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INFLUENCE OF SELECTED KINETIC PARAMETERS IN FEMALE POLE VAULT ON SPORT PERFORMANCE

KRSKA PETER[1], SEDLACEK JAROMIR[1*], KOSTIAL JAN[1]

ABSTRACT. Pole vault is the only athletic event in which the performance is reached with use of tool. From the point of technique it is considered like complex athletic event. The movement activity is realized in two basic parts; the first is approach ended with take-off and the second are movements of jumper on the pole. In the contribution we try to reveal hierarchy of kinetic parameters of competitive movement activity and their influence on the level of female pole vault sport performance. There are involved 19 female pole vault jumpers with sport performance 380 – 483 cm, divided on 2 different groups from the point of sport performance level (lower sport performance group and higher sport performance group). In this contribution are used logical methods, mostly analyse, comparison and induction. Differences between those two groups are mostly found in speed and angles parameters during pole vault jumping. Group of higher sport performance level loses less of horizontal speed of centre of gravity and of higher arm grip in phase of take-off and keep higher vertical speed of centre of gravity in phases end of the extension with turn and in end of the lift. Jumpers of higher performance level reached more favourable values also in some angle parameters; it was mostly in angle of take-off tread-down, climbing angle and angle between fore arm of lower upper extremity with the pole at moment of take-off end. In the work on pole we also found between our groups in watched angle parameters significant differences. In the group of female lower performance level jumpers comes to considerable centre of gravity body move away from extension axis. Too great centre of gravity move away at extension end is the course of minimal, resp. zero growths on maximal centre of gravity height during last phase of jump. Found differences in speed and angle parameters in female pole vault jumping manifest better mastering of movement activity mainly in phases take-off and in work on pole of higher level sport performance group. Presented differences of these two watched groups of female pole-vaulters show on possibilities and training orientation for further performance increase.

Keywords: *female, pole-vault, kinematic parameters, speed, angles*

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Introduction

Pole vault is the only athletic event in which is result reached with the help of tool. This pole use courses its withdrawal far from any fundamental locomotion and classifies it among complex athletic events. Movement activity of it is performed in two basic parts. First is an approach finished by take-off and second is a phase of actual jump – activity of jumper on pole. An approach has cycle movement structure and it is affected by handling and bearing of pole by both upper extremities with pole transmission at the end of approach. Movements on pole have on the contrary acyclic character and represent structure of forward movements in frontal and vice versa position at parallel rotations round horizontal and also vertical body axes and round the pole performed in optimal time sequence – rhythm.

Sport performance in pole vault depends on a reach height of the centre of gravity of pole vault jumper body during the jump and on the economy over the bar transition.

Very important precondition for high performance result is to reach during approach as high velocity as possible, mainly at the end of approach and finish this approach with explosive take-off and with rational transition on the pole. McGinnise (1997) proves that take-off effectiveness is manifested in holding or even in increase of kinetic energy gained with approach. Approach velocity and take-off form kinetic energy which pole-vaulter by exact and energy planting the pole in the take-off box transmits on the pole. At take-off moment the pole starts to bend and thus is shortened the distance between grip and the end of the pole. Pole elasticity thus enables actually to pass easier and faster through vertical line and this also enables to have higher grip on the pole. The pole in the phase of bending cumulate kinetic energy and at period of straightening phase returns it at vertical centre of gravity acceleration of pole-vaulter. At time of pole straightening is important active muscle pole-vaulter work, for direction of catapulting must be the same with direction of the pole-vaulter centre of gravity; otherwise it comes to force breakdown and it courses loss of peak height of the centre of gravity (CGv). The pole-vaulter by his activity on the pole influences common movement rhythm of movement; through his adequate activity on pole can be increased vertical centre of gravity peak.

For technique evaluation we need biomechanics analyse in order to evaluate more precisely technique of movements, enables to identify differences from ideal technique model and thus even form orientation its further improvement. At sportsmen technique evaluation we start from mechanic phenomena that are in biomechanics called biomechanical characteristics. These phenomena make sportsman movement technique more concrete in its

kinetic and dynamic manifestation and they can be measured and evaluated. The more complex movement activity is, the more needed and helpful can biomechanical analyse be.

Kinematical analyse enables to learn movement activity character and thus is formed prerequisite for following movement rationalization. Lately took care with kinematical analyse use of competitive movement activity in athletic events several authors (Bojko & Nikonov, 1989; McGinnis, 1997; Grabner, 1997; Varga, 1997; Krška & Koštial, 2000; Koštial & Dremmelová, 2001; Krska, 2008); they show mostly on its contribution on training process improvement.

In the sport performance structure of female pole-vaulters those speed and angle characteristics (fig 1) of movement activity play very important roles (Krška, 2008).

Objectives

Aim of this contribution is to analyse course of horizontal and vertical centre of gravity speed and to select angle characteristics of competitive female pole vault-jumpers movement activity and reveal their influence on sport performance level.

Tasks:

1. Realise kinematic analyse of jumps of watched female pole vault jumpers,
2. From the hierarchy of sport performance structure model (Krška, 2008) select positions of proper speed and angle characteristics,
3. Analyse and compare gained kinetic parameters of female pole-vaulters of different sport performance levels and try to explain their mutual relations and their influence on the level of sport performance.

Material and methods

This research was performed in 2004 - 2006 on the meetings Golden spiked shoes in Ostrava, Czech Republic. Kinetic parameters were gained by two-dimension analyser Consport Motion Analysis System (CMAS). There are involved 19 female pole-vaulters with the sport performance 380 – 483 cm. All watched top-level female pole-vaulters (group S) were divided on 2 smaller groups; lower sport performance group (S1) and higher sport performance group (S2). In this contribution are used logical methods, mostly analyse, comparison and induction.

Results and discussion

Fundamental statistical characteristics of our female pole-vaulters can be seen in tables 1, 2 and 3. Figure 1 shows us the hierarchy of sport performance structure of female pole vault with mutual relations of watched speed and angle parameters within single factor levels.

Speed parameters

Graphical courses of watched vertical and horizontal speed parameters can be seen in figures 2, 3 and 4.

Average horizontal centre of gravity (CGv) speed of our female pole-vaulters at the beginning of last step reached 7.27 $m.s^{-1}$ (fig 2). At the first touchdown moment of take-off the velocity even slightly increases on average value 7.46 $m.s^{-1}$. The fastest (8.48 $m.s^{-1}$) is always the one with the best sport performance result, S.D. (483 cm). During take-off reached pole-vaulters average loss of velocity 1.02 $m.s^{-1}$. Better value about technique effectiveness seems to be percentage loss of vertical CGv speed during take-off; average value is minus 13.4 % from the velocity reached during approach. After transmission on pole we can watch relatively high values of CGv horizontal speed at moment of end of hanging position (average value is 6.00 $m.s^{-1}$). At the moment of the end of swing up we watch their average velocity on the level 4.09 $m.s^{-1}$.

Like supported parameter of pole-vaulter transmission on pole we watched horizontal speed at the point of upper arm grip that during take-off suddenly decrease of 3.56 $m.s^{-1}$ (fig 3). This average loss in percentage is 49.4 %.

During pole-vaulter activity on pole is important gained vertical CGv speed (fig 4). First values are registered after the end of take-off when average vertical CGv speed reaches average value 1.20 $m.s^{-1}$. During following phases of hanging position, swing up and roll this value changes only slightly and have oscillating character. Considerable growth of vertical speed of the CGv can be watched after beginning of pole extension. After the end of extension phase, pole-vaulters reach an average value 3.51 $m.s^{-1}$. At the moment of peak height, the average vertical speed value is on the level 3.16 $m.s^{-1}$.

The average horizontal CGv speed of higher sport performance pole-vaulters (S2) slightly overreaches values reached by pole-vaulters of lower sport performance (S1). The highest difference can be watched at the moment of take-off end (average is 0.62 $m.s^{-1}$), when pole-vaulters S2 lost from horizontal CGv speed during transmission on pole only 0.74 $m.s^{-1}$, while S1 lost 1.33 $m.s^{-1}$ (fig 2).

Similar course with only slightly different values can be watched (fig 3) also at horizontal speed of upper arm grip. The most comprehensive difference between our groups are watched at moment of the end of take-off (difference is

1.41 $m.s^{-1}$), when in group S2 we watched average speed 4.28 $m.s^{-1}$ and in group S1 2.87 $m.s^{-1}$. The difference at speed loss of upper arm grip during the whole take-off period is even slightly higher and represents average value 1.57 $m.s^{-1}$.

Higher values of vertical CGv speed we found in the group of higher sport performance level (S2). The group of lower sport performance level (S1) reached higher velocity only at moment of hanging position (difference plus 0.40 $m.s^{-1}$) that we consider like not effective (fig 4). Significant difference in average value it is 0.72 $m.s^{-1}$ in favour of S2 group that can be watched at the end of roll and 0.56 $m.s^{-1}$ at the end of extension that shows on better work on pole of higher sport performance pole-vaulters (S2).

Angle parameters

In fig 1 we can see an importance of angle parameters in sport performance pole vault structure. From this point the decisive are operating angle and climb angle (u54 and u55); other 4 parameters (u52, u53, u56 and u57) belong to supported substructure factors. Positive influence on the 1st performance factor level we stay at operating angle of take-off on clean grip height (parameter of condition character) and at climb angle of the CGv in standing over (peak height) that is parameter of technique character). Mutual comparison of our watched groups S1 and S2 can be seen graphically in figures 5, 6, 7.

Average values of selected angle characteristics learned during take-off activity differ only slightly (fig 5). At tread-down of take-off angle we watch more active take-off action by higher performance jumpers S2 (71.90^0) comparing with lower performance group S1 (68.60^0). Following take-off angle is at higher performance group (S2) lower of 3.70^0 like at jumpers S1; this shows on more effective take-off end connected with better pole squeeze. Average value of operating angle is in both groups very similar – 34.4^0 at S1 and 34.8^0 at S2. Lower average climb angle at S2 like at S1 also shows on better transition on pole in the group of higher sport performance female jumpers.

During quality evaluation of transition on pole of female jumpers we watched position (angle) of forearm of lower upper extremity to the pole (fig 6). At take-off end we found in the group S1 angle 121.70^0 and in S2 103.30^0; it shows on better arms position in the group of higher sport performance female jumpers. At the end of following phase of hanging position we watch in the group S1 slight improvement of lower arm work and angle decrease of 1.80^0 on 119.90^0. On the contrary in the group S2 we found slight angle increase of 4.30^0 on 107.60^0; in spite of this decrease of difference it this proper arm position between our groups, we still consider our group S2 in this angle significantly better like it is in S1 (difference 12.30^0).

Effectiveness of activity on pole of female jumpers can be also estimated by watching of body position from vertical line on the surface during phases of pole extension (fig 7). In the first comparison in the moment of extension phase end we watch at female jumpers S1 angle 26.90^0 and in S2 more favourable angle 16.50^0. During phase extension with turn happens in both groups to move away of the CGv from the pole. Average angle increase in S1 is 24.70^0 and it represents its growth on 51.60% and in S2 is increase on 16.40^0 and it means its increase on 32.90%. At the end of lift when female jumpers leave pole and they get into last phase of bar clearance we watch significant angle growth that confirm move away of the centre of gravity from the pole. In S1 it is in average 80.00^0 and in S2 it is 65.80^0. These reached values are courses of unwanted low resp. zero increase in the height of the CGv during last phase of the jump.

Tab 1. Statistical characteristics of kinetic parameters of the whole group **S**, sport performance 380-483 cm (S, n = 19)

Parameter (u)		[unit]	x	x_{max}	x_{min}	s
u1	Maximal centre of gravity height	[cm]	448,03	490,50	408,10	23,07
u2	Absolute height of upper arm grip	[cm]	403,11	420,00	385,00	10,86
u3	Standing over (peak height)	[cm]	44,92	70,50	11,20	16,24

Tab 2. Statistical characteristics of kinetic parameters of the lower sport performance group **S1**, with sport performance 380-430 cm (S1, n = 9)

Parameter (u)		[unit]	x	x_{max}	x_{min}	s
u1	Maximal centre of gravity height	[cm]	428,36	441,14	408,10	12,28
u2	Absolute height of upper arm grip	[cm]	395,89	406,00	385,00	6,81
u3	Standing over (peak height)	[cm]	32,47	49,10	11,20	10,83

Tab 3. Statistical characteristics of kinetic parameters of the higher sport performance group **S2**, with sport performance 440-483 cm (S2, n = 10)

Parameter (u)		[unit]	x	x_{max}	x_{min}	s
u1	Maximal centre of gravity height	[cm]	465,73	490,50	449,30	13,98
u2	Absolute height of upper arm grip	[cm]	409,60	420,00	395,00	9,79
u3	Standing over (peak height)	[cm]	56,13	70,50	33,30	11,35

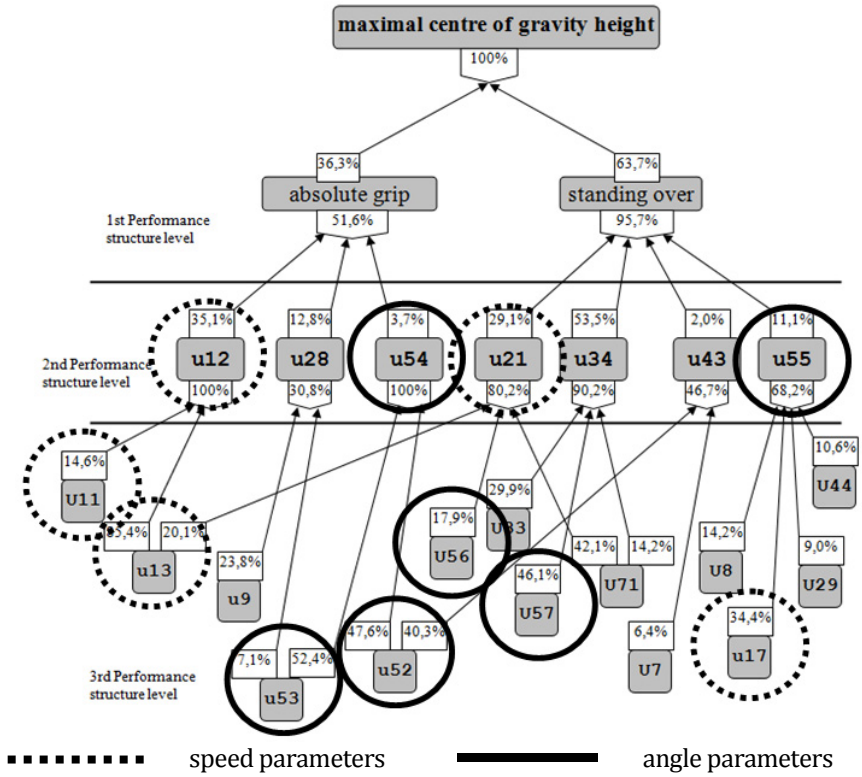

Fig 1. Relations and quantifications of parameters in female pole vault sport performance structure with regard of speed and angle parameters (Krška, 2008)

Legend:

Horizontal speed of centre of gravity at moment	
u11	tread-down of take-off
u12	end of take-off
u13	speed lost during take-off
Vertical speed of centre of gravity at the end of moment	
u17	end of hanging position
u21	end of extension with turn
Angle Parameters (u)	
u52	angle of tread-down of take-off
u53	angle of take-off
u54	operating angle
u55	climb angle
u56	angle between body and vertical line at moment of extension end
u57	angle between body and vertical line at end moment of swing-up with turn

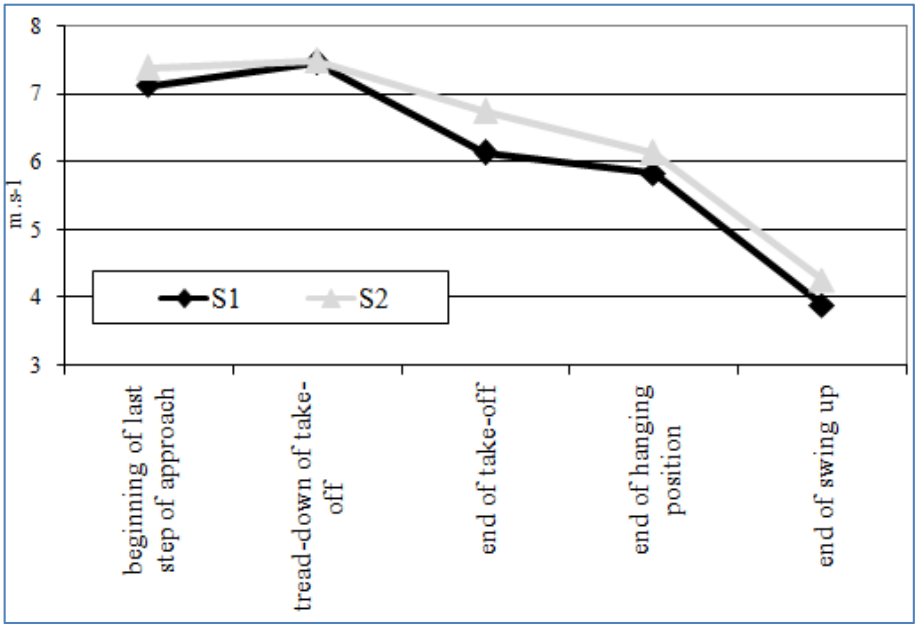

Fig. 2. Course comparison of horizontal speed of centre of gravity

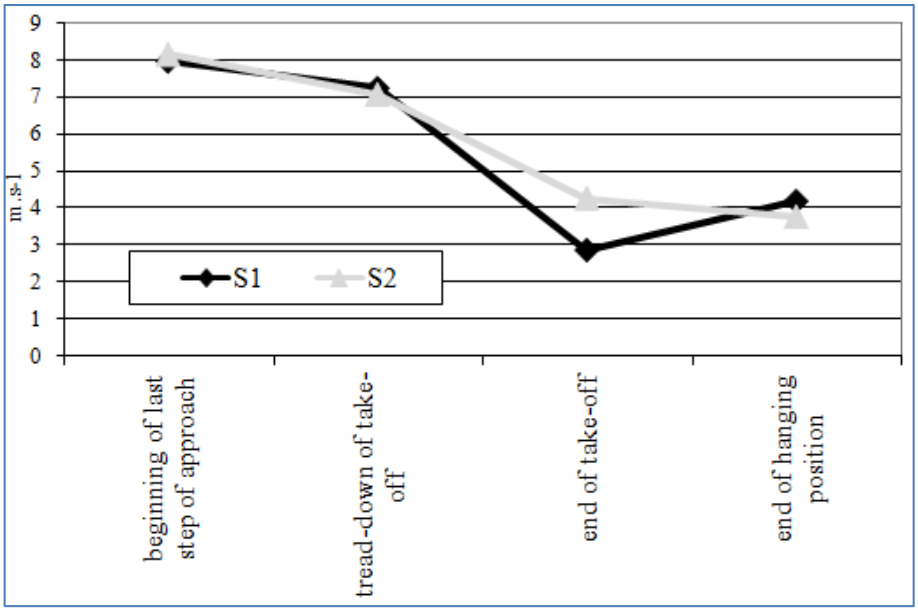

Fig. 3. Course comparison of horizontal point speed of higher arm grip

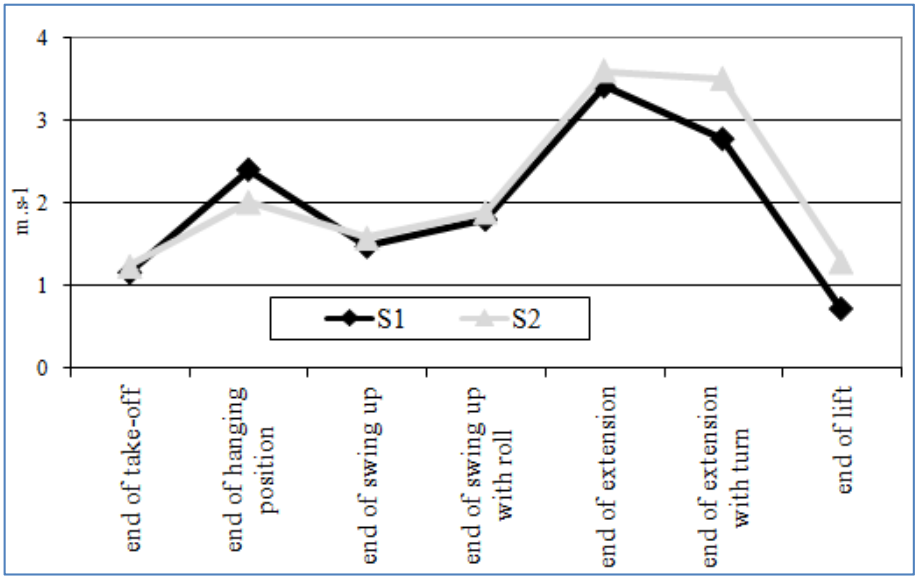

Fig. 4. Course comparison of vertical speed of centre of gravity

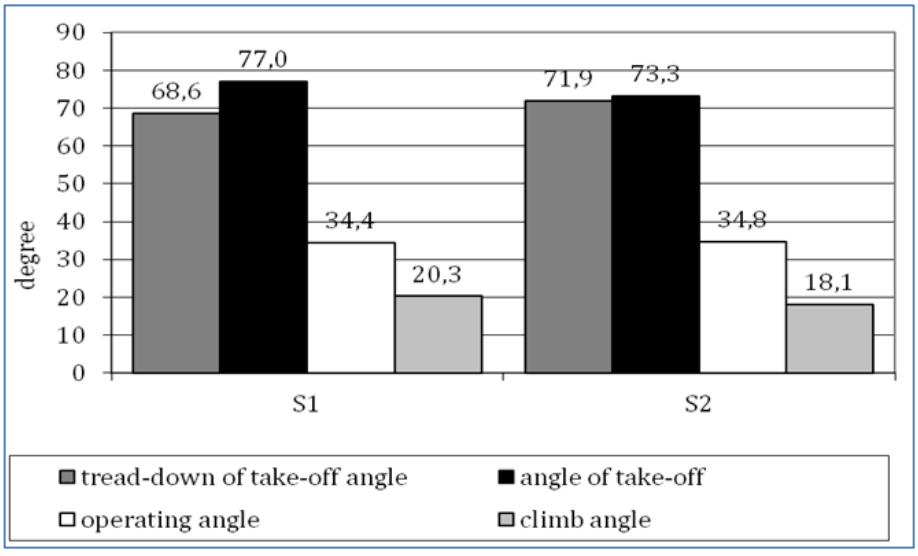

Fig 5. Angle comparisson during contact phase of take-off in groups of female pole-vaulters

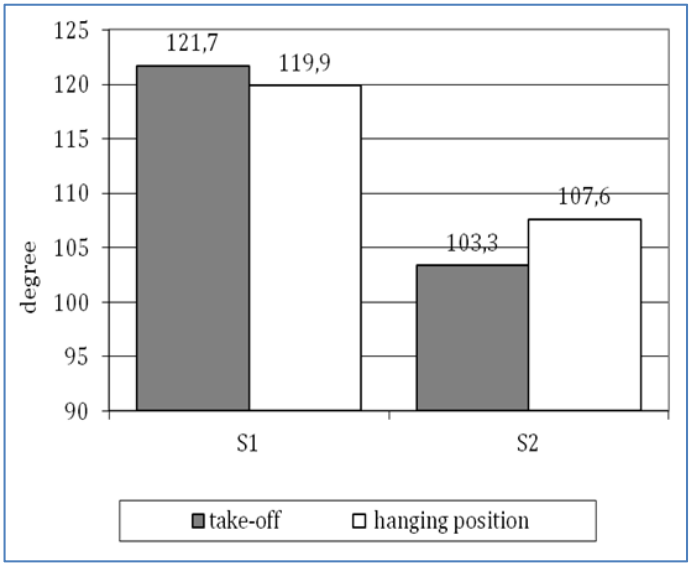

Fig 6. Angles comparison between fore-arm of lower upper extremity and pole at moment of end of take-off and hanging position phases in female jumpers

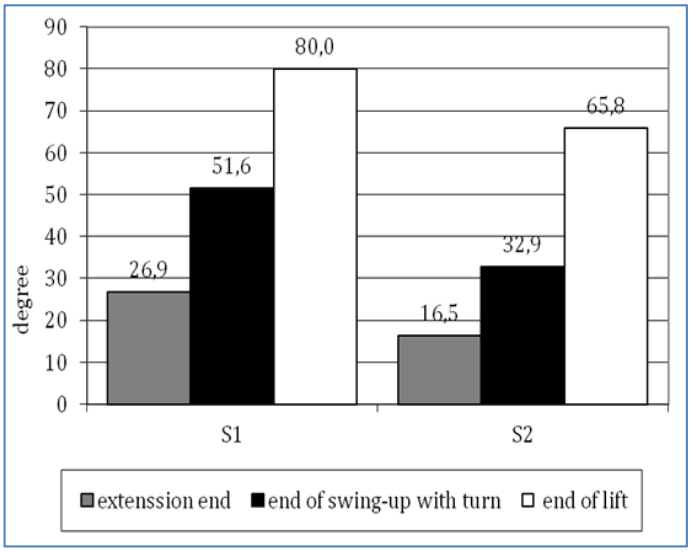

Fig 7. Body angles comparisson to vertical line on surface at finishing of selected phases

Conclusions

1. Our group of higher sport performance level reached in phase transmission on pole favourable values in horizontal centre of gravity speed at moment of the end of take-off and parallel watched loss during take-off phase and in angles of take-off tread-down, climb angle and angle between fore-arm of lower upper extremity with the pole at take-off moment end.

2. Better activity on pole of again higher sport performance pole-vaulters is manifested by higher vertical speed at the end of phases of extension with turn and lift. In the group of female lower performance jumpers comes to considerable centre of gravity body move away from vertical axis; thus angles between body and vertical line at phases extension, extension with turn and lift are too great and centre of gravity moves away from vertical axis and it results to minimal, resp. zero growths of centre of gravity height during last phase of jump.

There are two speed parameters (horizontal CGv velocity at the end of take-off and vertical CGv speed at the end of extension with turn) and two angle parameters (angle in take-off and climb angle of CGv) that influence directly parameters on the 1st sport performance factor level which are of condition resp. technique character.

Effective transmission on pole is enabled and mostly characterised by:
Speed parameters:
1. Horizontal CGv speed at moment of the end of take-off,
2. Velocity loss during take-off phase.
Angle parameters:
1. Operating angle in take-off,
2. Climb angle of centre of gravity,
3. Angle of take-off tread-down,
4. Angle between fore-arm of lower upper extremity with pole at moment of take-off end.

Effective work on pole is conditioned and characterized by these parameters:
Speed parameters:
1. Vertical speed at the end of phases of roll,
2. Vertical speed at the end of extension with turn.
Angle parameters:
1. Angle between fore-arm of lower upper extremity and pole at moment of hanging position end,
2. Angle between body and vertical line at moment of extension end,
3. Angle between body and vertical line at end moment of swing-up with turn,
4. Angle between body and vertical line at end moment of lift.

Found differences in speed and angle parameters between those two sport performance different level groups enable us to evaluate precisely individual female pole vault technique with further technique training specification and final sport performance level improvement.

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THE ROLE OF THE FUNCTIONAL TRAINING IN OPTIMISING THE MOTRIC CAPACITY OF JUNIOR FEMALE TEAMS I-VOLLEYBALL

CIULEA LAURA[1*], SZABO BARNA[1]

ABSTRACT. Premises: The recent trends on obtaining high quality technical executions in female volleyball players, junior I, requires besides the technical and tactical component, a great physical condition is the base of the athletes performance and efficiency (on the field). Concerning the junior I level, volleyball, the first important component is the physical training to create the motor and functional support in order to sustain the effort which is specific for this sport. Sports performance requires new adaptations to the programmes, innovative methods that can be adapted to the sports games. Because of a high level of the game and an international level of physical training, but a low level of training in the domestic area, both concerning the level of the game and the player's physical training, it's compulsory to modify the physical training programmes since early junior ship. Functional training programmes have as a main aim the optimization of the physical and functional capacity of the athletes, but also the prevention and rehabilitation of injuries. **Objective:** To emphasize the importance of the functional training in optimizing the physical capacity of the volleyball players, juniors I. **Methods:** The research was performed over a period of 11 months (July 2013 to May 2014), during the National Volleyball Championship, edition 2013-2014, juniors, and it comprised 2 groups: the experimental group of 12 junior I volleyball players from CSU Medicine CNUE Tg. Mures and a control group of volleyball players from ACS Provolei Tg. Mures juniors I. At the beginning of the training period (July) were performed the initial size tests concerning body mass index, and as physical tests, were performed tests as: vertical jump test with one hand, front flexibility test and abdominal strength. Before starting the final tournament, in May 2013, were performed the final tests. **Conclusions:** The functional training had a better influence on the physical training of the volleyball players belonging to the experimental group compared to the ones from the control group.

Keywords: *functional training, motric capacity, method, volleyball, optimization*

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REZUMAT. ***Rolul antrenamentului funcţional în optimizarea capacităţii motrice a echipelor de junioare I – volei.*** **Premise:** Tendinţele din ultima perioada privind obţinerea unor execuţii tehnice de mare calitate la nivelul jucătoarelor de volei, junioare I, necesită pe langă componenta tehnico-tactică, o bună pregătire fizică care se constituie în baza de susţinere a prestaţiei şi eficienţiei jucătoarelor. La nivelul junioarelor I, volei, prima componentă pe care se pune accentul este reprezentată de pregătirea fizică pentru a crea suportul motrico-funcţional care să susţină efortul specific acestui sport. Performanţa sportivă solicită noi adaptări la programele, metodele şi mijloacele de acţionare inovative care se pot adapta jocurilor sportive. Datorită nivelului de joc ridicat şi a pregătirii fizice superioare la nivel internaţional, şi a nivelului scazut pe plan intern, atât în ceea ce priveşte nivelul de joc, cât şi în ceea ce priveşte pregătirea fizică a jucătoarelor, se impune modificarea planurilor de pregătire fizică încă de la nivelul junioarelor I. Programele de functional training (antrenament funcţional) au ca obiectiv principal optimizarea capacităţii fizice şi funcţionale a sportivilor, dar şi de prevenire şi reabilitare după accidente suferite. **Obiectiv:** Cercetarea îşi propune evidenţierea rolului antrenamentului funcţional în optimizarea capacităţii fizice a jucătoarelor de volei, junioare I. **Metode:** cercetarea s-a efectuat pe o perioadă de 11 luni (iulie 2013 - mai 2014), de-a lungul Campionatului Naţional de Volei ediţia 2013-2014, junioare şi a cuprins 2 grupe: grupa experiment formată din 12 voleibaliste junioare I în cadrul CSU Medicina CNUE Tg-Mureş şi grupa control, compusă din voleibalistele de ACS Provolei Tg-Mureş. La începutul perioadei de pregătire (luna iulie) s-au efectuat testările iniţiale privind indicele de masă corporală, iar ca teste fizice au fost utiliazate: proba de săritură pe verticală cu elan, cu o mână; proba de flexibilitate frontală; forţa abdominală. Înainte de începerea turneului final, mai 2013, au fost efectuate testările finale. **Concluzii**: antrenamentul functional a avut o influenţă mai bună asupra pregătirii fizice a jucătoarelor de volei din cadrul grupei experiment, comparativ cu grupa control.

