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STUDIA UBB EDUCATIO ARTIS GYMN., LXII, 4, 2017, pp. 5 - 17
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THE EFFECT OF THE SELF-SUPERVISION MODEL INTEGRATING AUTHENTIC MOVEMENT AND EPIMOTORICS' ON SELF-EFFICACY AMONG DANCE MOVEMENT THERAPISTS

YIFAT SHALEM-ZAFARI[1]*, EMILIA FLORINA GROSU[2]

ABSTRACT. Introduction: This study is part of a larger research study examining the effect of a unique model of self-supervision based on Authentic Movement and Epimotorics' on young therapists. It relies on one of the basic assumptions in dance/movement therapy – that psychological/emotional states are reflected in one's manner of movement and body positions, and also that the position and movement of the body influence a person's emotional/ psychological state (Shahar-Levy, 2004; Chaiklin, 2009). This study attempted to demonstrate that the unique self-supervision model would change the sense of self-efficacy of young dance/movement therapists. Supervision in this field bases itself on moving between verbal language and body-movement language, and uses both languages as a source for cognitive and psycho-emotional language knowledge (Payne, 1992; Shalem-Zafari, 2016). **Methods and Materials:** This study utilized film-recordings for observation, the Epimotoric's movement-analysis tool, and questionnaires: Epimotorics' is a method of movement observation and analysis, which relates to visible human movement as "telling" the internal psycho-emotional scenario. The self-efficacy questionnaires that were used provide information about the way the therapists' view their own effectiveness and abilities. **Results**: It was found that the self-supervision model stimulated changes in the movement measures of the participants and showed marginally significant positive change in their self-efficacy. **Conclusion:** It can be suggested that the self-supervision model combining verbal and non-verbal movement languages allows for the use of knowledge stored in the body in combination with cognitive, verbal language. As such, it improves the therapists' experience in relation to their sense of professional capability.

Key words: *Dance/movement therapy*, *movement analysis*, *Self-Efficacy*, *supervision*, *Epimotorics*'.

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Introduction

This study examines a unique model for self-supervision that is based on Authentic Movement and Epimotorics' and its impact on young dance/ movement therapists, namely their movement and their experience of self-efficacy. It aims to highlight the importance of supervision, which can enhance dance/movement therapists' movement and psychological well-being in terms of self-efficacy. It also aims to study the relationship between certain movement measures and self-efficacy.

Supervision is known to be a process of learning, involving support and growth. It is considered essential in learning to function effectively as a therapist and involves professional training and building one's professional identity as a therapist (Watkins, 1997). The main goal of supervision is to help therapists build the skills for them to provide beneficial therapy (Young, 2012). In supervision involving both verbal and non-verbal approaches, the two aspects of experience and cognition are integrated to create a coherent whole (Hartley, 2004).

Dance movement/therapy (DMT) is based on the idea that there is a connection between motion and emotion (Payne, 1992). It assumes that movement patterns and body postures can reflect psychological patterns and that changes in either of these effects the other. DMT is a field that integrates theories, methods, and techniques from a variety of areas, including: psychotherapy (Weiner & Craighead, 2010); nonverbal communication (e.g. Davis, 1982); motor development; and developmental psychology (Kestenberg, 1975; Shahar-Levy, 2009). In order to understand visible movement in DMT, systems for movement observation (Laban, 1974; Shahar-Levy, 2009). This is an important tool that enables the classification of and interpretation of human movement.

One widely-used method of movement analysis is called "Epimotorics'." This conceptual model is based on a developmental, psychoanalytic approach to human emotive behavior,that interweaves the body, movement, and mind. It is and integrative, yet detailed and specific, tool that is used for movement analysis, psychophysical assessment, and DMT, and can be used for diagnostic purposes. The method involves a binary categorization of human psychophysical potentials, represented in the "Matrix of Binary Core-Potentials." When movement is observed, it can be recorded in this "Matrix," and the information can be analyzed, resulting in a movement profile reflective of the physical-emotional universe of the moving person. The Epimotorics' paradigm provides a theoretical framework for understanding this profile, which is influenced by the person's environment, in relation to the universal biological characteristics of emotive-motor behavior (Shahar-Levy 2017).

The movement measures in Epimotorics' reflect psychological-emotional states, whether on their own or in different combinations called "conglomerations" (Shahar-Levy, 2017). For example, indirect movement together with an inward direction can reflect a person's desire to move away from interaction with others.

The present study, besides for examining movement measures, also examines therapists' sense of self-efficacy. Self-efficacy (SE) is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events affecting their lives (Bandura, 1991). The present study is the first instance of examining therapists' movement and their sense of self-efficacy, in relation to a self-supervision model using Authentic Movement and Epimotorics'.

Research Design and Methodology

The present research is part of a larger study that explores the effects of the self-supervision model implementation. The current stage took place over the course of one academic year (2016-2017).

The study population included 12 participants from the Jerusalem, Israel region. All participants were newly-practicing therapists. They were divided into two equal groups: Six participants in the control group, DMT supervision with an experienced supervisor. The other six participants, in the study group, received supervision using the self-supervision model examined in the study. Three participants were males (25%) and nine were females (75%). Their ages ranged from 29 to 38 (M=32.75, SD=3.08). All of the participants hold a Master's degree (M.A).

Research methods: 1) Observation, which involved filming the participants' movement, before and after the implementation of the supervision. The movement was broken down into smaller paraphrases, and was coded and analyzed using the Epimotorics' method to assess certain movement measures. The Epimotorics' method is a statistically validated tool (Skrzypek, 2017) for movement-analysis developed by Shahar-Levy (2004), who herself helped to adapt the tool for use in the present study. The filmed movement was coded by two movement experts. The collected data was examined for inter-rater consistency, and was found to be reliable.

2) Questionnaires measured self-efficacy and were administered twice to both groups, before and after the implementation of the supervision. The questionnaire was developed by Chen & Gully (1997), and translated into Hebrew by Grant (1998). It consists of eight items, and was reported to have internal

consistency ranging between .76 and .90. The current research's internal consistency was found to be very good for the first measurement (before the implementation of the self-supervision model; α=.79). After the implementation there was a need to deduct a single item (number 8). Afterwards, the internal consistency was found to be identical to the above-mentioned (α=.79). Nevertheless, in order to compare both measurements, it was decided to deduct the same item in the 'before' measurement (α=.77).

