time diminutions over the training phase, from 4,13 seconds got for the preliminary testing (T_p) to 4,03 seconds for the T_2 testing during the first training year. IN the second year the experiment registered an improvement of the average time from 3,93 for the T_3 testing to 3,63 seconds for the T_4 testing.

Due to the cyclical nature of the speed development which repeats itself during the training period and also during the transition period we shall conclude that the two testing trials at the beginning of the two competitive years (the two annual macro cycles) register sensitively equal values.

- the variability coefficient with values ranging between 0,12% for the preliminary testing (T_p) and 0,12% for the T_4 testing underlines a great homogeneity of the group.

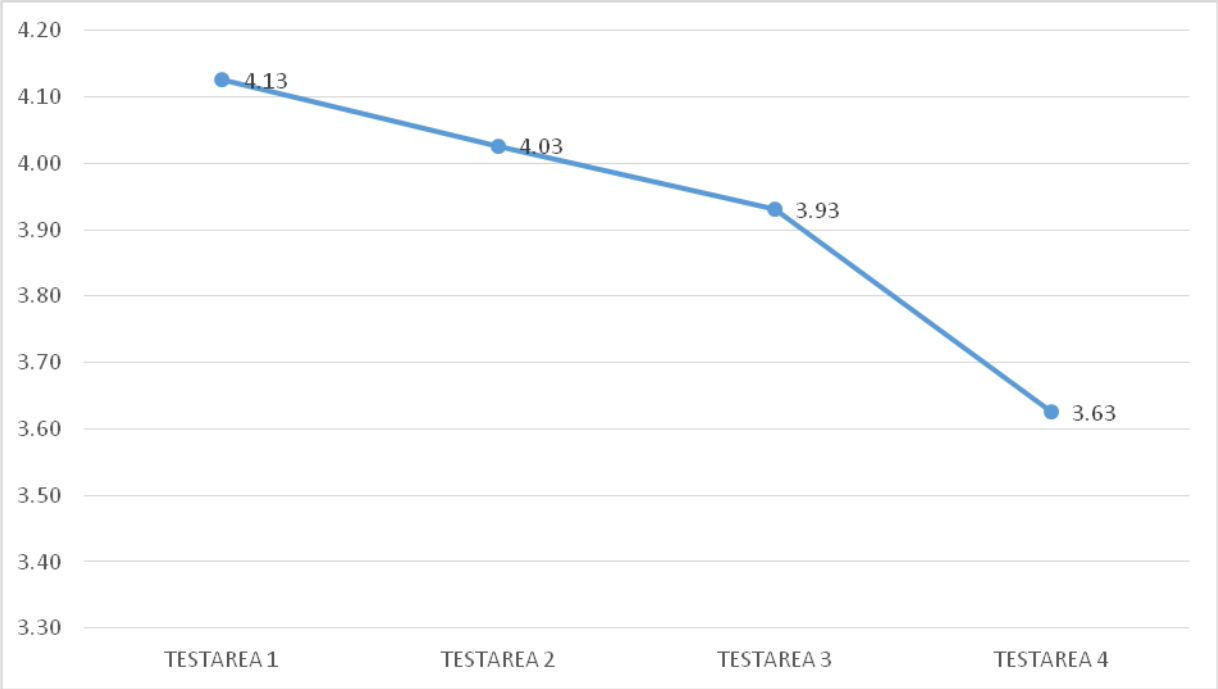

Figure 8.2. - Comparative diagram of the average values – 20 m speed running

Based on the comparative diagram of the average values of the 20 m running, we shall identify a diminution/reduction of the running time between the preliminary testing T_p and the T_4 testing (0,50). The diminution of the times got during the speed running trial test is less significant, considering the limited possibilities of the speed increase over short distances. Nevertheless, between the preliminary testing (T_p) and the T_4 testing, the registered difference becomes significant.

THE UNBOUNCED LONG JUMP - The trial evaluates the explosive force.

- the average values of the players' four testing trials underline an improvement of their explosive strength capacity, therefore during the first training year, from the preliminary testing (T_p), the average 1,75 to 1,79 for the T_2 testing; during the T_3 testing, the T_4 testing from 1,81 to 1,85. The difference between the preliminary testing (T_p) and the T_4 testing being more than obvious.
- the variability coefficient underlines equal values which reflect the high homogeneity of the group.

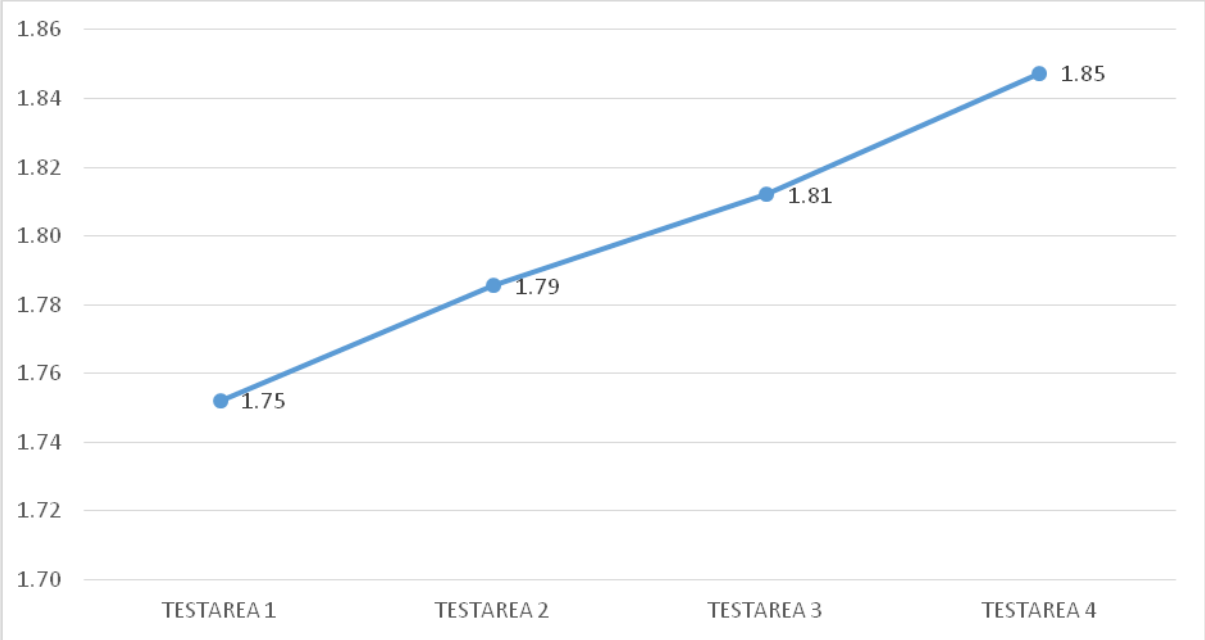

Figure 8.3. - Comparative diagram of the average values – the umbounced long jump

The average values comparative diagram of the unbounced long jump reflects an improvement of the explosive strength capacity between the preliminary testing T_p and the T_4 testing trial (0,10). This improvement is due to the implementation of the explosive strength development models and also to the improvement of the jumping technique.

SPEED AS ENDURANCE/RESISTANCE RUNNING - The trial testing evaluates the strength specific to the rugby players in 7.

- the average values of the times, registered by the players during the four testing trials are as follows: we shall notice an improvement of the time between the preliminary testing T_p and the trial testing T_2 (3,65-3,36) even beginning with the first competitive year, as well as between the T_3 testing and the T_4 testing (3,32-3,15) in the second competitive year. Significant values are also underlined between the preliminary testing T_p and the T_4 testing (3,65-3,15).
- the variability coefficient with values ranging between 0,03 for the preliminary test (T_p) and 0,03 for the T_4 test underlines a high homogeneity degree of the group, therefore we can conclude that the averages characterize the group in all the four 4 tests

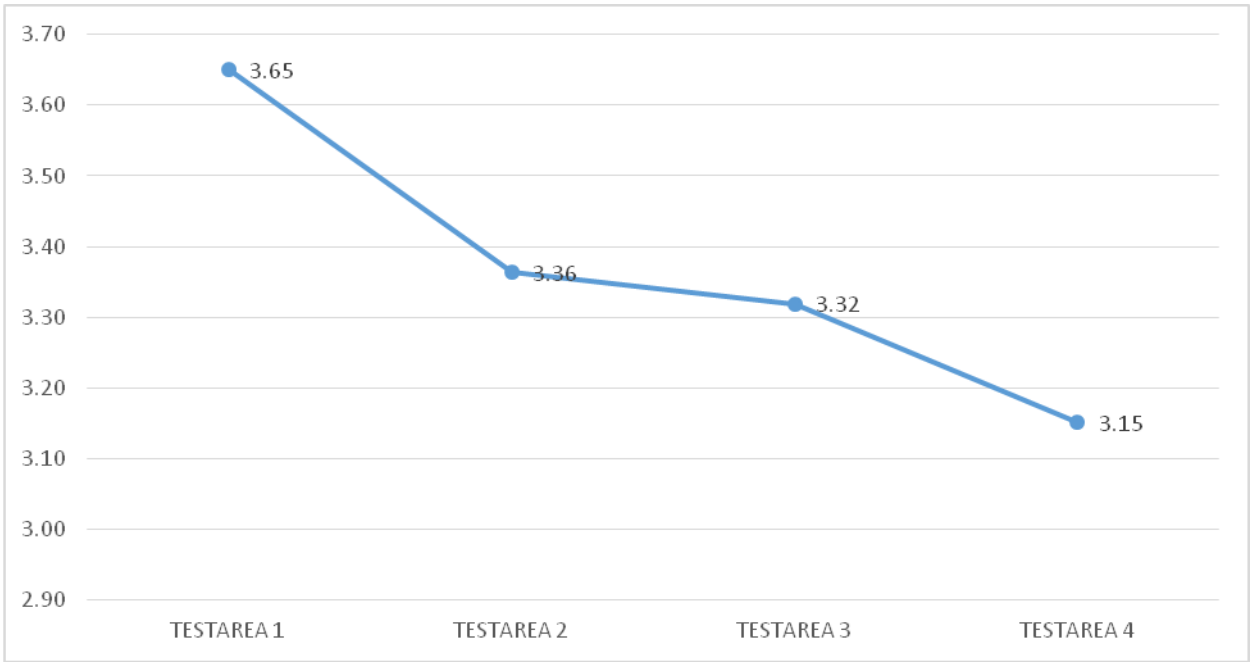

Figure 8.4. - Comparative diagram of the average values – speed as endurance/resistance running

The average values comparative diagram of speed as endurance/resistance running underlines a diminution of the time from the T_4 testing as compared to the time of the T_p preliminary testing, the tests records being in real progress, with significant values, due to the filed/tour experience preparation and development.

Speed is the quality which depends the most on the genetic factors, most of the specialists forecasting that it can be improved only up to 15-20%. Speed as an endurance/resistance running is the most perfectible form of speed, according to the average values comparative diagram, resulted subsequent to well-planned trainings and to the operational models implementation in the experiment.

THE TECHNICAL SKILLS TEST - The skills test investigates players' skills, the technical relationship specific to rugby players in 7. The statistic parameters indicate as follows:

- the analysis of the trial testing results underlines the favorable evolution of the score got by the players during the 4 tests, from 8,36 in the preliminary testing (T_p) to 8,48 in the T_2 testing during the first competition year and from 8,59 in testing T_3 to 9,05 in T_4 testing during the second competitive year. The values of the preliminary testing T_p and of the T_4 testing are considerably improved values due to the players' preparation/training based on the operational models performed as both technical and tactic means of improvement.

- the variability coefficient with values ranging between the preliminary testing T_p (0,43) and the T_4 (0,40) testing underlines a high homogeneity of the group.