Cuvinte cheie: *antrenament funcţional, capacitate motrică, metodă, volei, optimizare*

Introduction

”The motric capacity/motor skill is the totality of natural and acquired motric possibilities, whereby is possible to achieve a variety of efforts as structure and dosage.” (According to “Terminologia educatiei fizice si sportului, 1978, quoted by Dragnea & Bota, 1999, p. 41)

Dragnea & Bota (1999, p. 44) consider that “motor skill is a complex of mostly motric manifestations (movements) (skills and abilities), conditioned by the development level of the motor skill, by the morpho-functional index, by the

mental processes (cognitive, affective, motivational) and by the biochemical and metabolic processes; all these summed up, correlated and mutually conditioned, will have as a result the efficient performing of the actions required by the specific conditions in which the motor skill will be performed."

The authors Pailjous & Bonnard (1999) quoted by Epuran (2005), state that generally and restrictedly "motor skill designates a function that indicates the relationship with the environment and it has as peripheral support the skeletal muscles".

The essential philosophy of volleyball consists of "do not make only mistakes in the own court, but to win everything that's played towards/or in the opponent's court" (Mârza, 2006, p. 66).

The particularity of the volleyball game is given by the following essential characteristics (Bădău & Tănase, 2006, p. 12):

- Volleyball is a game that can be performed by all age groups (children, teenagers, adults), in an organized way or as extracurricular activities;
- Volleyball can be performed as a recreational, hygienic and compensatory activity;
- The effort that is specific to the volleyball game has a variable intensity, depending on age, physical training level and technicality level;
- Volleyball game needs a good multilateral training due to the several jumps and acrobatic procedures performed during the game, as well as of the attack and service hits, both requiring force and precision.

Professional volleyball players concluded that sports training should use the scientific progresses of the researches and should undergo to some rational principles. This is because modern training became a science, due to the fact that more and more specialists are interested to know the training process in order to improve it. Regardless of the surface on which is performed (court or sand), volleyball contributes to the development of motor skills and also to the formation of driving skills, thus, having an important role in motility.

The analysis of the volleyball game performed by junior female players reveals that the physical training programmes are outdated and they are no longer available for the requirements of the game nowadays.

The specific physical training has a "content mainly oriented towards the development of capacity concerning the specific effort in sports, as well as towards the combined qualities that determine a specific superior efficiency" (Teodorescu, 2009, p.150).

Training a team of female junior players must rely on a well organized and planned programme with a very good knowledge of all the factors that are involved in the game, thus contributing to the formation of the valuable players.

The trainers who work with juniors must ensure their development to the highest level of the motor and technical potential. The first concern should be to create a multilateral training base for the first stage of the volleyball training (beginners-advanced), a base that contributes to the formation of a motric (motor foundation) specific to the game's requirements, this being a major concern in sports specialization (cadets-juniors).

Bădău & Tănase (2006, p. 112) state that "the specific physical training represents a selective process of the motricity and of the body's function in accordance with the specific effort and with the highest requirements of the volleyball game."

Aerobics, borrowing means of action specific to fitness, managed to create an optimal combination which is called functional training and whose main objective is to optimize the motric and functional capabilities of those who practice it.

Functional training is a reinterpretation of the traditional training methods and it implies the relinquishment of fixed equipment and heavyweights (Cannone, 2007).

Functional training, considered the new trend in fitness, implies simple, natural moves which are performed on a daily basis.

The exercises that compose a functional training programme aim at a large variety of muscle groups. This offers muscular stability and, at the same time, reduces the possibility of injuries in athletes and increases the effort capabilities of the individual.

Materials and Methods

The research was conducted over a period of 11 months (July 2013-May 2014), during the 2013-2014 edition of the National Volleyball Championship junior I, on a sample of 14 players, divided into two groups: experimental and control. The players in the experimental group were trained using specific means of functional training and control group athletes were trained by conventional means.

During the pre-competitive period athletes in the experimental group were trained exclusively on functional training programs, so that during the competitive period to introduce during the last 20 minutes of training functional training-specific circuits.

Research sample included a total of 24 athletes, junior I, aged between 16 and 18 years. The experimental group was composed of 12 athletes, player of CSU Medicine CNUE Tg - Mures, and the 12 athletes from the control group are part of the CSS team Blaj (the same age as subjects from the experimental group).

The methods used in this research were: methods of data collection: bibliographic study, experiment, test.

Results and discussions

The first measurements in this research were designed as anthropometric measurements: body mass index (BMI).

Table 1. Results of BMI

ID.	Experimental group	TI	TF	Control group	TI	TF
1.	A.C	21,0	20,15	M.A.	19,94	19,94
2.	F.O.	20,1	20,15	P.O.	21,60	21,37
3.	L.M.	20,6	20,09	H.A.	21,13	20,60
4.	L.R.	20,3	19,97	C.R.	20,83	20,60
5.	S.T.	20,1	19,81	T.A.	20,52	20,09
6.	J.P.	20,6	20,38	D.A.	20,20	19,96
7.	C.I.	21,0	20,76	B.R.	20,99	20,68
8.	S.C.	20,6	19,79	N.A.	21,20	21,20
9.	B.R.	21,4	20,83	F.A.	20,37	20,15
10.	C.L.	19,4	18,51	C.O.	18,72	18,72
11.	M.C.	19,6	19,59	K.R.	19,82	19,27
12.	S.I	20,2	19,94	D.E.	20,68	20,23

Table 2. Statistical indicators for BMI

Groups	Statistical markers / Testing	X	S	CV	t-Student	P (dif. Tf & TI)
Experimental	Ti	20,40	0,60	2,71	0,58	0.0009
	Tf	20,0	0,57	2,85	0,59	
Control	Ti	20,50	0,74	3,59	0,77	0.0007
	Tf	20,23	0,71	3,52	0,74	

Physical tests:

1. Vertical jump test with one hand

Table 3. Summary results on vertical jump test with one hand

No.	Experimental group initials	TI (m)	TF (m)	Control group initials	TI (m)	TF (m)
1	A.C	2,68	2,7	M.A.	2,42	2,42
2	F.O.	2,81	2,85	P.O.	2,59	2,6
3	L.M.	2,72	2,74	H.A.	2,81	2,83
4	L.R.	2,75	2,79	C.R.	2,71	2,71
5	S.T.	2,78	2,83	T.A.	2,74	2,74
6	J.P.	2,81	2,84	D.A.	2,56	2,57
7	C.I.	2,86	2,9	B.R.	2,83	2,84
8	S.C.	2,62	2,66	N.A.	2,58	2,59
9	B.R.	2,45	2,47	F.A.	2,62	2,64
10	C.L.	2,51	2,55	C.O.	2,82	2,85
11	M.C.	2,52	2,55	K.R.	2,55	2,56
12	S.I	2,58	2,63	D.E.	2,59	2,6

Table 4. Statistical indicators for Vertical jump

Groups	Statistical markers / Tests	X	S	t-Student	P (diff. Tf & TI)
Experimental group	Ti	2,67±4,86	0,13	0,135	0,001
	Tf	2,70±4,90	0,13	0,138	
Control group	Ti	2,65±4,65	0,12	0,128	0,0016
	Tf	2,66±4,78	0,12	0,132	

The experimental group because the exercise program used, there was an increase in the arithmetic mean between the two assays of 0.03 cm, resulting from the initial average value of 2.67 m, and final testing of 2.70 m.

In the control group, progress was less than the initial value of the mean was 2.65 and the final value of 2.66 units.

2. Frontal flexibility

Table 5. Results from frontal flexibility test

No.	Initials Experimental group	Ti	Tf	Initials Control group	Ti	Tf
1	A.C	9	11	M.A.	11	12
2	F.O.	7	9	P.O.	9	11
3	L.M.	7	8	H.A.	7	9
4	L.R.	8	10	C.R.	7	8
5	S.T.	11	13	T.A.	8	8
6	J.P.	10	11	D.A.	8	9
7	C.I.	9	12	B.R.	9	10
8	S.C.	7	9	N.A.	10	11
9	B.R.	11	12	F.A.	9	9
10	C.L.	10	11	C.O.	8	9
11	M.C.	9	12	K.R.	11	12
12	S.I	8	10	D.E.	12	14

Table 6. Statistical indicators for frontal flexibility

Groups	Statistical indicators / Tests	X	S	t-Student	P (diff. Tf & TI)
Experimental group	Ti	8,83±15,8	1,40	1,46	0,0001
	Tf	10,66±13,4	1,43	1,49	
Control group	Ti	9,08±17,0	1,55	1,62	0,16
	Tf	9,25±17,2	1,63	1,71	

In testing this sample, experiment group athletes have achieved a higher progress than control group athletes, due to the specific means of functional training. As it can be seen in Table 6, in the group experiment the difference between the two tests is 1.83cm, while in the control group is only 0.17cm.

3. Abdominal strength

Table 7. Results from Abdominal strength

No.	Initials Experimental group	TI	TF	Initials Control group	TI	TF
1	A.C	59	63	M.A.	58	59
2	F.O.	64	68	P.O.	60	61
3	L.M.	62	66	H.A.	62	64
4	L.R.	59	62	C.R.	62	62
5	S.T.	60	63	T.A.	58	60
6	J.P.	62	65	D.A.	59	61
7	C.I.	64	66	B.R.	62	63
8	S.C.	63	65	N.A.	64	65
9	B.R.	63	67	F.A.	64	64
10	C.L.	60	63	C.O.	61	63
11	M.C.	61	65	K.R.	60	62
12	S.I	61	65	D.E.	60	61

Table 8. Statistical indicators for abdominal strength

Groups	Statistical markers / Testing	X	S	t-Student	P (diff. Tf & TI)
Experimental group	Ti	61,5±2,77	1,70	1,784	0,0001
	Tf	64,83±2,65	1,72	1,801	
Control group	Ti	60,83±3,20	1,95	2,037	0,081
	Tf	61„1±2,89	1,80	1,880	

According to Table 8, in the experimental group, because an adapted aerobics program was used, the differences were significant compared to the control group, the initial testing showed a value of 61.5 executions, and the final testing 64.83, with a difference mean value of 3.33 executions. The control group recorded during the initial testing a mean value of 60.83 and the final testing 61.1 with a difference of 0.27 executions.

Conclusions

1. Due to the selection and adaptation of methods and means of improving the physical preparation of the volleyball players, their driving ability, resulting in increased exercise capacity, was positively influenced.

2. The modernization program of physical training content through the introduction of specific means of training function was found a balance between clues: somatic (morphological) and motive.

3. The use of tailored functional training programs produced smooth development of athletes. An increase in height by an average of 1 cm, average weight loss with 1 kg and decreased body mass index (BMI) was observed in athletes from the experimental group when compared with athletes from the control group.

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OPTIMIZATION OF TECHNICAL AND TACTICAL PREPARATION USING MIXED TABLE TENNIS EXERCISES ON CHILDREN OF 10-12 YEARS

APOSTU PAULA[1*], DOBOŞI ŞERBAN[1]

ABSTRACT. Technical exercise consist the key element of the entire workout, during which the main goals are to achieve and perfect technical procedures, prevent and combat mistakes, automatize strokes, trying to obtain technical efficiency. During the 10-12 years old children's workout it is essential to improve technical procedures by using teaching methods appropriate for their age and according to their ability to comprehend. Using mainly combined exercise will contribute to their faster and easier learning, substantially increasing the stroke efficiency.

Keywords: *technical -tactical procedures, table tennis, forhand, backhand*

REZUMAT. ***Optimizarea pregătirii tehnico-tactice prin folosirea exerciţiilor combinate la copiii de 10-12 ani în jocul de tenis de masă.*** Pregătirea tehnică, constituie factorul de bază al antrenamentului, prin care se urmăreşte realizarea însuşirii şi perfecţionării procedeelor tehnice, prevenirea şi corectarea greşelilor, automatizarea loviturilor, eficacitatea tehnică, etc. În antrenamentul copiilor de 10-12 ani se impune îmbunătăţirea procedeelor tehnice printr-o însuşire cât mai corectă şi economică a acestora, folosind metode şi mijloace adecvate nivelului de cunoştinţe ale acestora. Folosirea cu pondere sporită a exerciţiilor combinate în instruirea copiilor la tenis de masă va contribui la însuşirea mai rapidă a procedeelor tehnice, favorizând substanţial eficienţa loviturilor.

Cuvinte cheie: *procedee tehnico-tactice, tenis de masă, forhand, rever*

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Introduction

The nowadays high performance tennis table resides in dynamism, fast thinking and acting, precision and exceptional tactical and technical skills. The high motivation, the fight for winning points in European and world rankings, along with the contribution of other scientific domains in training and game required for becoming a great champion, leads to decrease of the age when high performances in the table tennis are achieved.

Technical preparation represents the main training factor, whereby we aim to train and improve technical procedures, to prevent and correct mistakes, to create an automatism of the kicks, to increase technical efficacy, etc. The improvement of technical procedures through correct and efficient acquirement of these procedures, by using proper methods and means according to the children's level is mandatory in training children of 10-12 years (Doboşi & Apostu, 2009).

The increased use of mixed exercises in children's table tennis training will have impact on the fast learning of technical procedures, improving significantly the efficiency of kicks.

The table tennis players' activity is assessed not only by taking into consideration the competitions results but based on the observations made during trainings, depending on the subject, attention and the interest displayed by each player for the training process.

Research objectives

- The increased use of mixed exercises in children's table tennis instruction
- Assessment of the technical preparation level of the children of 10-12 years in tennis table.
- Argumentation and experimental verification of the efficacy of using mixed technical procedures in acquiring and consolidating the basic technique.

Materials and methods

The study group

The experiment was conducted within the Table Tennis Department of the sport club CS Politehnica Cluj - Napoca during the period of September 2013 - June 2014. The research was conducted on a group of 20 boys (having the same level) divided in two groups: the witness and the experimental group, each consisting of 10 players (age: 10-12 years).

Research methods

In the research I have used the following methods which helped me in finding solutions for the proposed objectives: the experimental method; the test method, the comparative method; graphical representation.

During the experiment I have used assignments on simple directions for specific technical preparation in table tennis of the witness group.

For the experimental group, I have used mixed assignments consisting of forhand and backhand which require a better coordination and are more difficult to execute.

Means of instruction used in the experiment for technical preparation of the experimental group

- Long serve followed by cross forhand counter (figure 1);
- Long serve followed by cross backhand counter (figure 2);
- Long cross serve from forhand followed by alternating counters from forhand and backhand towards the opposite forhand (figure 3);
- Long cross serve from backhand followed by alternating counters from forhand and backhand towards the opposite backhand (figure 4) (Doboşi, 2009).

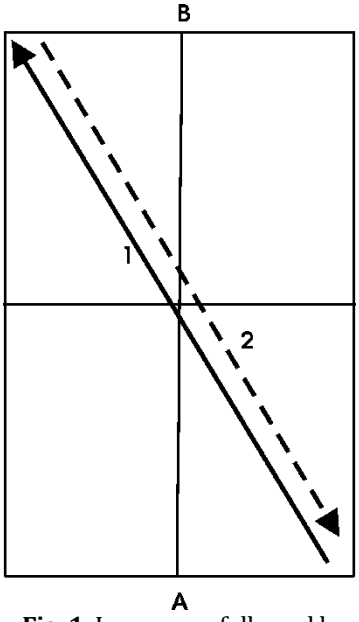


Fig. 1. Long serve followed by cross forhand counter

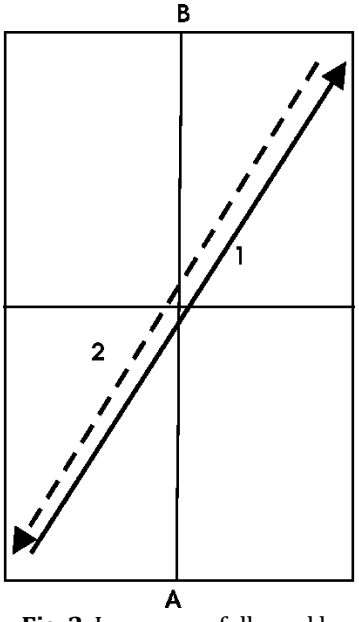


Fig. 2. Long serve followed by cross backhand counter

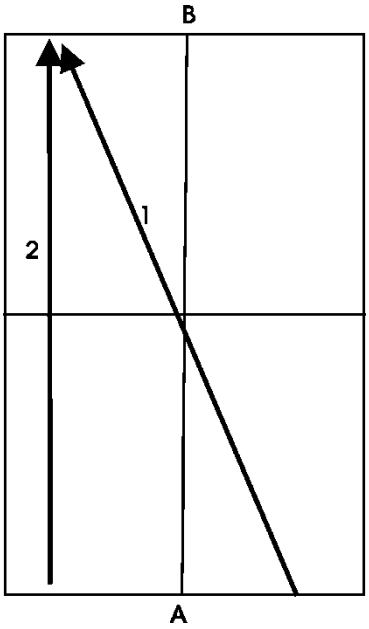


Fig. 3. Long cross serve from forhand followed by alternating counters from forhand and backhand towards the opposite forhand

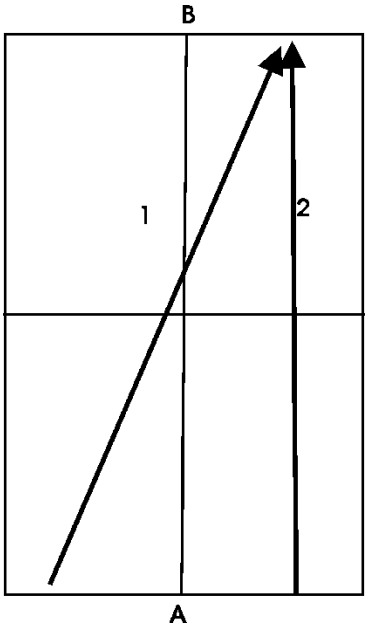


Fig. 4. Long cross serve backhand followed by from alternating counters from forhand and backhand towards the opposite backhand

Instruction means used in the experiment for technical preparation of the witness group

- Long serve followed by cross forhand counter (figure 5);
- Long serve followed by cross backhand counter (figure 6);

Results

By these instruction means we intended to estimate if mixed assignments used at the experimental group are more efficient for technical progress of players. As a result we have proceed to the initial testing (on September 2013) and final testing (on July 2014) both for the witness and experimental group.

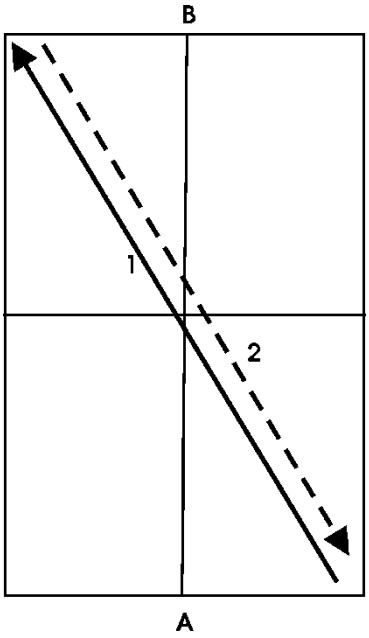


Fig. 5. Long serve followed by cross forhand counter

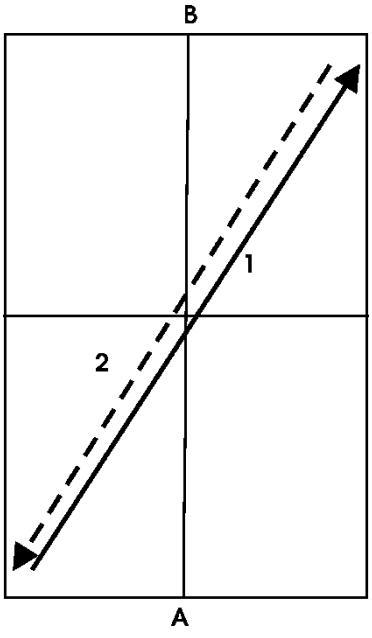


Fig. 6. Long serve followed by cross backhand counter

Table 1. Summarizing table – initial and final testing on witness group

Subject no.	Cross forhand counterattack No. of wins		Cross backhand counterattack No. of wins	
	Initial testing	Final testing	Initial testing	Final testing
1	8	9	7	8
2	8	8	6	7
3	5	6	9	9
4	7	8	8	7
5	8	9	8	9
6	9	9	6	6
7	10	8	7	8
8	9	10	5	5
9	6	7	8	8
10	7	8	9	8
Arithmetical mean	**7,70**	**8,20**	**7,30**	**7,50**

Table 2. Summarizing table – initial and final testing on experimental group

Subject no.	Cross forhand counterattack No. of wins		Cross backhand counterattack No. of wins	
	Initial testing	Final testing		Initial testing
1	7	9	6	8
2	9	10	8	10
3	6	8	5	7
4	8	8	9	10
5	11	10	9	11
6	6	8	5	8
7	8	9	7	9
8	7	7	8	10
9	9	10	7	8
10	7	8	6	9
Arithmetical mean	**7,80**	**8,70**	**7,00**	**9,00**

Table 3. Dynamics of technical preparation indices for the groups included into the experiment

Attempts for test	Sample	Initial testing	Final testing	Difference/Increment
Cross forhand counterattack	Witness group	7,70	8,20	0,50
	Experimental group	7,80	8,70	0,90
Cross backhand counterattack	Witness group	7,30	7,50	0,20
	Experimental group	7,00	9,00	2,00

Analysis of the dynamics of technical preparation indices for the groups included into the experiment

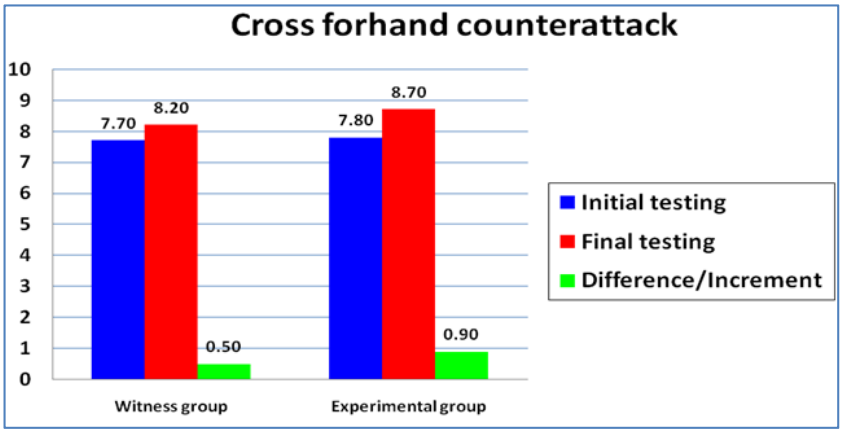
By analyzing data collected after the initial and final testing we notice as follows:

On final testing the result for the witness group is 0,50 wins better than the result on initial testing for cross forhand counterattack (T.I.-7,70; T.F.-8,20) and 0,20 wins better on final testing comparing with the result of initial testing for the cross backhand counterattack (T.I.-7,30; T.F.-7,50).

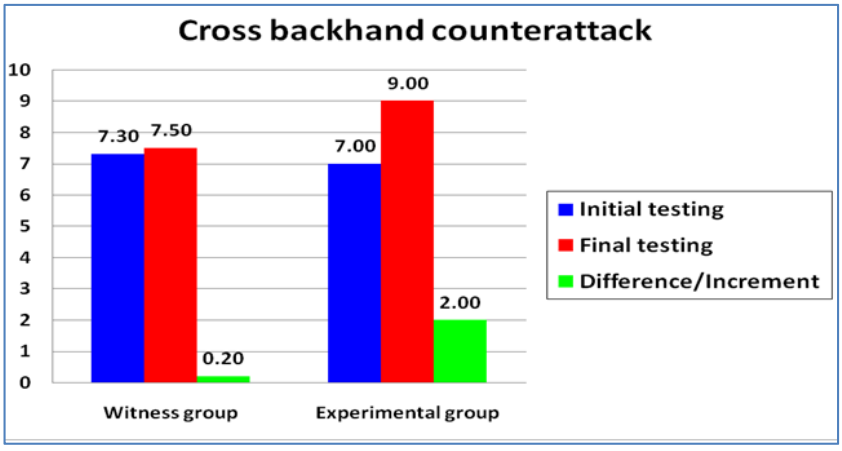
In what concerns the experimental group the result on final testing is 0,90 wins better for the cross forhand counterattack (T.I.-7,80; T.F.-8,70) and with 2,00 wins better on final testing comparing with the result of initial testing for the cross backhand counterattack. (T.I.-7,00; T.F.-9,00).

By comparing the results of the two groups (witness and experimental) we can notice that the witness group obtained at the initial testing higher results than the experimental group (7,70-8,20) both in case of the cross forhand and cross backhand counterattack (7,30-7,50).

On final testing, following the application of mixed assignments in technical preparation of the experimental group, the results obtained were significantly better than the results obtained by the witness group both in what concern cross forhand counterattack (7,80-8,70) and cross backhand counterattack (7,00-9,00), which proves the efficiency of this instruction method.



Graphic 1. Values of Cross forhand counterattack



Graphic 2. Values of Cross backhand counterattack

Conclusions

The improvement of technical procedures through correct and efficient acquirement of these procedures, by using proper methods and means according to the children's level is mandatory in training children of 10-12 years.

Based on the results obtained, we may assert that the suggested means for players' instruction, efficiently and successfully reached the objectives proposed at the beginning of the experiment.

Analyzing the results obtained during the research, we can say that these results validate the hypotheses of the research. Comparing the results of the initial testing with those of the final testing we observe the progress achieved in case of the two technical procedures by using the mixed assignments.

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MORPHOLOGICAL ASPECTS OF FORWARDS IN THE RUGBY GAME RELATED TO TASKS AND POSITION

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ABSTRACT. The aim of this study is to identify and underline the morphological particularities of Romanian elite rugby players from the forwards compartment. This aspect can contribute to the improvement of training contents. The hypothesis of this study is that morphological particularities of forwards vary depending on tasks and position in the same manner as in the case of elite players from other countries. The study included the players of a selected team, which comprises the best players of the Romanian championship. Among the 32 tested players, 17 are forwards. Evaluations were done by positions, and we drafted tables with arithmetic means and standard deviations for each position. We took several anthropometric measurements for the rugby players, thus determining the qualitative level of the body mass between the four positions of the compartment. Findings indicate that players have a certain level of morphological adaptation to specific effort by the post they occupy within the team. The players feature a hypertrophy of the muscle tissue, a phenomenon specific to strength sports. However, some of the players also had a significant amount of fat mass, which contributes to less impressive performances.

Keywords: *fat body mass, lean mass, forwards*

REZUMAT. ***Aspecte morfologice ale pachetului de înaintare în jocul de rugby, raportate la post şi sarcini.*** Scopul acestui studiu este reprezentat de identificarea şi evidenţierea specificului morfologic al jucătorilor profesionişti de rugby din România, aspect ce poate contribui ulterior la îmbunătăţirea conţinutului antrenamentului. În realizarea acestei lucrări am pornit de la premisa că valorile de masă şi compoziţie corporală ale înaintării se încadrează în standardele optime ale acestui sport. Studiul s-a desfăşurat pe jucătorii unei echipe, selecţionată a celor mai buni jucători din campionatul intern. Din cei 32 de sportivi testaţi, 17 sunt jucători ai compartimentului de înaintare. Evaluările au fost făcute pe posturi, mediile aritmetice şi abaterile standard la nivelul fiecărui post au fost întabelate. S-au efectuat măsurători antropometrice ale jucătorilor de rugby,

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determinând nivelul calitativ al masei corporale între sporturi. Rezultatele indică faptul că jucătorii au un nivel de adaptare morfologică la efortul specific, în funcție de postul ocupat în echipă. Jucătorii testați prezintă o hipertrofie a țesutului muscular, fenomen specific sporturilor de forță. Cu toate acestea, stratul de țesut adipos este mare, la unii dintre jucători, fapt ce contribuie la diminuarea performanțelor sportive ale acestora.

Cuvinte cheie: *țesut adipos, masă activă, înaintare*

Introduction

Performance physical effort determines adaptive variations of the human body as a whole, starting with the somatic nervous system, coordinator of voluntary movement and in charge with vegetative functions (cardiovascular, respiratory) and endocrine-metabolic functions, responsible for ensuring the energetic substrate of muscular effort.

There are numerous studies (Drăgan, 2002; Duthie, 2006; Gabbett, 2005) in the scientific literature concerning the adjustment capacities of rugby players, mostly in countries with rugby tradition. In Romania, this subject has not been approached very much by specialists, considering the low popularity of this sport.

For this reason, in the following lines, we will outline the positions of the forwards compartment of the rugby team:

- The forwards, comprised of 8 players:
  - *first line* – 2 props and a hooker;
  - *second line* – two players;
  - *third line* – two flankers and a lock.

The demands of each position are so diverse, that team unity is essential in attaining the objectives. Generally, rugby is a sport for all shapes and sizes, but it is also a sport of individual attributions and skills.

Purpose

Considering the low popularity of this sport in Romania, there have been only a few assessments of players' exercise and effort adjustment capacity. For this reason, we decided to conduct certain morphological tests on rugby players within the first Romanian league. We compared the results between teams, compartments, positions, and our findings to those of existing studies and to the biological model of top players.

The purpose of this study was to identify and highlight the morphological particularities of professional rugby players in Romania, which can contribute to an improvement of training contents.

In this paper, we focus on the adjustment of rugby players' body composition to game-specific effort.

Hypothesis

In this investigation, we have started from the idea that the tested morphological particularities values of the forwards varies within the optimal standards for this sport.

The second hypothesis is that the body density of the third line is better than the rest due to their more "aerobic tasks" during the game.

Material and methods

This study comprised anthropometrical measurements of the players and recordings of adjustment conditions specific to rugby.

The study was conducted on the players of an elite team, which comprises the best players of the Romanian championship.

Among the 32 tested players, 17 are forwards and 15 backs. Evaluations were done by positions, and we drafted tables with arithmetic means and standard deviations for each position.

Among the morph functional measurements, we will highlight the following:

- body mass;
- height;
- brachial skin fold thickness;
- subscapular skin fold thickness;
- intercostal skin fold thickness;
- abdominal skin fold thickness;
- femoral skin fold thickness.

Body composition was calculated by using the methods of the five skin folds on the right side of the body. We also conducted a bioelectrical impedance test. Through both these testes, we calculated the amount of lean and fat mass, as well as their percentages.

Results and discussions

In the following lines, we will compare and discuss the results obtained by the forwards, by positions and by each anthropometric index. The data were introduced into graphs for a better emphasis on the relations between the five positions of this category.