Results

The current section will examine the research hypotheses regarding the assumed effects of the self-supervision model.
Prior to the examination, a series of Mann-Whitney tests were performed, in order to detect baseline differences between the study groups. Table 1 presents baseline differences between the study groups (control/self-supervision), in movement measures and self-efficacy.

Table 1. Baseline differences between the study groups (control/self-supervision) in movement indicators and self-efficacy

	Group						U	p
	Control (n=6)			Self-Supervision (n=6)				
	Mdn	Mean Rank	SD	Mdn	Mean Rank	SD		
Inward Movement	2.00	3.67	0.52	4.00	9.33	0.41	1.00	.004
Outward Movement	2.50	8.75	1.05	1.00	4.25	0.41	4.50	.02
Round Curved Shapes	2.50	6.50	0.55	2.50	6.50	1.05	18	1.00
Straight Linear Shapes	2.00	6.50	1.03	2.00	6.50	0.82	18	1.00
Horizontal Alignment Shapes	2.50	7.50	0.82	1.50	5.50	1.21	12	.31
Vertical Alignment Shapes	2.00	5.33	0.75	3.00	7.67	0.52	11	.21
Quick Movement	1.50	6.25	0.82	1.50	6.75	1.38	16.5	.80
Slow Movement	3.00	6.50	0.63	3.00	6.50	1.10	18	1.00
Fragmentary Movement	1.50	5.42	0.98	2.00	7.58	1.60	11.5	.28
Continuous Movement	2.50	6.25	0.82	2.50	6.75	1.05	16.5	.80
Indirect Movement	3.00	4.33	0.75	4.00	8.67	0.41	5.00	.023
Direct Movement	0.50	7.00	0.55	0.00	6.00	0.52	15.00	.58
Self-Efficacy	2.71	7.33	0.20	2.65	5.67	0.38	13.00	.41

As seen in Table 1, significant differences were found between the study groups regarding inward movement, outward movement, and indirect movement. The study group was found to be initially higher in inward and indirect movement, and lower on outward movement compared to the control group.

The first research hypothesis assumed that movement measures would change as a result of the implementation of the self-supervision model. The following changes were hypothesized: A decrease in inward movement, quick movement, fragmentary movement, and indirect movement after the implementation of the self-supervision model; and an increase in outward movement, round (curved) shapes, (straight) linear shapes, horizontal (alignment) shapes, continuous movement, vertical alignment shapes, slow movement, and direct movement.

In order to examine the above-mentioned hypotheses regarding changes in movement measures, a series of statistical analyses were performed. First, a series of Wilcoxon tests for dependent samples were performed for each of the study groups - in order to examine changes in the movement measures according to the time of measure (before and after). Table 2 presents the differences in the movement measures, before and after, within the control group. Table 3 presents the differences in the movement indicators, before and after, within the study group. Figure 1 presents the significant differences within the study group.

Table 2. Wilcoxon test for dependent samples, control group (N=6)

Movement Measure	**Z**	***P* - value**	**Time**	**Median**	**SD**
Inward Movement	-1.00	.32	Before	2.00	0.52
			After	2.00	0.75
Outward Movement	-1.73	.08	Before	2.50	1.05
			After	2.00	0.89
Round Curved Shapes	0.00	1.00	Before	2.50	0.55
			After	2.50	0.55
Straight Linear Lines	-1.41	.16	Before	2.00	1.03
			After	1.50	0.82
Horizontal Alignment Shapes	-1.41	.16	Before	2.50	0.82
			After	2.00	0.63
Vertical Alignment Shapes	-0.58	.56	Before	2.00	0.75
			After	2.00	0.63
Quick Movement	0.00	1.00	Before	1.50	0.82
			After	1.00	1.37

Movement Measure	Z	*P* - value	Time	Median	SD
Slow Movement	-0.58	.56	Before	3.00	0.63
			After	3.00	0.41
Fragmentary Movement	-1.00	.32	Before	1.50	0.98
			After	1.50	1.21
Continuous Movement	-1.00	.32	Before	2.50	0.82
			After	2.00	0.75
Indirect Movement	-1.73	.08	Before	3.00	0.75
			After	2.50	0.82
Direct Movement	-0.58	.56	Before	0.50	0.55
			After	0.00	0.52

Table 3. Wilcoxon test for dependent samples, study group (N=6)

Movement Measure	Z	*P* - value	Time	Median	SD
Inward Movement	-1.84	.07	Before	4.00	0.41
			After	2.50	1.05
Outward Movement	-2.25	.02	Before	1.00	0.41
			After	4.00	0.52
Round Curved Shapes	-1.73	.08	Before	2.50	1.05
			After	3.50	0.55
Straight Linear Lines	-1.34	.18	Before	2.00	0.82
			After	2.00	0.51
Horizontal Alignment Shapes	-1.86	.06	Before	1.50	1.21
			After	3.00	0.52
Vertical Alignment Shapes	-0.58	.56	Before	3.00	0.52
			After	3.00	0.41
Quick Movement	-1.34	.18	Before	1.50	1.38
			After	2.00	0.89
Slow Movement	-0.41	.68	Before	3.00	1.10
			After	3.00	0.75
Fragmentary Movement	-2.06	.04	Before	2.00	1.60
			After	0.00	0.84
Continuous Movement	-1.89	.059	Before	2.50	1.05
			After	4.00	0.42
Indirect Movement	-2.04	.04	Before	4.00	0.41
			After	2.50	0.82
Direct Movement	-2.26	.02	Before	0.00	0.52
			After	3.00	0.52