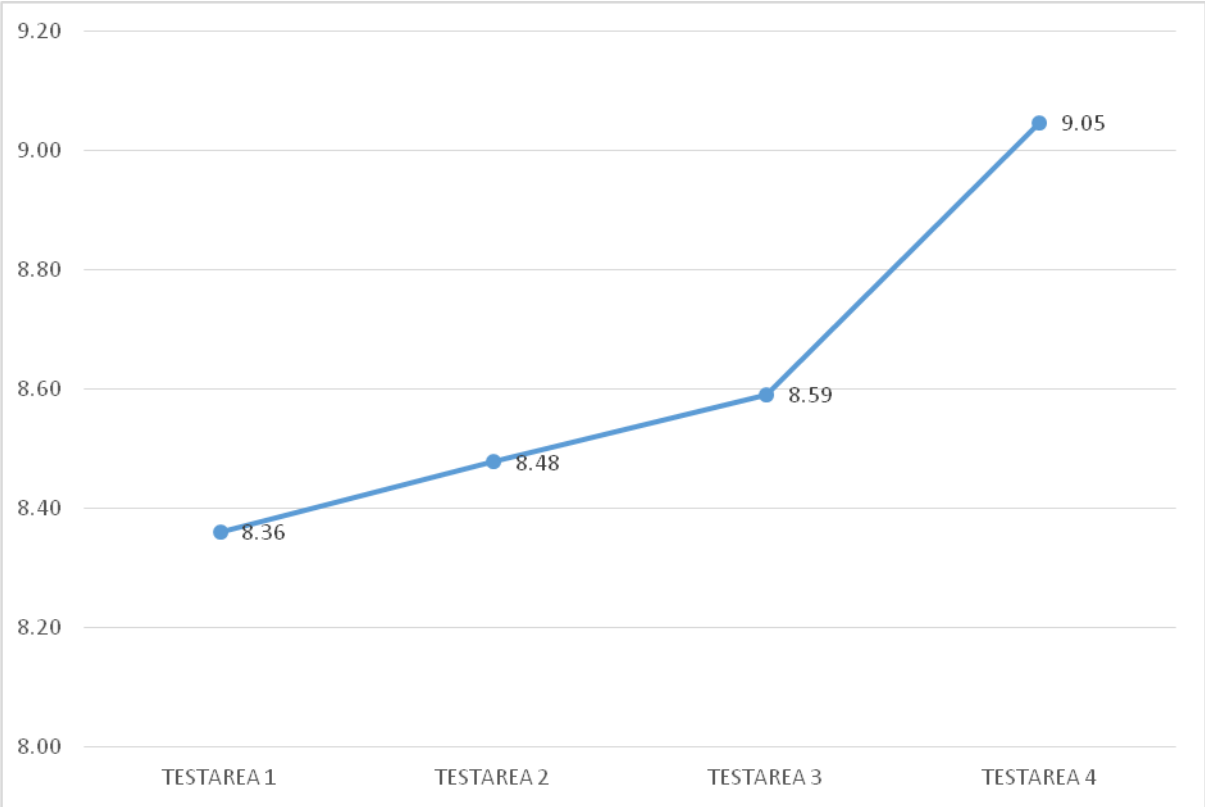

Figure 8.5. - Comparative diagram of the average values – The technical skills test

Based on the average values comparative diagram for the technical skills test, s-au considerably improved values were registered, between the preliminary testing T_p and the T_4 testing, due to an efficient planning and to the operational models well-balanced from a technical and tactical point of view, depending on the training plans.

LIFTS FROM THE BACK TO THE SITTING POSITION (SITUPS)

The test evaluates the development of the abdominal muscular strength at speeds against the clock (in 40 sec.).

The average time values registered by the players are as follows:

- we shall underline an improvement of the number of repetitions from the average of 23,87 got during the preliminary testing (T_p) to 25,65 during the T_2 testing. It is nevertheless interesting to mention that during T_3 of the second competition year (T_3 = 23,87) during the T_4 (28,96) testing, the small values

turned into high values, due to the fact that the players had been worn and became aware of the fact and they trained during the transition period.

- the variability coefficient with values ranging between 0,66 and 0,77 underlines the same increased homogeneity of the group as the rest of the testing trials.

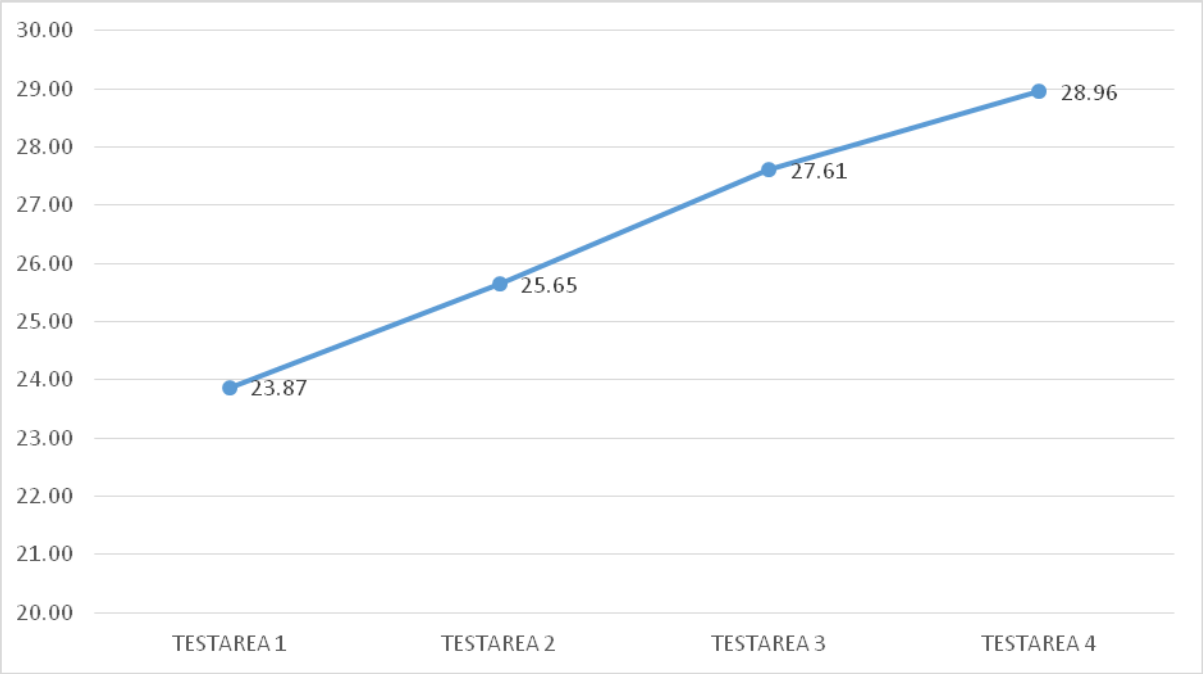

Figure 8.6. - Comparative diagram of the average values – Situps

Based on the comparative diagram of the average values of the lifts from the back to the sitting position (situps), the situps average increased from 23 during the preliminary testing to 28 during the T_4 testing.

The strength – quality is much more improvable than the speed and the skills, the proof being the results of the comparative diagram of the average values which are also due to the implementation of the proposed operational models and to the players' conscientiousness (for the strength improvement they worked during the transition period as well).

8.6. Results of the technical tactical investigations

EXERCISE TEST 1

This tour/itinerary focuses on the improvement of the technical and tactical elements, of the motion qualities, of the motion and of the execution speed.

- the average values of the times and of the score registered by the players reflect improved values (run time Tp – T_2 0,89 – 0,79; and the technical score of the tour/itinerary 2,39 – 3,39).
- the four tests reflect a diminution of the time achieved between the preliminary testing Tp from 0,89 to 0,79 in the T_2 testing; likewise, from the T_3 testing (0,58) to the T_4 testing (0,50), and the average testing between Tp and T_4, registers values extremely significant for the diminution of the time required to finish the tour due to the technical improvement of the players during the tour.
-the variability coefficient also suggests a high degree of homogeneity of all the four tests as far as both the time values and the scoring are concerned.

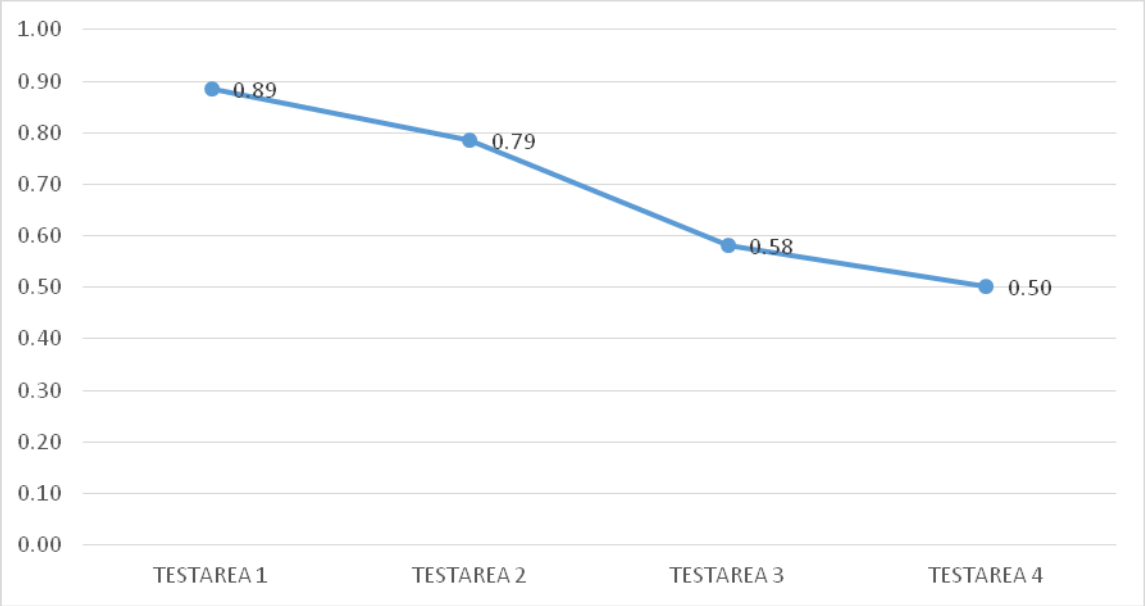

Figure 8.7. - Comparative diagram of the average values – The tour finishing time (ET1)

Based on the comparative diagram of the average values we shall conclude that the tour finishing time ET1 diminished from 0,89, during the preliminary testing Tp to 0,50, during the T_4 testing. It registered a significant diminution of the tour finishing times generated by the improvement of the technical elements and of the speed during the four tests.

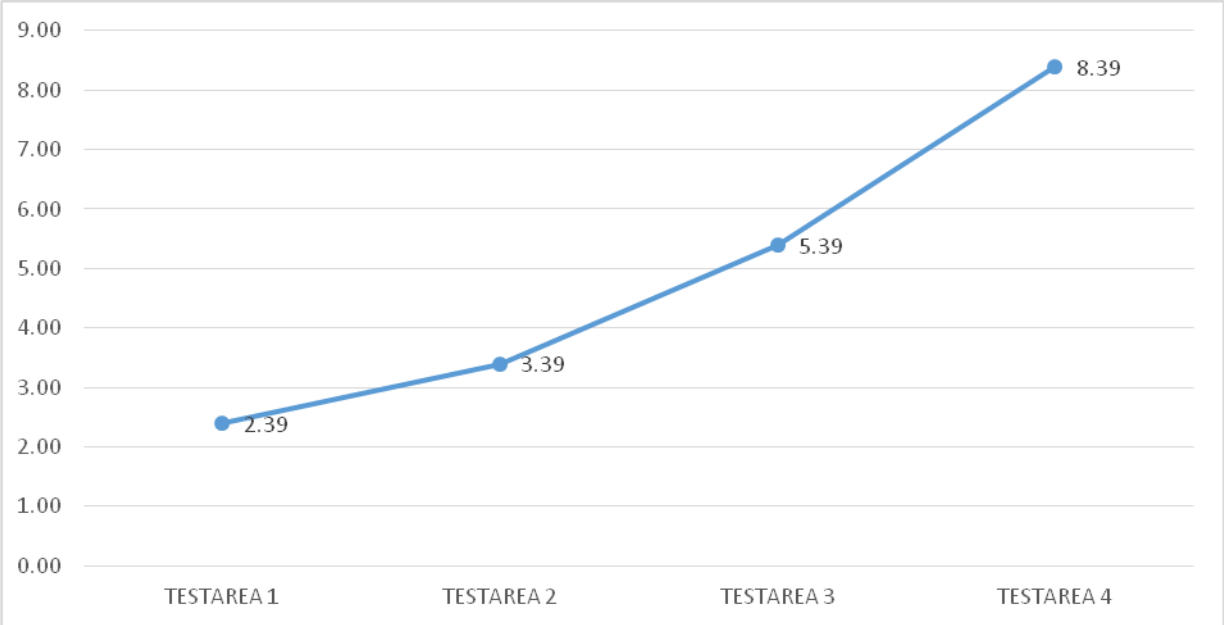

Figure 8.8. - Comparative diagram of the average values – The tour technical score (ET1)

Based on the comparative diagram of the average values, a better technical scoring was got by the T4 testing (8,39) as compared with the score obtained during the preliminary testing Tp (2,39), due to the implementation of the operational optimization models.

EXERCISE TEST 2

This tour/itinerary focuses on the players' improvement, on exercising the main rugby game proceedings, by using their skills, the run and the execution speed, both by timing it and by a well-defined scoring.

-the average values of the time scored by the players during the four tests are as follows: an improvement of the time is reflected, from 0,92 to 0,82 (T_p –T_2) and also of the technical scoring 1,96 and 3,48 (T_p –T_2).

- the tests (T_3 –T_4) registered a run time of 0,62-0,32 and a tour score between 4,98 and 7,96.

-the variability coefficient – the values of the four tests reflect a high homogeneity of the time values and of the technical tour score.