Table 1. Morphological results of the forwards

	Position	Age (years)	Weight (kg)	Lean body mass (kg)	Lean body mass (%)	Body fat (kg)	Body fat (%)
MEAN	**PROP**	**24**	**112**	**83**	**74**	**29**	**26**
S.D.		**3,0**	**4,9**	**2,0**	**3,5**	**5,2**	**3,5**
MEAN	**HOOKER**	**22**	**107**	**80**	**75**	**28**	**25**
S.D.		**2,8**	**1,4**	**7,8**	**6,4**	**6,4**	**6,4**
MEAN	**LOCK**	**22**	**112**	**86**	**77**	**26**	**23**
S.D.		**1,7**	**6,2**	**6,1**	**5,4**	**7,0**	**5,4**
MEAN	**FLANKER**	**22**	**102**	**84**	**83**	**18**	**17**
S.D.		**1,9**	**3,4**	**2,2**	**2,6**	**3,1**	**2,6**
MEAN	**NO.8**	**22**	**102**	**84**	**83**	**18**	**17**
S.D.		**1,9**	**3,4**	**2,2**	**2,6**	**3,1**	**2,6**

The mean ages by positions for forwards range between 21 and 24 (Fig 1). The means by positions are below those of previous studies, which generated results above 26 years old (Duthie et al., 2006). The players with the highest mean age are the props, but they also range below the mean of the professional level for this position. The lowest mean was that of the number-eights – 21, which can indicate a deficit of strength on the level of this category, as it is known that the climax of strength is reached after 25, and strength is the basic motor quality of the forwards. Furthermore, the game experience has a very important role in the activity of this category. Nonetheless, a low mean age can be to the advantage of this category, as it brings more agility and vitality.

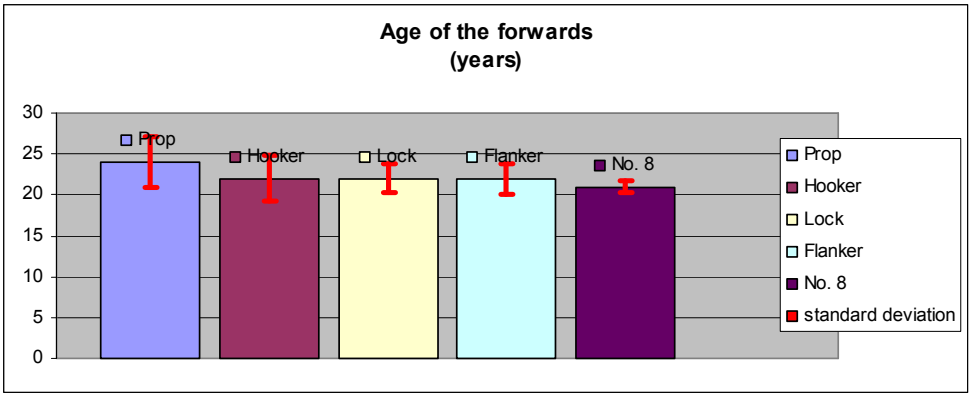

Fig. 1. Age of the forwards

The body mass of the players of this category is large. The forwards of rugby teams are among the heaviest athletes, similar to the weight throwers, wrestlers and heavy weight lifters, or with other athletes whose main skill is strength.

The mass of the forwards we have studied is close to the weight indices resulted from the tests conducted previously of professional rugby players. As seen in Figure 2, the biggest weight was that of props and locks, as they are the pillars of the scrum. The means of the five forwards coincide to the ideal weight values for this category (Drăgan, 2002; Gabett, 2005).

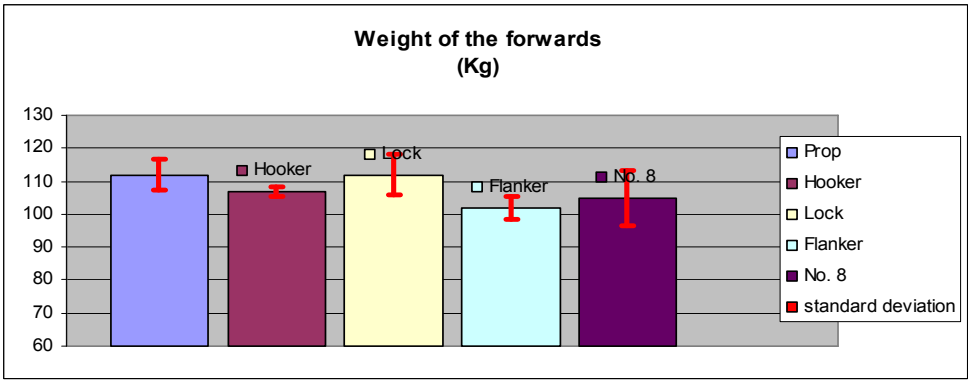

Fig. 2. Weight of the forwards

Body composition is a very important factor in the physical development of the athletes. Depending on the percentage of lean mass and body fat, the athletes can achieve or not the performances they have set in mind.

The forwards of a rugby team are athletes with large body mass, as their prevailing motor skill is strength (Clarke, 1995). Nonetheless, the body fat must be lower than the muscular tissue, considering that the rugby game requires a predominantly aerobic energy.

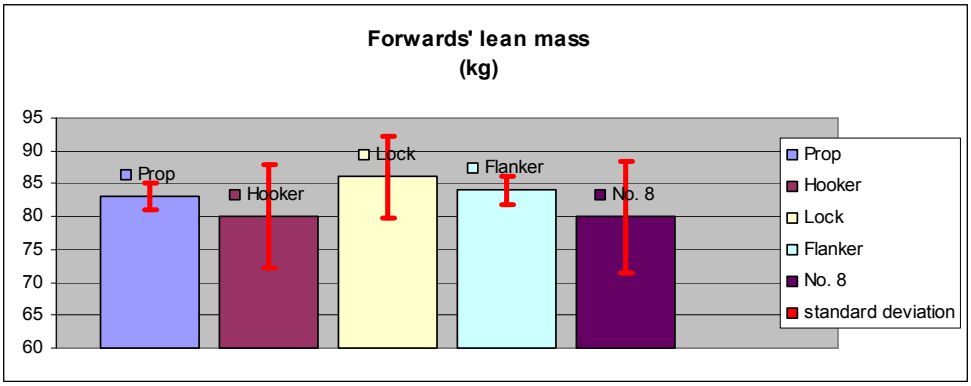

Fig. 3. Lean mass of the forwards

The lean mass means of the forwards is presented graphically (Fig. 3); the results are as follows: the props 83 kg, the hookers 80 kg, the locks 86 kg, the flankers 84 and the number-eights 80 kg. Though they have obtained a low arithmetic mean, number-eights had a high standard deviation, which reduces the value of the arithmetic mean; this was also observed in case of the hookers.

Regarding the lean mass percentage, the players of our study have obtained the following results: the props 74%, the hookers 75%, the locks 77%, the number-eights 77% and the flankers 83%. (Fig. 4) We notice that the values are close; only flankers scored above 80%. The results are below the ideal values of the players of this category; the only ones who scored four units below the value were the flankers (Drăgan, 2002). Furthermore, the locks and the hookers had a high standard deviation: some of the players are closer to the ideal values for these positions. Though the props and the locks had a large amount of lean mass, their percentage is lower than that of their teammates, which can indicate a deficit in the body density of these players.

The amount of body fat is large for the athletes of this category, with the following results: the props 29 kg, the hookers 28 kg, the locks 26 kg, the number-eights 25 kg and the flankers 18 kg. (Fig. 5) We notice that flankers are the only ones with a mean below 20 kg, as well as a low distribution of the individual values.

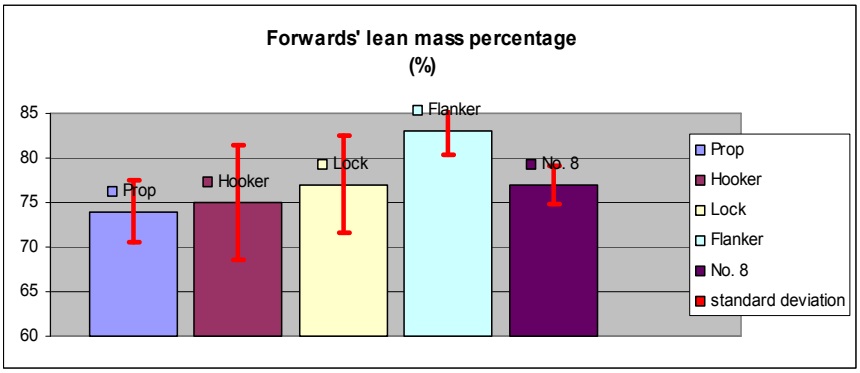

Fig. 4. Percentage of forwards' lean mass

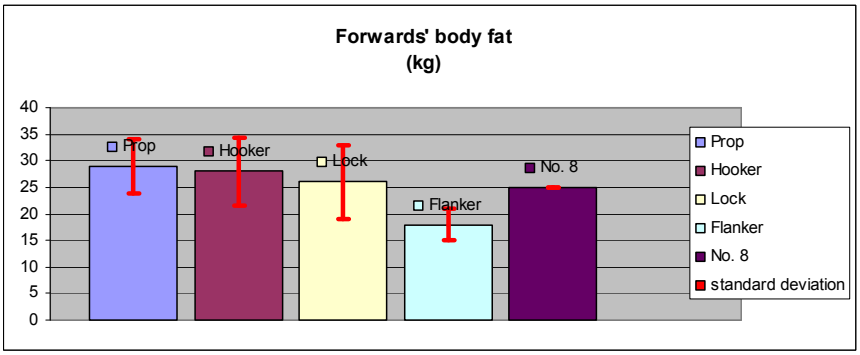

Fig. 5. Amount of the forwards' body fat

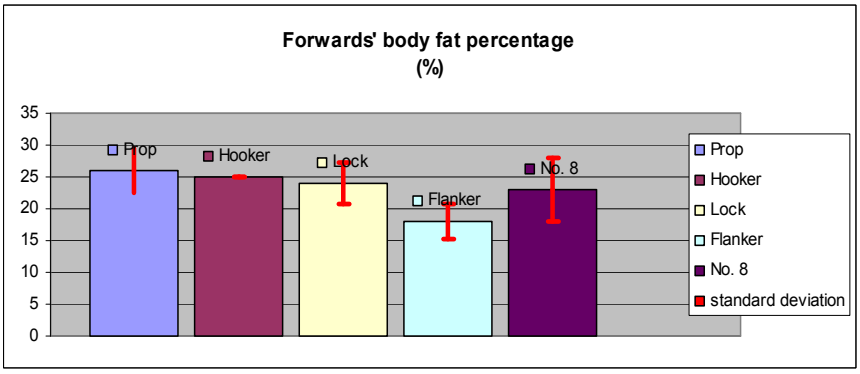

Fig. 6. Percentage of the forwards' body fat

In percentages, the forwards vary as follows: the props 26%, the hookers 25%, the locks 24%, the number-eights 24% and the flankers 17%. (Fig. 6) We notice that the first row players (the props and the hookers) have the highest percentage of body fat, closely followed by the locks and the number-eights. This indicates an excess of body fat to take into account and an ineffective adaptation to the demands of the rugby game for these positions. Flankers are better positioned: only four units above the ideal value for this position.

Conclusions

- The lean mass of the forwards is in the demanded standards, with the exception of the props, whose results are under the demands, considering their tasks based mostly on specific force.
- The fat tissue of the players is higher than normal, results indicating a low specific adaptation due to some lacks in training and nutritional habits.
- The differences between positions and lines are in the favor of the flankers who have a good body density. Props and hookers show a smaller adaptation of the body density. Also the No. 8 shows a poor adaptation, considering their tasks and the long distances they have to cover during the game.

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CONTRIBUTIONS TO THE DEVELOPMENT OF RESISTANCE IN THE YOUTH VOLLEYBALL PLAYERS (15-16 YEARS)

COJOCARU ADIN-MARIAN[1*], COJOCARU MARILENA[1]

ABSTRACT. Introduction: The need to know the characteristics of the current model of the game's development trends and elements of progress is an essential requirement then the coach must always be guided. Sports training contents must always be improved by updating and enriching the news, so that they can meet existing training and competition in the current model and future expected level (group) training respectively. **Objectives:** Optimizing the training of volleyball players to improve general and specific resistance. **Methods:** The following methods were used namely research and bibliographic documentation method, observation method, driving tests, mathematical method - statistical, graphical method. The comparative results with model selection and model motor model developed by FRV game differences recorded quite noticeable, especially in technical evidence. This approach requires a new strategy to achieve the objectives of training, improvement of the set of means used and not least the emphasis will be on individual instruction to players, even if they team depend on each other in achieving phase of game. **Conclusions:** The means selected to achieve the objectives were effective, well-dosed, it highlighted the progress and the quality of execution of techniques.

Keywords: *resistance, volleyball, player, development of motricity*

REZUMAT. ***Contribuţii privind dezvoltarea rezistenţei jucătorilor de volei la nivelul cadeţi (15-16 ani).*** **Introducere:** Necesitatea cunoaşterii caracteristicilor actualului model de joc, a tendinţelor lui de dezvoltare şi a elementelor de progres constituie o cerinţă esenţială după care antrenorul trebuie permanent să se orienteze. Conţinuturile instruirii sportive trebuie să fie permanent îmbunătăţite prin reactualizarea şi îmbogăţirea cu noutăţi, în aşa fel încât să se poată îndeplini cerinţele de pregătire şi concurs existente în modelul actual şi de perspectivă, preconizat pentru nivelul (grupa) respectiv de instruire. **Obiective:** Optimizarea procesului de instruire a jucătorilor de volei în vederea îmbunătăţirii rezistenţei generale şi specifice. **Metode:** Au fost utilizate următoarele metode de cercetare şi

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anume metoda de documentare bibliografică, observaţia, metoda testelor motrice, metoda matematico – statistică, metoda grafică. Rezultatele comparative cu modelul de selecţie, modelul motric şi modelul de joc elaborat de F.R.V. înregistrează diferenţe destul de vizibile, mai ales la probele tehnice. Acest lucru impune abordarea unei noi strategii în vederea realizării obiectivelor antrenamentului, îmbunătăţirea setului de mijloace utilizat şi nu în ultimul rând se va pune accent pe instruirea individuală a jucătorilor, chiar dacă aceştia în echipă depind unul de celălalt în realizarea fazelor de joc. **Concluzii:** Mijloacele selecţionate pentru realizarea obiectivelor au fost eficiente, bine dozate, lucru reliefat de progresul obţinut cât şi de calitatea execuţiilor procedeelor tehnice.

Cuvinte cheie: *rezistenţă, volei, jucător, dezvoltare motrică*

Introduction

Characteristics generalizes various schools volleyball players worldwide. Increased height of players coupled with particular strength in attack and defense with an emphasis on blocking, promoted by the European School, along with organizing varied and fast attack with acrobatic game on defense and efficient line II promoted Asian School are strategic attributes propagated to the current volleyball (Cojocaru & Cojocaru, 2009).

Physical training should achieve a high level of specific motor capacity development which is manifested through technical and tactical possibilities perfect needed volleyball player (Bril & Kleshev, 1988).

The orientation of physical training should be done considering the other components of the preparation (technical, tactical and mental), its contribution in strengthening and recovery efficiency is very technical and tactical. It becomes obvious need to apply the principle of concentric training (Ghenadi, 1984).

Hypotheses research

It was assumed that, using methods, techniques and specific means adapted to the particularities players cadets will achieve its objectives and thus will improve the quality of motor strength, specific volleyball game.

The research purpose is to optimize training volleyball players to improve general and specific resistance.

Materials and methods

⇒ organizing research experiment and determining sample;
⇒ studying literature and selecting the main means of achieving training model;
⇒ establish research and investigative methods to be used during the experiment;
⇒ establish evaluation criteria;
⇒ final evaluation sample from the application model training;
⇒ initial and final processing of results and comparative analysis of results;
⇒ validate assumptions, conclusions.

During the experiment, the following methods were used for research:

a) bibliographic documentation method;
b) observation;
c) motility test method;
d) mathematical method - statistical;
e) graphical method;

The experiment was organized in CS Steaua Bucharest team boys youth, aged 15-16 years.

The experiment was conducted over a period of one school year (2013/2014) and aimed at improving physical training volleyball players and especially the quality of the driving resistance.

Included in the research sample was composed of a group of 24 volleyball players cadets category, a fairly large group, which is explained by the three age categories: 15, 16 years.

During the training was intended to train all players to target all components of athletic training, the focus is put on physical training and hence development of resistance, and in May were reapplied control samples in order to ascertain the progress made the first test, but the differences between the final result and the model presented by Romanian Federation and Volleyball this category is age.

Methods and means used were those recommended by the literature.

It insisted on preparing both individual and collective players.

Towards the end of this period, after the age of 15 years may be given particular attention to developing overall strength and resistance under specific speed training is individualized for high - speed under stress and shooters - resistance regime jump. Amid a general training, specific training is performed (Bompa, 2003).

Development of resistance involves using several methods, employing only one not able to determine the corresponding effects (Baechle & Earle, 2000). Moreover, the outstanding results obtained in the tests demonstrate the usefulness of the resistance of the track to a wide variety of methods.

a) training method variable;
b) the method of hindering;
c) a method of long-term effort;
d) interval training;
e) control method;
f) method tempo;
g) method the competition;
h) training method in circuit.

Examples of exercises to develop strength

General Development of resistance

⇒ Running uniform tempo;
⇒ lengthy run with acceleration along the way;
⇒ running on varied terrain;
⇒ multiple technical replicates uniform tempo and even some acceleration;

Development of specific resistance

⇒ game, more sets (6-10);
⇒ game with a reduced squad;
⇒ game at end of training under conditions of tired;
⇒ game with shortening, number of sets, but with the introduction of fragments of game very fast tempo game with disabilities and reducing the duration of sets; play five alternating sets, each team starts with a lead of five points. Breaks between sets may be granted at the request of a team;
⇒ technical circuit: service pickup of service attack, lifting block (figure 1); will focus not only on fast tempo, but also a large percentage of executions as good;

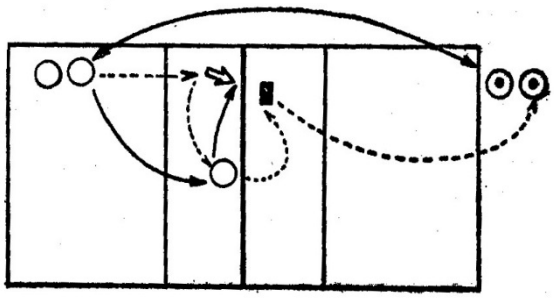

Fig. 1. Technical circuit

⇒ game 4-4 and the ball thrown normal (combined); play 4 sets to 11, the usual odd, the ball thrown by the husband. It will take account of methodical guidelines specified in the previous year.

Results

All subjects included in the survey results were recorded in the tables in Annex. To compare results using the arithmetic mean of the sample for each sample separately.

The results were analyzed and statistically, both initially and finally.

At the end of the experiment, the results are as follows:

Table 1. The somatic level

Nr. crt.	Sample	Testing initial	Testing Final	Progress	The Model of F.R.V.	The difference between the model and the final test
1.	Stature	162,8cm	165cm	2,2cm	177cm	12cm
2.	Weight	48,71kg	49,63kg	0,92kg	-	-
3.	Span arms	161,6	163,9	2,3cm	-	-
4.	Thoracic perimeter	68,2cm	71,5cm	3,3cm	-	-

Table 2. The motricity level

Nr. crt.	Sample	Testing initial	Testing Final	Progress	The Model of F.R.V.	The difference between the model and the final test
1.	Vertical Jump without elan	43,63cm	47,13cm	3,5cm	52cm	4,87cm
2.	Vertical Jump with elan	47,29cm	51,42cm	4,13cm	56cm	4,58cm
3.	Lateral displacements the 3meters, time 1 min	20,04	25,54	5,50	50	24,46
4.	Flexion of dorsal trunk	25,29	31,13	5,84	30	+1,13
5.	Triple jump length	5	6,33	1,33	10	3,67

Table 3. The technical level

Nr. crt.	Sample	Testing initial	Testing Final	Progress	The Model of F.R.V.	The difference between the model and the final test
1.	Service	5,12 good	5,91 good	0,79 good	10/10	4,09 good
2.	Reception from service	4,54 good	6,08 good	1,54 good	10/10	3,92 good
3.	Attack	4 good	5,5 good	1,5 good	10/10	4,5 good

Discussions

In the game, volleyball players running a large number of rapid movements (starts, shifts, stops, hitting the ball) combined with repeated jumping attack and block, acyclic movements made rounds of intense effort and interspersed with short breaks (Balaiş & Păcuraru, 1997).

Repeating these rounds very often in a match requires a specific resistance training. Resistance must be prepared according to the intensity and duration of exercise.

The fact that the movements are acyclic, complex and changing requirements for game development and maintenance of specific resistance is performed with some difficulty. Ensuring a sustainable overall resistance largely removes this difficulty.

The effort of the players on the front line is anaerobic and the second line, the effort is aerobic, so specific resistance training should take account of this aspect.

In general, the means for developing specific resistance must have a structure similar to volleyball, so it is recommended choice of means and performing typical volleyball match their speed or higher (Şerban, 1999).

Instability resistance requires specific volleyball and using their own means cyclic sports, to develop general strength (running the long-term average speed without acceleration and, skating and especially running on varied terrain).

Depending on the team, period, objective and based on the examples can also use other exercises or variations of those presented.

Lesson training must be organized, that duration is about 60 min (without heating), if the pulse goes up to 170 / min. If it is lower, 140 / min on average, the duration can be greater.

If the games are organized ball thrown phases of continuous play can be planned (reception, lift and attack, approximately 3 sec). Example of planning: 20-30-45-60-30-20-60-30 sec. etc (unequal halves, as in the game, their duration can be increased, but the kit will decrease compared to that in the game).

In order to improve specific resistance is recommended that parallel global influence to work and selectively game resistance lines I and II.

Conclusions

Analyzing each control sample in hand, in terms of initial and final notes:

- visible progress between the two tests, which demonstrates that the training was well planned and organized and use the most effective teaching tools.
- results with model selection and model motor model developed by FRV game differences recorded quite noticeable, especially in technical evidence. This approach requires a new strategy to achieve the objectives of training, improvement of the set of means used and not least the emphasis will be on individual instruction to players, even if they team depend on each other in achieving rally.
- means selected to achieve the objectives were effective, well-dosed, it highlighted the progress and the quality of execution of techniques.
- good selection of players, setting clear objectives, proper use of teaching strategies can lead to achieving the intended results.

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ANALYSIS OF THE RELATION BETWEEN THE INDIVIDUAL'S SOCIAL REPRESENTATION AND PHYSICAL DEVELOPMENT INDICES

ABALAŞEI BEATRICE[1*], HONCERIU CEZAR[1], TROFIN PETRUŢ-FLORIN[12]

ABSTRACT. The objective of our study is to pinpoint the relation between perceived image in social setting and the image determined by physical development indices. Representations are generated by members of a group, thus being part of its structure, but they can be far from reality, which says something about the diversity and complexity of taking over propagated messages. If representation is in agreement with reality, subjects are anchored in the surrounding environment, they perceive life as it is; if the representation of their own body differs from quantifiable indices considered important in the analysis of hypothesis validity, the communication between subjects and the world is deformed. After analyzing the correlations between the independent variables and the dependent variable, we determined the connections between the social representation of the body and body mass – more precisely, body mass index.

Keywords: *social representation, body image, physical development*

REZUMAT. ***Analiza relaţiei dintre reprezentarea socială a individului şi indici ai dezvoltării fizice.*** Obiectivul studiului nostru este de a identifica relaţia dintre imaginea percepută în cadrul social şi cea determinată de indicii dezvoltării fizice. Reprezentările sunt generate de membrii unui grup, formând o componentă a structurii lui, însă poate să fie departe de realitate şi asta vorbeşte de diversitatea şi complexitatea peluării mesajelor propagate. Dacă reprezentarea formată este în concordanţă cu realitatea, subiecţii sunt ancoraţi în mediul ambiant, percep viaţa în parametri reali; dacă reprezentarea propriului corp diferă de indicii cuantificabili consideraţi importanţi în analiza veridicităţii ipotezei, comunicarea subiecţilor cu lumea este deformată. În urma analizei corelaţiilor ce apar între variabilele

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independente și cea dependentă, au fost determinate legăturile ce se stabilesc între reprezentarea socială a corpului și masa corporală, respectiv, indicele de masă corporală.

Cuvinte cheie: *reprezentare socială, schemă corporală, dezvoltare fizică*

Introduction

Man – as entity separated by ethos and within a group – lives in harmony with the environment, forms his own symbols by watching the body at rest or in motion, thus modelling the fluctuating grids of perception, which are conscious or unconscious, but always active. Therefore, he constructs representations that help him anchor himself in the immediate reality and maintain this collaboration. Representing means bringing something to the foreground with the intent of explaining a thing to others; hence, the representation speaks and, because it is able to show reality (subjected to its own interpretation systems), it communicates. In this case, "social representation" – a term proposed by S. Moscovici (1961, *La psychanalyse, son image et son public apud* Moscovici, 1997) – is a particular knowledge method, an intermediary form between concept and image / perception (between showing the real and the abstract).

The idea of our study is to pinpoint the relation between the image created and the real, quantifiable image. Representations are generated by members of a group, thus being part of its structure, but they can be far from reality, and this hegemonic representation dominates most symbolic or affective practices, thus acquiring identical and coercive particularities that can influence the lifestyle practices of a social actor. Representations emerge following a social conflict, a social controversy, antagonistic relationships between members of the society; the genesis is the polemic, which can have a constructive or destructive effect for people in motion. From the space they dominate, from the existential sphere, social actors receive information and transform it depending on their own experience and on the collective one, and they acquire the group behaviour for data that exceed the personal level of perception. The social life of the individual enriches the content of representation, (cognitive, emotional and behavioural) which influences essentially the collection of images that he bears in the memory, such as daily gestures.

In this study, the representation of one's own body refers to the strategy through which the social actor thinks pragmatically – by mediating between the cognitive and the emotional, seeking to understand the information that promotes

a healthy lifestyle in relation to his image in space and passing it through the filter of reason – and manages to communicate for dominating the social, material and ideal environment (Neculau, 1996). In this context, Palmonari & Doise (1986) posit that social representations can be dual, thus presenting a side of the image and one of the significance: each image can be ascribed a significance and each significance, an image. The action through which the social actor gains access to common significances materializes itself in the exploration of the unknown real universe, emerged as a terror caused by ignorance and turned into the desire to know. The product – social representation – outlines an analogy between image and fund. Therefore, the object of a social representation is assimilated to the system of values and norms pertaining to the individual or to his group. In other words, the body of a social actor anchored in the social environment does not have a preset, determined significance, but it represents the relation subject/ object; it is this relation that we seek to underline in our investigation. A representation restructures reality; it reduces the unfamiliar to familiar, to enable the integration of objective characteristics of the object, of previous experiences of the subject and of his system of attitudes and norms.

Objective of the study

Our investigation seeks to pinpoint the causality between the social representation of the subjects' body and their physical development.

Hypothesis

We estimate that the individual's social representation is influenced by physical development indices.

Research variables

1. Social representation – the dependent variable;
2. Body mass, height and BMI – independent variables.

Material and methods

Body mass index (BMI) is an indicator of the individual's health; the interval considered normal by World Health Organization (WHO) in 2000 ranges between 18 and 23 kg/m^2 (Khongsdier, 2005). Under the value of 18 kg/m^2, it is considered that there is a misbalance between weight loss and energetic reserves of the body, which would lead to pathology (James et al., 1988; Shetty & James, 1994; WHO, 1995). Some studies have assessed the probability of determining

body fat percentage through the BMI (Frankenfield et al., 2001; Kyle et al., 2003), taking into account that it can vary as effect of certain factors, such as age, gender, body shape, ethnic group, etc (Norgan, 1994; Gurrici et al., 1998; Wagner & Heyward, 2000; Prentice & Jebb, 2001). It is important to know the BMI value during childhood and adolescence, considering that high values associate with pathologies and even death (Abraham et al., 1971; Baker et al., 2007; Bjorge et al., 2008; Mossberg, 1989; Franks et al., 2010). Kahn et al. (1977) reported that BMI could be altered through exercise (at least 4 hours/ week of walking or jogging). The aspect of body modification was explained subsequently by a study that compared forest workers and researchers: the first category ranged better within normal limits (Gallis, 2009).

Subjects

The volunteers involved in our investigation are male, aged between 19 and 30 (28 subjects). Their characteristics are featured in Table 1.

Table 1. – Characteristics of the experimental group
(mean ± standard deviation)

Characteristic	***Value***
Age (years)	22.71 ± 2.62
Number of subjects	28
Height (cm)	177.11 ± 6.76
Weight (kg)	73.56 ± 12.60
Physical activity level (1-5)	2.29 ± 0.76

Method

The investigation method used a questionnaire to pinpoint the social representation of the individual's body, a standardized tool, meant to show the image of each subject about his own person. The number of items was limited to 17, each with a Likert scale referring to the image ascribed by social actors to the body of the research subjects. The questionnaire was applied to 28 subjects, and Cronbach's Alpha coefficient of internal consistency was 0.933. The value of the coefficient of internal consistency demonstrates that the working instrument measures what we have proposed. Images are an important part of the questionnaire, because each respondent and each opinion of the pertaining group was related to this body image (Fig. 1).

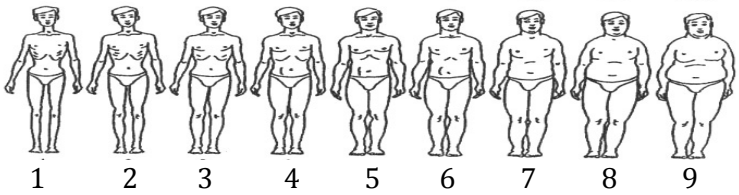


Fig. 1. – Body image models

Testing protocol for independent variables

Height was determined by using a metallic bevel (20/40 cm) and a Bosch GLM80 angle measurer. The subject stood next to a wall with 0º inclination toward the vertical plane, on a floor with the same inclination toward the horizontal plane, in a normal anatomic stance. The bevel was placed with one side on the wall and the other tangentially on the subject's top of the head. The angle measurer measured the distance between the horizontal lower side of the bevel and the floor, thus the subject's height. Body mass was assessed by using the Tanita BC 587 scale. After determining the height, the subject stepped on the scale to find out the body mass. During the assessment, the subject stood tall and he stepped back after the signal. Results were noted on the individual chart of each subject. Body mass index represents the result of the rapport between body mass and height squared.