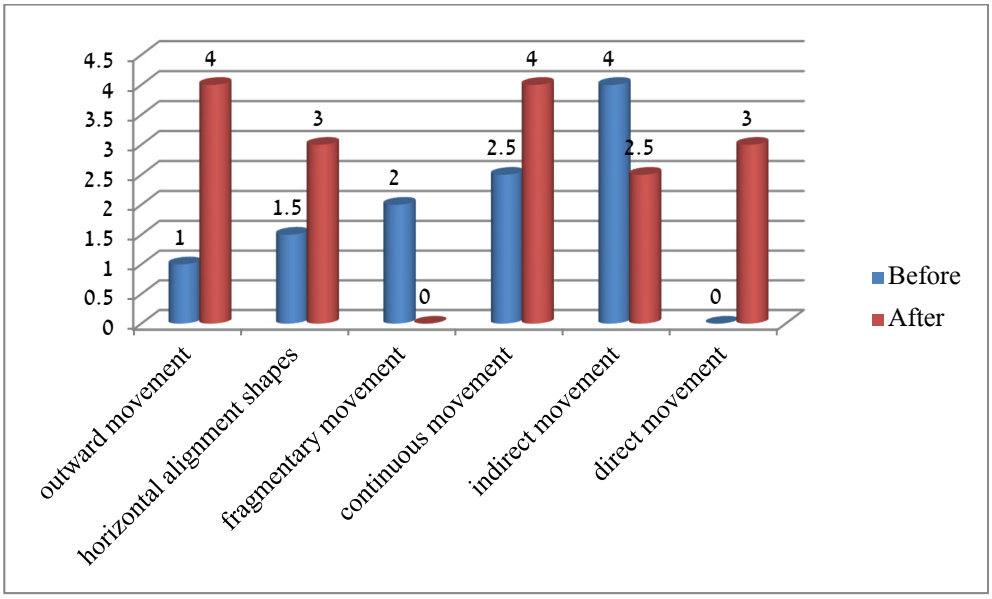

Figure 1. Movement indicators, significant differences within the study group

As seen in Table 2, no significant differences were found amongst the control group between the two measures. Table 3, on the other hand, presents ranking differences in movement measures after the implementation of the self-supervision model amongst the study group. Outward movement and direct movement increased significantly after the implantation of the self-supervision model, whereas fragmentary movement decreased significantly. In addition, horizontal alignment shapes and continuous movement increased, with marginally significant results.

After establishing the existence of significant differences and the lack of differences within each group, a series of Mann-Whitney tests were performed in order to examine the differences between the study groups during the second measurement (after the implementation of the self-supervision model).

Table 4 presents the differences in movement measures between the study groups (control/self-supervision), after the implementation of the self-supervision model. Figure 2 presents the between-groups movement measures significant differences, after the self-supervision model implementation.

Table 4. Differences in movement measures between the study groups (control/self-supervision), after the implementation of the self-supervision model

	Group						U	p
	Control (n=6)			Self-Supervision (n=6)				
	Mdn	Mean Rank	SD	Mdn	Mean Rank	SD		
Inward Movement	2.00	5.92	0.75	2.50	7.08	1.05	14.50	.55
Outward Movement	2.00	3.83	0.89	4.00	9.17	0.52	2.00	.008
Round Curved Shapes	2.50	4.25	0.55	3.50	8.75	0.55	4.50	.019
Straight Linear Shapes	1.50	4.75	0.82	2.00	8.25	0.41	7.50	.045
Horizontal Alignment Shapes	2.00	3.83	0.63	3.00	9.17	0.52	2.00	.007
Vertical Alignment Shapes	2.00	4.42	0.63	3.00	8.58	0.41	5.50	.026
Quick Movement	1.00	5.50	1.37	2.00	7.50	0.89	12.00	.32
Slow Movement	3.00	6.58	0.41	3.00	6.42	0.75	17.50	.92
Fragmentary Movement	1.50	7.75	1.21	0.00	5.25	0.84	10.50	.20
Continuous Movement	2.00	3.83	0.75	4.00	9.17	0.52	2.00	.007
Indirect Movement	2.50	6.50	0.82	2.50	6.50	0.82	18.00	1.00
Direct Movement	0.00	3.50	0.52	3.00	9.50	0.52	0.00	.003

As seen in Table 4, significant differences were found between the groups for outward movement, round curved shapes, straight linear shapes, horizontal alignment shapes, vertical alignment shapes, continuous movement, and direct movement – all of which were higher for the study group compared with the control group. In conclusion, the first hypothesis was partially affirmed.

The second research hypothesis assumed that the self-supervision model would enhance the self-efficacy of novice dance movement therapists. Due to the lack of differences between the study groups baselines (as shown in Table 1), in order to examine the hypothesis, a series of Wilcoxon tests for dependent samples were performed for each of the study groups - in order to examine changes in self-efficacy according to the time of measure (before and after the implementation of the self-supervision model).

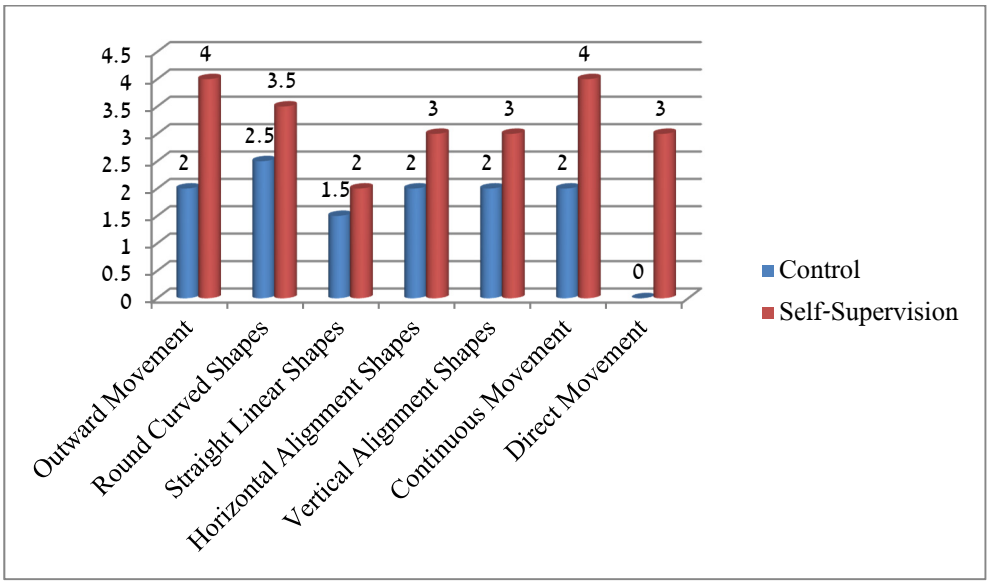

Figure 2. Between-groups movement indicators significant differences, after the self-supervision model implementation

No significant differences in self-efficacy were found amongst the control group (Z = -0.41, p = .68). On the other hand, marginal significant differences were found amongst the study group (Z = -1.75, p = .08). After the implementation of the self-supervision model (Md = 2.64, SD = 0.38) the level of self-efficacy was higher compared to before the implementation (Md = 2.56, SD = 0.38). Therefore, the second hypothesis has been fully affirmed.

Discussion

According to the Epimotorics' method and as demonstrated in other studies (Federman. 2011; Kleinfeld. 2013; Kołoło et al. 2012; Feniger-Schaal & Lotan, 2017) movement measures can be reflective of psychological parameters.