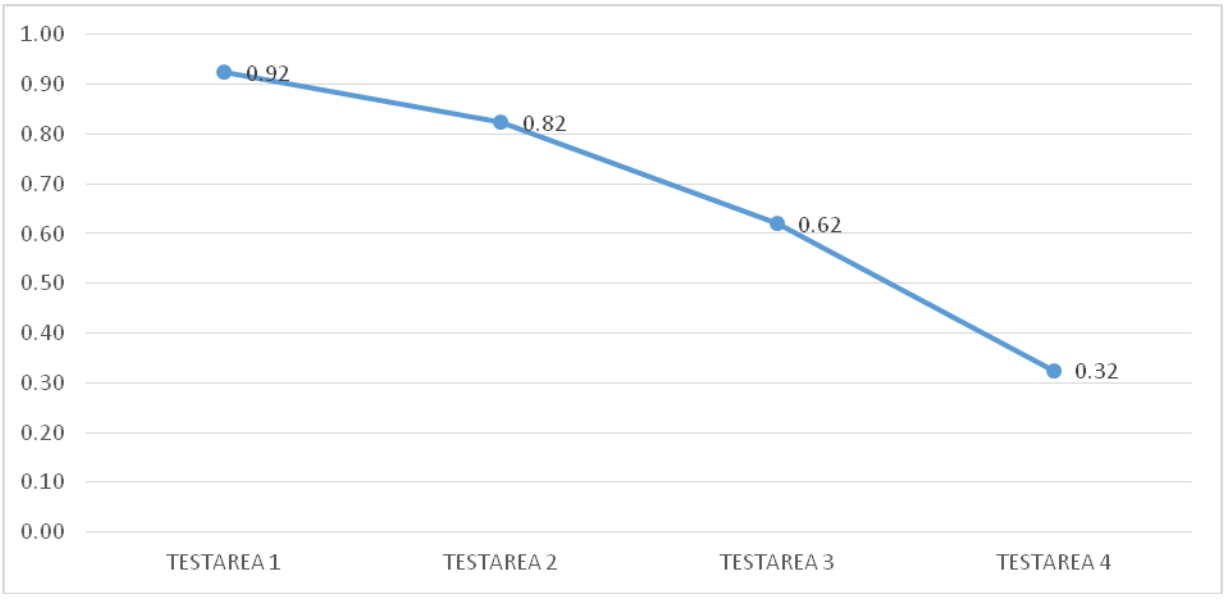

Figure 8.9. - Comparative diagram of the average values – Tour finishing time (ET2)

According to the average values comparative diagram the tour finishing time ET2 reduced from 0,92 for the preliminary testing Tp to 0,32 for the T_4 testing. The tour finishing time significant diminishing becomes possible by the technical elements improvement during the four tests, and also by the speed improvement.

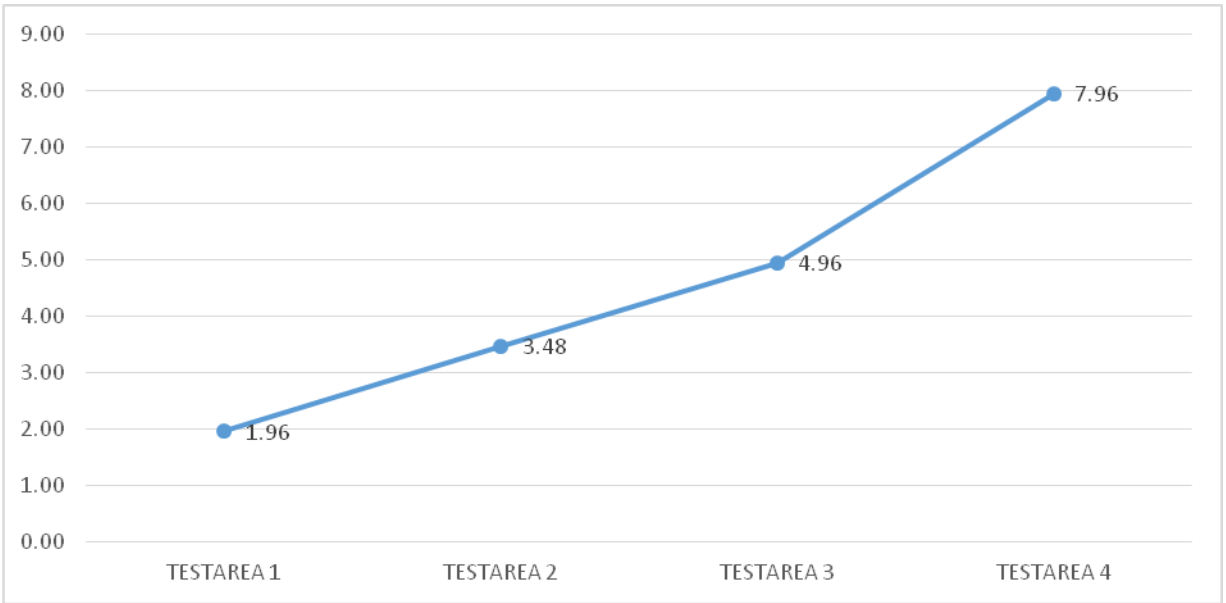

Figure 8.10. - Comparative diagram of the average values – The tour technical score (ET2)

According to the average values comparative diagram, a better tour technical score was got during the T4 testing (7,96) as compared to the score got by the preliminary Tp test (1,96) due to the optimization operational models.

8.7. The video testing results and their interpretation

The video analysis brings forth the results got by monitoring and scoring the basic technical and tactical elements specific to the feminine rugby game in 7.

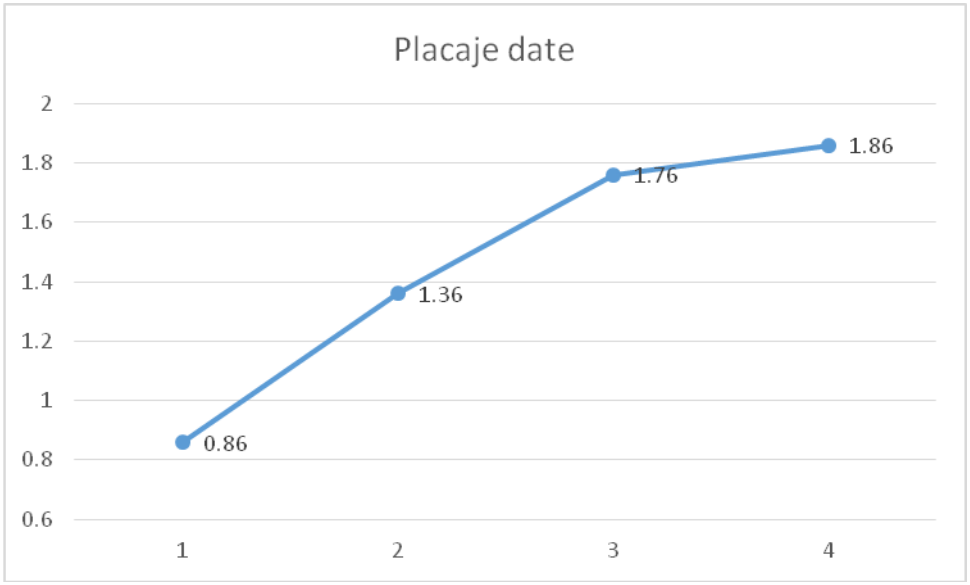

Figure 8.11. - Comparative diagram of the average values – Given stops

We have considered the number of the *given stops* and realized that the average resulted from the preliminary testing T_p is of 0,86 whereas the T_2 testing is of 1,36 which reflects the players' progress in the defense phase after the first competition year.

During the second competitive year we noticed again improvements during the T_3 testing (1,76) and the T_4 testing (1,86).

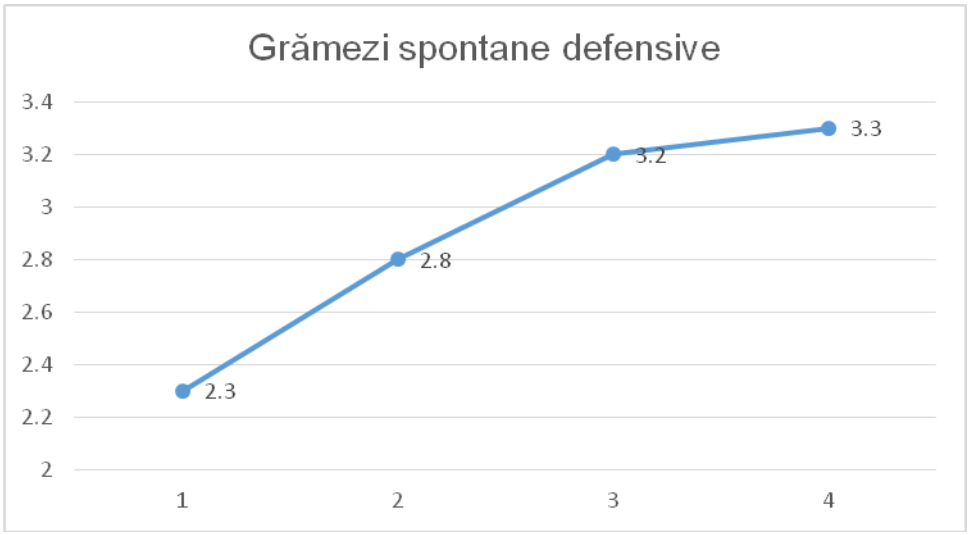

Figure 8.12. - Comparative diagram of the average values –Defensive spontaneous piles

While the defensive spontaneous game piles form, the average of the preliminary testing T_P is2,3 - progress is obvious in the T_2 testing which indicate an average of 2,8 after the first competition year.

A significant progress is underlined by the T_3 testing (3,2) respectively the T_4 testing (3,3) which indicates that the defensive system has improved.

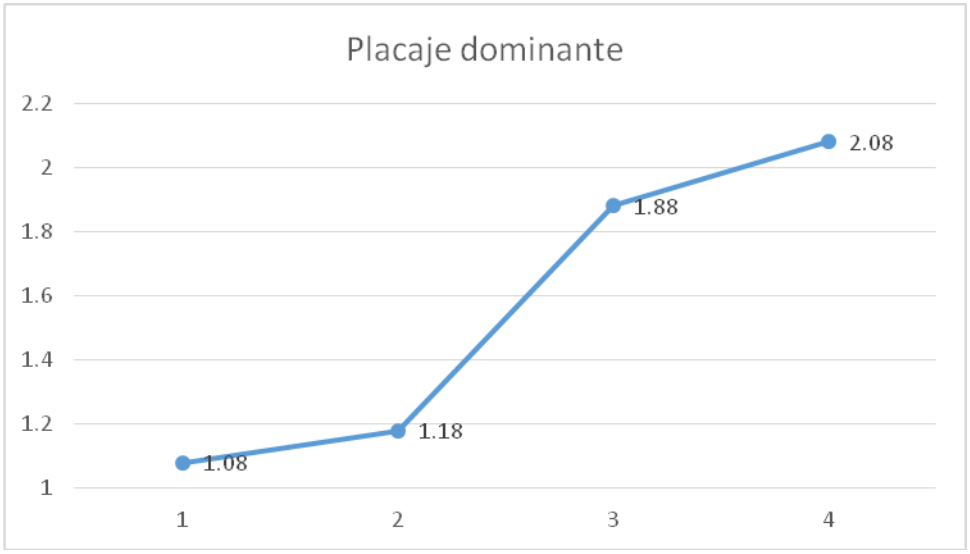

Figure 8.13. - Comparative diagram of the average values – Dominating stops

The most efficient and the most frequently used stops in the rugby in 7, as the number of the players is smaller and their skills are mostly alike, reason for which the technical proceeding was

monitored and analyzed. An average of 1,08 was registered during the preliminary test (T_p) urmată followed by a progress underlined by testing T_2 (1,18) after the first competitive year.

The best results were registered during the second competition year by the T_3 testing (1,88) respectively by the T_4 testing (2,08).