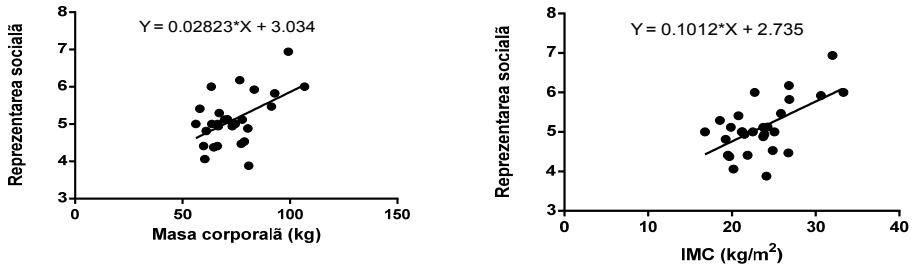
Findings and discussions

Table 2. Correlations between research variables

Pearson r	**Social representation**	**Social representation vs. Body mass**	**Social representation vs. Height**	**Social representation vs. BMI**
R		0.5202	-0.1415	0.5918
95% confidence interval		0.1825 to 0.7482	-0.4889 to 0.2446	0.2807 to 0.7904
R square		0.2707	0.02002	0.3503
P value				
P (two-tailed)		0.0045	0.4726	0.0009
P value summary		**	ns	***

The body is our reference point for self-perception, for relating to the environment, for evolving, for showing ourselves as persons or in relation to others. The body protects the genetic inheritance of each of us and it contributes to integration. Perceived body image is based on education, environment and heredity. They determine the individual to show interest for the image presented by the ethos. Sometimes, this image is in agreement with the values, principles and culture of the individual; other times, the representation of what we are transforms through the relation with society, a model promoted by society or by the pertaining group. It is beyond doubt that each individual acquires a representation about the self, about what he is and what he can improve to be successful, by interacting with the environment. Our findings show a correlation between the social representation of the body (as the image featured in the questionnaire) and two of the research variables: body mass and body mass index (BMI). The correlation between the social representation of the body and body mass is statistically significant, with a significance threshold of 0.004, which suggests that respondents associate their own weight with the social opinion corresponding to the images featured in the questionnaire. The correlation between social representation and BMI is statistically significant; the value of 0.0009 supports the idea that social representation depends on the rapport between body mass and height. Therefore, social image corresponds to the one determined by quantifiable body images, by the 3D image of the body perceived by the subject and by his group. Though BMI presents body image as a whole and social representation adjusts to this result, we found no statistically significant correlation between height and overall social representation. The result can be interpreted from the male perspective of projecting the self toward the outside world, where accomplishing tasks and action prevail over body image. After analyzing the correlations between the independent variables and the dependent variable, we determined the relations between the social representation of the body and body mass, more precisely – body mass index (Graphs 1 and 2). We can predict – with 95% probability – the value of body representation of an individual within the statistical population of our sample, if we know his body mass or body mass index.

Graph 1 shows the statistical relation between the social representation of the body and body mass. The relation Y = 0.02823*X + 3.034 (Y = social representation, X = body mass) expresses that the alteration of body mass also modifies the social representation of the individuals within our sample. Therefore, every extra pound adds to the peripheral system of the social representation variables able to change the core by 0.02823 units.



Graph 1. 2– Linear regression between body mass and social representation, – Linear regression between body mass index (BMI) and social representation

Graph 2 illustrates the statistical relation between the social representation of the body and body mass index. The relation Y = 0.1012*X + 2.735 (Y = social representation, X = body mass index) shows that the two variables alter in the same sense. The modification of BMI by unit determines the modification of the social representation by 0.1012 units.

Conclusions

The findings of this study confirmed the initial hypothesis. The body image of the subjects (for people included in our investigation) – determined in the social environment – is correlated with their body mass and with their body mass index. The male gender of our subjects may contribute to the fact that the social representation of their body modifies in the same sense – quantitatively speaking – with their body mass and body mass index, which suggests that subjects are anchored in reality, that they have a pragmatic relation with the environment.

Therefore, this investigation shows the final synthesis of body image, one's own perceived body in correlation with physical development indices; body image depends on concrete indices that mediate the relation between the object and the subject.

The continuation of this investigation can provide important data regarding the connection between body representation created within the social groups – for the same category of subjects – and their body composition, considering that body mass includes these parameters.

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CORRELATIONS BETWEEN PHYSICAL ACTIVITY AND RUFFIER INDICES IN ROMANIAN UNIVERSITY STUDENTS

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ABSTRACT. Introduction: Physical inactivity was prevalent in 31% of adults older than 15 years in 2008 and it is the fourth leading risk factor for global mortality. The purpose of this study was to establish the correlations between the self-reported Physical Activity Index (PAI) and the Ruffier Index in the case of students from Cluj-Napoca, Romania. **Materials and methods:** Four hundred students, enrolled at the "Babeş-Bolyai" University of Cluj-Napoca, voluntarily participated in this research. Anthropometric measures (weight, height and waist circumference) were carried out. Body Mass Index (BMI) was calculated. All subjects self-evaluated their current physical activity level (Physical Activity Index), performed a Ruffier test and an abdominal strength test. **Results:** Mean age of subjects was 20.56 ± 4.58 years, mean weight was 62.51 ± 12.74 kg, mean height was 167.94 ± 12.41 cm, mean Ruffier Index was 11.28 ± 4.76, mean Physical Activity Index was 39.19 ± 25.98, mean BMI was 21.91 ± 3.56 kg/m^2, and the mean number of performed sit ups was 22.26 ± 9.55. A statistically significant negative relation between the Ruffier Index and the Physical Activity Index was found (r = -0.28, p < 0.001). **Conclusions: S**elf-reported levels of physical activity were highly predictive of cardio-respiratory fitness. A positive result of this research was the fact that the participants were not overweight. An alarming outcome was the poor level of their physical fitness. Further investigations are needed in order to see if this situation is valid at national level.

Keywords: *physical activity, Ruffier test, indices, correlations, students*

REZUMAT. ***Corelaţii între indicele de activitate fizică şi indicele Ruffier în cazul studenţilor români.*** **Introducere:** Inactivitatea fizică a fost prevalentă în cazul a 31% dintre adulţii cu vârste peste 15 ani în anul 2008 şi este al patrulea factor de risc al mortalităţii la nivel mondial. Scopul acestui studiu a fost acela de a stabili corelaţiile dintre indicele de activitate fizică şi indicele

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Ruffier în cazul studenților din Cluj-Napoca, România. **Materiale și metode:** Patru sute de studenți ai Universității „Babeș-Bolyai" din Cluj-Napoca au participat voluntar la această cercetare. Au fost efectuate măsurători antropometrice (greutate, înălțime și circumferința taliei). S-a calculat Indicele de Masă Corporală (IMC). Toții subiecții și-au autoapreciat nivelul de activitate fizică (Indicele de Activitate Fizică - IAF), au efectuat un test Ruffier și unul pentru evaluarea forței abdominale. **Rezultate:** Vârsta medie a subiecților a fost 20.56 ± 4.58 de ani, greutatea medie a fost 62.51 ± 12.74 kg, înălțimea medie a fost 167.94 ± 12.41 cm, indicele Ruffier mediu a fost 11.28 ± 4.76, IAF mediu a fost 39.19 ± 25.98, IMC mediu a fost 21.91 ± 3.56 kg/m^2 și numărul mediu de abdomene efectuate a fost 22.26 ± 9.55. Între indicele Ruffier și IAF există o corelație negativă semnificativă statistic (r = -0.28, p < 0.001). **Concluzii:** Nivelurile de activitate fizică autodeclarate au prognozat corect nivelurile de pregătire fizică ale participanților. Un rezultat pozitiv al cercetării a fost acela că subiecții nu au fost obezi. Este alarmant, însă, faptul că nivelul lor de pregătire fizică a fost foarte scăzut. Ar trebui efectuate investigații ulterioare pentru a vedea dacă această situație este valabilă la nivel național.

Cuvinte cheie: *activitate fizică, testul Ruffier, indici, corelații, studenți*

Introduction

Physical inactivity causes annually the death of approximately 3.2 million people worldwide. As the fourth leading risk factor for mortality, physical inactivity was prevalent in 31% of adults older than 15 years in 2008 (WHO, 2011). Over the course of time, physical activity has been proved to be negatively related to weight gain or obesity, coronary heart disease (CHD), type 2 diabetes mellitus, Alzheimer's disease and, respectively, dementia (Reiner et al., 2013). In school-aged children and youth, aerobic exercise has positive effects on blood pressure, on the metabolic syndrome, on Body Mass Index (BMI), total fat, and/or abdominal fat, on bone mineral density, and on depression (Janssen & LeBlanc, 2010).

Existing scientific evidence regarding the association between a reduced risk of premature death and regular physical activity is incontrovertible (Warburton, Whitney Nicol & Bredin, 2006). Although it is known that physical activity lowers the risk of mortality, it still remains to be determined the role of its components (intensity, duration, frequency) on preventing CHD, hypertension, obesity, diabetes, and other chronic diseases. Citing different studies, Kokkinos & Myers (2010) conclude that exercise intensity and duration are both associated, in an inverse mode, to the risk of coronary events. Other authors (Warburton et

al., 2006) emphasize the fact that there seems to be a linear relation between the volume and the intensity of the performed physical activity and the health status of those who engage in it.

The general physical condition of one person is defined by that person's cardio-respiratory fitness. An indicator of the cardio-respiratory fitness is the speed of recovery of the cardiac frequency after exercising (Nsenga Leunkeu, Shephard & Ahmaidi, 2014). In France, the interest of the scientific community regarding the heart recovery curves during the first decades of the 20th century led Jean-Edouard Ruffier to develop the Ruffier test. Nsenga Leunkeu et al. (2014) compared the scores obtained by twelve healthy men who performed the Ruffier test with the results obtained by the same subjects after performing a 20 meter shuttle run. The Ruffier test indices and the 20 meter shuttle run indices were moderately correlated. Nevertheless, the scores obtained with the recovery test (Ruffier test) did not correspond to the ranking of the participants based on the 20 meter shuttle run results (Nsenga Leunkeu et al., 2014).

The purpose of this study was to establish the correlations between the self-reported Physical Activity Index (PAI) and the Ruffier Index in the case of students from Cluj-Napoca, Romania.

Materials and methods

Participants

Four hundred students, enrolled at the "Babeş-Bolyai" University of Cluj-Napoca, voluntarily participated in this research. The research protocol was explained to them and they agreed to sign a written informed consent.

Table 1. Physical Activity Index – self evaluation of the score

	Score	Activity
Intensity		
	5	Sustained heavy breathing and perspiration
	4	Intermittent heavy breathing and perspiration, as in tennis
	3	Moderately heavy, as in cycling and other recreational sports
	2	Moderate, as in volleyball, softball
	1	Light, as in fishing
Duration		
	4	Over 30 minutes
	3	20 to 30 minutes
	2	10 to 20 minutes
	1	Less than 10 minutes

Frequency		
	5	6 to 7 times per week
	4	3 to 5 times per week
	3	1 to 2 times per week
	2	A few times per month
	1	Less than once a month

Procedures

Anthropometric measures (weight, height and waist circumference) were performed on all 400 subjects. The Body Mass Index (BMI) was calculated for each participant according to the formula: weight / height^2 [kg/m^2].

Table 2. Physical Activity Index – evaluation of the physical activity level

Evaluation of Activity Score		
Score	**Evaluation**	**Activity Category**
81 to 100	Very active lifestyle	High
60 to 80	Active and healthy	Very good
40 to 59	Acceptable but could be better	Fair
20 to 39	Not good enough	Poor
Under 20	Sedentary	Very poor

All subjects self-evaluated their current physical activity by selecting a score for each of the three components (intensity, duration, frequency) (Table 1). The total score was calculated with the following equation: Intensity x Duration x Frequency, and it was categorized as shown in Table 2.

Table 3. Ruffier Index – classification

Classification	Ruffier Index
Endurance athletes	< 0
Excellent or Good Aerobic fitness	0.1 - 5
Average fitness	5.1 - 10
Poor fitness	10.1 - 15
Very poor or medical issues	> 15.1

Each subject performed a Ruffier test as described by Monod, Vandewalle & Flandrois (2007), cited by Nsenga Leunkeu et al. (2014). Participants performed 30 squats in 45 seconds, with a given pace. Their feet were placed

shoulder width apart, flat on the floor, and their back was kept straight. Heart rates were recorded before starting the test, after 3 minutes of seated rest (P_0), immediately after performing the squats (P_1), and after 1 minute of seated rest (P_2). The Ruffier index was calculated with the formula: Ruffier Index = [(P_0 + P_1 + P_2) – 200] / 10. The classification was made according to Table 3 (Nsenga Leunkeu et al., 2014).

A test for abdominal strength was carried out by all participants. The test consisted of executing sit ups, as fast as possible, in 30 seconds. Subjects were lying with their back on the floor, hands behind the head, knees bent, ankles immobilized by a partner. They elevated their trunk from the floor until they reached a vertical position.

Analyses

Means, standard deviations and standard errors were calculated for all data. Pearson's correlation coefficients were computed in order to investigate the relationships between parameters (age, weight, height, waist circumference, BMI, Physical Activity Index, Ruffier Index, sit ups). A crosstabulation analysis was performed for the Physical Activity Index and the Ruffier Index. The independent-samples t-test was used to investigate whether there are significant differences between males and females in the case of Ruffier Index, Physical Activity Index, sit ups, and BMI. A $p<0.05$ was considered statistically significant. The analyses were carried out in IBM SPSS, version 20.0.

Results

Mean age of subjects was 20.56 ± 4.58 years, mean weight was 62.51 ± 12.74 kg, mean height was 167.94 ± 12.41 cm, mean waist circumference was 73.06 ± 9.40 cm, mean Ruffier Index was 11.28 ± 4.76 (classified as *poor fitness* – see Table 3), mean Physical Activity Index was 39.19 ± 25.98 (evaluated as *not good enough* - see Table 2), mean BMI was 21.91 ± 3.56 kg/m^2 (evaluated as *low risk* of developing diseases related to obesity), and the mean number of performed sit ups was 22.26 ± 9.55.

As seen in Table 4, a statistically significant negative relation between the Ruffier Index and the Physical Activity Index was found (r = -0.28, p < 0.001). Subjects with high Ruffier scores have reported low levels of physical activity. Physical Activity Index has significant positive relations with BMI (r = 0.20, p < 0.001), with waist circumference (r = 0.29, p < 0.001), and with the performed number of sit ups (r = 0.23, p < 0.001) (Table 4).

Table 4. Correlations between six parameters

		BMI (kg/m²)	Waist circum-ference (cm)	Sit ups	Physical Activity Index	Ruffier Index	Weight (kg)
BMI (kg/m²)	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	399					
Waist circum-ference (cm)	Pearson Correlation	0.769**	1				
	Sig. (2-tailed)	0.001					
	N	398	399				
Sit ups	Pearson Correlation	0.081	0.141**	1			
	Sig. (2-tailed)	0.108	0.005				
	N	398	398	399			
Physical Activity Index	Pearson Correlation	0.206**	0.299**	0.239**	1		
	Sig. (2-tailed)	0.001	0.001	0.001			
	N	395	395	395	396		
Ruffier Index	Pearson Correlation	-0.002	-0.115*	-0.187**	-0.289**	1	
	Sig. (2-tailed)	0.971	0.022	0.001	0.001		
	N	396	396	396	393	397	
Weight (kg)	Pearson Correlation	0.817**	0.861**	0.160**	0.348**	-0.100*	1
	Sig. (2-tailed)	0.001	0.001	0.001	0.001	0.046	
	N	399	399	399	396	397	400

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

A significant association was found between the five levels of self-reported physical activity (PAI) and the four levels of calculated recovery scores (Ruffier Index) ($\chi^2 = 53.15$, $df = 12$, $p = 0.001$) (Tables 5, 6).

Table5. Crosstabulation between Physical Activity and Ruffier Indices

			Ruffier Index				
			excellent	**average**	**poor**	**very poor**	**Total**
Physical Activity Index	81-100 high	Count	4	5	4	4	19
		% of Total	1.0%	1.3%	1.0%	1.0%	4.8%
	60-80 very good	Count	18	29	18	8	69
		% of Total	4.6%	7.4%	4.6%	2.0%	17.6%
	40-59 fair	Count	17	25	17	8	69
		% of Total	4.3%	6.4%	4.3%	2.0%	17.6%
	20-39 poor	Count	40	24	40	30	103
		% of Total	10.2%	6.1%	10.2%	7.6%	26.2%
	<20 very poor	Count	53	28	53	44	133
		% of Total	13.5%	7.1%	13.5%	11.2%	33.8%
Total		Count	56	132	132	94	393
		% of Total	14.2%	33.6%	33.6%	23.9%	100.0%

Table 6. Chi-square test (Physical Activity and Ruffier Indices)

	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	53.150[a]	12	0.001
Likelihood Ratio	53.514	12	0.001
Linear-by-Linear Association	37.183	1	0.001
N of Valid Cases	393		

a. 2 cells (10.0%) have expected count less than 5. The minimum expected count is 2.71.

The Ruffier Index had a mean value of 12.05 ± 4.37 (classified as *poor fitness* – see Table 3) for female participants, and a mean value of 9.46 ± 5.2 (classified as *average fitness* – see Table 3) for male participants (Table 7). PAI had a mean value of 34.39 ± 22.76 (evaluated as *poor* - see Table 2) for females, and a value of 51.15 ± 29.35 (evaluated as *fair* - see Table 2) for males (Table 7).

Table 7. Descriptive statistics (Ruffier and PA Indices, Sit ups, BMI)

	Sex	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Ruffier Index	Female	279	12.0480	4.37011	0.26163
	Male	117	9.4585	5.20060	0.48080
Physical Activity Index	Female	280	34.39	22.757	1.360
	Male	115	51.15	29.348	2.737
Sit ups	Female	281	20.94	9.189	0.548
	Male	117	25.34	9.739	0.900
BMI (kg/m^2)	Female	282	21.440472	3.7178500	0.2213947
	Male	116	23.075164	2.8828848	0.2676691

Table 8. T-test for Ruffier and Physical Activity Indices, Sit ups and BMI

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Ruffier Index	Equal variances assumed	8.830	0.003	5.078	394	0.001	2.58948
	Equal variances not assumed			4.731	187.992	0.001	2.58948
Physical Activity Index	Equal variances assumed	16.758	0.001	-6.088	393	0.001	-16.755
	Equal variances not assumed			-5.483	172.948	0.001	-16.755
Sit ups	Equal variances assumed	2.809	0.095	-4.274	396	0.001	-4.399
	Equal variances not assumed			-4.173	206.206	0.001	-4.399
BMI (kg/m^2)	Equal variances assumed	1.930	0.165	-4.239	396	0.001	-1.6346922
	Equal variances not assumed			-4.706	273.740	0.001	-1.6346922

The mean score of Ruffier Indices for female participants is significantly higher than the mean score of Ruffier Indices for male participants (t = 4.73, df = 187.99, p = 0.001) (Table 8). Because the variances for the two groups are significantly unequal (F = 8.83, $p < 0.05$), a t-test for unequal variances was used (Table 8). In the case of PAI, the same t-test for unequal variances was utilized (F = 16.76, $p < 0.05$) (Table 8). The mean PAI's score for females is significantly lower than the mean PAI's score for males (t = -5.48, df = 172.94, p = 0.001) (Table 8).

Mean scores of Ruffier Indices are presented in Figure 1 and Figure 2 presents the relations between Physical Activity and Ruffier Indices.

Discussion

In a study published in 2013, Asztalos et al. discussed the relations between subjective health and three other parameters (physical activity, waist circumference, and BMI) based on data obtained from 3208 Belgian adults. The short International Physical Activity Questionnaire (IPAQ) was used to assess physical activity. The authors reported that subjective health was strongly associated with physical activity and negatively associated with BMI (Asztalos et al., 2013).

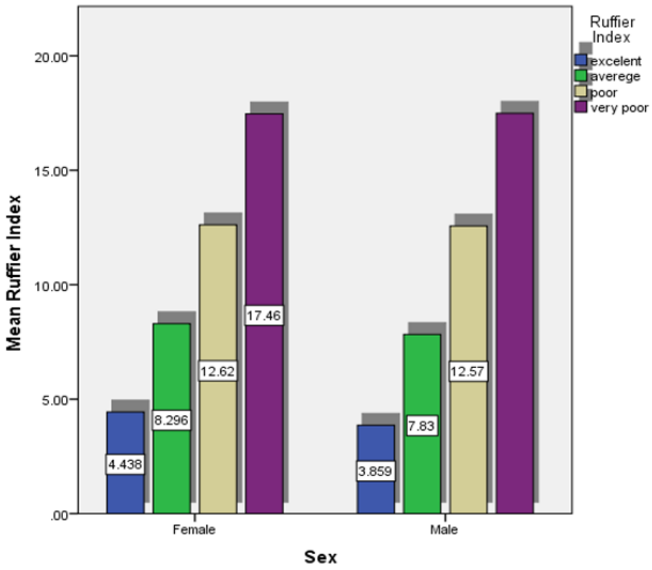

Fig. 1. Classification of Ruffier Indices

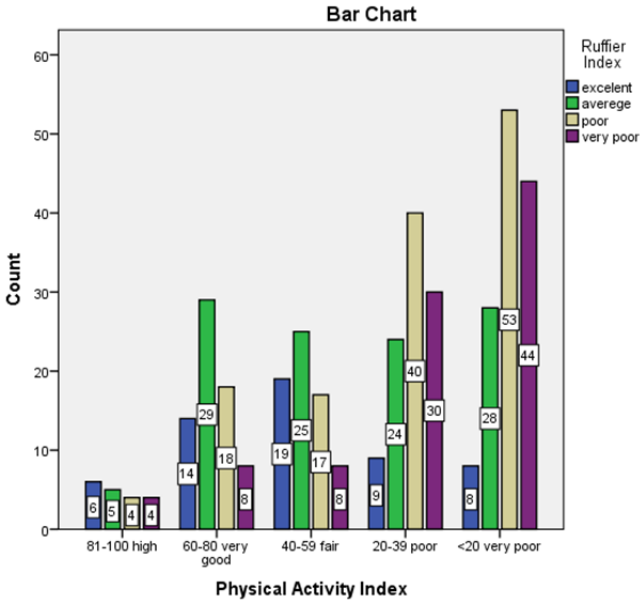

Fig. 2. Crosstabulation between Physical Activity and Ruffier Indices

In the same year, another group of researchers shared with the scientific community results regarding the relationship between the level of physical activity and markers of cardiovascular health in adolescents from Valencia, Spain (Morales-Suarez-Varela, Clemente-Bosch & Llopis-Gonzalez, 2013). 583 Valencian adolescents aged 12-18 years filled in a questionnaire developed to evaluate their physical activity level, participated in sessions of anthropometric (weight, height, waist circumference) measurements, have performed the 20 meter shuttle run test and manual dynamometry. Physical activity level was negatively related to BMI, waist circumference and weight in male adolescents, and positively related to aerobic capacity in both male and female adolescents (Morales-Suarez-Varela et al., 2013).

Self-reported physical activity levels and aerobic fitness status were assessed by Singleton, Fitzgerald & Neale (1994) in 384 healthy black and white adults aged 50-80 years. Physical Activity Index Questionnaire was used to evaluate physical activity levels and aerobic fitness was assessed using a Naughton protocol, with a treadmill (Singleton et al., 1994). Men were more physically active than females, white males and white females were more physically active than black males and black females, respectively. A significant positive relation was found between self-reported exercise levels and aerobic fitness in men. For women, fitness status could not be predicted by self-reported physical activity levels (Singleton et al., 1994).

Toriola & Monyeki (2012) investigated the status of health-related physical fitness, body composition and physical activity in 283 adolescents from South Africa (mean age of 14.90 ± 0.72 years, 111 boys and 172 girls). Eurofit protocol test was chosen to assess physical fitness and International Physical Activity Questionnaire (IPAQ) was administered to evaluate activity levels (Toriola & Monyeki, 2012). BMI was higher for girls than for boys, boys had better scores at Eurofit tests than girls. The conclusion of Toriola & Monyeki (2012) was that boys were more physically active and less overweight than girls.

The mean BMI of our subjects was 21.91 ± 3.56 kg/m^2, evaluated as *low risk* of developing diseases related to obesity. Females had significantly lower BMI than males. Neither males nor females were overweight. Mean Physical Activity Index was 39.19 ± 25.98, evaluated as *not good enough*. Females had significantly lower levels of self-reported physical activity than males. Mean Ruffier Index was 11.28 ± 4.76, classified as *poor fitness*. Females had significantly higher levels of Ruffier Indices than males. Men performed a significantly higher number of sit ups than women.

The findings of our study suggest that, among students aged 20.56 ± 4.58 years from "Babeș-Bolyai" University of Cluj-Napoca, self-reported physical activity was a very good predictor of cardio-respiratory fitness assessed with the

Ruffier test. These results were consistent with the findings of Morales-Suarez-Varela et al. (2013), in the case of adolescents, and partially consistent with the findings of Singleton et al. (1994), in the case of healthy older adults.

Conclusions

The main goal of this study was to investigate the correlations between the self-reported Physical Activity Index (PAI) and the Ruffier Index among students from Cluj-Napoca, Romania. According to the analyzed data, self-reported levels of physical activity were highly predictive of cardio-respiratory fitness. A positive result of this research was the fact that participants were not overweight. An alarming outcome was the poor level of their physical fitness. Further investigations are needed in order to see if this situation is valid at national level.

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COMPARATIVE STUDY ABOUT THE PHYSICAL EDUCATION ACTIVITY AMONG STUDENTS BETWEEN TWO UNIVERSITIES IN TÎRGU MUREŞ

SZABO BARNA[1*], CIULEA LAURA EDIT[1]

ABSTRACT. We start this study from the necessity to evaluate the possibilities and options of the students from two universities in Tîrgu Mureş, to improve and enrich the teaching activity for physical exercises when required. In the past years we don't evaluate to much the student's options about their need to practice one kind of sport, what we realized with this paperwork. This can opened new horizons to widening our educational offer and the enrichment the program of study in physical education by the two institutes. We were curious if the students from other locations, countries (in case of the foreign students who studies at English section) have enough knowledge about possibilities to practice different outdoor sports in our city, out of physical education lessons. After this study if we realize to offer more information about the sport potential of the universities and the city, we can achieve that the students make more physical activity. As method, we built a questionnaire with 19 questions concept by the authors, applying at most to the students from 1st and 2nd year of study, but also from senior years, because they have more experience, they lived longer in Tîrgu Mureş and they know better the cities opportunities. If we can form a clear image about the student options, needs, and also their attitude about the physical activities we would know in which direction to go to forestall the students' attention to do physical exercises.

Keywords: *physical activity, compare, university sport, options*

REZUMAT. ***Studiu comparativ al activităţilor fizice a studenţilor între două universităţi din Tîrgu Mureş.*** Am pornit această cercetare de la necesitatea de a evalua posibilităţile şi opţiunile studenţilor al celor două universităţi din Tîrgu Mureş pentru a îmbunătăţi şi îmbogăţi la nevoie activitatea didactică în ceea ce priveşte exerciţiile corporale. În ultimii ani nu am avut curiozitatea de a evalua opţiunea studenţilor despre practicarea unor discipline sportive, ceea ce am efectuat pin această lucrare, ce poate deschide orizonturi în lărgirea ofertei

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educaționale, îmbogățirea programei de educație fizică învățământ în cadrul celor două instituții. Am fost curioși, dacă studenții din alte localități, județe sau chiar din alte țări, studenți străini la seriile de engleză, au cunoștințe necesare de potențialul de a practica sporturi outdoor în oraș în afara programului de învățământ. După acest studiu dacă reușim să oferim mai multe informații despre potențialul de a efectua activități sportive din oraș și a lărgi posibilitățile universităților de a oferta practicarea mai multor ramuri de sport, putem spune că am venit în sprijinul ideii ca studenții de la universitate să facă din ce în ce mai multă mișcare. Ca metode de studiu vom acționa cu un chestionar alcătuit din 19 întrebări de concepție proprie, aplicând în majoritate studenților care mai au în program disciplina educație fizică, adică anii I și II, dar chestionând și studenți din anii de studii superioare, deoarece aceștia au experiența de a petrece deja mai mult timp în oraș, cunoscând mai bine posibilitățile lui. Dacă vom putea alcătui o imagine clară despre opțiunile studenților și atitudinea lor față de sport, vom ști în ce direcție să ne orientăm pentru a acapara atenția spre a efectua mișcare.

Cuvinte cheie: *activitate fizică, comparare, sport universitar, opțiuni*

Introduction

Physical education has a significant influence on building the human personality (character, intelligence, skills, creativity, temperament) so it is considered a basic component in the process of improving the human personality.

Among the objectives of the physical education, we have to mention:
- The optimal health maintenance;
- Promote physical development processes;
- Proper development of motor skills;
- Forming the habit to practice physical exercises during leisure time;
- Proper development of intellectual traits (Cârstea, 2000).

Among of the above mentioned objectives, we have to emphasize the fourth one, to form the habit to practice sport and physical exercises during leisure time, because at the university level, we suppose that we work with students who have a lot of knowledge and skills formed in the school and high school, and our role is to lead them to use this skills during their free time.

To relaunch the physical education activity in the universities and schools, the recommendations of the European Council are:

- Alternating the practice of the competitive sport with those for recreation, entertainment, which cover the students options for motion;
- Introducing tourist activities in the school's schedule, which takes place mostly outdoor;
- Ensure coordination of activities within the university physical education to those outside the university;
- Teachers provide regular contests and competitions for all levels of sport, but mostly for recreation (Smîdu & Smîdu, 2012).

Objectives

We start this study from the necessity to evaluate the possibilities and options of the students from two universities in Tîrgu Mureş, to improve and enrich the teaching activity for physical exercises when required. In the past years we didn't evaluate the student's options about their need to practice one kind of sport, what we realized with this paperwork. This can open new horizons to widening our educational offer and to enrich the program of study in physical education of the two institutes. We were curious if the students from other locations, countries (this is the case of foreign students who study in English) have enough knowledge about possibilities to practice different outdoor sports in our town, out of physical education lessons.

Method

As method, we used the method of investigation, for identifying the students' options and interests for the physical education activity. We have designed a questionnaire with 19 questions which was applied to students from the 1st and 2nd year of study, but also from senior years, because they have more experience, they lived longer in Tîrgu Mureş and they know better the town's opportunities. We have interrogated 156 student from the University of Medicine and Pharmacy of Tg-Mures and 100 from the "Petru Maior" University of Tg-Mures, starting from this university year.

In the case of UMF Tg-Mures, the subjects were between 18 and 26 years old, from 17 counties and 10 countries (the UMF has in his offer to study in English section, so they have students from different countries of the World), and between 18 and 29 years old and from 6 counties and 2 countries in case of UPM Tg-Mures. Both universities have physical education in their program of study for 2 years, in the 1st and 2nd year.