As discussed above, combinations of movement patterns can reflect certain psychological states or shifts. The following combination was found in the present study: A decrease in inward movement and increase in outward movement, together with an increase in horizontal shapes and direct movement. This combination of movement qualities reflects a greater sense of confidence and presence, as well as an interest in others and a desire to connect (Shahar-

Levy, 2004). The combination of an increase in continuous movement and outward movement together with a decrease in fragmentary movement can point to enhanced self-worth, body-image, and a sense of legitimization experienced by participants (Shahar-Levy, 2004; Laban, 1974).

There were initial differences present between the control group and the study group, in the movement qualities of inward movement, outward movement, and indirect movement. These differences can perhaps be explained in light of the fact that the study group included religiously observant men and women, who hold by a religious prohibition against touching members of the opposite sex. This fact likely caused a greater presence of the measures of inward movement and indirect movement and a decrease in outward movement, because of the cultural influence of avoiding touch between the sexes.

The fact that in the control group significant differences were not found between the two before-and-after measurements, while in the study groups significant differences were found after the intervention, can testify to the beneficial impact of the self-supervision model examined in this study.

If the movement measures are contemplated through the perspective of the binary paradigm of the Epimotorics', then one must contemplate them in terms of pairs of measures, and not in terms of single, stand-alone measures (Shahar-Levy, 2017). In this framework, as can be seen in Table 5, changes occurred in five out of the six pairs of movement measures. The facts that changes occurred in one side of the binary pair points to an influence on the other side of it as well (Shahar-Levy, 2017). In light of this perspective, one can relate to the hypothesis as having been confirmed. The confirmation of the second hypothesis in a significant manner strengthens this way of relating to it and to the clear results of the model's beneficial impact on the therapists, in general, and specifically on the young therapists' sense of self-efficacy. This is similar to results from a study by Kleinfeld (2013) that found that the use of movement increases one's revealed and hidden sense of self-worth.

Among the control group, self-efficacy did not change. In the experimental group, participants' SE showed marginally significant positive change after the training in the self-supervision model, which may indicate that Self-Efficacy was positively affected by the training. Kololo et al. (2012) also found that self-efficacy, self-esteem, and body-image were associated with physical activity.

Table 5. Pairs of Binary Movement Measure – Hypothesis and Results

Hypothesis	Movement Measure	Verification of Hypothesis		Movement Measure	Hypothesis
⇧	Outward Movement	☆	☆	Inward Movement	⇩
⇧	Straight Linear Shapes	☆		Round Curved Shapes	
	Vertical Alignment Shapes		☆	Horizontal Alignment Shapes	⇧
	Slow Movement			Quick Movement	
⇧	Continuous Movement	☆	☆	Fragmentary Movement	⇩
⇧	Direct Movement	☆		Indirect Movement	

Decrease in movement measure = ⇩
Increase in movement measure = ⇧
Results that verified the hypothesis = ☆

Although the number of participants in this study is small, there has been precedent for research with small sample sizes (e.g. Wiedenhofer, Hofinger, Wagner, & Koch, 2016). Widenhofer & Koch (2017) argue that smaller samples frequently reflect effects that would be present in larger groups, as well.

Conclusions

This study aimed to produce findings regarding the effects of a unique self-supervision model on novice dance/movement therapists. The findings show a clear impact of the training in the self-supervision model on the participants in the areas of self-efficacy and enhanced movement qualities. The movement measures that showed significant change in the study are movement qualities that reflect attitudes of attachment and empathic connection, as well as confidence and presence (Shahar-Levy, 2017). This may point to the

ability of the supervision model to enhance therapists' skills in these areas – skills crucial to successful therapy.

It appears probable that the self-supervision model integrating verbal and non-verbal/movement expressions allows for the use of knowledge stored in the body and the integration of this knowledge into cognitive, verbal knowledge. In this way, it seems to improve the therapist's skills, and the therapist's experience of his own skills in terms of professional ability. Supervision in the field of DMT may benefit from incorporating aspects of this self-supervision model, namely the intentional and structured use of verbal and non-verbal tools.

This study examined the impact of the self-supervision model on therapists and their sense of self-efficacy, with the results suggesting that the movement measures that improved were associated with improved self-efficacy. In light of this, the movement measures that were responsive in the present study could be incorporated into further research examining how physical activity incorporating these movement qualities impact emotional/psychological states.

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PHYSICAL EFFORT CAPACITY AND GLYCEMIC CONTROL IN TYPE 1 DIABETES PACIENTS

ANCA LUCIA VĂDAN[1*], CODRUȚA FLORINA BULDUȘ[1], DRAGOȘ ADRIAN MANIU[1], SERGIU MOLDOVAN[1]

ABSTRACT. Introduction. Physical activity may be considered as an efficient and relatively inexpensive non-pharmacological tool for diabetes treatment, added to the usual insulin administration. **Objectives**. The aim of this study was to investigate the possibility to improve physical effort capacity in type 1 diabetes patients, maintaining an adequate glycemic control. **Materials and methods**. The subjects included in this study were three patients (two men and one woman), aged 19-22, diagnosed with type 1 diabetes. The study was conducted at a fitness studio in Cluj-Napoca for a period of 6 weeks with a frequency of 3 sessions per week, 60 minutes each session. Aerobic exercise capacity was assessed before the physical exercises program (CAEi) began and at the end of the program (CAEf). The arithmetic mean of subjects' glycemic counts recorded each day for each of the four moments of glycemic control was calculated: morning, noon, evening and bedtime (the week before the physical exercises program, after 3 weeks, after 6 weeks and the week after the physical exercises program was completed). **Results**. In our study, with regular physical exercise, we managed to increase aerobic exercise capacity by maintaining satisfactory glycemic control in patients with type 1 diabetes. **Conclusions**. The aerobic exercise capacity has increased in patients with type 1 diabetes who have undergone a regular exercise program. Glycemic control can be maintained at an appropriate level during a regular exercise program in patients with type 1 diabetes.