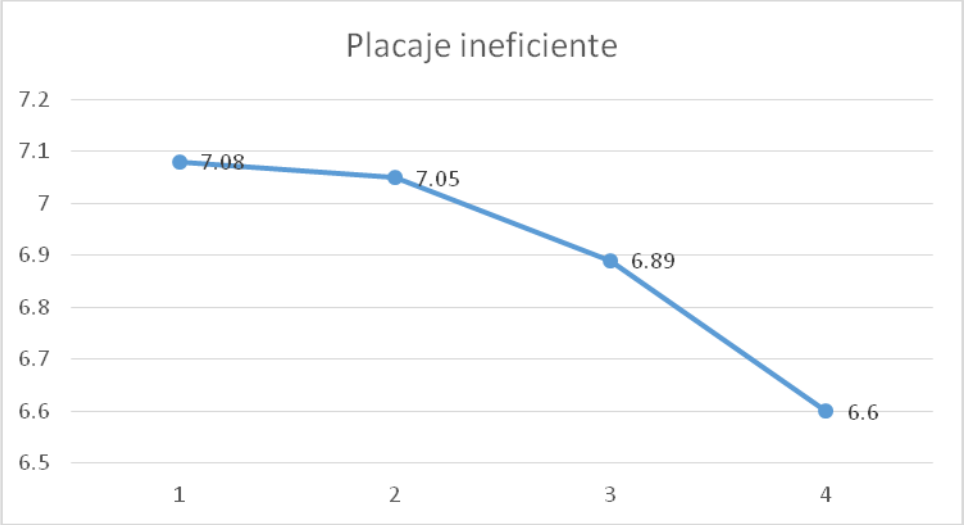

Figure 8.14. - Comparative diagram of the average values – Inefficient stops

As it is a dynamic game with a small number of players and with playgrounds of normal dimensions (destined to rugby games in 15) there are also inefficient stops which means that the opponent, even stopped, managed to pass or to keep the balloon.

The training operational optimization models have determined the reduction of the number of inefficient stops, according to the findings of the preliminary testing T_p (7,08) and to the testing T_2 (7,05).

This significant diminution may be ascertained during the second competition year, when average values of 6,89 were registered by the T_3 testing and of 6,6 by the T_4 testing.

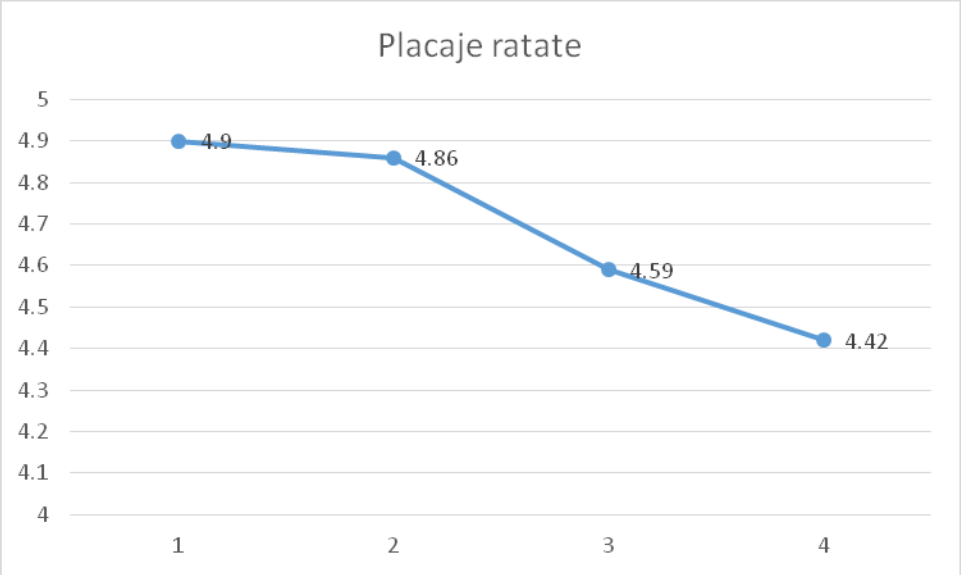

Figure 8.15. - Comparative diagram of the average values – Missed stops

As it is a dynamic game played at maximum speed, the rugby of 7 also supposes *missed stops.* The average value of the T_2 testing (4,86) is smaller than the value of the preliminary testing T_p (4,9) which means an improvement of this technical proceeding. This improvement is best observed during the second competition year by the T_3 testing (4,59) and by the T_4 testing (4,42).

Figure 8.16. - Comparative diagram of the average values – Crossing the defensive line

Due to the improvement of the attack technical-tactical proceedings and also to a better positioning positive values were registered the test average as far as the defensive line crossing is concerned, by registering the following parameters:

- the average of the T_2 testing (2,1) is higher than the average of the preliminary testing T_p (1,6) which underlines a significant improvement of the players' technical-tactical qualities, improvement which is best underlined by the T_3 tests (2,4) and by the T_4 tests (2,6).

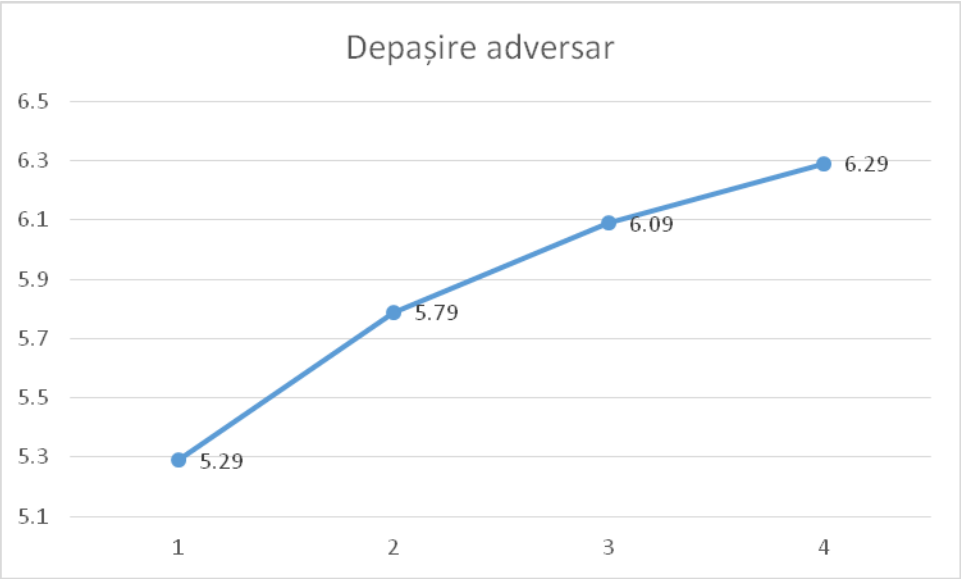

Figure 8.17. - Comparative diagram of the average values – Overcoming the opponent

The video analysis reflects the average by which the player manages to overcome their opponents and this average has improved from 5,29 of the preliminary test (T_p) to 5,79 in the T_2 test during the first competitive year, respectively from 6,09 during the T_3 test to 6,29 in the T_4 test during the second competitive year.

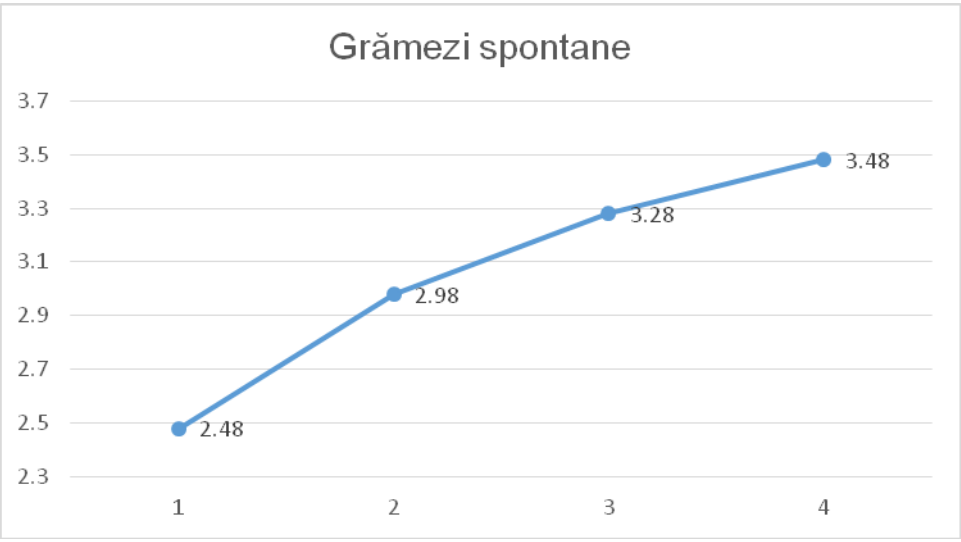

Figure 8.18. - Comparative diagram of the average values – Spontaneous piles

Keeping possession of the balloon during the attack phases is generally achieved by spontaneous piles and the video analysis underlines an improvement of these averages from 2,48 during the preliminary test T_p to 2,89 in the T_2 test during the first competitive year.

The way in which the players manage to protect the ball and to keep it in their possession by spontaneous piles is best reflected by the T_3 test (3,28) respectively by the T_4 test (3,48).

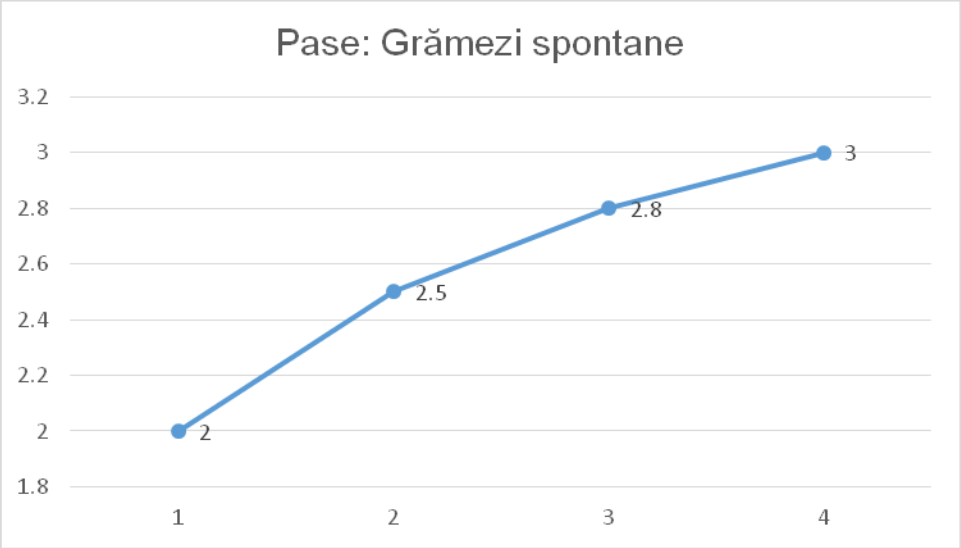

Figure 8.19. - Comparative diagram of the average values – Passes: Spontaneous piles

The spontaneous pile passes are an important, special technical proceeding often used by the rugby game in 7.

The analyzed results indicate an increase from 2,00 in the preliminary test T_p to 2,5 in the T_2 test. A significant increase is also pointed out by the T_3 test (2,8) and by the T_4 test (3,00).

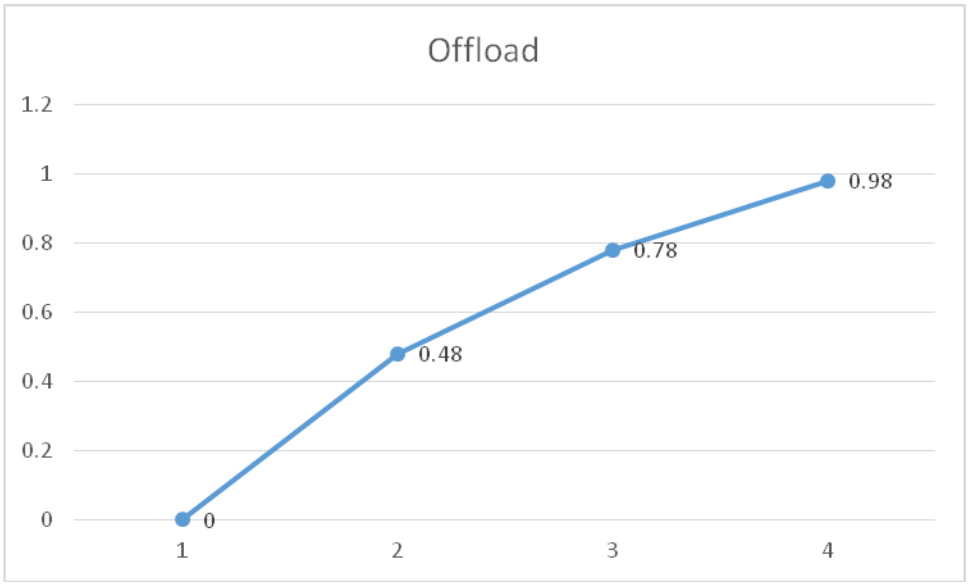

Figure 8.20. - Comparative diagram of the average values – Offload

The technical proceeding by which the player passes the ball after passing the opponent from behind is an extremely complicated proceeding, that is why the average of the preliminary test Tp was of 0,00, nevertheless the players' qualities and skills have improved, thus underlining an increase of the average of the following tests T_2 (0,48), the test T_3 (0,78) and the test T_4 (0,98).