Results

The first important question was: how many students practiced competitive sport before they enrolled at the university? We see that the percentage of the UMF students is better than the UPM students, represented by the two charts below:

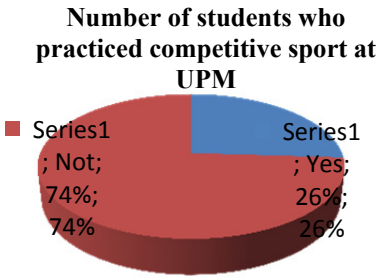

Fig. 1. Sport loving students from UPM

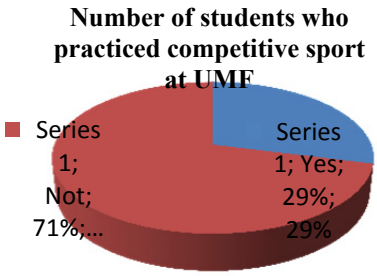

Fig. 2. Sport loving students from UMF

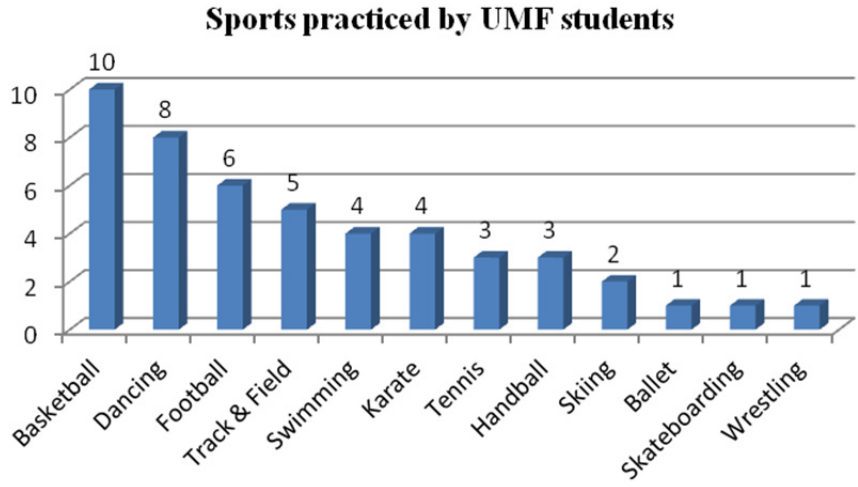

Fig. 3. Different sports, what the students practiced in high school from the UMF

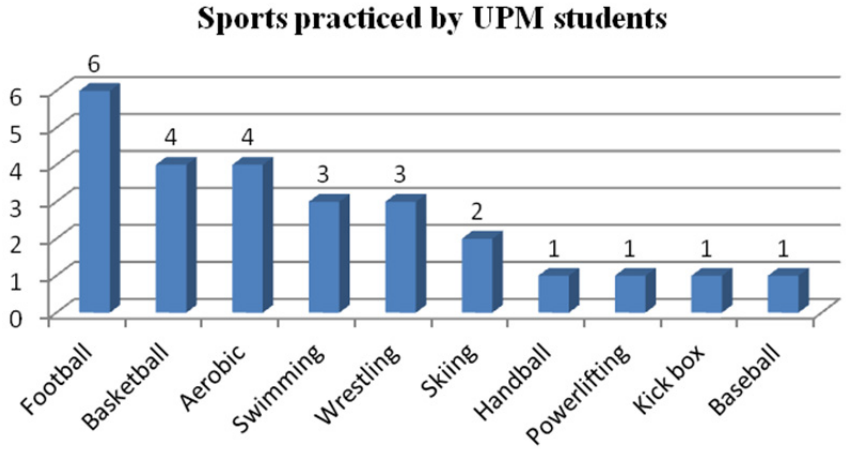

Fig. 4. Different sports, what the students practiced in high school from the UPM

The following question show us, the options what the two university students can choose to practice physical activities during the physical education lessons. We can see that the students from UMF have more options as the students from the UPM. As we see in the two charts from below (Figure 5 and 6), the students from UMF have possibilities to practice regularly 9 types of sports, and the students from UPM only 5.

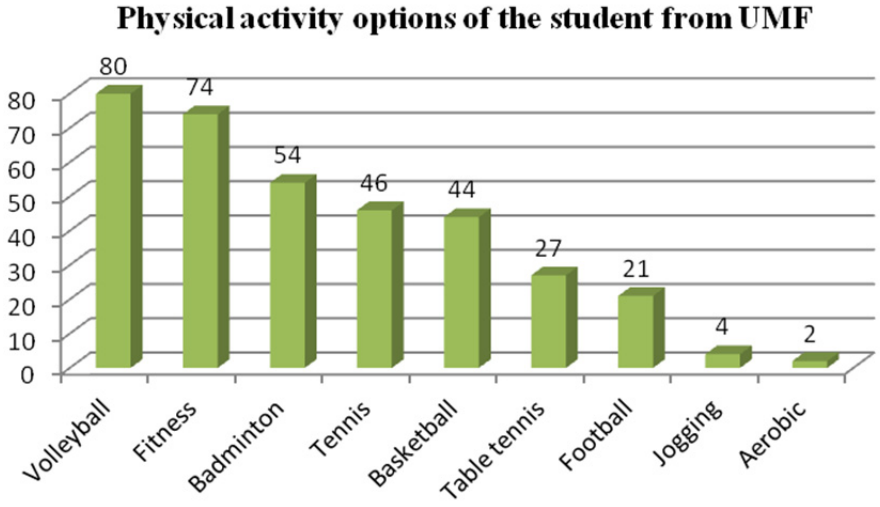

Fig. 5. The 9 sport activities chosen by students from UMF

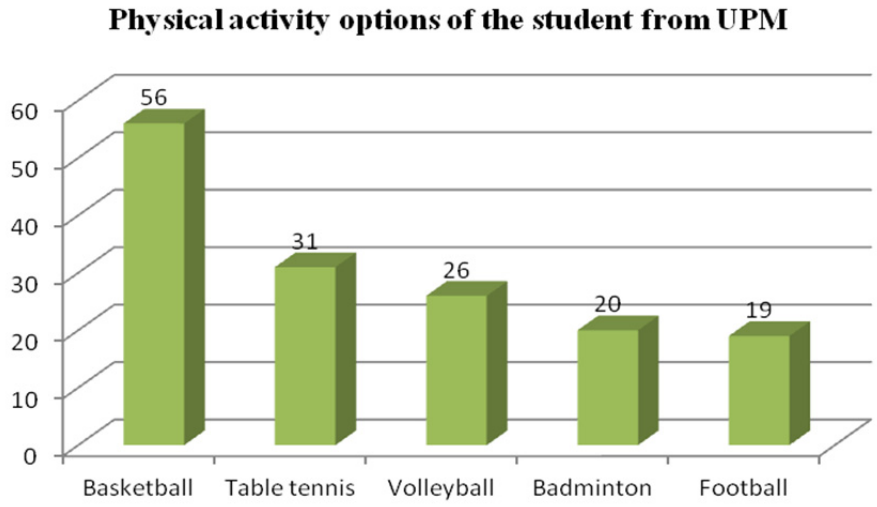

Fig. 6. The 5 sport activities chosen by students from UMF

This difference we can explain by the existence of the better sport complex from the UMF. UMF has 2 sport gyms, 4 open air tennis fields, 3 indoor tennis fields, 2 fitness gyms, 1 aerobic gym, 2 synthetic football fields, and 1 fencing gym. There is also a swimming pool, which is under construction in the final phase. There are only 2 sport gyms at the UPM University.

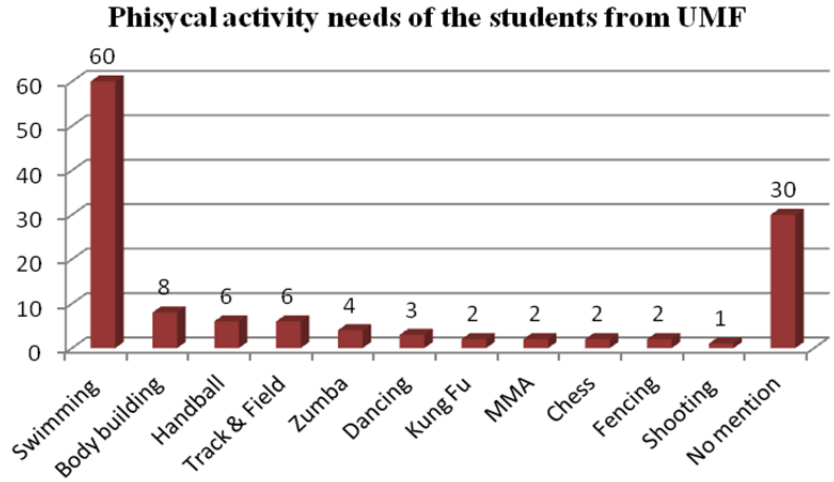

Fig. 7. The UMF student needs for physical activity

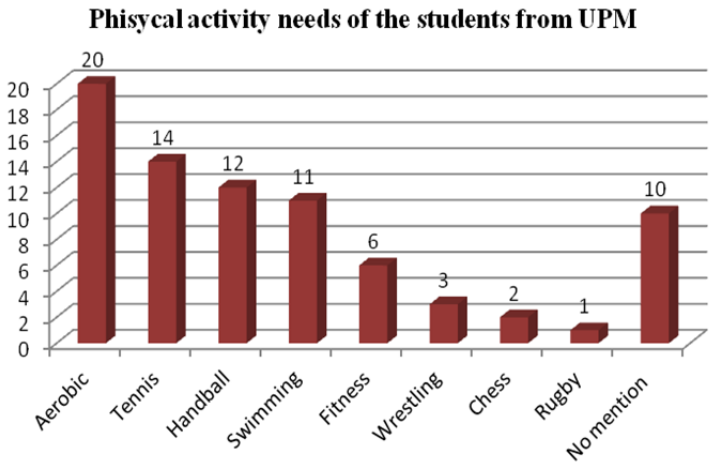

Fig. 8. The UPM student needs for physical activity

The students' need for physical activities is almost the same for both universities. Students from UMF are oriented to swimming, but this can be explained by the fact that they know the swimming pool will opened soon. A lot of students are satisfied with their options, and they don't want to choose other activities. In the case of the students from UPM, we see their needs for the other common sports, as swimming, aerobic, handball, fitness, and we observe that only 10 students have any options.

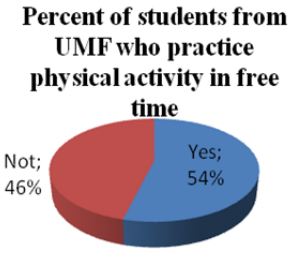

Fig. 9. Activity in free time in UMF

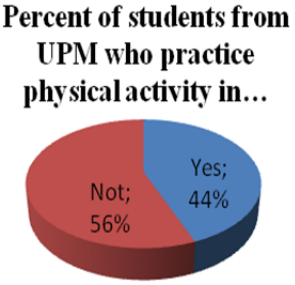

Fig. 10. Activity in free time in UPM

As the two charts from above show us, the students from the 2 universities don't practice physical activity during their free time, the answer from the both universities was that they don't have enough time. In this case, the role of the physical education teacher is to determine the students to be more active.

All of the students who were practicing sports in their free time, they know a lot of possibilities, they enumerate us about 20 types of sports which can be practiced in Tîrgu Mureș. Also they expressed their needs for a tourist guide in which they can find more information about the outdoor activities in the City.

Among their options we can mention sports that are not so popular and just a few people practiced them, as: scuba diving, sky diving, climbing, MMA, Krav Maga etc. They don't know, for example, that a lot of these sports can be practiced in Tîrgu Mureș.

On the questions about how they feel during physical activities, most of them are relaxed, they like competition, they like to practice sports in the company of their friends.

Conclusions

From this study we found out the students reviews about the physical activities in their Universities. From the results we can conclude that the students from the UMF have more possibilities and options to practice physical activities during the physical education lessons as the students from UPM. This can be explained with the better sport complex of the UMF.

The students' need for physical activities are the same, the reason that they can't practice some sports is lack of time.

In case of the UMF we can say that the options for physical activities during the physical education lessons will be increased significantly by opening the new swimming pool, and also we can collaborate with the University Club who can give us options for fencing and martial arts.

We observed that UMF students are more opened to the idea of physical activities when compared to their peers from UPM.

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HEMP SEED OIL EFFECT ON THE RAT TISSULAR OXIDANT/ANTIOXIDANT BALANCE IN EXERCISE WITH PROGRESSIVE INTENSITY

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ABSTRACT. Introduction. Pro oxidant effect of intense physical effort, its consequences and the importance of combating nitrosative stress is a topical issue of interest, according to the literature. Combating this effect is achieved by administration of exogenous nutritional or non nutritional, natural or synthetic antioxidants. The influence of nutrition, the antioxidant and pro oxidant effect of moderate exercise is added to this aspect. Hemp seed oil is a natural source of antioxidants whose beneficial effects on the balance of serum oxidant / antioxidant in exercise rats was the subject of our previous research. **Objectives**. We aim to study the effect of the administration of hemp oil on indicators of tissue oxidant/antioxidant balance in the myocardium and brain in the exercise training with gradual intensity. **Methods.** The research was conducted on two groups of male, adult Wistar rats. Group I consisted of rats trained at progressive intensity exercise, group II consisted of rats trained with progressive intensity exercise and supplemented with hemp oil. Indicators of oxidative stress: malondialdehyde (MDA), protein carbonyls (PC) were determined. Antioxidant defense capacity indicators were hydrogen donor (DH), total sulfhydryl groups (SH), glutathione (GSH). For statistical analysis, data for normal distribution we used the t (Student) and one-way ANOVA analysis of variance. **Results.** The intensity progressive exercise and dietary supplementation with hemp oil produce significant changes in the myocardium and brain with increased indicators of oxidative stress and increased antioxidant defense versus unsupplemented group. **Conclusions.** Hemp oil supplementation and progressive intensity exercise affect the oxidant/antioxidant balance in the tissues, causes significant increases in oxidative stress and increases antioxidant defense in brain and myocardium.

Keywords: *oxidative stress, nutritional antioxidants, myocardium, brain*

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REZUMAT. ***Efectul uleiului din seminţe de cânepă asupra balanţei tisulare oxidanţi/antioxidanţi în efortul fizic cu intensitate progresivă la şobolani.*** **Introducere.** Efectul prooxidant al efortului fizic intens, consecinţele acestuia şi importanţa combaterii stresului oxinitrozativ, este o temă actualitate şi interes, conform datelor din literatură. Combaterea acestui efect se realizează prin administrare de antioxidanţi exogeni nutriţionali sau nenutriţionali, naturali sau sintetici. Acestui aspect i se adaugă şi influenţa nutriţiei, ca prooxidant şi antioxidant şi efectul antioxidant al efortului fizic moderat. Uleiul din seminţe de cânepă este o sursă naturală de antioxidanţi ale cărui efecte favorabile asupra balanţei serice oxidanţi/antioxidanţi în efortul fizic la şobolani a făcut obiectul cercetărilor noastre anterioare. **Obiective**. În acest studiu s-a urmărit efectul administrării uleiului de cânepă asupra indicatorilor tisulari ai balanţei oxidanţi/antioxidanţi la nivelul miocardului şi encefalului în antrenamentul la efort fizic cu intensitate progresivă. **Metode.** Cercetarea a fost efectuată pe două loturi de şobolani masculi, adulţi, rasa Wistar. Lotul I a cuprins şobolani antrenaţi la efort cu intensitate progresivă, lotul II a cuprins şobolani antrenaţi la efort cu intensitate progresivă şi suplimentaţi cu ulei de cânepă. Indicatorii stresului oxidativ determinaţi au fost: malondialdehida (MDA), proteinele carbonilate (PC). Indicatorii apărării antioxidante au fost capacitatea de donori de hidrogen (DH), grupările sulfhidril totale (SH), glutationul (GSH). Pentru analiza statistică a datelor, în cazul datelor cu distribuţie normală s-a utilizat testul t (Student) şi analiza variantei one-way ANOVA. **Rezultate.** În efortul fizic cu intensitate progresivă şi suplimentarea dietei cu ulei de cânepă determină la nivelul miocardului şi la nivelul encefalului se produc modificări semnificative cu creşterea indicatorilor stresului oxidativ şi creşterea apărării antioxidante, faţă de lotul nesuplimentat. **Concluzii.** Suplimentarea cu ulei de cânepă şi efortul fizic cu încărcare progresivă influenţează balanţa oxidanţi/antioxidanţi la nivel tisular, determină creşteri semnificative ale stresului oxidativ şi creşteri semnificative ale apărării antioxidante în miocard şi în creier.

Cuvinte cheie*: stres oxidativ, antioxidanţi nutriţionali, miocard, creier*

Introduction

Exercise is a complex stress: neuromuscular, endocrine, systemic, biochemical and psycho-emotional. Depending on the intensity and duration, exercise can act paradoxically as a prooxidant or antioxidant (AO) factor, by modifying redox homeostasis: prooxidant, if high intensity and short duration and antioxidant if moderate and long duration (Fisher-Wellman & Bloomer, 2009). Increased oxygen consumption during exercise thereof causes the formation of oxigen catabolites and subsequently nitrogen catabolites, with oxinitrosative stress (ONS) triggering under conditions of intense effort (Tache, 2001).

Paradoxical effect of exercise is a topic of great interest and concern, according to the literature on the prooxidant effect of intense physical effort, its consequences and the importance of combating nitrosative stress by administration of exogenous nutritional or non nutritional, natural or synthetic antioxidants and antioxidant effect of moderate physical effort. To this effect is added the influence of nutrition, as prooxidant and antioxidant (Tache, 2006).

The myocardium has a high rate of oxidative metabolism and relatively low activity of main AO enzymes, which could increase susceptibility to oxidative damage after acute exercise. The exercise is considered an important stimulus for antioxidant systems as GSH and related AO enzymes that are important in protecting the myocardium, such as SOD and GSH-Px (Tache & Staicu, 2010).

Endurance training induces upregulation in some AO defense mechanisms protecting the heart muscle in potentially harmful situations that induce additional SO (Ascensão et al., 2003).

The brain uses 20% of the total oxygen consumed by the entire body at rest. Oxygen consumption increases by 10 to 15 times during the exercise. However, oxygen consumption of the brain is known to be constant during exercise. Thus, it is unlikely the exercise to induce oxidative stress (OS) in the brain. The brain may be sensitive to lipid peroxidation processes due to the high concentration of polyunsaturated fatty acids and low levels of antioxidant enzymes (SOD, CAT, GSH-Px) and GSH present in normal conditions (Radak et al., 2008).

Chronic physical effort increases the level of AO in the brain and helps protect brain oxidative lesions (Tache & Staicu, 2010).

Endurance training induces upregulation in some AO defense mechanisms protecting the heart muscle in potentially harmful situations that induce additional SO (Ascensão, 2003).

Physical training induces an adaptive biochemical response, which may require an increase of the intake and /or absorption of micronutrients. One hypothesis raised is whether acute or chronic exercise alter AO requirements. In this respect, the interaction of exercise with nutrition should be considered. SON cannot be avoided, but the imbalance between O and AO can be mitigated to reduce oxidative damage and consequences SON (Sies, 1997).

In the modern society there is excess of calories in the diet, what causes obesity and chronic metabolic stress. The calorie excess associated with elevated concentrations of plasma lipids and lipid accumulation in skeletal muscle, lead to decrease insulin sensitivity.

The exercise is commonly used to combat these consequences as it is considered an effective means of lipid oxidation (Kiens et al., 2001).

In high intensity exercise the O/AO balance is disturbed and nutritional AO supplements are administered to rebalance it. Doses of antioxidant supplements should be prescribed with respect to quantitative aspects relating to the effect of acute and chronic exercise on the O/AO balance and their impact on health.

Adopting certain nutritional strategies during exercise means administration of AO that must consider: the specific metabolic processes (aerobic, anaerobic or mixed) during various sports activities; intensity and duration of exercise during training or competitions. Intake of AO aims to increase intracellular concentrations of AO, delays muscle fatigue, improves performance, reduces the risk of injuries or illnesses related to the specific muscle effort (Tache, 2006).

There is growing evidence that a particular AO cannot prevent by itself the ONS production. As direct adverse effects of dietary supplements are synergistic adverse effects. Other effects are assumed to limit the effect of endogenous adaptive produced by chronic exercise. High doses of AO supplementation may reduce the favourable effects induced by the reactive species or generate prooxidant effects. The administration of nutritional supplements in athletes is needed only when the nutritional status is poor. Analysis of the risk/benefit evidence for an unknown risk of high doses of AO, namely an impairment of adaptive effects and long-term risk is still unknown (Margaritis & Rousseau, 2008).Caution should be applied in administering antioxidant supplements in excess. Atalay et al. (2006) recommends the following doses required to determine individual AO doses of each athlete performing a specific type of sport. Administration of several nutrients instead of mega-doses of any single nutrient form, appear to be a prudent choice and performance should not be the sole criterion for choosing supplementation doses AO. The general condition of the athlete, faster recovery and reduced oxidative damage could be affected by AO therapy (Arent et al., 2010).

Objectives

In this study we aimed:

1. the determination of tissue indicators of the O/AO balance in progressive intensity exercise training;

2. the effect of hemp oil administration on tissue indicators of the O/AO balance in the myocardium and brain in exercise training with progressive intensity.

Material and method

Lots

The research was conducted on two groups of adult male Wistar rats, weighing 200-300g average (n = 10 animals/group). Group I consisted of rats trained to progressive intensity exercise, group II consisted of rats trained with progressive intensity exercise and supplemented with hemp oil. Exercise intensity was progressively modified by loading the animals with weights attached, carried as follows: 7 days without charge, day 8 to14 with10% charge, day 15 to 21 with 15% charge, day 21 to 28 with 20% of the weight load. The time moment analyzed was on day 28.

Hemp oil administration was made by oral gavage in amount of 0.1 ml per rat, the dose was calculated in relation to the recommended daily dose for humans oil.

Training lasted 28 days, with the swimming test, which was performed in a plastic basin with water at 20 ° C, by measuring the time interval, in seconds, timed from the moment the animal were introduced in the pool, until exhausted (refusal to swim).

For the determination of the oxidant/antioxidant (A/AO) balance indicators in the myocardial tissue and brain, samples of myocardial and brain tissue were harvested following euthanasia of the animals.

Biochemical determinations were performed in the Laboratory for the Study of Oxidative Stress of the "Iuliu Haţieganu" University, in Cluj-Napoca.

We determined the following indicators of oxidative stress:

Malondialdehyde (MDA) was dosed using the fluorescence method after Conti et al. (1991). Protein carbonyls (PC) were determined using the method according to Reznik and Packer (1994). We determined the following indicators of antioxidant defense: Hydrogen donor ability (DH) was determined using the assay method after Janaszewska and Bartosz (2002). Total sulfhydryl groups (SH) were dosed according to the Hu (1994) method. Glutathione (GSH) concentration was assayed by the fluorescence method (Hu, 1994).

For statistical analysis of data, t test (Student) was used for data with normal distribution, one-way ANOVA analysis of variance followed by post hoc analysis for multiple comparison (Scheffe test/ Bonferroni/LSD test), the variations being tested with Levene test for variance. Kolmogorov-Smirnov test was used for normal distribution.

Results

Comparative statistical analysis between tissue indicators of the O/AO determined in samples of myocardium and brain is shown in Table 1.

Table 1. Statistical analysis of comparative indicators of tissue O/AO balance in myocardium and brain, the groups studied.

Myocardium homogenate - brain homogenate		MDA		PC		SH		DH		GSH	
Lot I	Average values	0,14	0,137	0,741	0,656	0,023	0,030	35,463	39,877	0,670	0,838
	p	0,865		0,482		**0,002**		**0,006**		**0,004**	
Lot II	Average values	0,268	0,153	1,122	4,051	0,016	0,043	51,479	30,413	0,52	3,941
	p	**0,001**		**1,38 x 10^{-5}**		**2,06 x 10^{-7}**		**1,92 x 10^{-7}**		**2,45 x 10^{-9}**	

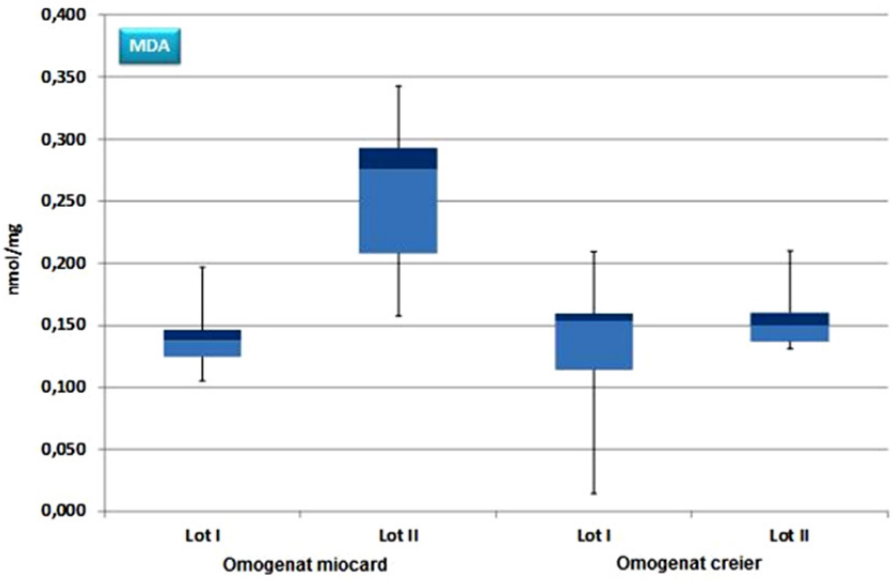

Fig. 1. MDA values for the studied lots (nmol/mg)

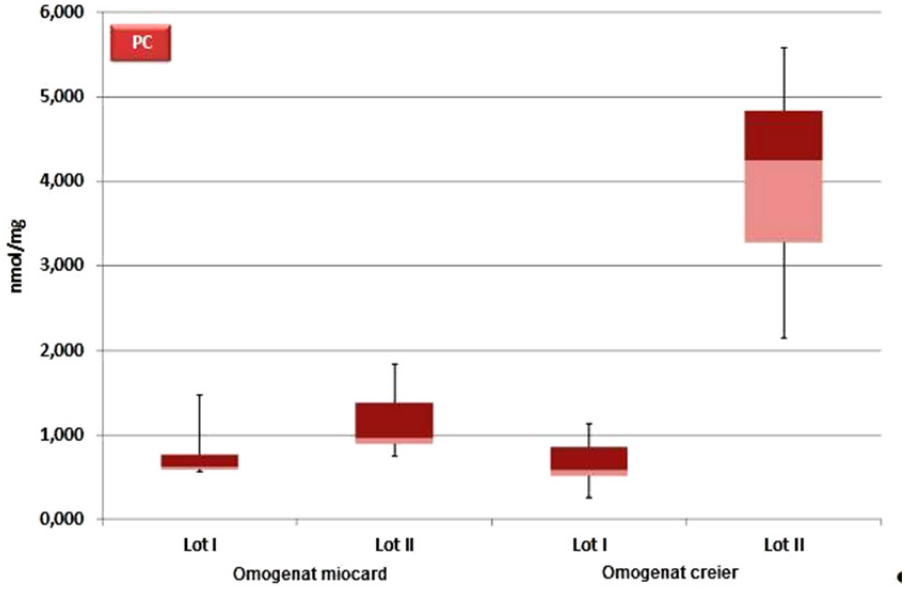

Fig. 2. PC values for the studied lots (nmol/mg)

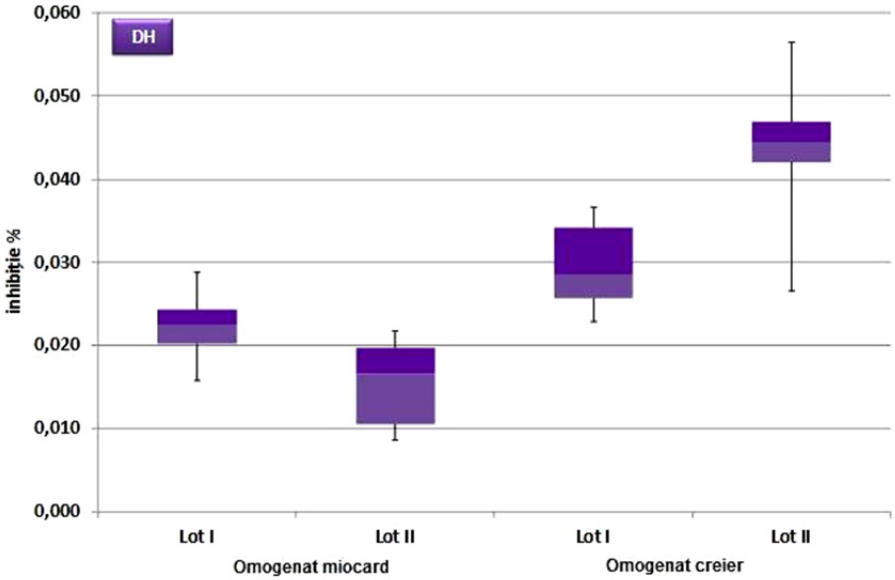

Fig. 3. DH values for the studied lots (% inhibition)

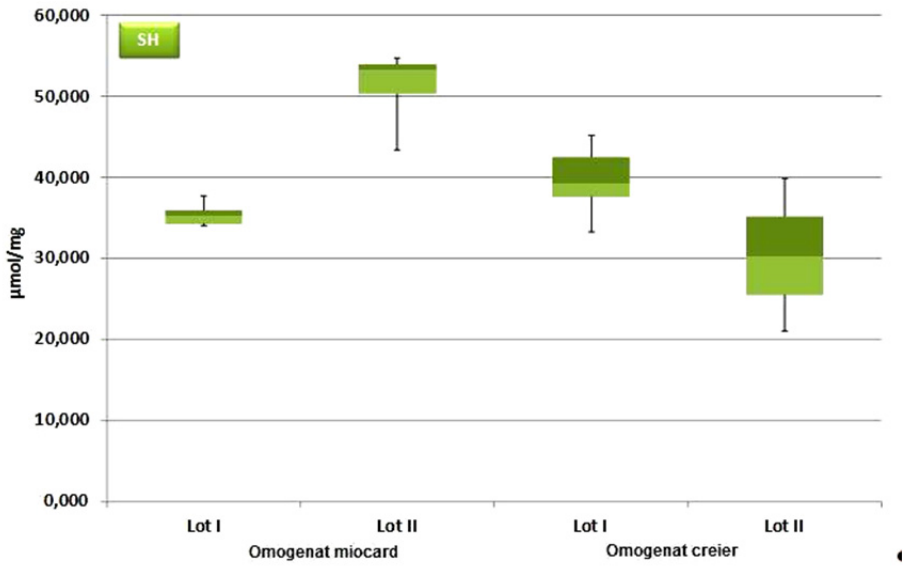

Fig. 4. SH values for the studied lots (µmol/mg)

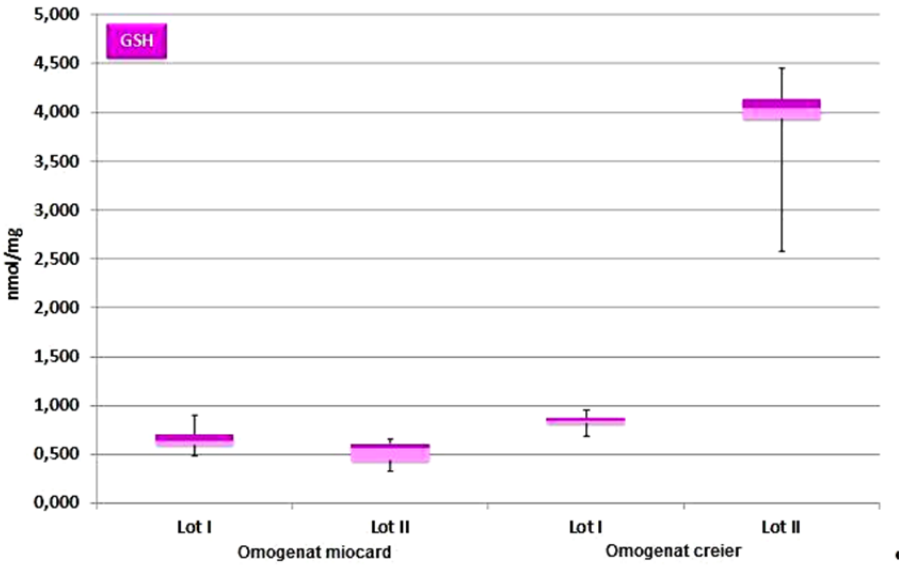

Fig. 5. GSH values for the studied lots (nmol/mg)

Discussion

The exercise with progressive intensity and hemp oil supplementation causes significant changes in the rat myocardium: increased ONS on account of MDA and decreased AO defense on behalf of SH groups and DH growth versus un-supplemented group.