Keywords: *physical activity, physical effort capacity, glycemic control, type 1 diabetes.*

REZUMAT. Capacitatea de efort fizic şi controlul glicemic la pacienţii cu diabet de tip 1. Introducere. Activitatea fizică poate constitui o metodă non-farmacologică eficientă și necostisitoare pentru tratamentul pacienților cu diabet de tip 1, concomitent cu administrarea de insulină. **Obiective**. In acest studiu

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am investigat dacă putem crește capacitatea de efort fizic la pacienții cu diabet de tip 1, menținând, în același timp, un control glicemic adecvat**. Materiale și metode**. În studiu au fost incluși trei pacienți cu diabet de tip 1, (doi bărbați și o femeie), cu vârste cuprinse între 19-22 de ani. Programul de exerciții fizice s-a desfășurat într-o sală de fitness din Cluj-Napoca, pe parcursul a 6 săptămâni, de 3 ori pe săptămână, 60 de minute fiecare ședință. Capacitatea aerobă de efort fizic a fost evaluată înainte și după cele 6 săptămâni de exerciții fizice. S-au măsurat glicemiile pe tot parcursul studiului, in fiecare zi, dimineața, la amiază, seara și înainte de culcare. S-au calculat mediile glicemiilor pentru fiecare moment al zilei, pentru săptămâna de dinainte de începerea programului de exerciții fizice, după trei săptămâni, după 6 săptămâni și în săptămâna de după terminarea programului de exerciții fizice. **Rezultate**. Rezultatele studiului arată că s-a reușit creșterea capacității de efort fizic aerob la toți pacienții incluși în studiu, menținând, în același timp, un control glicemic adecvat. **Concluzii**. Capacitate de efort fizic aerob a crescut la pacienții cu diabet de tip 1 care au urmat un program regulat de exerciții fizice. Controlul glicemic a fost menținut la un nivel adecvat pe tot parcursul programului de exerciții fizice, la pacienții cu diabet de tip 1.

Cuvinte cheie: *activitate fizică, capacitate de efort fizic, control glicemic, diabet de tip 1.*

Introduction

Type 1 diabetes (T1D) is a chronic disease that requires intensive effort on the part of the person with diabetes and caregivers. Exercise training is known to induce several benefits by reducing inflammation, improving antioxidant defenses (Farinha et al., 2017), improving glycemic control, delay cardiovascular complications and increase overall well-being (Nadella et al., 2017). In this context, exercise training may be considered as an efficient and relatively inexpensive non-pharmacological tool for diabetes treatment, added to the usual insulin administration. Unfortunately, as Yates and Davies (2017) stated, physical activity is an underused therapy and most people with T1D do not reach the recommended levels of physical activity due to concerns regarding hypoglycemic episodes (Moser et al., 2017). Several studies concluded that patients with type 1 diabetes have poorer exercise capacity than their aged-matched nondiabetic individuals (Hagglund et al., 2012; Peltonen et al., 2012; Koponen et al., 2013; Rissanen et al., 2015). On the other hand, there are studies prooving that type 1 diabetes pacients can successfuly compete in ultramarathon races with satisfactory glycemic control (Belli et al., 2017).

Objectives

The aim of this article is to study the means to improve physical effort capacity while maintaining an adequate glycemic control in patients with T1D.

Materials and methods

The study was conducted at a fitness studio in Cluj-Napoca for a period of 6 weeks with a frequency of 3 sessions per week, 60 minutes each session. The selection criteria were as follows: patients without effort contraindications; patients who meet the number of daily calories required by doctor prescription; patients following an insulin regimen with 4 injections per day (three ultra-fast and one long-acting insulin).

Subjects included in the study

The subjects included in this study were 3 students (two men and one woman), aged 19-22, diagnosed with type 1 diabetes.

Table 1. Subjects included in the study

Subject 1	Subject 2	Subject 3
Patient data: **-** Age: 20 years old - Sex: F - Weight: 60 kg **History of the disease:** **-** Starting date: March, 2011; **Symptoms:** **-** polyuria, polydipsia, increased fatigue; **Lifestyle:** - Diet: 2000 calories / day, divided in 3 main meals and 3 snacks;	**Patient data:** **-** Age: 19 years old - Sex: M - Weight: 72 kg **History of the disease:** **-** Starting date: October, 2007; **Symptoms:** **-** polyuria, polydipsia, increased fatigue; **Lifestyle:** - Diet: 2200 calories / day, divided in 3 main meals and 3 snacks;	**Patient data:** **-** Age: 22 years old - Sex: M - Weight: 84 kg **History of the disease:** **-** Starting date: August, 2010; **Symptoms:** **-** polyuria, polydipsia, increased fatigue; **Lifestyle:** - Diet: 2100 calories / day, divided in 3 main meals and 3 snacks;

The time points studied

Aerobic exercise capacity was assessed before the physical exercises program (CAEi) began and at the end of the program (CAEf).

The week before the physical exercises program started: the arithmetic mean of subjects' blood glucose was calculated each day of the week prior to the beginning of the kinetotherapeutic program (G0), for each of the four moments of the glycemic control: morning, noon, evening and bedtime.

After 3 weeks of physical exercises program: the arithmetic mean of subjects' blood glucose was calculated daily for the first 3 weeks of kinetotherapeutic program (G3) for each of the four moments of glycemic control: morning, noon, evening and bedtime.

After 6 weeks of physical exercises program. The arithmetic mean of subjects' glycemic counts recorded each day during the last 3 weeks of physical exercises program (G6) for each of the four moments of glycemic control was calculated: morning, noon, evening and bedtime.

The week after the physical exercises program was completed: the arithmetic mean of the subjects' glycemic counts was calculated each day of the week after the physical exercises program (Gppk) for each of the four moments of glycemic control: morning, noon, evening and bedtime.

Methods

Assessment of aerobic exercise capacity

The aerobic exercise capacity (AEC%) was evaluated indirectly by the Astrand-Ryhming method by performing a submaximal 6 minute exercise on a cycloergometer at 60 rotations/minute with a load of 2.1 W/kg body, maintained constant throughout the test. Thus, the maximum oxygen consumption in absolute value (VO2 max), expressed in ml/minute, was obtained. The unit value of VO2 max (VO2 max / G) was compared to the ideal unit value of VO2 max, obtained by the following calculation: 110-0.4xG for male subjects and 91.6-0.332xG for female subjects. Depending on the percentage obtained, the aerobic exercise capacity was assessed (Ionescu in Dragan, 2002). Values were expressed as a percentage.

Measuring blood glucose

Blood glucose measurement was performed with the Accu-Chek® Active Accu (Accu-Chek, n.d.) meter using the Accu-Chek® Softclix punch (Accu-Chek, n.d.) and was expressed in ml/dl.

The kinetotherapeutic program

The kinetotherapeutic program was conducted over 6 weeks, 3 sessions/ week, 60 minutes/ session, from 10.00-11.00 a.m. and included stretching exercises, exercises to improve aerobic exercise capacity, isometric and isotonic exercises. To avoid hypo or hyperglycemia, blood glucose values were measured before, at the middle and at the end of the session. If the blood glucose was above 250 mg/dl before the session, it was postponed until the blood glucose was rectified; if the blood glucose was below 100 mg / dl, the subject consumed 10g of fast or slowly absorbable carbohydrates.