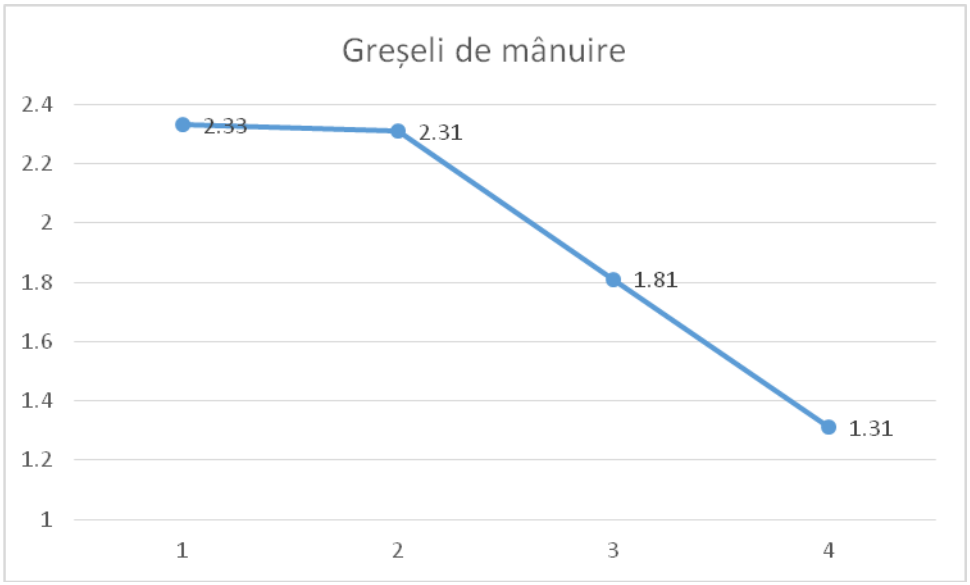

Figure 8.21. - Comparative diagram of the average values – Handling errors

The average of the handling errors registered by the T_2 test (2,31) suggests an improvement as compared to the initial T_p test (2,33) a significant improvement being registered by the T_3 tests (1,81) and by the T_4 tests (1,31).

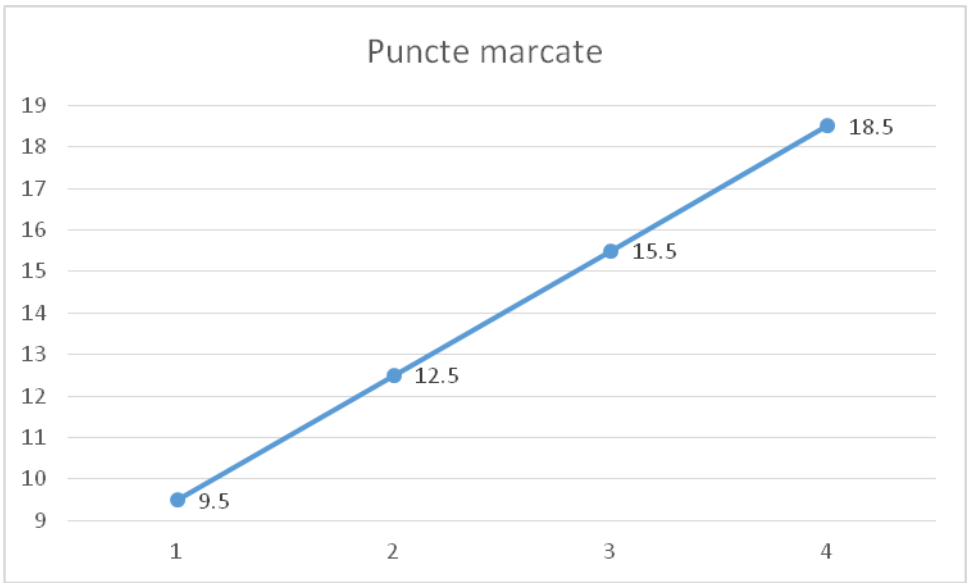

Figure 8.22. - Comparative diagram of the average values – Scored points

The purpose of all the proceedings used in the rugby game by 7 is to score points. The video analysis suggests an increase of the average of the points scored during the T_2 test (12,5) as compared to the preliminary test T_p (9,5) in the first competitive year.

The second competitive year registered values of 15,5 of the T_3 test and of 18,5 of the T_4 test.

CONCLUSIONS

The analysis and implementation of certain physical and technical-tactical models is based on the video analysis of the games. The global positioning system (GPS) and the video analysis are the most used techniques of analyzing and monitoring the players.

The use of a training design, the implementation and evaluation of optional optimization models could help the coaches who activate in the same field, respectively the feminine rugby field.

Within the feminine rugby game in 7 the movement analysis is a frequently used method, together with the supervision of the movement within the game, which is the total run distance, the average speed, the average distance and the number of sprints.

Rugby in 7 is played as a tournament, as 5-6 games are played a day. The tournament lasts for 2-3 days. The players' fatigue affects the players' movement models, and there are differences between a the first and the last game during a tournament.

Running is extremely important in the rugby in 7 respectively the frequency, the distances and the efforts during the competition.

The success of the rugby in 7 is ensured by both the physical and the technical-tactical factors. The coaches try to improve the players' performances working especially for the development of the motion qualities, by using exercises specific to the rugby game.

Unfortunately most of the rugby players in 7 are part of the rugby teams of 15, and, according to the current research works the rugby players in 7 move differently as compared to the rugby players in 15 that is the reason why the specific training design and operational models are utterly required and necessary.

Conclusions of the research work

The research results confirm the working hypotheses by which the design, the implementation and the evaluation of the operational optimization models used to enhance the performances of the female rugby players in 7, by stimulating the sports training according to the current tendencies of the modern game.

Leading the trainings of improving both the physical and the technical-tactical performances at the level of a feminine rugby team of 7 is a thorough planning activity, of a strict control, by introducing a series of operational optimization models and also by their accurate evaluation.

During the preparatory/training period (the pre-competitive period) the applied design and the operational models used mostly relate to the motion qualities development whereas, towards the end, the operational models advanced for the technical-tactical development are used. The number of trainings and the operational models used for the development of the motion skills become of outmost importance.

Within the annual training plan, the models proposed begin by an average volume, reaching a higher volume towards the end of the preparatory phase; their intensity and complexity being in a relation of reverse proportionality with the volume. From half of the pre-competition period the average of the proposed operational technical-tactical models increases.

During the competition phases of the feminine rugby of 7, respectively the tournaments, the number of the implemented operational models which refer to the physical training diminishes as

compared to the pre-competition period, to the detriment of the proposed operational technical-tactical models.

The transition period was better acknowledged, underlining at all the tests levels differences between the preliminary testing Tp and the T3 testing, diminishing.

It was suggested, at the speed development level which was studied for both 40 m distances and for 20 m that subsequent to the design and to the operational models proposed, that the players of the feminine rugby team in 7 of U Cluj, have registered a diminution of the temps both between the preliminary testing Tp and the T2 testing, and also between the T3 testing and the T4 testing, the difference being even bigger between the preliminary testing Tp and the T4 testing. This is achieved by both specific physical training and by the improvement of the running and of the execution technique.

The tests related to the explosive strength capacity suggests significant values between the four tests, the design and the methods being efficient.

The technical-tactical tests which investigate the players' skills, the technical relationship specific to the rugby in 7, the statistic parameters indicate the fact that the favorable evolution obtained by the players during the four tests both in the first competitive year and in the second competitive year, underlining the efficiency of the design and of the technical-tactical operational models.

The two Test Exercises (ET1) and (ET2) which focused on the improvement of the technical-tactical elements, the running speed and the execution speed have underlined suggestive improvements of all the tests, both from the point of view of the tour finishing time and from the point of view of the accumulated score.

The variability coefficient registered, during the tests, values which confirmed the high homogeneity of the group.

Based on the video testing results we shall conclude that the proposed design and the operational models and their evaluation had positive values, therefore:

- as for the number of the given stops, they registered a significant progress between the preliminary tests Tp and the T4 test.
- the defensive spontaneous piles, the dominant stops have also registered positive values, being in real progress.
- the number of inefficient stops has diminished due to the operational technical models and to the proposed specific training.
- based on the design and on the implementation of the proposed operational models a significant improvement was ascertained on crossing the opponent's defensive line.

- the video analysis of the opponent dribbling and of the offload s-a pointed to a visible progress and to an increase of the number of correct executions; the balloon handling mistakes reduced, underlining a significant improvement of the initial tests.
- The players manage to protect the balloon and to keep it in spontaneous attack piles, generating real progress based on the tests.
- positive results were also manifested by passes from spontaneous piles, a technical-tactic proceeding, extremely important for the dynamic game of rugby in 7.
- remarkable results were also obtained by the point scoring – significant values of the tests performed.

Recommendations

Based on the ascertained results, and according to the conclusions of the developed research activity, we propose as follows:

- The implementation of the operational models elaborated both at a physical level and at the technical-tactical levels of the applied experiment should be used and valued by the feminine rugby teams in 7 as a reference system, as a model and a starting basis within the training of the performance teams of the feminine rugby in 7;
- The implementation by the coaches who work in the field, of the operational models experimented within the paperwork which dwell on both the issues of the motion qualities development and on the development of the technical-tactical based on the training period (pre-competitive, the competitive period, the transition period);
- The use of the operational training methods in the various experience exchanges with teams beyond the national championship.
- The implementation of the training operational methods on the feminine rugby game in 7 on the male team of 7.
- The analysis and the implementation of new operational training models in the rugby game of 7.

LIST OF THE PUBLISHED SCIENTIFIC PAPERWORK

Paperwork published in famous magazines:

Pop, S., Chihaia, O**.,** (2015) *Measures for the prevention of accidents in the performance rugby*, published by Rev. Studia Cluj-Napoca, no. 3/2015, pag. 67-72, 6 pages, www.studia.ubbcluj.ro

Chihaia, O., Pop S., (2014) *The rugby game aggressiveness***,** published by the magazine Rev. Studia Cluj-Napoca, no. 2/2014, pag. 127-132, 6 pages, www.studia.ubbcluj.ro

Articles published in volumes of international scientific manifestations:

Pop, S., Monea, Gh., (2016) *Dynamic games specific to the rugby game, a means of physical and mental education at a secondary school level*, In: Vol. The VIIthe International Conference of Universitaria Consortium „Education for health and Performance" ,dated 14-15 October 2016, pag. 20-26, 7 pages, Ed. Risoprint Cluj-Napoca.

Pop, S., Chihaia, O**.,** (2014) *Measures for the prevention of accidents in the performance rugby*, the International Conference „Education for Health and Performance", dated 5 December 2014.

Chihaia, O**.,** Pop, S., (2012) *The Management of the creation of the feminine rugby team in 7 „Universitatea" Cluj*, In: Vol. The VIth International Conference of physical education and sports, dated 7 December 2012, pag.75-78, 4 pages, Ed. Risoprint Cluj-Napoca.

Bibliography

Alexei, M. (2005). *Atletism – tehnica probelor*. Cluj-Napoca: Editura Presa Universitară Clujeană.

Ardelean, T. (1990). *Particularităţile dezvoltării calităţilor motrice în atletism*. Bucureşti: Editura I.E.F.S.

Argus CK, Gill ND, Keogh JWL (2012). Characterization of the differences in strength and power between different levels of competition in rugby union athletes. *The Journal of Strength & Conditioning Research 26:2698–2704.*

Argus CK, Gill ND, Keogh JWL, Hopkins WG (2011). Assessing lower-body peak power in elite rugby-union players. *The Journal of Strength & Conditioning Research 25:1616–1621.*

Argus CK, Gill ND, Keogh JWL, Hopkins WG, Beaven CM (2009). Changes in strength, power, and steroid hormones during a professional rugby union competition. *The Journal of Strength & Conditioning Research 23:1583–1592.*

Argus CK, Gill ND, Keogh JWL, McGuigan MR, Hopkins WG (2012) Effects of two contrast training programs on jump performance in rugby union players during a competition phase. *International Journal of Sports Physiology and Performance 7:68–75.*

Arsac LM, Locatelli E (2002). Modeling the energetics of 100-m running by using speed curves of world champions. *Journal of applied physiology 92:1781–1788.*

Atkins SJ (2006) Performance of the yo-yo intermittent recovery test by elite professional and semiprofessional rugby league players. *Journal of Strength and Conditioning Research 20:222.*

Aughey RJ (2011) Applications of GPS technologies to field sports. *International Journal of Sports Physiology and Performance 6:295–310.*

Austin D, Gabbett T, Jenkins D (2011). The physical demands of Super 14 rugby union. *Journal of Science and Medicine in Sport 14:259–263.*

Austin DJ, Gabbett TJ, Jenkins DG (2013) Reliability and sensitivity of a repeated high-intensity exercise performance test for rugby league and rugby union. *Journal of Strength and Conditioning Research 27:1128–1135.*

Austin DJ, Gabbett TJ, Jenkins DJ (2011) Repeated high-intensity exercise in a professional rugby league. *Journal of Strength and Conditioning Research 25:1898–1904.*

Badea, D. (1997). *Evoluţia indicatorilor de efort specifici modelului competiţional în jocul de rugby*, Sesiunea de Comunicări Ştiinţifice, Bucureşti: Editura ANEFS.