In the brain, progressive intensity exercise and dietary supplementation with hemp oil, determine significant changes with increasing ONS due to PC and decreased AO defense due to the decrease in SH groups and GSH compared to un-supplemented group.

Conclusions

• Hemp oil supplementation and exercise with progressive loading influences O/AO balance at the tissue level.

• Hemp oil supplementation and exercise with progressive loading cause significant increases in ONS, on behalf of MDA in the myocardium and on behalf of PC in the brain.

• Hemp oil supplementation and exercise with progressive loading causes significant increases in AO defense on account of DH in the myocardium and on behalf of SH groups and GSH in the brain.

• Proper nutrition and strategies on intake of dietary nutritional agents, for supporting exercise capacity and post effort recovery, requires the development of recommendations by specialist physicians in the field of sports medicine in collaboration with nutritionists.

• To increase the performance should be considered use of antioxidants through proper nutrition and nutritional supplements in exercise, to increase aerobic capacity and antioxidant defense.

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ASPECTS REGARDING THE MOTOR CAPACITY DEVELOPMENT IN CHILDREN WITH DIABETES

URZEALĂ CONSTANŢA[1*]

ABSTRACT. This study is achieved and published under the aegis of the National University of Physical Education and Sports of Bucharest, as a partner in the program co-financed by the European Social Fund through the Sectoral Operational Programme for Human Resources Development 2007-2013, developed through the project Pluri- and interdisciplinary in doctoral and post-doctoral programmes, Project Code: POSDRU/159/1.5/S/141086, its main beneficiary being the Research Institute for Quality of Life, Romanian Academy. Our contribution to the project development is concretized in a research topic oriented towards the possibilities of interdisciplinary intervention on the body of persons suffering from diabetes. In this context, the objective of the present paper is to identify the motor potential of the child diagnosed with type 1 mellitus diabetes, as a landmark in dimensioning the physical exercise programmes developed simultaneously with nutritional, family and psychological counseling activities. The sample was made up of 11 diabetic children aged between 6 and 12 years. The assessment took place at the National University of Physical Education and Sports of Bucharest, in cooperation with the Medical Association "Support for Diabetes" and the Department of Pediatrics II within the "Marie S. Curie" Hospital. The motor tests were selected from the Eurofit test battery and were performed at the beginning of the first interdisciplinary intervention module, in October 2014. The results of this constative study have proved that the subjects participating in our research have a motor capacity development level encompassed within the limits corresponding to their current age stage.

Keywords: *diabetes, child, motor capacity*

REZUMAT. ***Aspecte privind dezvoltarea capacităţii motrice a copilului cu diabet.*** Acest studiu este elaborat şi publicat sub egida Universităţii Naţionale de Educaţie Fizică şi Sport din Bucureşti, ca partener în programul co-finanţat de Fondul Social European prin Programul Operaţional Sectorial pentru

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Dezvoltarea Resurselor Umane 2007-2013, dezvoltat prin proiectul Pluri- şi interdisciplinaritate în programe doctorale şi postdoctorale Cod proiect: POSDRU/159/1.5/S/141086, al cărui principal beneficiar este Institutul de Cercetare a Calităţii Vieţii, Academia Română. Contribuţia noastră în derularea proiectului se concretizează într-o cercetare a cărei problematică este orientată spre posibilităţile de intervenţie interdisciplinară asupra organismului persoanelor cu diabet. În acest context, obiectivul prezentei lucrări este de a indentifica potenţialul motric al copilului diagnosticat cu diabet zaharat tip I, ca reper în dimensionarea programelor de exerciţii fizice, care se derulează simultan cu activităţi de consiliere nutriţională, familială şi psihologică. Eşantionul a fost format din 11 copii cu diabet, cu vârste cuprinse între 6 şi 12 ani. Evaluarea a avut loc în cadrul UNEFS Bucureşti, în colaborare cu Asociaţia Medicală Sprijin pentru Diabet şi cu secţia Pediatrie II a Spitalului "Marie S. Curie". Probele motrice au fost selecţionate din bateria de teste Eurofit şi au fost susţinute la începutul primului modul de intervenţie interdisciplinară, în octombrie 2014. Rezultatele acestui studiu constatativ au demonstrat faptul că subiecţii participanţi la cercetarea noastră au un nivel de dezvoltare a capacităţii motrice care se înscrie în limitele corespunzătoare etapei de vârstă la care se află.

Cuvinte cheie: *diabet, copil, capacitate motrică*

Introduction

This research is part of a more comprehensive scientific approach within the POSDRU/159/1.5/S/141086 project, through which we aim to render efficient the interdisciplinary intervention on persons with diabetes. Studies about the incidence of diabetes emphasize that in 2010, at global level, 6.4% of the adult population was diagnosed with this disorder. This percentage is estimated to reach 7.7% until 2030 (Dishman, Heath & Lee, 2013), the year when the World Health Organization prefigures that this disease will be the 7th cause of mortality in the world.

As to the incidence of diabetes in children, statistical data reveal that the number of cases differs depending on the race/ethnicity and the geographical area. The countries with the lowest degree of risk are thought to be Japan and Korea, while at the opposite pole, we find Finland and Sweden ("Familial insulin-dependent diabetes", 1991).

In Romania, the onset of diabetes mellitus between the ages of 0 and 14 records 3.48 cases/100,000 people/year (Moraru, Moraru, Oltean, Bozomitu, Bogdan & Stana, 2008).

Mellitus diabetes, popularly called "sugar disease", represents a metabolic disorder affecting both the adults and the children, in the latter case being an autoimmune disease (Herrmann, Mutter, Rodl, Rose & Zaker, 2009).

There are two types of mellitus diabetes: type 1, a predominantly juvenile disorder that necessitates permanent insulin treatment and for which no prevention measures can be taken, and type 2, mainly affecting the overweight persons and which, in many cases, if identified in due time, can be kept under control through an appropriate diet (Dishman, Heath & Lee, 2013).

Regardless of the type of diabetes, if the disease is well-controlled and balanced, it doesn't represent a contraindication to motor activities. The type of physical exercises and, implicitly, the type of effort will be chosen in cooperation with the attendant physician, who will ensure that there are no side disorders that might restrict the practice of motor activities (Orgeret, 2008).

The treatment of diabetic children requires insulin administration, a proper diet and physical exercise. This emphasizes the existence of three factors the oscillations of which may lead to physiological imbalances (Bota & Teodorescu, 2007). Although many studies in the field prove the effect of physical exercises on the increase in glucose tolerance, in the case of type 2 diabetes, there is no conclusive evidence related to the glucose control improvement in the case of type 1 mellitus diabetes ("Sport – Eurofit for adults:", 1995). However, the exercise intensity during the practice of motor activities will be correlated to the glucose values and the carbohydrate intake, pre-, intra- and post-effort.

In this context, any formative motor intervention on the child with type 1 mellitus diabetes relies on a good cooperation between family, teacher and diabetologist. We think that the physical exercise parameters are set after a minute analysis of the motor capacity development level, of the growth and development particularities, but also of the medical prescriptions.

Aims

This paper aims to identify the motor capacity development level in children with type 1 mellitus diabetes, as a landmark in dimensioning the physical exercise programmes applied in the context of an interdisciplinary intervention.

Methods and materials

As research methods, we used: bibliographical study, observation, testing and the Microsoft Excel software to calculate the statistical indicators.

The research was conducted at the National University of Physical Education and Sports of Bucharest, in October 2014, as part of a complex approach of educational intervention on both the diabetic child and his family, which required us to develop some modular programmes of motor activities and counseling. The initial motor assessment of the participants in this project was programmed at the beginning of the first module of activities, being followed by the prefiguration of the most efficient modalities of physical exercising. The sample was made up of 11 diabetic children from the Medical Association "Support for Diabetes" and the Department of Pediatrics II within the "Marie S. Curie" Hospital of Bucharest. The investigated insulin-dependent children were not medically exempt from the physical education and sports discipline imposed by the school syllabus. In order to identify the level of their motor capacity development, they had to perform many tests selected from the Eurofit battery, namely: sit-ups from dorsal decubitus with support (maximum number of repetitions within 30 sec.), trunk extension from ventral decubitus with support (maximum number of repetitions within 30 sec.), standing broad jump, sit-and-reach (for mobility), Flamingo balance test and tapping test. They were added tests for the coordination capacities, such as the Matorin test and a rhythm test, the latter for assessing the fidelity with which the subjects were able to reproduce a varied rhythmic sequence. With the support of volunteers from the UNEFS Student League and also of Graduates, we prepared the observation protocols and the individual assessment records, where we put down both the children's results and manifestations in relation to the glucose values registered before, during and after the end of the activity.

Results

The calculated statistical indicators allow us to have a global picture of the motor components that should be approached in the physical exercise programmes (table 1).

Table 1. Statistics for the motor capacity assessment

Test	Min.	Max.	Med.	Mean	St. dev.	Coeff. var.
Sit-ups from dorsal decubitus	12	27	12	17.54	4.48	25.54
Trunk extension from ventral decubitus	4	40	33	27.36	12.8	46.78
Standing broad jump	73	152	117	112.36	27.77	24.71
Sit-and-reach	-7	13	1	3	5.42	180.66
Turning jump to the right side	180	360	320	300.9	59.74	19.85
Turning jump to the left side	90	360	270	257.27	88.55	34.41
Flamingo	2	30	11	13.45	9.05	67.28
Tapping	13	32	18	19.27	5.04	26.15
Rhythm	6	10	8	8.27	1.1	13.3

Among the calculated statistical indicators, we insist on the coefficient of variability (Tudoş, 1993), which shows us that the group is non-homogeneous in the situation of the performed assessment, except for two tests, the rhythm and coordination ones. This is due to the age gap encompassing the research sample. That is why we tried as much as possible to take into account some clues considered to be standards for each age. Thus, to better assess the development level of the muscles strength, the results achieved by the investigated children were related to the minimal standard existing in the National School Assessment System for the physical education discipline (Filip, Scarlat, Dragomir, Mironescu & Predescu, 1999), corresponding to each grade.

In the sit-ups from dorsal decubitus, all the tested children managed to exceed the standard corresponding to mark 5 (with 12.9 repetitions on an average), respectively to the "sufficient" grade (fig. 1). The development level of the back muscle strength assessed through the number of trunk extensions from ventral decubitus emphasizes that 82% of the children have exceeded the minimal standard level, by recording an average equal to 27.36 repetitions, as compared to 10.81 repetitions. In the standing broad jump, the values achieved by the children are below the level specified in the minimal standards, the average being 112.36 cm, as compared to 122.72 cm (fig. 3). 36% of the subjects managed to reach/ exceed the length corresponding to their age.

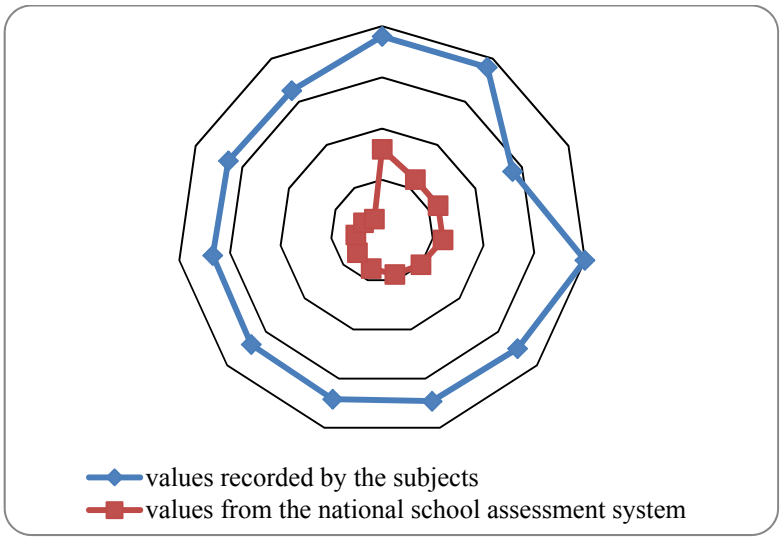

Fig. 1. Graph for the values recorded by subjects in the sit-ups from dorsal decubitus, in relation to the National School Assessment System

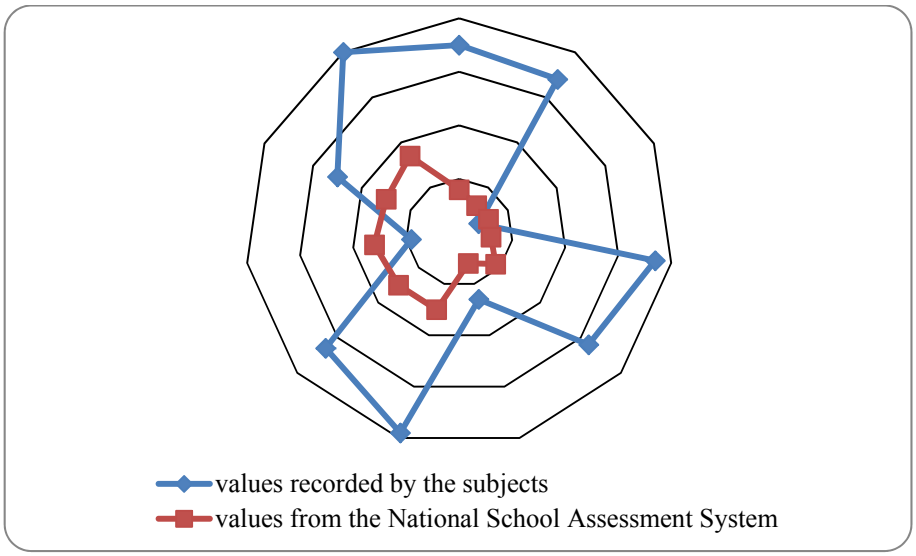

Fig. 2. Graph for the values recorded by subjects in the trunk extension from ventral decubitus, in relation to the National School Assessment System

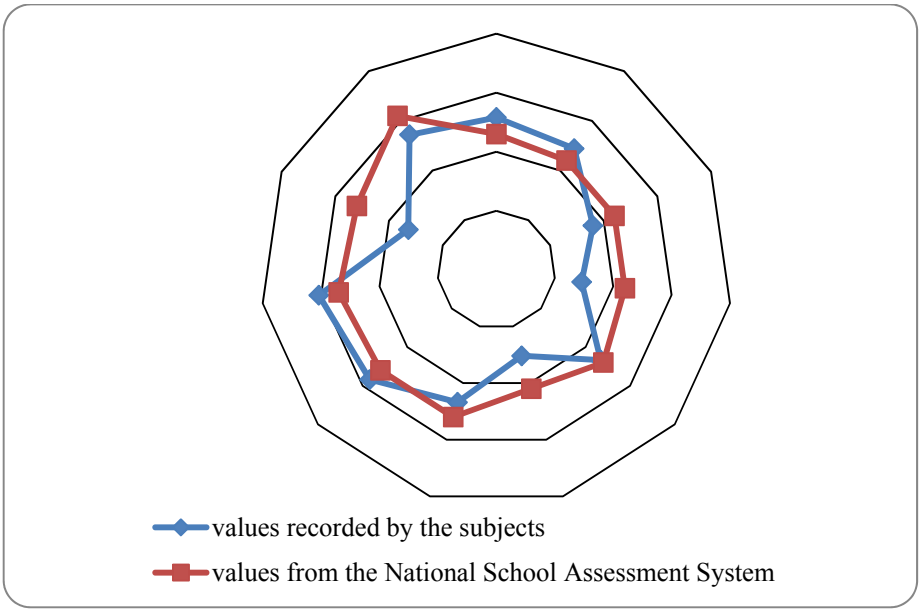

Fig. 3. Graph for the values recorded by subjects in the standing broad jump, in relation to the National School Assessment System

Mobility at the vertebral column and the coxofemoral joint levels was better in the case of the younger pupils compared to older pupils, the average being 4.16 cm versus 1.6 cm (fig. 4).

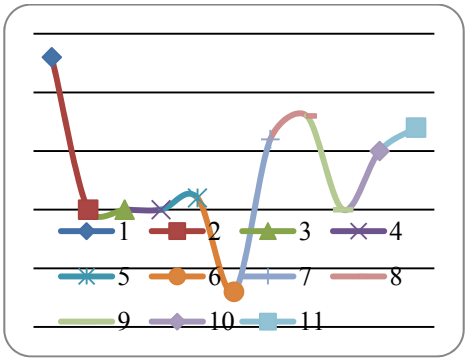

Fig. 4. Graph for the mobility values

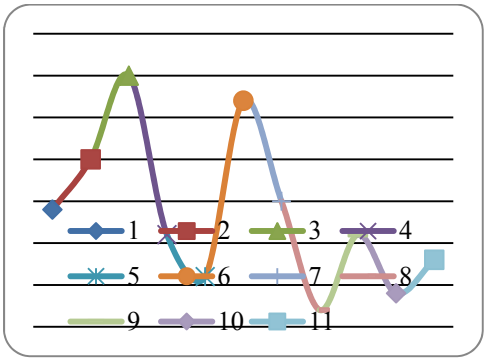

Fig. 5. Graph for the results in the balance test

The average obtained in the Flamingo test (13.45 balance losses/min) was influenced by the great amplitude of the data (fig. 5). General coordination investigated through the Matorin test indicated higher values in the case of the turning jump to the right side (300.9^0 compared to257.27^0 to the left side), an aspect that could be explained by the fact that all the subjects were right-handed.

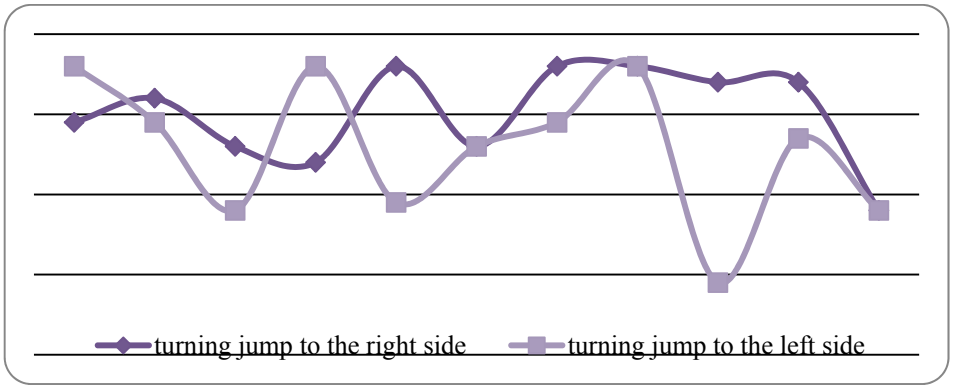

Fig. 6. Graph for the general coordination (the Matorin test)

The average for tapping was 19.27 sec., which proved a good repetition speed and coordination in the upper limbs. The average mark obtained by the children in the rhythm test (8.27) indicated a higher capacity of motor musicality and rhythmicity.

Discussions

The possibility to bring together, in a representative sample, children with type 1 diabetes is reduced, due to the number of recorded cases and to the parents' availability to get involved in this project, even if their participation doesn't require any expenses. The investigated children showed an increased interest in the proposed motor activities, they having a higher motivation even in the assessment lessons.

Conclusions

The study of specialty literature reveals that physical exercise represents the bio-antidote to hyperglycemia, while hypoglycemia is the most redoubtable enemy of the programmes of motor activities addressed to the child with type 1 mellitus diabetes.

The development of motor capacity components investigated through this scientific approach is situated at a level corresponding to the subjects' age, despite the existing metabolic diagnosis.

Knowing the initial level of the motor capacity development in children with type 1 diabetes represents a compulsory stage in dimensioning the physical exercise programmes, together with the permanent monitoring of the subjects' blood sugar, treatment and diet.

Acknowledgements

This study was achieved and published under the aegis of the National University of Physical Education and Sports of Bucharest, as a partner in the program co-financed by the European Social Fund through the Sectoral Operational Programme for Human Resources Development 2007-2013, developed through the project Pluri- and interdisciplinary in doctoral and post-doctoral programmes, Project Code: POSDRU/159/1.5/S/141086, its main beneficiary being the Research Institute for Quality of Life, Romanian Academy.

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PHYSICAL EXERCISES FOR DIABETIC POLYNEUROPATHY

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ABSTRACT. Introduction: Chronic sensorimotor neuropathy is the commonest of the diabetic neuropathies, although at any one time only approximately 50% of patients will experience symptoms and 10-20% have symptoms severe enough to warrant specific therapy. A structured exercise program with active and passive movements to reduce muscle tension and prevent muscle wasting. **Material and methods**: In this study, 28 patients received a structured exercise program: 14 with treatment and physical program exercises and 14 without. Pain relief was measured by the patient's global assessment of efficacy, using a visual analogue scale (0–10). Treatment goals include restoring function and improving pain control. Patients were randomly selected, the common factor being the presence of painful diabetic non insulin-dependent neuropathy. Patients of either sex with type 2 diabetes, aged between 25 and 83 years, who were on stable glucose-lowering medications during the preceding 3 month and who had PDN for at least 1 month were begin to be treated. Patients who had a pain score of >5, as assessed by visual analogue scale (VAS), were enrolled in our observation. **Results**: Our study shows the results of physiotherapy for painful diabetic non insulin-dependent neuropathy after 6 months of exercise program improving stability, gait and coordination. Another aspect is the reduction in depression symptoms caused by unsuccessful therapy before using the physiotherapy used in this study. The study shows how the physiotherapy is efficient in reducing muscle cramps and pain. Pain relief was measured by the patient's global assessment of efficacy, using a visual analogue scale (0–10). Treatment goals include restoring function and improving pain control. **Conclusions**: The current study compared the efficacy of physiotherapy in patients with painful diabetic non insulin-dependent neuropathy. Numerically, more patients have pain relief after physiotherapy program than the group without physiotherapy.

Keywords: *polyneuropathy, physical exercises, pain control*

REZUMAT. ***Exerciţiul fizic în polineuropatia diabetică.*** **Introducere**: Realizarea unui program de exerciţii fizice cu mişcări active şi pasive cu rolul de a reduce

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tensiunea musculară şi a preveni apariţia atrofiilor musculare. **Materiale şi metode**: este un studiu realizat pe 28 pacienţi cărora li s-a aplicat un program de exerciţii fizice (14 au avut un program structurat de exerciţii fizice şi terapie medicamentoasă, iar 14 au primit doar terapie medicamentoasă) . Reducerea intensităţii durerii a fost măsurată în baza eficienţei clinice a tratamentului pacienţilor şi în baza scalei vizuale (0-10). Ţinta tratamentului include restabilirea funcţiilor motorii şi îmbunătăţirea din punct de vedere al controlului durerii. Pacienţii au fost randomizaţi selectiv, factorul comun fiind prezenta neuropatiei diabetice noninsulinodiabetice. Pacienţii selectaţi indiferent de sex, cu vârste cuprinse între 25 si 83 ani, aflaţi pe doze stabile de medicamente antidiabetice orale în ultimele 3 luni şi care au diagnostic de polineuropatie diabetică de cel puţin 1 luna. Pacienţii incluşi au avut un scor al durerii sub 5 pe scala vizuală. **Rezultate**: studiul nostru arată rezultatele tratamentului fizic pentru pacienţii cu polineuropatie diabetică dureroasă după 6 luni de exerciţii fizice cu îmbunătăţirea stabilităţii, mersului şi coordonării. Alt aspect este reducerea depresiei cauzate de terapia medicamentoasă ineficientă înainte de iniţierea programului de exerciţii fizice. Acest studiu arată eficienţa terapiei prin exerciţiu fizic în reducerea crampelor musculare şi a durerii. Durerea a fost măsurată prin eficienţa clinică a tratamentului pacienţilor şi în baza scalei vizuale (0-10), ţinta fiind restaurarea funcţionalităţii şi controlul durerii pacienţilor. **Concluzii**: Acest studiu a comparat eficacitatea exerciţiului fizic la pacienţii cu polineuropatie diabetică non-insulinodependentă. Numeric, mai mulţi pacienţi au prezentat o scădere a intensităţii durerii după programul de exerciţii fizice.

Cuvinte cheie: polineuoropatie, exerciţii fizice, controlul durerii

Introduction

Chronic sensorimotor neuropathy is the commonest of the diabetic neuropathies, although at any one time only approximately 50% of patients will experience symptoms and 10-20% have symptoms severe enough to warrant specific therapy.

A structured exercise program with active and passive movements reduces muscle tension and prevents muscle wasting.

Objective

The aim of this study was to compare the efficacy of physical exercises in painful diabetic neuropathy (PDN). Sensory, motor as well as autonomic neuropathy all contribute to development of the diabetic foot syndrome.

Material and methods

In this observational trial, 28 patients received pregabaline, 150 mg orally twice daily in the morning at 8 a clock and at the bedtime, each for 6 months with optional dose uptitration (divided in two groups, each group has 14 patients both groups has the same medication for pain and the first group receive a program of physical exercise). Pain relief was measured by the patient's global assessment of efficacy, using a visual analogue scale (0–10). Treatment goals include restoring function and improving pain control. Patients were randomly selected, the common factor being the presence of PDN. Patients of either sex with type 2 diabetes, aged between 25 and 83 years, who were on stable glucose-lowering medications during the preceding 3 month and who had PDN for at least 1 month were begin to be treated. Patients who had a pain score of >5, as assessed by visual analogue scale (VAS), were enrolled in our observation.

PDN was confirmed by *1*) the patient's medical history, *2*) a diabetic neuropathy symptom and increased thresholds on the vibration perception test and monofilament test. Patients were excluded if they had any clinically significant or unstable medical or psychiatric illnesses. Patients with other causes of neuropathy; renal dysfunction , liver disease; psychiatric illness; uncontrolled hypertension; those taking anticonvulsants, antidepressants, local anaesthetics, or opioids; those who were pregnant; lactating women; or those being treated with any investigational drug within the last 30 days were excluded from this observation.

All patients underwent 6 months of treatment with one drug and, at the end of 6 months, patients underwent clinical evaluation.

One dose 75 pregabaline twice daily were used in the study for both groups. The primary end point of the study was the reduction of the average pain score from initial results, as assessed by the patient's global assessment of efficacy by the VAS (0–10 points). Secondary end points included the 24-point Hamilton Rating Scale for Depression; and patient self-evaluation of overall change on the basis of patient global impression of change scale.

Demographic characteristics were noted and all the parameters were measured before and after treatment with all four drugs and compared. Patients were not allowed any other pain medication.

Results and discussion

Impairment of sensory inervations often results in the numbness of the feet, and minor trauma or persistent pressure lead to severe complications

rapidly. Motor neuropathy is also common in the diabetic foot syndrome. In addition to reflex loss, electrophysiological testing of the peroneal provides quantitative information on the severity of motor impairment. For the group with pregabalin with physical exercise program we choose a controlled exercise program of 20 minutes, with various exercises picked form aerobic, stretching and strengthening disciplines, repeated three times a week.

The study was conducted between January 2014 and June 2014.

Population and samples: Total population was 28 participants randomly selected, divided into 2 groups of 14. Age varies between 25 and 83 years old, mean age 53.42 (SD 15.75), 12 male patients and 16 female patients, with duration of diabetes between 3 and 17 years, mean duration 3.90 (SD 11.03).

Gathered data analysis

Table 1. Values reported on visual analogue scale (VAS) by patients measuring pain.

	Group I with medication and physical program		Group II with medication without physical program	
	Before	After 6 month	Before	After 6 month
Patient 1	8	2	6	5
Patient 2	9	1	7	6
Patient 3	10	3	8	6
Patient 4	8	3	5	5
Patient 5	7	2	9	8
Patient 6	10	4	8	7
Patient 7	8	8	7	6
Patient 8	9	5	5	3
Patient 9	8	2	6	5
Patient 10	7	1	5	3
Patient 11	6	3	7	7
Patient 12	7	5	6	6
Patient 13	9	5	9	8
Patient 14	10	3	8	8

All data collections in above table have been tested for normality of distribution using Shapiro-Wilk normal distribution test, and Normal Q-Q Plots. All data collections have been found to have normal distribution.

Mean reduction of pain on VAS was calculated for each of the two groups and found 58.24% improvement in pregabaline group without exercises program and 72.82% improvement in pregabaline group with exercises program. Differences between mean values of pain on VAS for each group were tested with t-test for paired samples and were found statistically significant and non-accidental. We based differences found on medication treatment for the past six months. Differences were however statistically significant between pregabaline group with exercises program and also between pregabaline group without exercises program.

Table 2. Depression scores on Hamilton Scale

	Group I with medication and physical program		Group II with medication without physical program	
	Before	After 6 month	Before	After 6 month
Patient 1	11	5	10	6
Patient 2	10	4	9	8
Patient 3	11	6	10	9
Patient 4	12	4	11	10
Patient 5	9	4	8	7
Patient 6	8	4	8	7
Patient 7	10	5	10	5
Patient 8	11	4	10	4
Patient 9	13	4	12	4
Patient 10	12	4	13	5
Patient 11	12	4	15	4
Patient 12	10	4	9	4
Patient 13	10	4	8	5
Patient 14	10	4	11	5

Initial assessment showed normal distribution of scores. The 6 moths visit showed statistically significant reduction of depression score for all patients.

Table 3. Overall perception of change

	Group I with medication and physical program		Group I with medication without physical program	
	Before	After 6 month	Before	After 6 month
Patient 1	1	4	1	2
Patient 2	2	5	2	3
Patient 3	1	4	1	2
Patient 4	1	5	1	3
Patient 5	1	5	1	2
Patient 6	1	5	1	2
Patient 7	1	5	1	2
Patient 8	1	4	1	2
Patient 9	2	4	2	3
Patient 10	1	4	1	2
Patient 11	2	4	1	2
Patient 12	1	4	2	3
Patient 13	1	4	1	2
Patient 14	1	4	1	2

Overall perception of change, being a patient self-reported measure, like the VAS, showed similar results as the VAS after data analysis.

Conclusions

The current study compared the efficacy of exercises program at patients in treatment with pregabaline with PDN with patients without exercises program at patients with PDN. Numerically, more patients have pain relief after combination of drug and exercise.

In the present observational study, more than 72% improvement in pain score was observed in first group, and 58% with second group. Improvement in pain was significant and as a result, a significant reduction in depression scores was also observed. The overall self evaluation of patients is consistent with this result.

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THE EFFECT OF KINESIO TAPING ON KNEE INSTABILITY OF FEMALE RUGBY PLAYERS

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ABSTRACT. Background: The study aims to demonstrate the influence of physical exercises and the Kinesio Taping method over the knee's stability. The purpose of this study was to investigate the effect of Kinesio Tape on knee joint, during balance tests.We hypothesized that using Kinesio Taping we will obtain better assessment results in comparison with the assessment results in the lack of Taping. **Methods:** The study involved five adult female subjects. Four of the subjecte was heathy, and one had recent ACL surgical intervention, with mean age for 20 ± 21 years old and body weight 55,5 ± 78 kg. Two different training programs were given to the subjects during two months, with a frequency of three times per week, each one lasting approximately 50 minutes. The first training program contained isometric and dynamic exercises. As to the second training program, it consisted of dynamic exercises and an agility drill. Each subject trained the same way. The subjects were assessed three times: prior to starting the first training program, after finishing it, and, finally, after finishing the second training program. At each assessment, there were two testing conditions: the first without Taping and the second with Kinesio Taping (applied). Dynamic balance was assessed with the Star Excursion Balance Test, while for static balance we used the NetForce platform. With the help of the SPSS statistics program's Student's t-test, we performed the statistical analysis of the results. **Results:** Kinesio Taping techniques applied in this research, have seen segnificant changes in pain amelioration, edema reduction and regaining full knee extension in the acute postoperative period. Kinesio Taping also positively influences the dynamic equilibrium necessary both during traning and official meetings.