At the beginning of the first session, the subjects were explained the role of the exercises to be performed on the body.

Insulin administration

Subject 1 - NovoRapid: Breakfast (18u), Lunch (18u), Dinner (18u); Levemir: at bedtime (20u).

Subject 2 - NovoRapid: Breakfast (20u), Lunch (20u), Dinner (20u); Lantus: at bedtime (20u).

Subject 3 - Apidra: breakfast (19u), lunch (20u), dinner (19u); Levemir: at bedtime (19u).

Starting with week 4, insulin doses of 2 units were reduced to all subjects.

Results

Table 2 presents the baseline values of the aerobic exercise capacity of subjects, in percentage, based on body weight and heart rate.

Table 2. Initial rates of effort aerobic capacity, expressed as a percentage

	Weight	**Hart rate**	**CAEi**
Subject 1	60 kg	144 bpm	66,26%
Subject 2	72 kg	138 bpm	63,27%
Subject 3	84 kg	168 bpm	46,74%

Table 3 presents final values of the aerobic exercise capacity of the subjects, in percentage, based on body weight and heart rate.

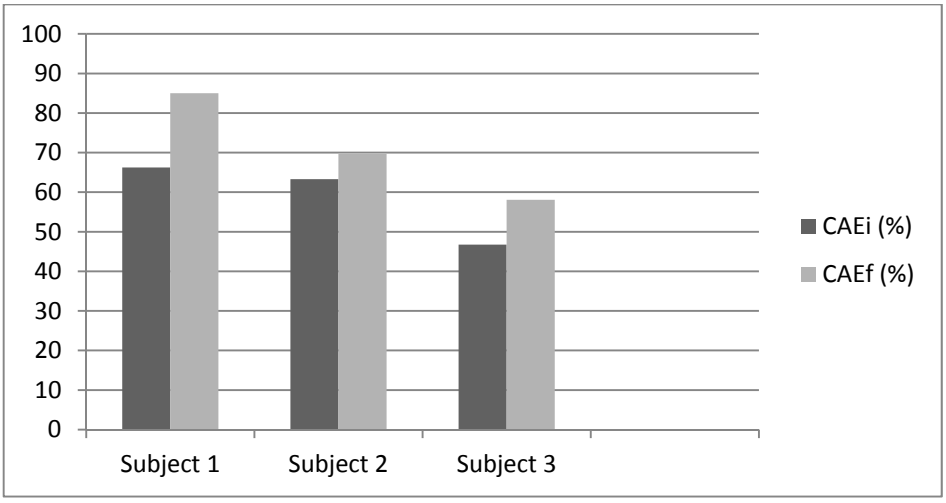
Table 3. Final aerobic exercise capacity, expressed as a percentage

	Weight	Hart rate	CAEf
Subject 1	61 kg	126 bpm	85%
Subject 2	70 kg	132 bpm	69,68%
Subject 3	81 kg	150 bpm	58,06%

Table 4 presents in comparison the initial and final values of the aerobic exercise capacity of the subjects, in percent, based on body weight and heart rate.

Table 4. Initial and final strength of aerobic exercise capacity, expressed as a percentage

	CAEi	CAEf
Subject 1	66,26%	85%
Subject 2	63,27%	69,68%
Subject 3	46,74%	58,06%



Graph 1. Initial and final aerobic exercise capacity, expressed as a percentage

Table 5 shows the mean glycemic values for subject 1 during the study.

Table 5. Median glycemic values for subject 1

	G0	G3	G6	Gppk
Morning	175 mg/dl	168 mg/dl	159 mg/dl	163 mg/dl
Noon	212 mg/dl	189 mg/dl	175 mg/dl	179 mg/dl
Evening	192 mg/dl	184 mg/dl	178 mg/dl	183 mg/dl
Bedtime	181 mg/dl	177 mg/dl	169 mg/dl	175 mg/dl

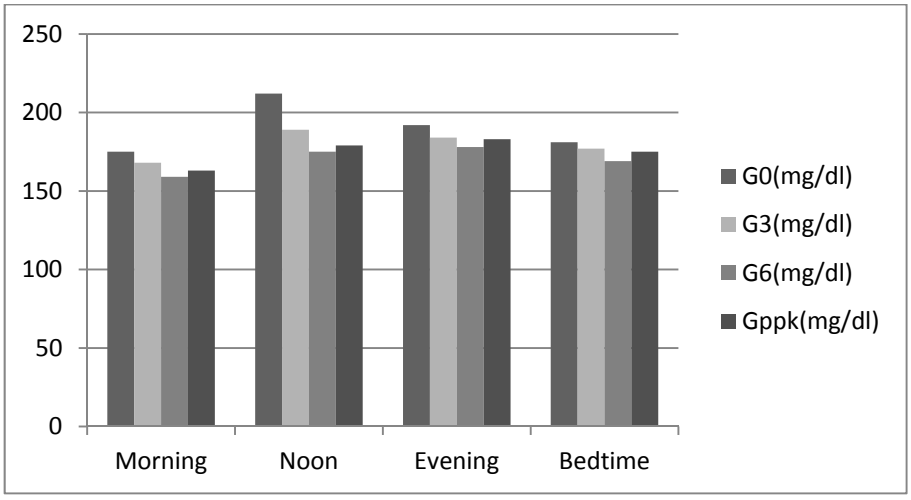


Figure 2. Comparison of mean glycemic values for subject 1

Table 6 shows the mean glycemic values for subject 1 during the study.