Badea, D. (1997). *Ponderea formelor de joc în cadrul primului timp al mişcării generale în jocul de rugby*. Bucureşti: Revista Discobolul nr.6.

Badea, D. (1999). *Studiu privind evoluţia jocului de rugby de înalt nivel şi relaţia cu rugby-ul românesc*, Sesiune de Comunicări Ştiinţifice. Bucureşti: Editura ANEFS.

Badea, D. (2000). *Ameliorarea formei părţii fundamentale a lecţiei de antrenament în jocurile sportive*, Conferinţa Ştiinţifică Naţională, Bucureşti.

Badea, D. (2001). *Rugby, fundamente teoretice şi metodice*. Bucureşti: Editura FEST.

Badea, D. (2006). E*voluţia indicatorilor de efort specifici modelului competiţional în jocul de rugby*, Sesiunea de Comunicări Ştiinţifice, Bucureşti: Editura ANEFS.

Badea, D.(2004). *Rugby, strategia formativă a jucătorului de rugby*. Bucureşti: Editura FEST.

Baker DG, Newton RU (2008). Comparison of lower body strength, power, acceleration, speed, agility, and sprint momentum to describe and compare playing rank among professional rugby league players. *The Journal of Strength & Conditioning Research 22:153–158*

Bangsbo J, Iaia FM, Krustrup P (2008). *The Yo-Yo intermittent recovery test : a useful tool for evaluation of physical performance in intermittent sports*. Sports Medicine 38:37–51

Barth, B. (1995). *Pregătirea pentru competiţie printr-un antrenament strategico-tactic*

comple. Bucureşti: Revista "Leistungsport", nr.1, Revista "Teoria competiţiei", nr. 362-364, Editura CCPS .

Batterham AM, Hopkins WG (2006) Making meaningful inferences about magnitudes. *International Journal of Sports Physiology and Performance 1:50– 57*

Beltean, J., (2005). *Quels parameters prendre un compte pour programmer un plan de preparation physique?* Beziers: Editure Max Godenet.

Bishop D, Girard O, Mendez-Villanueva A (2011) *Repeated-Sprint Ability part II: recommendations for training.* Sports Medicine 41:741-756.

Bompa, T., O. (2002). *Teoria şi metodologia antrenamentului sportiv – Periodizarea*. Bucureşti:Editura Ex Ponto.

Bompa, T., O. (2003). *Performanţa în jocurile sportive.* Bucureşti: Editura Ex Ponto.

Bota, C. (2002). F*iziologie generală. Aplicaţii la efortul fizic*. Bucureşti: Editura medicală.

Bota, I. (1989). *Modele de joc şi pregătire*. Bucureşti: Editura Sport-Turism.

Bracewell P (2003) Monitoring meaningful rugby ratings. *Journal of Sports Sciences 21:611–620*

Brack, R. (1993). *Teoria practică de acţionare a coach-ului de jocuri sportive*, În: "Leistungsport", nr. 23. Bucureşti: Editura CCPS.

Bremner S, Robinson G, Williams MD (2013) A Retrospective Evaluation Of Team Performance Indicators In Rugby Union. *International Journal of Performance Analysis in Sport 13:461–473*

Brown, H. (1997). *Preparing for special situations*. Indianapolis: Editura Master Press.

Brughelli M, Cronin J, Chaouachi A (2011) Effects of running velocity on running kinetics and kinematics. *Journal of Strength and Conditioning Research 25:933–939*

Buchheit M, Allen A, Poon TK, Modonutti M, Gregson W, Di Salvo V (2014) Integrating different tracking systems in football: multiple camera semi-automatic system, local position measurement and GPS technologies. *Journal of Sports Sciences 1–14.*

Buchheit M, Samozino P, Glynn JA, Michael BS, Haddad Al H, Mendez-Villanueva A, Morin J-B (2014) Mechanical determinants of acceleration and maximal sprinting speed in highly trained young soccer players. *Journal of Sports Sciences 32:1906–1913.*

C.N.E.F.S. (1971). *Conţinutul şi metodica antrenamentului sportiv*. Bucureşti: Editura STADION.

Cahill N, Lamb K, Worsfold P, Headey R, Murray S (2013) The movement characteristics of

English Premiership rugby union players. *Journal of Sports Sciences 31:229–237.*

Carreras D, Kraak W, Planas A, Martín I, Vaz L (2013*)* Analysis of International Rugby Sevens matches during tournaments. *International Journal of Performance Analysis in Sport 13:833–847*

Cârstea, Gh. (1980). *Teoria şi metodica educaţiei fizice şi sportului*. Bucureşti: Editura Universal.

Cârstea, Gh. (1999). *Educaţie fizică – fundamente teoretice şi metodice*. Bucureşti: Casa de Editură Petru Maior.

Cazoria, G., Godeman, M. (1993). *Testes specifiques d'evaluation de Rugby man.* Editura Federaţiei Franceze de Rugby

Charreyre, B., Mitrea, D. (2002). *Proiect naţional de joc*. Bucureşti: Editura F.R.R.

Chihaia O., Pop, S. (2012). *Metodica antrenamentului de rugby la copii și juniori, suport de curs an III.* Cluj-Napoca: Editura F.E.F.S.

Chihaia, O. (2005). *Rugby – curs pentru specializare an III*. Cluj-Napoca: UBB-FEFS.

Chihaia, O. (2005). *Rugby – curs pentru specializare an IV*. Cluj-Napoca: UBB-FEFS.

Chihaia, O. (2006). *Rugby - antrenamentul de forţă a înaintaşilor*. Cluj-Napoca: Editura GMI.

Chihaia, O. (2007). *Rugby- antrenamentul de viteza a înaintaşilor.* Cluj-Napoca: Editura GMI.

Chihaia, O. (2008). *Ameliorarea forţei şi vitezei la jucătorii de rugby înaintaşi.* Cluj-Napoca: Editura Napoca Star

Chihaia, O. (2008). *File din istoria rugby-ului.* Cluj-Napoca: Editura G.M.I.

Chihaia, O., Şofron, D. (2000). *Monografia rugby-ului Clujean*. Cluj-Napoca: Editura Europa General.

Chiriac, R. (1992). *Jocuri dinamice pentru învăţarea elementelor fundamentale ale jocului*. Bucureşti: Editura ANEFS.

Chiriac, R. (1997). *Dezvoltarea calităţilor motrice în rugby-ul de performanţă*. Bucureşti: Editura ANEFS – F.R.R.

Cîrligelu, V., Teofilovici, Al. (1980). *Rugby, antrenament, exerciţii, jocuri*. Bucureşti: Editura Stadion.

Clark KP, Stearne DJ, Walts CT, Miller CT (2009) The Longitudinal Effects of Resisted

Sprint Training Using Weighted Sleds Versus Weighted Vests. *Journal of Strength and Conditioning Research. 24: 3287-3295*

Coaching. (1998). *Acreditation Manual* – New Zeeland: Rugby Union

Colibaba-Evuleţ, D., Bota, I. ( ). *Jocuri sportive – Teorie şi metodică*. Bucureşti: Editura Aldin.

Collinet, S. (2000). *Foundament aux du rugby*. Paris: Editure Amphora.

Collinet, S. (2000). *Foundamentaux du rugby-manual pour l'educateur et l'entraineurs, niveau 1 et 2-use exercises. Paris:* Amphora.

Collinet, S. (2000). *Foundamenteux du rugby-manual pour l'educateur et l'entraineurs, niveau 3 et 4.* Paris: Amphora.

Comfort P, Graham-Smith P, Matthews MJ, Bamber C (2011) Strength and power characteristics in English elite rugby league players. *Journal of Strength and Conditioning Research 25:1374–1384*

Comfort P, Haigh A, Matthews MJ (2012) Are changes in maximal squat strength during preseason training reflected in changes in sprint performance in rugby league players? *Journal of Strength and Conditioning Research 26:772– 776*

Conquet, P. (1976). *Contribution a l'etude techique du rugby*,. Paris: Editure Vigot

Conquet, P. (1995) „Les Fondamenteaux du Rugby''. Paris. Editura Vigot

Constantin, V. (2002). *Rugby – Specializarea posturilor.* Bucureşti: Editura FEST.

Constantin, V., (2004). *Rugby – Tehnică şi tactică.* Bucureşti: Editura FEST

Cormie P, McGuigan MR, Newton RU (2011) *Developing Maximal Neuromuscular Power: Part 2 Training Considerations for Improving Maximal Power Production.* Sports Medicine 41:125–146

Coughlan GF, Green BS, Pook PT, Toolan E, O'Connor SP (2011) Physical game demands in elite rugby union: a global positioning system analysis and possible implications for rehabilitation. *The Journal of Orthopaedic and Sports Physical Therapy 41:600–605*

Coutts A, Reaburn P, Piva TJ, Murphy A (2007) Changes in selected biochemical, muscular strength, power, and endurance measures during deliberate overreaching and tapering in rugby league players. *International Journal of Sports Medicine 28:116–124*

Crăciun, M. (2012). *Psihologia sportului pentru antrenor*. Cluj-Napoca: Editura Risoprint

Crewther B, Lowe T, Weatherby R, Gill N, Keogh J (2009) Neuromuscular performance of

elite rugby union players and relationships with salivary hormones. *The Journal of Strength & Conditioning Research 23:2046–2053*

Crewther BT, McGuigan MR, Gill ND (2011) The ratio and allometric scaling of speed, power, and strength in elite male rugby union players. *The Journal of Strength & Conditioning Research 25:1968–1975*

Cronin JB, Hansen KT (2005) Strength and power predictors of sports speed. *Journal of Strength and Conditioning Research 19:349–357*

Cross MR, Brughelli M, Brown SR, Samozino P, Gill ND, Cronin JB, Morin J-B (2014*)* Mechanical Properties of Sprinting in Elite Rugby Union and Rugby League. *International Journal of Sports Physiology and Performance. In Press*

Cunniffe B, Proctor W, Baker JS, Davies B (2009) An evaluation of the physiological demands of elite rugby union using Global Positioning System tracking software. *Journal of Strength and Conditioning Research 23:1195– 1203*

da Silva JF, Guglielmo LGA, Bishop D (2010) Relationship between different measures of aerobic fitness and repeated-sprint ability in elite soccer players. *Journal of Strength and Conditioning Research 24:2115–2121*

David, L. (1993). *1000 exercises et jeux de rugby*. Paris: Editions Vigot.

Deutsch MU, Kearney GA, Rehrer NJ (2007) Time - motion analysis of professional rugby union players during match-play. *Journal of Sports Sciences 25:461–472*

Devaluez, J. (2000). *Pour un nouveau rugby de la Coupe du Monde 1999 au super 12 eau Tri-nations propositiong de jeu*. Paris: Editions Chiron.

Devaluez, J. (2000). *Pour un nouveau rugby de la Coupe du Monde 2007 au super 12 eau Tri-nations propositiong de jeu*. Paris : Editura Chiron.

Dictionary of contemporary english. (1995). Londra: Longman British National Corpus.

Dicţionarul explicativ al limbii române. (1996). Bucureşti: Editura Univers Enciclopedic.

Dragnea, A. (1996). *Antrenamentul sportiv*. Bucureşti: Editura Didactică şi Pedagogică.

Dragnea, A. şi colaboratorii (2000). *Teoria educaţiei fizice şi sportului*. Bucureşti: Editura Cartea Şcolii.

Dragnea, A., Bota, A. (2000). *Teoria activităţilor motrice*. Bucureşti: Editura Didactică şi Pedagogică.

Dragnea, A., Mate-Teodorescu, S. (2002). *Teoria sportului*. Bucureşti: Editura FEST.

Dragomir, Z. (1968). *Pregătirea fizică în antrenamentul sportiv*. Bucureşti: Editura

Consiliul Naţional pentru Educaţie Fizică şi Sport.

Drăgan, I. (1978). *Refacerea organismului după efort*. Bucureşti: Editura Sport-Turism.

Duma, E. (1997). *Controlul medical în activitatea de educaţie fizică şi sport*. Cluj-Napoca: Editura Argonaut.

Duthie G, Pyne D, Hooper S (2003) *Applied physiology and game analysis of rugby union.* Sports Medicine 33:973–991

Duthie GM (2006) *A framework for the physical development of elite rugby union players.* International Journal of Sports Physiology and Performance 1:2– 13

Duthie GM, Pyne DB, Hopkins WG, Livingstone S, Hooper SL (2006) Anthropometry profiles of elite rugby players: quantifying changes in lean mass. *British Journal of Sports Medicine 40:202–207*

Duthie GM, Pyne DB, Marsh DJ, Hooper SL (2006) Sprint patterns in rugby union players during competition. *The Journal of Strength & Conditioning Research 20:208–214*

Elloumi M, Makni E, Moalla W, Bouaziz T, Tabka Z, Lac G, Chamari K (2012) Monitoring training load and fatigue in rugby sevens players. *Asian Journal of Sports Medicine 3:175–184*

Epuran, M., Marolicaru M. (1998). *Metodologia cercetării activităţilor corporale*. Cluj-Napoca: Editura Risoprint.