Keywords: *Kinesio Taping, instability, knee, rugby*

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REZUMAT. ***Efectul metodei Kinesio Taping asupra instabilității genunchiului la jucătoarele de rugby.*** **Introducere:** Studiul urmărește influența exercițiilor fizice și metodei Kinesio Taping asupra stabilității genunchiului la jucătoarele de rugby. **Ipoteză:** Scopul acestui studiu a fost de a investiga efectul Kinesio Taping pe articulația genunchiului, în timpul testărilor de echilibru. **Materiale și metode:** La studiu au participat cinci subiecți adulți de sex feminin dintre care - 4 sănătoase, iar una suferind o recentă intervenție chirurgicală a LIA, cu o vârstă medie de 20 ± 21 ani și o masă corporală de 55,5 ± 78 kg. Două programe de antrenament au fost aplicate timp de două luni, cu o frecvență de 3 ori pe săptămână, fiecare cu o durată de aproximativ 50 minute. Primul program de antrenament a fost format din exerciții izometrice și dinamice. În ceea ce privește al doilea program de exerciții, a fost compus din exerciții dinamice, dar și un traseu de agilitate. Subiecții au fost evaluați de trei ori: înainte de a începe primul program de antrenament, după terminarea acestuia, și după aplicarea celui de-al doilea program de antrenament. Pentru fiecare evaluare au existat două condiții de testare: prima, fără Taping și a doua cu Kinesio Taping. Echilibrul dinamic a fost evaluat prin intermediul Star Excursion Balance Test, iar pentru echilibrul static am folosit platforma NetForce. Cu ajutorul programului de statistică SPSS am aplicat Student t-test, pentru prelucrarea și analiza statistică a datelor culese în urma testărilor. **Rezultate:** Tehnicile Kinesio Taping aplicate în această cercetare, au înregistrat modificări semnificative în sensul ameliorării durerii, reducerii edemului și recâștigarii extensiei genunchiului în perioada acută post-operatorie. De asemenea Kinesio Taping, influențează pozitiv echilibrul dinamic, important în jocul de rugby atât în timpul antrenamentelor cât și în timpul întâlnirilor oficiale.

Cuvinte cheie: *Kinesio Taping, instabilitate, genunchi, rugby*

Introduction

The knee is the most important joint of the body. By his position, through its role in the static and dynamic biomechanics of the lower limb, and also by its covering with soft tissue, it is particularly susceptible and vulnerable to both direct and indirect trauma. Balance is one of the most important factors in sports. A deficitary balance was identified as being an important risk factor regarding the knee joint.

Rugby is a contact sport by its specificity, which by default will cause diverse and quite frequent trauma.

Current research conducted by Kaplan, Goodwill, Strauss & Rosen (2008) has found that the leg is the most prone area in terms of anatomical injuries in rugby, regardless of the experience level, that being from 42% to 55% of the total injury rate .

In a study conducted by the International Rugby Board (Fuller & Taylor, 2013) on the rate of injuries in women`s rugby 7 women during 2011-2013, showed that lesions in the knee joint were ranked on second, with a percentage of 17.6% for lesions located in the posterior area and 26.7% for lesions located in the anterior area.

The Kinesio Taping Method has been used for a long time for the prevention and treatment of sports injuries, even for supporting the joint or muscle during movement. Kinesio Taping can improve the proprioception which is considered to play an important role in the prevention of acute injuries and also during chronic injuries as well (Kase & Wallis, 2003).

According to Williams, Whatman, Hume & Sheerin (2012), on a set of 10 articles that included the use of this method in sports, has discovered that it allows a wider range of moving and compared to a normal dressing, it can be worn over a longer period of time without reapplying. Also in this study, from 10 articles only one had significant results statistically reported regarding pain amelioration and proprioception, 4 articles were found to be significant in enhancing stimulation of muscle contraction. By applying Kinesio Taping bandages it is aimed at a better muscle contraction in the bandaged area, of the 10 articles, 2 had significant results statistically reported and the others presented a substantial change in muscle activity.

Another article, which involves tracking the effects of two types of dressing: Kinesio Taping and Athletic Tape in the functional performance for basketball players with ankle sprains, found that following the performance tests there were statistically significant differences between the two test conditions. Athletic Tape (Strap) showed a significant decrease in performance, while Kinesio Taping did not limited the functional performance (Bicici, Karatas & Baltac, 2012).

Objectives

The study aims to demonstrate the influence of physical exercises and the Kinesio Taping method over the knee's stability. The purpose of this study was to investigate the effect of Kinesio Tape on knee joint, during balance tests.We hypothesized that using Kinesio Taping we will obtain better assessment results in comparison with the assessment results in the lack of Taping.

Participants

The study involved five female adult subjects selected from the female rugby team "U" Cluj, out of which - 4 healthy, and one who suffered a recent surgery of ACL, with a mean age of 20 ± 21 years and a body weight of 55.5 ± 78 kg.

Experimental design

All subjects took part in the study after signing the informed consent needed.

The research period was of six months of recovery and training. To reach the same level of stability with the other participants, the subject having had ACL surgery followed a rehabilitation program for a period of four months.

After the recovery period, all subjects followed two training programs designed to increase the stability of the knee joint. The first program included isometric and dynamic exercises, and the second program consisted of dynamic exercises, and a agility trail. Each program was conducted over a period of 1 month, with a frequency of 3 times / week, lasting about 50 min.

Data recording

To highlight the results, the subjects were evaluated three times: before starting the first workout, after its completion and after the application of the second workout.

The Star Excursion Balance Test (SEBT) was used to assess the dynamic balance; it is a functional dynamic test that requires strength, flexibility and proprioception (Abbasi, 2012).

Ground Reaction Forces (GFR) were measured using a balance platform (model AMTI BP400600-2000 Hz, with size 400x600x83 mm), collected and stored with an AMTI NetForce software at 2000 Hz. All data was analyzed using the software developed in Matlab, managing to highlight the static equilibrium. During all balance tests, subjects had their eyes open and they were ordered to keep looking straight ahead. During the test, subjects were instructed to place the measured leg (barefoot) on the middle of the platform, the other member being at 90 ° flexion of the knee joint. Before starting the test and data collection, subjects were allowed a sampling evaluation from each condition to perceive the position and to accommodate with the equipment. When subjects were ready, they were asked to say "Ready!" in order to start the testing. Testing under each condition was performed three times (initial, intermediate and final), each test lasting 15s. If subjects lost balance and touched the platform with the other foot, the test was repeated after a 3 minutes break.

The evaluation of postural control by this means of assessment was shown to be a reliable and valid way to determine the ability of static equilibrium (Lyytinen et al., 2010; Qu, 2010; Harring et al., 2008; Hoffman, Schrader & Koceja, 1999; Williams et al., 1997).

Test Conditions

For each evaluation there were two test conditions: first, without Kinesio Taping and second, with Kinesio Taping.

Kinesio-Taping Techniques used to support the knee joint were: ligamentous technique and the correction technique according to the Sijmonsma Kinesio taping manual (Sijmonsma, 2013).

Data analysis

For the statistical interpretation of numerical data we used the SPSS statistical analysis program, whereby we applied Paired Sample T-Test. Statistical significance was set at $p < 0.05$ (Huang, Hsieh, Lu & Su, 2011).

Results

After the dynamic balance test (SEBT) for the right leg by comparing the final statistical results in two conditions: without Taping and with the aplications of the Kinesio Taping bandages it shows that there is a statistically significant difference between condition Mean. The first condition (EfFDr) ($M = 1.01$, $SD = 9.41$) and the second condition (EfTDr) ($M = 1.06$, $SD = 7.28$) resulted in: $t(4) = -2.924$ and $p = 0.043$. For the left leg, there were no statistically significant differences from the statistical analysis.

As regarding the results of the static equilibrium of the right leg for the initial evaluation of the two conditions, only the standard deviation of the center of pressure on the x(SDx) axis recorded differences in statistical terms; SDxF ($M = 0.79$, $SD = 0.23$) and SDxT ($M = 0.97$, $SD = 0.14$) resulted $t(4)=-3.076$, $p=0.037$. At the lower left limb, there were significant statistical differences regarding the displacement average of the center of pressure (ARD). ARDF ($M=0.74$, $SD=0.09$) and ARDT($M=0.83$, $SD=0.08$) indicated $t(4)=-8.374$, $p=0.001$.

Discussions

For the multitude of dynamic exercises applied, the dynamic balance was much better developed, although good records were obtained during the evaluation of the static equilibrium.

Kinesio taping with small degrees of elasticity, causes similar effects to a more rigid bandaging. Specifically, the taping influences the stability, supports the muscles, but restricts the joint movement to a small extent. So when we applied SEBT, in certain directions the knee joint was prevented to reach the maximum score so, during the official meetings, Kinesio Taping helps to protect the joint and does not allow it to slide during pivoting.

The differences between legs significantly decreased from the first evaluation. By using Kinesio Taping techniques on some subjects, the difference between the left leg and right leg is almost nonexistent.

Conclusions

Kinesio Taping techniques applied in this research, have seen segnificant changes in pain amelioration, edema reduction and regaining full knee extension in the acute postoperative period.

Kinesio Taping also positively influences the dynamic equilibrium necessary both during training and official meetings.

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THE IMPLICATIONS OF CARBOHYDRATES DURING PHYSICAL EFFORT: A COMPREHENSIVE REVIEW

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ABSTRACT. The metabolism during physical exercise changes depending on the nature of the effort in various sports, duration, intensity, environmental conditions, etc. Carbohydrates in the form of glucose and intramuscular glycogen becomes an increasingly important energy substrate during physical activity, with the muscle contraction being triggered by ATP (adenosine triphosphate). The biochemical processes that occur during muscle contraction are very complex. Degradation of glycogen to lactic acid and oxidative degradation of glycogen to carbon dioxide and water have no other role during muscle contraction but to obtain molecules of ATP. The modifications of certain biochemical parameters such as blood sugar levels depend on the exercise intensity and they, in turn, influence the speed of metabolic changes in the working capacity of the body.

Key words: *carbohydrates, ATP, physical effort*

REZUMAT. Implicaţiile carbohidraţilor în efortul fizic. Metabolismul efortului sportiv prezintă modificări în funcţie de natura efortului depus în diferite ramuri sportive, durată, intensitate, condiţii de mediu etc. Carbohidraţii, sub formă de glucoză şi glicogen reprezintă un substrat energetic important pentru activitatea fizică, contracţia musculară fiind declanşată de ATP(adenozin-trifosfat). Procesele biochimice care au loc în timpul contracţiei musculare sunt foarte complexe. Degradarea glicogenului la acid lactic precum şi degradarea oxidativă a glicogenului la dioxid de carbon şi apă nu au alt rol în procesul contracţiei musculare decât de a procura molecule de ATP. Modificările anumitor parametrii biochimici-precum glicemia, care pot influenţa gradul de efort, sunt dependente de intensitatea efortului fizic şi ele, la rândul lor, acţionează asupra vitezei de realizare a modificărilor metabolice cu rezultat direct asupra capacităţii de muncă a organismului

Cuvinte cheie: *carbohidraţi, ATP, efort fizic.*

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Introduction

In order to achieve performance, lifestyle and above all alimentation play a crucial part, both in the preparatory stages, but especially in the competition phase. For the best performance, athletes undergo a complex process of preparation during which the body is required to reach even the maximum physiological limits.

Carbohydrates during effort

Carbohydrates are organic compounds containing in their structure C, H, O and other elements found only on certain classes of compounds. The basic units of carbohydrates are the monosaccharides. Despite their similar chemical composition, carbohydrates can form an enormous number of combinations through the stereochemical variety of the hydroxyl groups that they carry many possibilities to assemble monosaccharides one to another, and through the wealth of noncarbohydrate substituents that can decorate the resulting oligo- and polysaccharides (Lombard V, 2014). Carbohydrates play primarily an energetic role, in addition to a structural and protective part.

Athletic performance is unthinkable without the involvement of carbohydrate. During prolonged muscular effort or when the external environment temperature is lowered, energy consumption is greatly increased and the need for carbohydrates increases as well. Carbohydrate oxidation accounts for 10–15% of total energy production during low intensity aerobic exercise, increasing progressively to roughly 70–80% of total energy during intense exercise (Holloszy JO, 1996).

There are two sources of glucose molecules available to the working muscle: plasma glucose and muscle glycogen. The modifications of certain biochemical parameters such as blood sugar levels depend on the exercise intensity and they, in turn, influence the speed of metabolic changes in the working capacity of the body (Creţu A, 2010). Glucose delivery to the working muscle is accelerated by a marked increase in capillary perfusion during exercise and by ingestion of carbohydrate rich meals or drinks as well as the permeability of the muscle membrane to glucose. The latter is regulated by a plethora of molecular signalling thought to include calcium, stretch and energy stress signalling and probably others. In the post-exercise recovery period, muscle glucose uptake displays an increased sensitivity to insulin in this way increasing glucose uptake after a meal in the muscles that have performed the exercise and therefore are in need of rebuilding their glycogen stores. (Thomas E Jensen,

2012). Furthermore, glucose utilization during exercise and the amount metabolized per unit of insulin plasma (used as an indicator of insulin sensitivity) increases especially when body weight loss is accompanied by physical exercise (Creţu A, 2010).

Carbohydrate in the form of glucose and intramuscular glycogen becomes an increasingly important energy substrate with rising exercise intensity (Holloszy JO, 1996). While very little net glycogen breakdown is observed at low-intensity exercise, glycogen-breakdown becomes the predominant glucose source at higher intensities (Hargreaves M, 1988), which resulted in the practice of high-carbohydrate diet regimens to increase pre-exercise glycogen levels (carbohydrate loading). However, skeletal muscle glycogen concentration exerts a regulatory effect on many cellular processes. For example, contraction-induced as well as insulin-stimulated glucose transport and glucose transporter 4 (GLUT4) translocation are inhibited by high muscle glycogen levels. (Richter EA, 2001.). A number of studies (De Bock K, 2008.), (Akerstrom TC, 2009.), (Hulston CJ, 2010), show that independent of prior training status, short-term (3–10 wk) training programs in which a portion of workouts are commenced with either low muscle glycogen and/or low exogenous glucose availability augment training adaptation to a greater extent than when all workouts are undertaken with normal or elevated glycogen stores.

Glycogen metabolisation

The two largest glycogen deposits in mammals are in the liver and skeletal muscle but many cells are capable of synthesizing glycogen. Both muscle and liver glycogen reserves are important for whole body glucose metabolism and their replenishment is linked hormonally to nutritional status. Control differs between muscle and liver in part due to the existence of different tissue-specific isoforms at key steps. Readily visualized by the electron microscope, glycogen granules appear as bead-like structures localized to specific subcellular locales. Each glycogen granule is a functional unit, not only containing carbohydrate, but also enzymes and other proteins needed for its metabolism. These proteins are not static, but rather associate and dissociate depending on the carbohydrate balance in the muscle (Shearer J, 2002).

Glycogen degradation and synthesis are relatively simple biochemical processes. Glycogenolysis is regulated by glycogen phosphorylase (GP), acting on the terminal α-1,4-glycosidic linked glucose residues, and debranching enzyme, targeting the α-1,6-branchpoints in the glycogen molecule (Roach, 2002). Therefore, glycogen degradation consists of three steps: (1) the release of glucose

1-phosphate from glycogen, (2) the remodeling of the glycogen substrate to permit further degradation, and (3) the conversion of glucose 1-phosphate into glucose 6-phosphate for further metabolism. The glucose 6-phosphate derived from the breakdown of glycogen has three fates (1) it is the initial substrate for glycolysis, (2) it can be processed by the pentose phosphate pathway to yield NADPH (nicotinamide adenine dinucleotide phosphate) and ribose derivatives; and (3) it can be converted into free glucose for release into the bloodstream. This conversion takes place mainly in the liver and to a lesser extent in the intestines and kidneys. The activity of GP is increased by allosteric binding of AMP (adenosine monophosphate) or IMP (inosine monophosphate) and competed by ATP or glucose-6-phosphate (G-6-P) (Roach, 2002).

Glycogen synthesis requires an activated form of glucose, uridine diphosphate glucose (UDP-glucose), which is formed by the reaction of UTP (uridine triphosphate) and glucose 1-phosphate. UDP-glucose is added to the nonreducing end of glycogen molecules. As is the case for glycogen degradation, the glycogen molecule must be remodeled for continued synthesis. Control of synthesis is shared between transport into the muscle and the step catalyzed by glycogen synthase (Roach, 2002).

Muscle glycogen serves only to fuel muscular activity and its utilization is controlled by muscle contraction and by catecholamines (Roach, 2002). Other studies show that after prolonged high-intensity exercise the depletion of glycogen is dependent on subcellular localization. In addition, the localization of glycogen appears to be influenced by fibre type prior to exercise, as well as carbohydrate availability during the subsequent period of recovery. These findings provide insight into the significance of fibre type-specific compartmentalization of glycogen metabolism in skeletal muscle during exerciseand subsequent recovery (Nielsen J, 2011).

Blood glucose level is kept constant by the liver glycogen reserves. When the blood glucose increases through the absorption of carbohydrates from the intestine, the excess is converted to glycogen in the liver and muscles, so that glycogenolysis that is replaced by glycogenesis. Skeletal muscle does not contribute directly to blood glucose levels, as it does not contain specific enzymes for the conversion of glucose-6-phosphate to glucose.

While certain enzymes such as glycogen synthase and glycogen phosphorylase have been extensively studied, other proteins such as the glycogen initiating and targeting proteins are just beginning to be understood. Two metabolically distinct forms of glycogen, pro- and marcoglycogen have been identified that vary in their carbohydrate complement per molecule and have different sensitivities to glycogen synthesis and degradation. The primer for glycogen synthesis is an autoglucosylating protein referred to as glycogenin.

While identifying and studying rodent muscle glycogenin, Lomako and colleagues (Lomako J, 1993) discovered that there were two forms of glycogen. These glycogen pools were shown to differ in size and protein content, with macroglycogen (MG) being the larger at 107 Da and proglycogen (PG) the smaller at 400 kDa. Both molecular forms contain only a single glycogenin but different amounts of CHO; thus they are separable via solubility in perchloric acid (PCA) because MG is soluble and PG precipitates. The literature (K. B. Adamo, 1998) demonstrates that at exhaustion, the MG store shows the greater relative depletion, and PG is the more sensitive to dietary CHO and is synthesized more rapidly after glycogen depletion. (K. B. Adamo, 1998) also demonstrated that the PG reaches a plateau at 24 h, whereas the MG pool continues to expand and is responsible for the supercompensation seen in the days after exhaustive exercise in a high CHO condition.

Gluconeogenesis (GNG)

Blood glucose is essential during prolonged periods of endurance exercise, when large changes occur in tissue oxygen delivery and use, metabolic rate, carbohydrate (CHO) oxidation, blood glucose disposal, and hepatic plus renal glucose production. Following an overnight fast, gluconeogenesis (GNG) provides 25–50% of total glucose production in resting humans, while the remainder is supported by hepatic glycogenolysis (GLY)((Bergman BC, 2000.) (Chandramouli V, 1997.) (Chen X, 1999.)). In resting humans after fasting for 40 h GNG accounts for nearly 90% of total glucose production (Staehr P, 2007). During submaximal exercise, energy demand requires muscle glucose utilization and, consequently, increases blood glucose disposal in order to prevent hypoglicemia (Brooks GA, 1994.) In contrast to rest, the relative contribution of GNG to total glucose production has been shown to decrease during hard exercise (Trimmer JK, 2002.)

Glycolysis durring effort

Glycolisis represents the enzymatic breakdown of a carbohydrate (as glucose) by way of phosphate derivatives with the production of pyruvic or lactic acid and energy stored in high-energy phosphate bonds of ATP.

The biochemical processes that occur during muscle contraction are very complex. The source of energy that triggers muscle contraction is ATP (adenosine triphosphate). There are three possible sources for ATP production: (a) *anaerobic alactacid metabolism* –the ATP-CP (phosphocreatine) or phosphagene phase,

during which energy is provided from ATP stored in muscles and by phosphagene type degradation (ATP and creatine phosphate). ATP can be reconstructed by reducing phosphocreatine to creatine and inorganic phosphate, again providing energy for the ATP. This contraction stage is followed by the (b) *anaerobic lactacid metabolism*, with formation of lactic acid, given by an incompete glycogen breakdown during glycolisis. The production of lactate regenerates NAD+ (pyruvate is reduced to lactate while NADH is oxidized to NAD+), which is used up in oxidation of glyceraldehyde 3-phosphate during creation of pyruvate from glucose, and this ensures that energy production is maintained and exercise can continue. In the final stage of glycolysis (the production of pyruvate) ATP is generated. The anaerobic phase with the two components(alactacid and lactacid) is of great value as it provides the ATP energy molecules during muscle contraction in conditions of a lack of oxygen, a situation which is created after an intense physical effort. (c)*Aerobic metabolism*-oxidation or aerobic metabolism of carbohydrates and fats. In the body, muscle is continuously supplied with blood, and therefore oxygen. This causes a new phase of muscle contraction, which is more effective –the so called aerobic phase, and which provides a greater amount of energy.

Therefore, degradation of glycogen to lactic acid during the anaerobe phase and oxidative degradation of glycogen to carbon dioxide and water during the aerobe phase have no other role in muscle contraction but to obtain molecules of ATP, and creatinphosphate is used to recover the degraded ATP during muscle contraction.

Carbohydrate and fat utilization

There has been continued interest in the regulation of carbohydrate utilization in muscle tissue, as they are, together with fatty substances, the main substrates for energy production during exercise in well fed humans. The concept of a reciprocal relationship between fat and carbohydrate oxidation in muscle resulted from the work of Randle and colleagues in the 1960s (Randle PJ, 1963).

The relationship was called the “glucose–fatty acid (G–FA) cycle”, and demonstrated the ability of increasing fat provision to downregulate carbohydrate metabolism in the heart and diaphragm. Furthermore, many investigations have demonstrated that increasing fat availability increases fat oxidation and decreases carbohydrate use in the whole body and skeletal muscle. By increasing the availability of free fatty acids to the working muscles, it was shown that carbohydrate downregulation during moderate and intense aerobic exercise occurred mainly at glycogen phosphorylase, the enzyme that regulates the

degradation of muscle glycogen (Spriet, 2014). A main advantage of glucides over lipids is that after aerobic and anaerobic catabolism, energy is released at a rate almost three times higher in comparison with fatty substances. However, the energy released by 1 gram of carbohydrate is lower as to to the same amount of lipids.

Types of physical effort

Before classiffying physical effort, we consider necessary to define a few terms that describe different concepts: ”physical activity," "exercise," and "physical fitness". C. J. Caspersen states in his study (C J Caspersen, 1985) that physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure. The energy expenditure can be measured in kilocalories. Physical activity in daily life can be categorized into occupational, sports, conditioning, household, or other activities. Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness. Physical fitness is a set of attributes that are either health- or skill-related.

In sport, physical effort can be classified according to several criterias: according to exercise intensity (maximum intensity effort, submaximal exercise intensity, exercise of high intensity, exercise of moderate intensity, low intensity exercise), according to the degree of oxygen supply to the body (anaerobic exercise, aerobic exercise, combined exercise), according to the type of muscle contraction (isotonic effort, isometric effort and isokinetic effort), based on energy consumption (light work, medium work, heavy work) and according to the load degree of the major systems of the body (neuromuscular effort, effort cardiopulmonary, endocrine-metabolic effort (ApostuM, 2003).

Depending on exercise intensity can be distinguished: maximum intensity effort, lasting 10-15 seconds, the energy released is from ATP, which is again created from phosphocreatine. Submaximal intensity effort, lasting up to 1 minute, the energy source used in addition to ATP is creatine-phosphate and glucose during anaerobe glycolysis which forms lactic acid. High intensity effort, lasting up to 6 minutes, releasing energy through the aerobic and anaerobic path. Moderate effort, lasting up to 60 minutes, the energy formation occurs via aerobic energy substrate -the carbohydrates. The after effort small oxygen deficiency is covered in this case by an increased oxygen consumption. Mild effort, lasting between 60 minutes and several hours, the energy formation occurs through the aerobe path using as substrate carbohydrates and fat. Fujimoto T et. al tested whether glucose uptake is enhanced in trained men during low-, moderate-, and

high-intensity exercise as compared with untrained men. The results showed that skeletal muscle glucose uptake is higher in trained than in untrained men at high relative exercise intensity, although at lower relative exercise intensities no differences are observed. Thus, endurance training improves the capacity of contraction-induced glucose uptake in skeletal muscle (Fujimoto T, 2003).

Carbohydrates in skeletal muscles, heart and brain during physical exercise

Thorsten Rudroff et al. used positron emission tomography/computed tomography (PET/CT) and [18F]-FDG to test the hypothesis that glucose uptake (GU) heterogeneity in skeletal muscles as a measure of heterogeneity in muscle activity is greater in old than young men when they perform isometric contractions. The findings of the study demonstrated greater heterogeneity in GU in old men during two types of isometric contractions with the knee extensors. The GU measurements of muscle activation obtained with PET/CT imaging are consistent with age-associated differences in the modulation of muscle activation during tasks that require force or position control, but provide greater spatial information about the magnitude of the difference in muscle activity between young and old men when performing isometric contractions (Thorsten Rudroff, 2014).

Jukka Kemppainen investigated the effects of exercise on myocardial glucose uptake and whether the pattern of glucose uptake is the same as in skeletal muscle, as the heart has a greater oxygen consumption both at rest and during exercise compared to skeletal muscle (Rowell, 1986). Glucose uptake was measured using positron emission tomography (PET) and 2-[18F]fluoro-2-deoxy-D-glucose ([18F]FDG). The study demonstrated that myocardial glucose uptake is increased during mild- and moderate-intensity exercise, but is decreased during high-intensity exercise (Jukka Kemppainen, 2002).

Physiological activation increases glucose uptake locally in the brain. However, it is not known how high intensity exercise affects regional and global brain glucose uptake. Pellerin & Magistretti have introduced the astrocyte–neurone lactate shuttle hypothesis where lactate along with glucose serves as an oxidative fuel for elevated neuronal energy metabolism so that the largely glycolytic metabolism in astrocytes is linked with the largely oxidative metabolism of lactate in neurones (Pellerin L, 2003). The study of Kemppainen J demonstrated that brain glucose uptake decreases with increase in exercise intensity. Therefore substrates other than glucose, most likely lactate, are utilized by the brain in order to compensate the increased energy needed to maintain

neuronal activity during high intensity exercise. Moreover, it seems that exercise training could be related to adaptive metabolic changes locally in the frontal cortical regions (Kemppainen J, 2005). The study by Kemppainen ***et al.*** provokes speculation as to the fate of the carbohydrate taken up by the brain. Secher NH states that lactate taken up by the activated brain is metabolized (Secher NH, 2005) as it does not accumulate within the brain or in the spinal fluid (Dalsgaard MK, 2004) and it is known to be a substitute for glucose metabolism (Magistretti PJ, 1999).

To conclude, during exercise the energy consumed in muscle tissue is mainly supplied by carbohydrates and fats. The use of intramuscular carbohydrate and lipid energy stores are coordinated during different types of exercise remains a subject of debate. The importance of muscle glycogen on performance during both prolonged and high intensity intermittent exercise has subsequently been confirmed in numerous studies. Furthermore, the major metabolic consequences of the adaptations of muscle to endurance exercise are a slower utilization of muscle glycogen and blood glucose, a greater reliance on fat oxidation, and less lactate production during exercise of a given intensity. These adaptations play an important role in the large increase in the ability to perform prolonged strenuous exercise that occurs in response to endurance exercise training.

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FINANCIAL REWARD AND ITS EFFECTS ON MANAGERS AND EMPLOYEES IN THE SPORT ORGANIZATIONS

DRAGOŞ PAUL[1*]

ABSTRACT. Inequity, real or only perceived as it is, has one of the strongest effects in decreasing the motivation. An employee, initially motivated, may be thinking: why should I do the best I can if I get paid as well as office colleague and he hangs all day / if both work as he is paid much better? Paradoxically, the studies have shown that employees are asking themselves very rarely such questions of fairness, if they are the ones that hang or are unduly better pay.

Keywords: *reward, motivation, sport, managers, employees*

REZUMAT. ***Recompensa financiară şi efectele acesteia asupra managerilor şi angajaţilor din organizaţiile sportive.*** Inechitatea, reală sau doar percepută ca atare, are unul dintre cele puternice efecte de scădere a motivaţiei. Un angajat, de altminteri iniţial motivat, poate gândi: de ce sa mă străduiesc dacă sunt plătit la fel ca şi colegul de birou şi el pierde vremea toata ziua/ dacă muncim amândoi la fel şi el este plătit mult mai bine? Paradoxal, studiile au arătat ca angajaţii îşi pun rareori acest tip de întrebări legate de echitate, în cazul în care ei sunt aceia care pierd vremea sau sunt în mod nejustificat mai bine plătiţi.

Cuvinte cheie: *recompensă, motivaţie, sport, manageri, angajaţi*

Introduction

This paperwork, as the title suggests, deals with the role of motivation in sport (Hodge, 2005; Elliot, 2008; Walsh & Giulianotti, 2009) at the level of managers and employees, fundamental thing in order to achieve superior performance at all levels of activity.

The often changes occurred in economic, social and sportive plan, as well as the importance, proven in time, of the motivational act, provide it with a special importance both as theoretical approach and especially as practical approach (Dănăiaţă et al., 2002; Derek & Hall, 1999).

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In the last years, also in our country, there have been developed complex systems of compensation and benefits based on rigorous human resources policy, by the influence of managers with international experience and a more obvious need to further motivate talented employees. In addition to fixed salary, organizations have begun to offer other elements that build the salary package to be as motivating as close to the needs of employees: performance related bonus, company car, phones, laptops, meal tickets / gift, medical insurance / life subscription to medical clinic / gym, pension funds, paid trips, loans, stock plan sites, profits, kindergarten children, gifts. By offering such salary packages depending on the needs of employees, the organization can gain in terms of their motivation for work and satisfaction in work. So, one of the specialists directions of investigation are outlined in the content of salary package.

In many sports organizations, payroll system is by far the most important motivator factor for employees (Bill, 2009; Hertzberg et al., 1993; Deci & Flaste, 1996). Even if this fact is known, very often, their pay scale is not based on a coherent wage policy and a systematic study of the importance of positions in the organization.

Implementing a paying system that is based on rigorous investigation to capture the needs of employees in terms of salary package content but also the importance of the job to the organization and the level of salary in the labor market, carries many advantages. For the employee, it is noted that strong motivator role, making a sustained effort at work, interest in professional development, increased satisfaction, organizational commitment increased, wellbeing at work.

All of this is reflected at the organization level in reducing staff turnover, reducing counterproductive behaviors and increasing the productive, in other words, it succeeds in achieving organizational goals more effectively.