Table 6. Median glycemic values for subject 2

	G0	G3	G6	Gppk
Morning	159 mg/dl	150 mg/dl	138 mg/dl	143 mg/dl
Noon	185 mg/dl	166 mg/dl	154 mg/dl	158 mg/dl
Evening	180 mg/dl	175 mg/dl	167 mg/dl	171 mg/dl
Bedtime	178 mg/dl	171 mg/dl	164 mg/dl	168 mg/dl

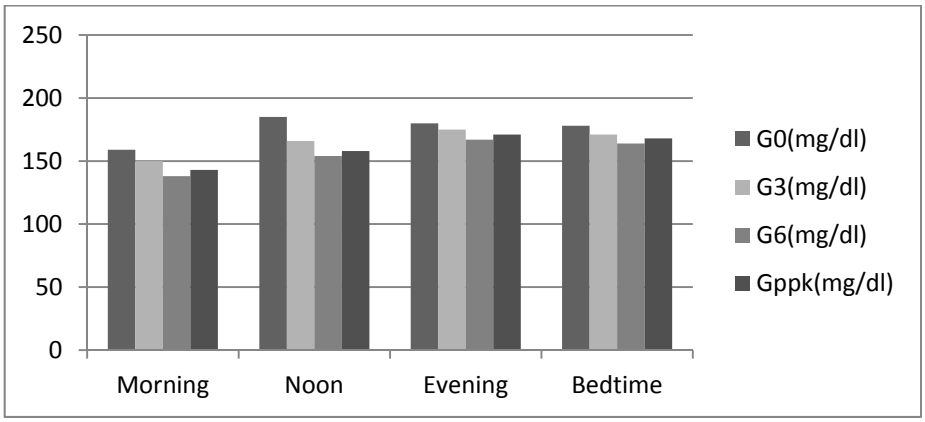


Figure 3. Comparison of mean glycemic values for subject 2

Table 7 shows the mean glycemic values for subject 1 during the study.

Table 7. Median glycemic values for subject 3

	G0	G3	G6	Gppk
Morning	208 mg/dl	195 mg/dl	181 mg/dl	185 mg/dl
Noon	193 mg/dl	170 mg/dl	162 mg/dl	166 mg/dl
Evening	199 mg/dl	186 mg/dl	168 mg/dl	175 mg/dl
Bedtime	224 mg/dl	201 mg/dl	189 mg/dl	190 mg/dl

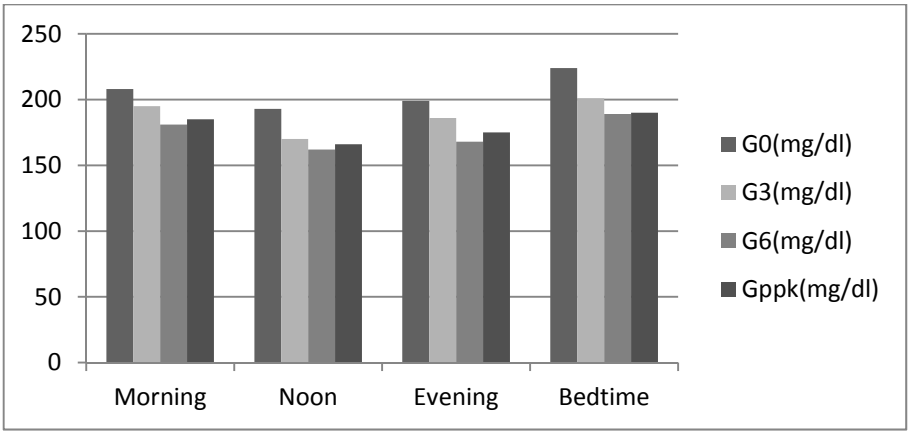


Figure 4. Comparison of mean glycemic values for subject 3

Discussion

Several studies concluded that many patients with type 1 diabetes experience exercise-induced late-onset hypoglycemia (Basu et al., 2014). This might be harmful, especially because of being unaware: patients may unconsciously experience hypoglycemia during sleep. Physical activity during the daytime accelerate the risk of nocturnal hypoglycemia to about 30–40% (Taplin et al., 2010; Iscoe, Corcoran & Riddell, 2008; Maran et al., 2010). Therefore, in order to avoid any episodes of night hypoglycemia, exercise sessions took place between 10.00-11.00 a.m.

During weeks 2 and 3, subjects 1 and 2 had few episodes of mild hypoglycaemia (60-80 mg/dl) treated immediately by ingesting 10g of rapidly absorbing carbohydrates. Moderate post-exercise hypoglycaemia is very common in patients with type 1 diabetes, as concluded by Shetty et al. (2016).

Tsalikian et al. (2015) reported that during 60 min of moderate intensity exercise, 82% of participants experienced at least a 25% decrease in glucose compared to pre-exercise.

Starting with week 4, insulin doses were reduced with 2 units to all subjects and the evolution of glycemic values continued for 3 weeks further. The need to adjust the insulin dose in type 1 diabetic patients performing physical exercise is demonstrated by numerous studies (Rabasa-Lhoret, Bourque, Ducros & Chiasson, 2001; Yardle, et al., Cryer, 2008; Cryer, 2010) There was a continuous improvement in blood glucose levels, a sign that the body responded well to lower doses of insulin administered.

After completing the kinetotherapeutic program, the evolution of glycemic values was monitored in the absence of physical exercise, knowing that regular physical activity is needed in order maintain insulin sensitivity. A slight increase in glycemic levels was observed in all subjects, a sign that the body's sensitivity to insulin began to decline, a fact found in many other studies that concluded that moderate and high intensity physical exercises have the potential to improve short-term glycemic control (Cockcroft et al., 2017).

In our study, with regular physical exercise, we managed to increase aerobic exercise capacity by maintaining satisfactory glycemic control in patients with type 1 diabetes, but further studies are necessary because it is still uncertain whether reduced work capacity in young subjects with T1D results from poor oxygenation (Levy et al., 2008), low muscular capillarization (Kivelä et al., 2006), or poor metabolic control, depending on low regular physical activity (Krause, Riddell & Hawke, 2011).

Conclusions

The aerobic exercise capacity has increased in patients with type 1 diabetes who have undergone a regular exercise program.

Glycemic control can be maintained at an appropriate level during a regular exercise program in patients with type 1 diabetes.

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STUDY ON THE DEVELOPMENT OF EXPLOSIVE FORCE IN FOOTBALL AT JUNIORS A LEVEL

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ABSTRACT. The aim of this paper is to find and implement a program for the development of the muscles of young footballers in order to enforce the transition to seniors and to reduce the physical differences. The research included 40 subjects and faded over a 6 months period. The subjects were selected following the value-based observation, being considered as the most perspective players. The research results confirmed that all 5 follow-up indexes: push-ups, flat bench press, chin-ups, squats, high knee jumps, after the training period showed a good progress. In conclusion, we can once again confirm that the circuit-weight training method is an effective method for developing the force. At the same time, the results of the research show that the age of Juniors "A" (17-18 years) is suitable for the development of force.

Keywords: *force, football, weight training, circuit, juniors*.