F.R.R. (2008). *Regulamentul jocului de rugby.* București: Editura FEST.

F.R.R. (2012). *Modele de joc și pregătire.* București.

Fall, H., Baylor, A., Dishmann, R. (1980). *Essentials for fitness*. Philadelphia: Saunders College.

Fuller CW, Taylor A, Molloy MG (2010) Epidemiological study of injuries in international rugby sevens. *Clinical Journal of Sports Medicine 20:179*

Gabbett T, Kelly J, Pezet T (2007) Relationship between physical fitness and playing ability in rugby league players. *Journal of Strength and Conditioning Research 21:1126–1133*

Gabbett T, Kelly J, Ralph S, Driscoll D (2009) Physiological and anthropometric characteristics of junior elite and sub-elite rugby league players, with special reference to starters and non-starters. *Journal of Science and Medicine in Sport 12:215–222*

Gabbett TJ (2012) Sprinting patterns of National Rugby League competition. *Journal of Strength and Conditioning Research 26:121–130.*

Gabbett TJ, Jenkins DG, Abernethy B (2011) Correlates of tackling ability in high-

performance rugby league players. *Journal of Strength and Conditioning Research 25:72–79*

Gabbett TJ, Jenkins DG, Abernethy B (2011) Relationships between physiological, anthropometric, and skill qualities and playing performance in professional rugby league players. *Journal of Sports Sciences 29:1655–1664*

Gabbett TJ, Wiig H, Spencer M (2013) Repeated high-intensity running and sprinting in elite women's soccer competition. *International Journal of Sports Physiology and … 8:130–138*

Girard O, Mendez-Villanueva A, Bishop D (2011) *Repeated-sprint ability – part I: factors contributing to fatigue.* Sports Medicine 41:673–694

Glaister M, Howatson G, Lockey RA, Abraham CS, Goodwin JE, McInnes G (2007) Familiarization and reliability of multiple sprint running performance indices. *Journal of Strength and Conditioning Research 21:857–859*

Granatelli G, Gabbett TJ, Briotti G, Padulo J, Buglione A, D'Ottavio S, Ruscello BM (2014) Match analysis and temporal patterns of fatigue in rugby sevens. *Journal of Strength and Conditioning Research 28:728–734*

Guillaume, J., L. (1994). *De l'evaluation a la notation*. Paris: În: Revue EPS nr.250

Hansen KT, Cronin JB, Pickering SL, Douglas L (2011) Do force-time and power-time measures in a loaded jump squat differentiate between speed performance and playing level in elite and elite junior rugby union players? *The Journal of Strength & Conditioning Research 25:2382–2391*

Harre, D., Hauptmann, M. (1987). *Viteza şi antrenamentul de viteză*. În: Sportul de performanţă, nr.270.

Harre, D., Winifried, L. (1987). *Rezistenţa, forţa şi antrenamentul de rezistenţă – forţă.* În: Sportul de performanţă, nr. 267.

Harris NK, Cronin JB, Hopkins WG, Hansen KT (2008) Squat jump training at maximal power loads vs. heavy loads: effect on sprint ability. *The Journal of Strength & Conditioning Research 22:1742–1749*

Harrison AJ, Bourke G (2009) The effect of resisted sprint training on speed and strength performance in male rugby players. *Journal of Strength and Conditioning Research 23:275–283*

Hartwig TB, Naughton G, Searl J (2011) Motion analyses of adolescent rugby union players: a comparison of training and game demands. *Journal of Strength and Conditioning Research 25:966–972*

Haseler LJ, Hogan MC, Richardson RS (1999) Skeletal muscle phosphocreatine recovery

in exercise-trained humans is dependent on O2 availability. *Journal of applied physiology 86:2013–2018*

Heasman J, Dawson B, Berry J, Stewart G (2008) Development and validation of a player impact ranking system in Australian football. *International Journal of Performance Analysis in Sport 8:156–171*

Higham DG, Hopkins WG, Pyne DB (2014) Patterns of play associated with success in international rugby sevens. *International Journal of Performance Analysis in Sport 14:111–112*

Higham DG, Hopkins WG, Pyne DB (2014) Performance Indicators Related to Points Scoring and Winning in International Rugby Sevens. *Journal of Sports Science and Medicine 13:358*

Higham DG, Hopkins WG, Pyne DB, Anson JM Relationships between rugby sevens performance indicators and international tournament outcomes. *Journal of Quantitative Analysis in Sport 10:81–87*

Higham DG, Pyne DB, Anson JM, Eddy A (2012) Movement patterns in rugby sevens: effects of tournament level, fatigue and substitute players. *Journal of Science and Medicine in Sport 15:277–282*

Higham DG, Pyne DB, Anson JM, Eddy A (2013) Physiological, anthropometric, and performance characteristics of rugby sevens players. International *Journal of Sports Physiology and Performance 8:19–27*

Higham DG, Pyne DB, Anson JM, Hopkins WG, Eddy A (2014) Comparison of activity profiles and physiological demands between international rugby sevens matches and training. *Journal of Strength and Conditioning Research. In Press*

Hiscock D, Dawson B, Heasman J, Peeling P (2012) Game movements and player performance in the Australian Football League. *International Journal of Performance Analysis in Sport 12:531–545*

Hopkins WG (2000) *Measures of reliability in sports medicine and science.* Sports Medicine 30:1–15

Hopkins WG (2007) Sportscience. "*A spreadsheet to compare means of two groups"* 22–23

Hopkins WG (2010) *Linear models and effect magnitudes for research, clinical and practical applications.* SportScience 14:49–57

Hopkins WG, Marshall SW, Batterham AM, Hanin J (2009) *Progressive statistics for studies in sports medicine and exercise science.* Medicine and Science in Sports and Exercise 41:3–13

Hori N, Newton RU, Andrews WA, Kawamori N, McGuigan MR, Nosaka K (2008) Does performance of hang power clean differentiate performance of jumping, sprinting, and changing of direction? *Journal of Strength and Conditioning Research 22:412–418*

Hughes M, Jones R (2005) *Patterns of play of successful and unsuccessful teams in men's 7-a-side rugby union.* Science and football V: the proceedings of the Fifth World Congress on Science and Football. Routledge, 2005

Hughes MT, Hughes MD, Williams J, James N, Vučković G, Locke D (2012) Performance indicators in rugby union. *Journal of Human Sport and Exercise 7:383–401.*

Ianusevici, P., (1991). *Manual pentru perfecţionarea elementelor tehnice*. Traducere după Coaching Publication, New Zeeland Rugby Union.

James N, Mellalieu SD, Jones NMP (2005) The development of position-specific performance indicators in professional rugby union. *Journal of Sports Sciences 23:63–72*

Jennings D, Cormack S, Coutts AJ, Boyd L, Aughey RJ (2010) The validity and reliability of GPS units for measuring distance in team sport specific running patterns. *International Journal of Sports Physiology and Performance 5:328–341*

Johnston RD, Gabbett TJ, Jenkins DG, Hulin BT (2014) Influence of physical qualities on post-match fatigue in rugby league players. *Journal of Science and Medicine in Sport. In Press*

Jones NMP, James N, Mellalieu SD (2008) An objective method for depicting team performance in elite professional rugby union. *Journal of Sports Sciences 26:691–700*

Katz, J. (1988). *Fitness workas – A beneprint of lifelong fitness*. Human Kinetics Publischers, Inc. Illinois.

Kawamori N, Newton RU, Hori N, Nosaka K (2014) Effects of weighted sled towing with heavy versus light load on sprint acceleration ability. *The Journal of Strength & Conditioning Research 28:2738–2745*

Kempton T, Sirotic AC, Coutts AJ (2014) An integrated analysis of match-related fatigue in professional rugby league. *Journal of Sports Sciences 1–9*

Kirkendal, D.R., Gruber, J., Johnson, R.E. (1987). *Measurement and Evaluation for Physical Educators*. Illinois: Human Kinetics Publishers.

Krustrup P, Mohr M, Amstrup T, Rysgaard T, Johansen J, Steensberg A, Pedersen PK, Bangsbo J (2003) *The yo-yo intermittent recovery test: physiological response, reliability, and validity.* Medicine and Science in Sports and Exercise 35:697–705

Lander J (1985) Maximum based on reps. *NSCA Journal 6:60–61*

Lemeire, E. (1995). *Cours de rugby*. Paris: Edition de Vecchi.

Lim E, Lay B, Dawson B, Wallman K, Aanderson S (2009) Development of a player impact ranking matrix in Super 14 rugby union. *International Journal of Performance Analysis in Sport 9:354–367*

Lim E, Lay B, Dawson B, Wallman K, Anderson S (2011) Predicting try scoring in super 14 rugby union the development of a superior attacking team scoring system. *International Journal of Performance Analysis in Sport 11:464–475*

Lopez V, Galano GJ, Black CM, Gupta AT, James DE, Kelleher KM, Allen AA (2012) Profile of an American amateur rugby union sevens series. *American Journal of Sports Medicine 40:179–184*

Lorentz, K. (1981). l*'agression une histoin naturelle du mal.* Paris: Editure Flamarion.

Los Arcos A, Yanci J, Mendiguchia J, Salinero JJ, Brughelli M, Castagna C (2014) Short-Term Training Effects of Vertically and Horizontally Oriented Exercises on Neuromuscular Performance in Professional Soccer Players. *International Journal of Sports Physiology and Performance 9:480–488*

Manno, R. (1996). *Baze teoretice ale antrenamentului sportiv*. SDP 371-374, CCPS. Bucureşti.

Manoileanu, D. (1979). *Rugby modern*. Bucureşti: Editura Sport-Turism.

Markovic G, Dizdar D, Jukic I, Cardinale M (2004) Reliability and factorial validity of squat and countermovement jump tests. *Journal of Strength and Conditioning Research 18:551–555*

Matneev, L.P., Novicon, A.D. (1980). *Teoria şi metodica educaţiei fizice.* Bucureşti: Editura Sport-Turism.

Mendiguchia J, Samozino P, Martinez-Ruiz E, Brughelli M, Schmikli S, Morin JB, Mendez-Villanueva A (2014) Progression of Mechanical Properties during On-field Sprint Running after Returning to Sports from a Hamstring Muscle Injury in Soccer Players. *International Journal of Sports Medicine*

Merriam-Webster's Collegiate Dictionary. (1998). Springfield: Massachusetts Merriam-Webster.

Merriam–Websters's Collegiate Dictionary Tenth Edition. (2000). Springfield: Merriam – Webster, Incorporated .

Mihalache, D., Cojocaru, M. şi colaboratorii. (1988). *Rugby – modelul de pregătire şi concurs. Sistemul unitar de norme şi cerinţe privind activitatea rugbystică de performanţă*. FRR

Monea, G., Bogdan, V. (1996). *Curs specializare atletism*. Cluj-Napoca: Editura ICPIAF.

Monea, Gh., Monea D. (2010). *Măsuri și evaluări în sportul de performanță.* Cluj-Napoca: Editura Risoprint

Monea, Gh., Monea D. (2010). *Selecția și orientarea în sportul de performanță*. Cluj-Napoca: Editura Risoprint.

Mooney M, Cormack S, O'Brien B, Coutts AJ (2013) Do physical capacity and interchange rest periods influence match exercise-intensity profile in Australian football? *International Journal of Sports Physiology and Performance 8:165– 172*

Mooney M, O'Brien B, Cormack S, Coutts A, Berry J, Young W (2011) The relationship between physical capacity and match performance in elite Australian football: a mediation approach. *Journal of Science and Medicine in Sport 14:447–452*

Morin J-B, Edouard P, Samozino P (2011) *Technical ability of force application as a determinant factor of sprint performance*. Medicine and Science in Sports and Exercise 43:1680–1688

Morin JB, Jeannin T, Chevallier B, Belli A (2006) Spring-mass model characteristics during sprint running: correlation with performance and fatigue-induced changes. *International Journal of Sports Medicine 27:158–165*

Morin J-B, Sève P (2011) Sprint running performance: comparison between treadmill and field conditions. *European Journal of Applied Physiology 111:1695–1703.*

Morrison, I. (1998). *Play the game – rugby union.* Londra: World Lock Book.

Niculescu, M. (2000). *Personalitatea sportivului de performanţă*. Bucureşti: Editura Didactică şi Pedagogică.

Niculescu, M. (2002). *Metodologia cercetării ştiinţifice în educaţie fizică şi sport*. Bucureşti: ANEFS.