Material and methods

The choice of research methods and techniques has been made according to the studied issue, with the established objectives and hypotheses, endeavor which has allowed us to get to know the studied phenomena in relation with up to date theories, practices and realities. In consequence, the following methods and techniques have been chosen:

- Study of specialty literature
- Questionnaire

After establishing the research approach strategy, the author decided to accomplish the study on a number of 60 managers and 140 employees of differed sports organizations. Because of some of the potential respondents' reserves and because of the mistakes occurred in filling in the questionnaire, I have managed to gather a number of 51 correctly filled in questionnaire from managers and 127 from employees.

The sampling was mixed (random and directed) because of the following reasons:

- sportive organizations of various sizes and statuses were taken into consideration;
- from each type, the investigated subjects were selected first of all according to their availability to answer the questionnaire.

The sample was subjected to analysis through the following:

- geographical area (in the case of managers 23% fronm the total of subjects are from Oradea, 21% from Cluj Napoca, about 20% from Timişoara and Bistriţa and 8% from Arad. In the case of employees, from Oradea were enroll in research 26%, from Bistriţa 21%, from Timişoara 20%, Cluj Napoca 18% and from Arad 15%);
- the size of the organization (12% of respondents among both managers and employees are part of small sports organizations. Among 27% of managers and 20% of the employees belong to medium size sports clubs, 61% of managers and 68% of the employees are part of larger sport organizations);
- the position within the organization (29% of managers are directors, 23% are vice presidents, 12% are presidents; 12% deputy directors; also 12% are counselors; 6% financial officers and 6% administrators. From the employees group: teacher-coach 38%, coaches 24%, organizers of competitions 8% and 5% head of deparments and reviewers. Also, in a small percentage (4%) are reviewers, secretaries and clerks. There is a category of 8% occupied by other staff (caretakers, drivers etc.);
- study level (53% of the managers graduated bachelor's degree, 29% postgraduate diploma and 18% are doctors. About the majority of employees (52%) have graduated bachelor's degree, 23% attended postgraduate and only 27% graduated just the high school);
- the age of the subjects (a percentage of 47% of managers are between 46-55 years, 24% are between 36-45 years and same 24% are between 56-65. Among employees, 31% are up to 35 years and between 46-55 years, 22% were between 36 and 45 years and the remaining 16% are over 56 years);
- gender (88% from managers şand 80% from employees are men);

Data interpretation followed the analysis of some marks which can provide important aspects regarding the level of subjects' motivation (the way of salary should be given, the own perception about the level or received reward and what can be done to have more motivated people)

Results

Responses received from the managers indicate in 82% that the salary should be granted differential, depending on the results. Only 12% believe that the salary should be paid equally for ones with the same tasks and only 6% believe that wages should only be granted based on seniority (fig. 1).

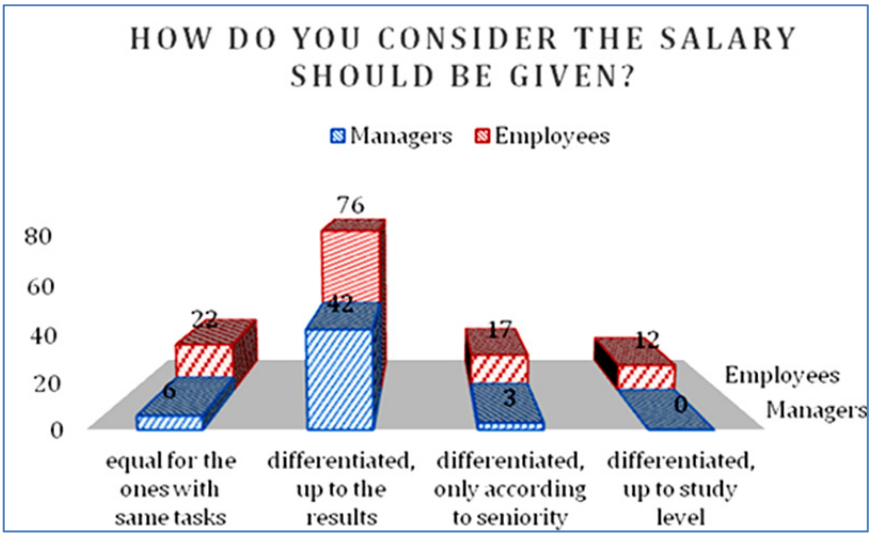

Fig. 1. Graphical representation of the opinions regarding salary

The opinion of the employees regarding the issue of granting wage differs a little bit from what managers though, even if, most of the executives indicates, as well as managers, that performances should be the first criteria to be taken into account for the establishing the salary, 60% of respondents choosing this option.

Managers' perception of the level of reward received at current job reveals that 53% of them (it means the majority) consider their work well-paid, therefore have a proper motivation in this respect. However 23% say they are underpaid while 24% believe they are paid less than they deserve, which leads to decrease in motivation and the performance in the workplace (fig. 2).

The situation among employees is totally different (fig. 2). If 53% of managers are feeling that are well payed for the work they perform, among executive staff only 17% fall into this category. On the other hand, 36% of employees believe they are paid less than they deserve and a percentage of 47% say they are underpaid. Thus, the motivation of staff in terms of salaries obtained leave much to be desired in sports organizations where research was conducted.

Regarding the proposed actions of managers to motivate employees, as shown in Fig. 3 stands appropriate remuneration (depending on results) that appears in 44%, than working conditions, proposed by 31% of respondents, and the staff is considered in 25% of cases. There are other "actions" such as material resources, awards, bonuses, trust, appreciation, etc. but do not appear with such frequency as the above mentioned.

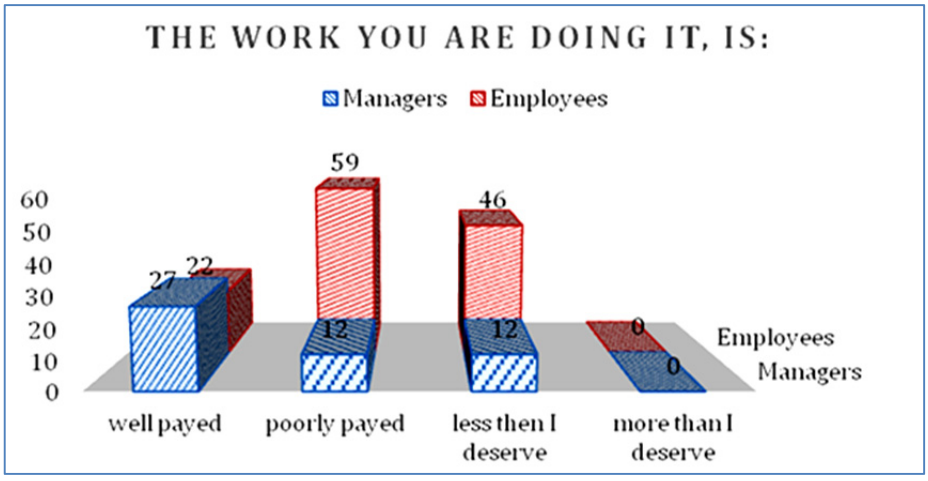

Fig. 2. Graphical representation of the opinions regarding the work

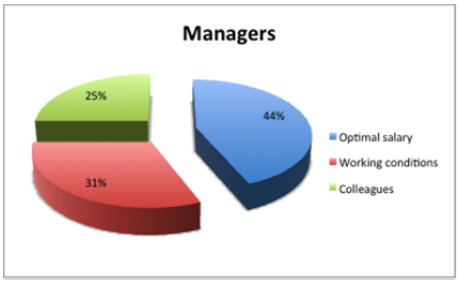

Fig. 3. Actions which can motivate the managers

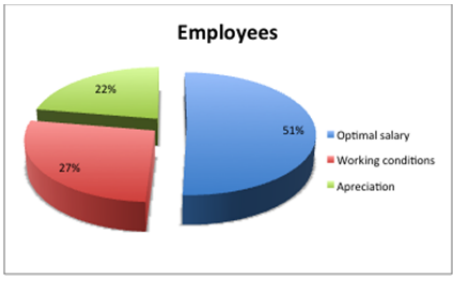

Fig. 4. Actions which can motivate the employees

The proposed actions of employees (fig. 4) does not differ too much from those listed by managers, by contrast, the first two are identical. Thus, 51% of respondents consider adequate remuneration the most important way to be motivated. Also, working conditions appear in a 27% of the responses and the appreciation of the manager is an important incentive for 23% of the employees. Another things proposed by employees are the job security, the staff, the dynamics of the activity etc.

Discussions

Implementing in the companies of a pay system that is based on rigorous investigation to capture the needs of employees in terms of salary package content, also the importance of the job within the organization and the level of the wage at the labor market, carries many advantages. For the employee, it is noted that strong motivator role, making a sustained effort at work, interest in professional development, increased satisfaction, organizational commitment increased wellbeing at work (Arnold & Feldman, 1986; Cole, 2000; Hoye et al., 2009).

As profit is appear as a measure of success in a business, so people judge their own success or failure depending on the level at which they are maintained by the employer in financial terms, ie according to the amount of salary that are rewarded for work performed. Salary can be considered as a survival factor. Money can act as an incentive for more productive work. With money earned people can buy goods and services to meet their needs. As much as the work is tedious and stirs a low intrinsic interest, the greater the importance of money as a motivator factor of the initiative to effort (Johns, 1999; Jutta & Heinz, 2010; Roşca, 2004; Wagner & Harter, 2009).

Each employee has a specific reason to go to work. Managers who succeed to motivate people are those who know the objectives of each of their employees. Every day, they do nothing else then to help people in achieving these expectations. A true leader not only he understands these reasons, but also how to integrate them into the life of employees (Zaharia, 2008; Bill, 2009).

Conclusions

- About the way that should salary be granted, managers' opinion can be a starting point, their authority, but specially the possibility of involvement in setting wage salary is a basic component in motivating employees in sport organizations.

- To understand the motivation, managers firstly need to understand the reasons for that the individuals behave in a certain way and have certain reactions in threatening situations or seeking to influence.
- Managers need to understand the strategies of motivation, how they succeed or fail based on how they manage to influence the internal motivations of employees.
- Leaders who succeed to help employees in achieving their own goals will never have problems for motivating them. Fulfilment of their objectives is the way they are constantly motivated. All the things the managers need to do is to find connections between employees' personal goals and needs of the organization.
- The equity at the workplace viewed through the perspective of rewarding - workload, has a major motivator effect, reflected in responses from subjects included in the study. Also, differentiation of the grant received in depending with the performance can be a real motivational contribution in sports organizations.
- The material conditions, workplace environment and correct appreciation of the employees' work are really important motivator factors, both in terms of managers and employees, and their careful use can create a strategic advantage in the field of sports management.

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CONSIDERATIONS ON THE REALIZATION OF THE LAW IN THE MATTER OF ANTI-DOPING REGULATIONS IN SPORT ACTIVITIES IN ROMANIA

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ABSTRACT. The treatment of such topics could not be sufficiently covered by the content of a single scientific paper - but at least we can present its complexity. The theme of the paper, can offer us the percentage between un-clarity (existence) and the effectiveness of the law - that is the extent in which the law is realized under the doping policies in Romania. Our considerations will highlight the fact that we are in the presence of an object of regulation of a new branch of law - imposed by social-economic reality of today - namely "sports law" - belonging both to the field of sports science and science of law. We can relate to legal values with the values of sport - so in this way we can highlight the state of realization of the rights in the matter doping in sport in Romania.

Keywords: *sports law, the fundamental right to practice sports activities, right to life, right to health, the right to physical and mental integrity of the person, the right to dignity, the achievement of law, transparency of decision*

REZUMAT. ***Considerații privind realizarea dreptului în materia reglementărilor antidoping în activitățile sportive din România.*** Tratarea unei astfel de tematici nu ar putea fi suficient acoperită prin conţinutul unei singure lucrări - dar, cel puțin, ne poate oferi măsură complexității acesteia. Tematica lucrării, ne poate oferi și procentajul între declararitatea (existența) și efectivitatea legii – adică măsura în care se realizează dreptul în cadrul politicilor antidoping din România. Considerațiile noastre vor evidenția și faptul că suntem și în prezența unui obiect de reglementare a unei noi ramuri de drept – impusă de realitatea vieții social-economice contemporane - și anume a „dreptului sportului" – aparținătoare atât științei sportului cât și științei dreptului. Nu vom putea să nu relaționăm valorile juridice cu valorile sportului – numai astfel vom putea evidenția starea de realizare a dreptului în materia reglementărilor antidoping în activitățile sportive din România.

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Cuvinte cheie: *dreptul sportului, dreptul fundamental de a practica activități sportive, dreptul la viață, dreptul la sănătate, dreptul la integritate fizică și psihică a persoanei, dreptul la demnitate, realizarea dreptului, transparența decizională*

Introduction

In a paper published in the journal, Science of Sport stated that, "Perhaps those who are concerned by the analysis of the values of physical education and sport, in today's Romania, would be tempted to withdraw from the field to devote to some abstract existential meditation" (Voicu, 2007)- meaning, to be able to make such an analysis, you have to rise above the phenomenon - to become even "irrational" to be able to make a such valorization of patterns made by the onstuporous proto-ideology of the contemporary sport. For, is not it, "... in the knowledge process of values it is about of determination of a value in a general consciousness, the value of knowledge and we had characterized this value as necessary, objective, independent of our subjectivity" (Petre, 1945, p.111) - thus initiating a profane approach to the sport.

About realization of the law

Law is an important factor for progress and act as a powerful tool of social control. The existence and implementation of law is a condition for the public order. In general, the idea of order means a specific sequence in time or in space of things. Order represents an essential prerequisite for social cohesion, being conditioned by the existence of the normative systems and by the content perception of translation in their life. In this context it is placed also the order of law, which represents the conduct of social life in accordance with the legal norms. Given the importance of the legal system, as the core of social order, in which the perception of the essence of law regulations are translated, also including those governing the sport, to achieve legal commands is a crucial moment in the life of the law. Far from being just a matter of legal technique, achieving the law, by its social implications, is a constituent of leading the society. The analyzes of the process of realization of the law cannot omit to emphasize the general features of the social system whom is a guarantee of the integrity of rule of law, of the effectiveness of legal norms, the correspondence between abstract and general provisions of the legal norm and concreteness of social relations. The analysis of the concept (realization of the law) is actually the analysis of the implementation of the rule of law in society, the way in which the society receives the rule of law, incorporating in the psychological heritage of individuals.

The general conditions that characterize the social-political and ideological climate determine the efficiency of immediate legal forms of the realization of the law. The role of these conditions (economic, political, spiritual, and ideological) are crucial in the process of transformation the principles of the law in intimate structures of human personality and in criteria for assessing the proper conduct in relations in society. Legal Sociology and Criminological studies, studding the social condition of the law, knowledge of the law by its receivers, etc., have revealed an important theoretical and practical finding regarding the dependence between the realization of the law and the general socio-economic and cultural conditions. These researches highlights the peculiarities of how the major social processes exert their influence on the juridical behavior of the citizens and upon the legal application of the law by state bodies. Thus, finally, we believe that "realization of the law can be defined as the process of transposition in life of the content of legal norms in which people, as subjects of law, respects and implements the legal provisions" (Popa, 2008, p.186-187).

Possible limiting factors in realizing the law in doping policies in Romania

Persevering in the pursuit of identifying possible new assessment of the values of sport, it can be seen that, in contemporary society, perception of the value of sport in the collective mind, including lawyers produced no changes. So we formulated, for now, the following questions:

1. How do you assess the realization of the law in the field of sports since its current social values do not cover the content dedicated to sports functions?

2. How to realize the law in a field that is not yet defined in accordance with the European Union's documents?

The first two questions will be answered only after a preliminary bending the definitions of sport in EU documents - informed about the fact that: a) the right to practice the sport was elevated to a fundamental human right (Voicu et al., 2011, p.157-162); b) In art. 4 of the Preliminary Title - About the New Civil Code (NCC) civil law should be applied "priority of the international human rights treaties, and enshrined at the constitutional regulation" (art. 16 and 21 of the Constitution), paragraph (2) of art. 4, to which we refer, states that where there is inconsistency between them and national law, regarding the fundamental human rights, the international treaties and pacts have precedence unless there are more favorable provisions in the Civil Code; c) According to art. 5 entitled Priority Application of EU law, in matters governed by the NCC, the rules of EU law applies in priority, regardless of the quality or status of the parties. With regard to European Union law, we specify that the constitutive treaties or original law and also the Lisbon Treaty entered into force on November 1, 2009, have the

significance of a Constitution of the European Union. The White Paper on sport, gaining legal force with the entry into force of the Lisbon Treaty took full definition of sport as worded in the European Charter of Sport (art. 2, paragraph 1, letter a) – "all forms of physical activity which, through participation in organized or unorganized form, aim at expressing or improving physical fitness and mental, social relationships or obtaining results in competitions at all levels", while, Law no. 69/2000 regarding Physical Education and Sport in Romania, regulating the organization and functioning of the national system of physical education and sport in Romania, contains a definition of physical education (note - not the sport): "the physical education means all forms of physical activity aimed, through an organized or self-expressing or improving physical fitness and spiritual comfort, establish civilized social relations and lead to obtaining results in competition at all levels". (Law no 69/2000, art. 1, paragraph 2), also stating that: "physical education and sport include the following activities: physical education, school and university sports, sport for all, sport performance, exercise practiced for maintenance, prophylactic or therapeutic." (Law no 69.2000, art. 2, paragraph 3).

3. How to realize the law in the field of preventing and combating doping in sport regulated in Romania by the Law no. 227 of 7 June 2006 and updated and republished and Law no. 104 of May 9, 2008, republished and updated on preventing and combating illicit production and trafficking of doping substances with high risk - in parallel with the existence of the Law on preventing and combating illicit drug trafficking no. 143 of July 26, 2000, republished and updated - knowing that many doping substances on the banned substances list for athletes, are also on the list of drug substances?

4. How to qualify the express repeal of the text from the Law no 227/2006 republished in the Official Gazette of Romania, Part I, no. 485 of July 14, 2009, the provision contained in (repealed) Law no. 552/2004 on preventing and combating doping in sport, published in the Official Gazette of Romania, Part I, no. 1215 of December 17, 2004, (to amend the Law 227/2006 by Law no. 128 of 8 October 2014 amending and supplementing Law no. 227/2006 on preventing and combating doping in sport, and for the amendment of Law no. 104/2008 on preventing and combating illicit production and trafficking of doping substances with high risk) the provision that express. If the substances discovered during doping control fall under Law no. 143/2000 on preventing and combating illicit drug trafficking and consumption, republished, with subsequent amendments, or Government Emergency Ordinance no. 121/2006 on the legal regime of drug precursors, approved with amendments by Law no. 186/2007, as amended, the Agency is required to notify the National Antidrug Agency and prosecution" (art. 52 ^ 7) - actually I signaled policy factors in the field, through an published article. (Voicu, 2007, p.137-142)

5. How to qualify the introduction into the text of the Law no. 227/2006, only in Official Gazette no. 744 of 13 October 2014, with a delay of approx. 8 years after the first publication of this law the provisions of art. 36 of the Law stipulate the responsibility of the Agency to make the following obligations: (1) the identity of the athlete or support personnel thereof, who is suspected of one of the offenses referred to in art. 2 paragraph (2) shall be made public by the agency, after notification thereof, in accordance with art. 28 paragraph (5) and (9); paragraph (2) within 20 days of the delivery of the Commission's decision of the hearing, subject to appeal, according to art. 49, or the date on which the appeal procedure was abandoned or waived the hearing, in accordance with art. 33 paragraph (2) letter i) the agency must publish the decision; (3) The public agency must report within 20 days, the Board of Appeal decisions on violations of anti-doping regulations; (4) The identity of the athletes and their support personnel after the final resolution of the case, have not been found guilty of one or more violations of anti-doping regulations laid down in art. 2 paragraphs (2) may be made public only with their written consent; (5) the information disclosed under paragraph (1) - (3) are presented and preserved during the suspension, but not less than one year, and on the Agency's website and national sports federations responsible, where they exist; (6) Notwithstanding the provisions of paragraph (1) and (4) Agency Chairman or, in his absence, his replacement may make public comment about a pending case out if they are needed in response to public comments of athletes or support personnel concerned; (7) Public Information mandatory under paragraph (2) and (3) is not required if the athlete or other person is a minor? - I actually reported these that in the fact the National Anti-Doping Agency do not assume transparency of its decisions in accordance with the provisions of Law no. 52 of 21 January 2003 on transparency in public decision republished and updated (Voicu, 2007b).

Conclusions

We can state that the legal reality of the European Union helps to achieve uniformity in a democratic system of fundamental cultural differences. Differences resulting from the disposition of systems, to political events which occurred in the Europe of the 1990s, on each side of the "iron curtain". In this context, but also in the conditions of the adoption of the beneficial aspects of each of the two systems, we consider that the mutual influence of the two creates benchmarks for developing a new theory in Comparative Law regarding contemporary judicial geography. As far as we are concerned, we consider that although there are peculiarities of interpretation of the values of sport for those

belonging to each of the two systems, we cannot speak with the same intensity of the fundamental differences on these perceptions. In our case - we can say that Sport Law can be seen, equally, as a part of the science of Sport as well as of the science of Law. We can appreciate the illegality or legality of the facts that occurred in the field of Sport according to the following sociological criteria - legal norms, rules and regulations, customs, traditions, manners and habits (Gavriluță & Gavriluță, 2010, p.88) – this assertion is also justified by the classification given by the legal doctrine to the areas of legality of Sport: 1. The area of state order; 2. The area of the sport field; 3. The area of the international structures of sport. For those who still have not decided to decipher Sport in depth, which has become and is considered the notable social-economic phenomenon whose legalization is a necessity, in order to bring it as a possible object of work and of their professional concerns (Voicu, 1999), we remind them that Sport Law has assumed, with reasons and arguments, the quality of branch of Law and sub-branch of the sciences of Law and Sport (Voicu, Fildan & Voicu, 2009)

We must also agree with the fact that the instrumentalization of Law (similar to the social phenomenon of Sport), its transformation into an instrument of politics, can be a real threat for the rule of law - but the threats of the current conditions (the legislative inflation, the excess of normativism as a tendency towards self-destruction, the possibility of separation and aggravation of the conflict between the values of public order and the rule of law in the process of application of the law) to the existence of the rule of law must not alter the normativity of Law, nor that of Sport. Thus, Law, seen as a normative phenomenon must also represent the implementation of law in an ample social phenomenon like sport. We must promote the legal safety of all participants to these activities influencing behavior, on the basis of value requirements which should address equally the values of Law and the positive values of Sport - especially in the current situation of excessive commercialization of sport and its transition to an instrument of political manipulation (Marțian, p.80-81) which can lead to the legitimization of illegal behavior on the sport field and related places. In this context, we must also mention the utility of the formulation of the arguments above. Admitting that the Sport Law was formed as a separate branch of Law in the Romanian legal system (as well) we can "enhance the scientific research tasks both in the general theory as well as in the plane of sectoral knowledge". In the conditions of globalization, and sport is fully a globalized phenomenon, lawyers can no longer afford the luxury of approaches made only strictly from the local perspective. (Popa, 2008, p.11)

The approach of desecration of sport was not initiated by the authors of this article - we only continue to place a social phenomenon such as sport as a possible object of legal liability - because, after all, no-one is above the law. No individual or legal person, no object or field of activity.

Specialists the field of sport, directly confronted with the many problems with regard to moral judgment, the responsibility and irresponsibility of sports bodies and those having related activities seem more and more interested to form a concrete and coherent vision in this field. It is said that sport was professionalized and commercialized excessively - in this sense can answer that professional activities understood in terms of the New Civil Code must obey legal regulations. It is said that sport carries the message of interest groups - independently of this reason; we must affirm that the existence of interest groups provides for the functionality of a society. Pressure groups, along with the ineffectiveness of coercive forces of the state and the passivity of citizens representing civil society or not, can cause the illegality of interest groups. Realizing a brief diagnosis of unlawful conduct causing injury occurred in sports and related activities we can ascertain - that some authors of harmful events, invoke, in their defense, as “clause of removing legal liability” the need for the operationalization of the functions of sport without control and limitations. The basis of such reasons is anchored in the ancestral need of a part of the population to be satisfied, in the case of its material and spiritual unfulfillment by the circus spectacle, the game in which it manifests its ego and the spirit of justice without foundations of social normativity - was formed as a fundamental principle of a current or future government "Panem et circenses" (bread and circus/game) - expression considered to be coming from the Latin poet Decimus Juvenalis who lamented, addressing a friend, the decay of the Roman people.

The permissiveness of natural and human preprogrammed antisocial manifestations, untamed by the imperatives of civic culture, allow maintaining a high rate of popularity of those who hold or aim to hold political power - especially in situations of material and spiritual precariousness of society. An illusion is created, that for the population dissatisfied with the bad management of the country's affairs, represented by the so-called sports fans, there is no greater happiness than the victory or their favorite athletes. It is necessary to know other opinions regarding the values of sport today, others than those invoking the values of sport without knowing and being aware of them. Perhaps, if the extent of this paper allowed us, it might prove necessary to develop the issue of morality in general and morality in sport in particular - and to relate to its instances of manifestation: morality, immorality and amorality - the last two equally dangerous, taking into account that legal norms are grounded in the moral ones. And we know that where moral decays - as a natural consequence - the power law also decays. Only then we probably could generate an understanding of the need to restore the values of sport which originally made it famous. Thus we can combat the possible effects of a spiral of silence induced to achieve a certain optic related to valuing sports activities. Specialists the field of

sport, directly confronted with the many problems with regard to moral judgment, the responsibility and irresponsibility of sports bodies and those having related activities seem more and more interested to form a concrete and coherent vision in this field. According to those shown above we can state that sport was professionalized and commercialized excessively - in this sense can answer that professional activities understood in terms of the New Civil Code must obey legal regulations. It is said that sport carries the message of interest groups - independently of this reason; we must affirm that the existence of interest groups provides for the functionality of a society. Pressure groups, along with the ineffectiveness of coercive forces of the state and the passivity of citizens representing civil society or not, can cause the illegality of interest groups. Realizing a brief diagnosis of unlawful conduct causing injury occurred in sports and related activities we can ascertain - that some authors of harmful events, invoke, in their defense, as "clause of removing legal liability" the need for the operationalization of the functions of sport without control and limitations. The basis of such reasons is anchored in the ancestral need of a part of the population to be satisfied, in the case of its material and spiritual unfulfillment by the circus spectacle, the game in which it manifests its ego and the spirit of justice without foundations of social normativity - was formed as a fundamental principle of a current or future government *"Panem et circenses"*(bread and circus/game) - expression considered to be coming from the Latin poet Decimus Juvenalis who lamented, addressing a friend, the decay of the Roman people.

"The professionalization of sport makes it no longer emit spontaneity and nonchalance... In modern society, sport gradually departs from the purely ludic sphere and becomes a sui generis element: there's no more game, although no seriousness either. In today's society, the phenomenon of sport is detached from the process of culture itself, which takes place outside it. ... Sport has become completely profane and has no organic connection or other with the structure of society, even if its exercise is required by authority..." (Huizinga, 2003, p. 289-311).

The construction of an ideology of sport in agreement with the ideologies of this field in democratic countries should be constructed in the spirit of achieving Law, according to the legal conscience of the citizens of those states. Can we accept a separation of state powers, namely - the legislative, the executive, the judiciary, the power of sport, media power and religious power?

Fulfillment of the Law relating to the fight against doping in sport involve the Court of Arbitration of Sport in Lausanne - thus, Law no. 227/2006, republished and updated states: Article 58 - Decisions of the Appeals Board may be appealed to the Court of Arbitration for Sport in Lausanne, within 21 days of notification; Article 59 - The decisions referred to in Article 55 Letters a) to e)

and g), taken in connection with a competition within an international sports event or involving athletes of international level, can be appealed to the Court of Arbitration for Sport in Lausanne, within 21 days from the date of communication, by the following persons: a) international-Level Athletes or another person who is the subject of the contested decision; b) the sport structure to which the athlete belongs or other party in connection with which the contested decision was taken; c) the International Federation responsible; d) the anti-doping organization of the country of domicile of the person/athlete; e) an Agency; f) the World Anti-Doping Agency; Article 60 - The decisions referred to in art. 55 Letter f) can be challenged only by the athletes or persons against whom the sanction of provisional suspension was imposed, in accordance with Article 57, respectively Article 59, as applicable; Article 61 - If the committee hearing the athletes and athlete support personnel who violated anti-doping regulations, during the hearing procedure, does not issue a decision within the period referred to in Article 33 Paragraph (3), the World Anti-Doping Agency can appeal to the Court of Arbitration for Sport in Lausanne. If the Court of Arbitration for Sport in Lausanne determines that a violation of anti-doping regulations was committed and that the World Anti-Doping Agency acted correctly in choosing to appeal, the costs incurred by the World Anti-Doping Agency in resolving the appeal shall be borne by the Agency; Article 62 - The contested decisions retain effects during the proceedings referred to in Articles 57 and 59, excepting the situation when the Board of Appeal or the Court of Arbitration for Sport decides to suspend them.

In this regard Decision no. 560 of 29 May 2012 of the Constitutional Court on the plea of unconstitutionality of Article 61 of Law no 227/2006 on preventing and combating doping in sport, published in the Official Journal of Romania, Part I, no 537 of 1 August 2012, rejected as unfounded the plea of unconstitutionality of Article 61 of Law no 227/2006 on preventing and combating doping in sport, objection raised ex officio by the Cluj Court of Appeal - The Commercial, Contentious Administrative and Tax Division, file no 131/33/2011, on the grounds that during the arbitration proceedings, the Court, by Decision no 203 of 7 March 2006, published in the Official Gazette of Romania, Part I, no 267 of 24 March 2006, held that arbitration is an exception to the principle that justice is done by courts and represents that efficient legal mechanism designed to ensure a fair trial, faster and less formal, confidential, completed by enforceable judgments. Moreover, the Court notes that Romania agreed, by Law no 367/2006, published in the Official Journal of Romania, Part I, no 828 of 9 October 2006, the International Convention against Doping in Sport, adopted by the General Conference of the United Nations Organization for Education, Science and Culture

in Paris on 19 October 2005. World Anti-Doping Code is an integral part of this Convention. Thus, in Part I of the World Anti-Doping Code, Article 13 expressly provides the jurisdiction of the Court of Arbitration for Sport in Lausanne in cases of doping in sport. The Court found that the doping in sport, the Court of Arbitration for Sport in Lausanne functions as a disciplinary court, especially after the adoption of the World Anti-Doping Code, which in this case gives the direct jurisdiction to this court. Thus the Court found that the criticism according to which the criticized provisions of the law are contrary to the constitutional provisions of Articles 20, 21, 124 and 126 cannot be accepted.

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STUDIA UBB EDUCATIO ARTIS GYMN., LIX, 4, 2014, p. 145
(RECOMMENDED CITATION)

==ERRATUM==

LET'S TELL, THE NUMBERS, LET'S TELL THE DATAS; OR THE WOMEN'S CHANCE OF EGUAL OPPORTUNITY, IN THE SPORTDIPLOMACY AND IN THE SPORTLEADERSHIPS

Trenka Magdolna Lawyer

In the 3/2014 issue, of the p. 97, the gender marker-coloring was unfortunately reversed in Figure 1.