Nirmalendran R, Ingle L (2010) *Detraining effect of the post-season on selected aerobic and anaerobic performance variables in national league rugby union players: A focus on positional status.* Medicina Sportiva 14:161–168

Norton K, Whittingham N, Carter L, Kerr D, Gore C, Marfell-Jones M (2004) *Measurement Techniques in Anthropometry*, in. Anthropometrica 25–75

Ortega E, Villarejo D, Palao JM (2009) Differences in game statistics between winning and losing rugby teams in the Six Nations Tournament. *Journal of Sports Science and Medicine 8:523–527*

Perini TA, Oliveira GL de, Ornellas JDS, Oliveira FP de (2005) Technical error of measurement in anthropometry. Revista Brasileira de Medicina do Esporte 11:81–85

Peyresblanques, M. (1992). *Rugby-entraînement technique et tactique*. Paris: Ed. Amphora SA.

Pharamin, F. (1996). *Rugby. Les regroupements*. Paris: În: Revue E.P.S., nr. 258.

Popa, G. (1984). *Teoria acţiunii şi logica formală*. Bucureşti: Editura ştiinţifică şi Enciclopedică.

Pyne DB, Saunders PU, Montgomery PG, Hewitt AJ, Sheehan K (2008) Relationships between repeated sprint testing, speed, and endurance. *Journal of Strength and Conditioning Research 22:1633–1637*

Quarrie KL, Handcock P, Waller AE, Chalmers DJ, Toomey MJ, Wilson BD (1995) The New Zealand rugby injury and performance project. III. Anthropometric and physical performance characteristics of players. *British Journal of Sports Medicine 29:263–270*

Quarrie KL, Hopkins WG (2007) Changes in player characteristics and match activities in Bledisloe Cup rugby union from 1972 to 2004. *Journal of Sports Sciences 25:895–903*

Quarrie KL, Hopkins WG, Anthony MJ, Gill ND (2013) Positional demands of international rugby union: Evaluation of player actions and movements. *Journal of Science and Medicine in Sport 16:353–359*

Ramsbottom R, Brewer J, Williams C (1988) A progressive shuttle run test to estimate maximal oxygen uptake. *British Journal of Sports Medicine 22:141– 144*

Randell AD, Cronin JB, Keogh JW, Gill ND (2010) Transference of strength and power adaptation to sports performance—horizontal and vertical force production. *Strength & Conditioning Journal 32:100–106*

Raţă, G., Raţă, B. (1999). *Aptitudinile motrice de bază – probleme teoretice*. Bacău: Editura Plumb.

Retier, D. (1998). *Les niveaux de jeu*, Paris: În: Revue EPS, nr. 271.

Rienzi E, Reilly T, Malkin C (1999) Investigation of anthropometric and work-rate profiles of Rugby Sevens players. *Journal of Sports Medicine and Physical Fitness 39:160*

Robbins DW, Young WB (2012) *Positional relationships between various sprint and jump abilities in elite American football players*. Journal of Strength and Conditioning Research 26:388–397

Roberts SP, Trewartha G, Higgitt RJ, El-Abd J, Stokes KA (2008) The physical demands of elite English rugby union. *Journal of Sports Sciences 26:825–833*

Roman, Gh. (2004). *Antrenamentul şi concepţia în sportul de performanţă*. Cluj-Napoca: Editura Star.

Ross A, Gill N, Cronin J (2014) *Defensive and attacking performance indicators in rugby sevens*. AUT University

Ross A, Gill N, Cronin J (2014*) Match analysis and player characteristics in rugby sevens.* Sports Medicine 44:357–367

Ross A, Gill N, Cronin J (2014) The match demands of international rugby sevens. *Journal of Sports Sciences 1–7*

Ross A, Gill N, Cronin J (2015) The relationship between physical characteristics and match performance in rugby sevens. *European Journal of Sport Science. In Press*

Ross A, Gill ND, Cronin JB (2014) A Comparison of the Match Demands of International and Provincial Rugby Sevens. *International Journal of Sports Physiology and Performance. In Press*

Ross A, Gill ND, Cronin JB (2014) Comparison of the Anthropometric and Physical Characteristics of International and Provincial Rugby Sevens Players. *International Journal of Sports Physiology and Performance. In Press*

Ross, D.W., Marfell-Jones, M. (1997). *Kinautropologia*. În: Testarea fiziologică a sportivilor de înaltă performanţă. Bucureşti: MTS-CCPS.

Rugby, Football, Union, (2002-2003), *Rugby continuum*

Sabău, I. (1997). *Aspecte noi şi contribuţii privind dezvoltarea forţei în probele de aruncări la atleţii de performanţă şi mare performanţă*. Bucureşti: Teză de doctorat.

Sabău, I. şi colaboratorii (2000). *Atletism – Tehnica şi metodica de învăţare rapidă cap. VII, Calităţi motrice*, Târgovişte: Editura Macarie.

Samozino P, Morin J-B, Dorel S, Slawinski J, Peyrot N, Saez de Veillarreal E, Rabita G A simple *Method for Measuring Power, Force, and Velocity Properties of Sprint Running.* In: International Society of Biomechanics Congress, Natal.

Samozino P, Rejc E, di Prampero PE, Belli A, Morin J-B (2012) *Optimal Force–Velocity Profile in Ballistic Movements—Altius.* Medicine and Science in Sports and Exercise 44:313–322

Santrock, J.W. (1992). *Life-Span Development*. Dubuque, Wm. C. Brown Publischers.

Seitz LB, Barr M, Haff GG (2014) Effects of Sprint Training With or Without Ball Carry in Elite Rugby Players. *International Journal of Sports Physiology and Performance. In Press*

Sirotic AC, Coutts AJ, Knowles H, Catterick C (2009) A comparison of match demands between elite and semi-elite rugby league competition. *Journal of Sports Sciences 27:203–211*

Smart D, Hopkins WG, Quarrie KL, Gill N (2014*)* The relationship between physical fitness and game behaviours in rugby union players. *European Journal of Sport Science 14:8–17*

Smart DJ, Hopkins WG, Gill ND (2013) Differences and changes in the physical characteristics of professional and amateur rugby union players. *The Journal of Strength & Conditioning Research 27:3033–3044*

Stoica, M. (2000). *Capacităţile motrice în atletism*. Bucureşti: Editura Printech.

Suarez-Arrones L, Arenas C, Lopez G, Requena B, Terrill O, Mendez-Villanueva A (2014)

Positional differences in match running performance and physical collisions in men rugby sevens. *International Journal of Sports Physiology and Performance 9:316–323*

Suarez-Arrones LJ, Nuñez FJ, Portillo J, Mendez-Villanueva A (2012) Running demands and heart rate responses in men Rugby Sevens. *Journal of Strength and Conditioning Research 26:3155–3159*

Suárez-Arrones LJ, Portillo LJ, González-Ravé JM, Muñoz VE, Sanchez F (2012) *Match running performance in Spanish elite male rugby union using global positioning system*. Isokinetics and Exercise Science 20:77–83

Şiclovan, I. (1984). *Teoria şi metodica antrenamentului sportiv*, Bucureşti: CNEFS.

Takahashi I, Umeda T, Mashiko T, Chinda D, Oyama T, Sugawara K, Nakaji S (2006) Effects of rugby sevens matches on human neutrophil-related non-specific immunity. *British Journal of Sports Medicine 41:13–18*

Taylor K-L, Cronin J, Gill ND, Chapman DW, Sheppard J (2010*)* Sources of variability in iso-inertial jump assessments. *International Journal of Sports Physiology and Performance 5:546–558*

Teodorescu, L. (1975). *Probleme de teorie şi metodică în jocurile sportive*. Bucureşti: Editura Sport-Turism.

Thomas, R. (1995). *Aptitudinile motrice. Teste şi măsurători pentru tinerii sportivi* SCJ nr. 100-101. Bucureşti: Editura MTS CCPS.

Thomas, R., Elache, J.P., Keller, J. (1995). *Aptitudinile motrice – structura şi evaluare*, Bucureşti: MTS-CCPS.

Thomas, R.J., Nelson, K.J.(1997). *Metodologia cercetării în activitatea fizică*. Bucureşti: CCPS-SDP.

Thompson, P.S.(1993). *Introducere în teoria antrenamentului*. Bucureşti: MTS – CCPS.

Tomlin DL, Wenger HA (2001) *The relationship between aerobic fitness and recovery from high intensity intermittent exercise*. Sports Medicine 31:1–11

Tong RJ, Mayes R (1995) The effect of pre-season training on the physiological characteristics of international rugby players. *Journal of Sports Sciences 13:507*

Tudor, V. (1999). *Capacităţile condiţionale, coordonative şi intermediare – Componente ale capacităţilor motrice*. Bucureşti: Imprimeria Coresi.

Tudor, V. (2005). *Măsurarea şi evaluarea în cultură fizică şi sport*. Buzău: Editura Alpha.

van Rooyen M, Yasin N, Viljoen W (2014) Characteristics of an " effective"tackle outcome in Six Nations rugby. *European Journal of Sports Science 14: 123-129.*

van Rooyen MK, Lombard C, Noakes TD (2008) Playing demands of sevens rugby during the 2005 Rugby World Cup Sevens Tournament. International Journal of Performance Analysis in Sport 8:114–123

Veale JP, Pearce AJ, Carlson JS (2010) The Yo-Yo Intermittent Recovery Test (Level 1) to discriminate elite junior Australian football players. *Journal of Science and Medicine in Sport 13:329–331*

Verhosanski, I. (2001). *Rolul pregătirii fizice speciale în cadrul sistemului de antrenament al sportivilor de mare performanţă în: Formele solicitărilor motrice şi antrenarea lor în reglarea conduitei motrice*. Bucureşti: SP nr.442, XII.

Vlak, T., Pivalika, D. (2004*).* Handball:The Beautyof the Best, *Croatian Medical Journal, 45(5), pp. 526-530.*

Waldron M, Worsfold P, Twist C, Lamb K (2011) Concurrent validity and test– retest reliability of a global positioning system (GPS) and timing gates to assess sprint performance variables. *Journal of Sports Sciences 29:1613–1619*

Waldron M, Worsfold PR, Twist C, Lamb K (2014) The relationship between physical abilities, ball-carrying and tackling among elite youth rugby league players. *Journal of Sports Sciences 32:542–549*

Weineck, J. (1997). *Manuel d'entraînement, 4 e edition*. Paris: Editura Vigot.

West DJ, Cook CJ, Beaven MC, Kilduff LP (2014) The influence of the time of day on core temperature and lower body power output in elite rugby union sevens players. *Journal of Strength and Conditioning Research 28:1524–1528*

West DJ, Cook CJ, Stokes KA, Atkinson P, Drawer S, Bracken RM, Kilduff LP (2014) Profiling the time-course changes in neuromuscular function and muscle damage over two consecutive tournament stages in elite rugby sevens players. *Journal of Science and Medicine in Sport 17: 688-692.*

West DJ, Cunningham DJ, Bracken RM, Bevan HR, Crewther BT, Cook CJ, Kilduff LP (2013) Effects of Resisted Sprint Training on Acceleration in Professional Rugby Union Players. *The Journal of Strength & Conditioning Research 27:1014–1018*

Wheeler K, Sayers M (2009) Contact skills predicting tackle-breaks in rugby union. *International Journal of Sports Science and Coaching 4:535–544*

Wheeler KW, Askew CD, Sayers MG (2010) Effective attacking strategies in rugby union. *European Journal of Sport Science 10:237–242*

Wilson, G.J., Murphy, A.J., Walshe, A.D. (1997). *Beneficiile antrenamentului pliometric şi de forţă asupra performanţei: influenţa nivelului iniţial de forţă*. În: Rev. "Coaching and sport science journal". Roma: Editura Societa Stampa Sportiva.

Wolgh, B. (1999). *Antrenamentul de forţă în rugby*. Bucureşti: Editura Fest.

Young W, Russell A, Burge P, Clarke A, Cormack S, Stewart G (2008) The use of sprint tests for assessment of speed qualities of elite Australian rules footballers. *International Journal of Sports Physiology and Performance 3:199– 206*

Young WB, Newton RU, Doyle TLA, Chapman D, Cormack S, Stewart G, Dawson B (2005) Physiological and anthropometric characteristics of starters and non-starters and playing positions in elite Australian Rules Football: a case study. *Journal of Science and Medicine in Sport 8:333–345*

Young WB, Pryor L (2007) Relationship between pre-season anthropometric and fitness measures and indicators of playing performance in elite junior Australian Rules football. *Journal of Science and Medicine in Sport 10:110– 118*

Zamfir, Gh., Roman, Gh., Chihaia, O. (2004). *Educaţie fizică şi sport*. Profil universitar, Cluj-Napoca: Ed. Napoca.

Zaţiorski, V. (1968). *Calităţi fizice ale sportivului.* ICF, fond didactic, Bucureşti.