REZUMAT. Studiul dezvoltării forţei explozive în fotbal la juniori. Forţa fizică depinde de activitatea sistemului nervos central, de secţiunea fiziologică a muşchiului şi de procesele biochimice care au loc în muşchi. Eforturile voinţei, concentrării şi atenţiei pe care este capabil atletul sunt de asemenea foarte importante. Din punct de vedere biochimic, forţa contracţiei musculare depinde de natura impulsurilor nervoase, modul de transmitere a acestor impulsuri şi de acţiunea ATP asupra miozinei musculare. Scopul acestei lucrări este de a găsi şi implementa un program de dezvoltare a sistemului muscular a tinerilor fotbalişti pentru a impune trecerea spre performanţă şi a reduce diferenţele fizice. Cercetarea a inclus 40 de subiecţi pe o perioadă de 6 luni. Subiecţii au fost selectaţi în urma observării valorice, fiind consideraţi cei mai de perspectivă jucători. Rezultatele cercetării au confirmat faptul că toţi cei 5 indicatori de urmărire: ridicări din culcat facial, împins din culcat dorsal pe plan orizontal, tracţiuni bara fixa, genuflexiune, sărituri cu genunchi sus, după perioada de antrenament au înregistrat un progres bun. În concluzie, putem confirma încă o

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dată că metoda de antrenament cu greutăţi în circuit, este o metodă eficientă pentru dezvoltarea forţei. În acelaşi timp, rezultatele cercetărilor arată că vârsta juniori "A" (17-18 ani) este potrivită pentru dezvoltarea forţei.

Cuvinte cheie: *forţă, fotbal, pregătire în greutate, circuit, juniori*

Introduction

Physical strength depends on the activity of the central nervous system, the physiological section of the muscle, the biochemical processes taking place in the muscles, as well on the efforts of the will, concentration and attention that the athlete is capable of. From the biochemical point of view, the force of muscle contraction depends on the nature of the nerve impulses, the way of transmitting these impulses, and the action of ATP on muscle myosin.

The muscular hypertrophy that emerges from strength training is because of from the high protein consumption that takes place in such endeavors (Florescu, 1975).

For the education of force, it is necessary to take into account the following aspects:

- Simultaneous mobilization of the maximum number of functional units,
- Maximizing the effort of will and attention focus on the work being done,
- Increasing the physiological section of the muscles.

In terms of muscle strength, the conditioning reaction is known to be very variable.

As a result of the training, the isolated subject can record evolutions, stagnation or even involution of the muscular force. But, if group training is more frequent (as number of weekly sessions), it is possible that the strength of more subjects will evolve.

The results from the study made by Wisloff et al (2004) indicated that there was no relation between the 10 m shuttle run and the 30 m sprint test. However, after Cormie et al (2011) and Silva et al (2015) both sprint capacities are of importance in soccer, and the obtained data show that both capacities should be included and evaluated in a sprint test battery of soccer players.

The results obtained by Maio Alvez et al (2010) suggested that the complex and contrast training (CCT) induced the performance increase in 5 and 15 m sprint and in squat jump. Vertical jump and sprint performances after CCT program were not influenced by the number of CCT sessions per week (1 or 2 sessions/wk). From the obtained results, it was suggested that the CCT is an adequate training strategy to develop soccer players' muscle power and speed.

Sedano et al (2011) studied the effects of plyometric training on explosive strength, acceleration capacity and kicking speed in young elite soccer players, after Paavolainen et al (1999) and Lopez-Segovia et al (2010). Marques et al (2013), Saez de Villareal et al (2013) and Chtara et al (2017) confirmed that the replacement of some soccer-specific training with plyometric, agility, or repeated shuttle sprint exercises would enhance explosive actions, agility and anaerobic performance to a greater extent in young soccer players than soccer training alone.

After Jovanovic et al (2011), their proposed speed, agility, quickness training program appears to be an effective way of improving some segments of power performance in young soccer players during the in-season period. After Keiner et al (2014) football coaches could use this information in the process of planning in-season training. Without proper planning of the SAQ training, soccer players will most likely be confronted with decrease in power performance during in-season period.

Cicioni-Kolsky et al (2011) examined the effect of two different interval training programs–high-intensity interval training (HIT) and supramaximal interval training (SMIT)–on measures of sprint and endurance performance. The study showed that for concurrent improvements in endurance, sprint and repeated sprint performance, SMIT provides the greatest benefits for physically active individuals.

Wahl et al (2014) revealed that 4 weeks without high intensity training (HIT) had moderate to large decreasing effects on physical performance. On the contrary, 2-week HIT shock microcycle is a promising tool in preseason training of semi-professional soccer players to largely improve Repeated-Sprint-Ability $(RSA)_{Index}$ by 46% (Cohen's d = -1.99), RSA_{Mean} by 2.3% (Cohen's d = -1.15) and Yo-Yo Intermittent Recovery Test Level 2 (YYIR2) performance by 24% (Cohen's d = +1.92) of semi-professional soccer players. These results were further confirmed by Keiner et al (2014).

Balsalobre-Fernández et al (2015) observed after Tonnessen et al (2013) that a month of active rest during the off-season break is enough to prevent decreases in force production of such athletes.

The effectiveness of the different techniques implies reaching the limit force by the subjects, which allows an accurate determination of the role played by the candidates' prior training and attenuates any reaction depending on their initial strength. A shorter number of weeks to reach the limit force indicate the superiority of a technique. This is true only when all subjects have a relative equal initial force, and all practice the same training method.

Behm et al (2017) proved that power training was more effective than strength training for improving youth jump height. For sprint measures, strength training was more effective than power training with youth. Furthermore, strength training exhibited consistently large magnitude changes to lower body strength measures, which contrasted with the generally trivial, small and moderate magnitude training improvements of power training upon lower body strength, sprint and jump measures, respectively.

Abade et al (2017) in their research explored the effects of the re-warm-up performed in the time gap between the end of the warm-up and the beginning of the match. It was proved that re-warm-up exercises such as plyometrics and repeated changes of direction are simple, quick and efficient activities to attenuate losses in power output during vertical jump and sprint activities after warm-up.

Helgerud et al (2011) observed that their concurrent strength and endurance training program together with regular football training resulted in considerable improvement of the players' physical capacity and so may be successfully introduced to elite football players. Moreover, after Di Giminiani &Visca (2017) the tests used in the study are practical and reliable predictors to monitor explosive strength, and endurance performance changes in young elite soccer players. Secondly, the training structure and the improvements evidenced provide helpful guidelines of expected longitudinal gains in endurance and strength performance of elite soccer players from 13 to 15 years.

The qualitative aspect of the accumulations can be analyzed from two points of view: the "angular" specificity and the "working" specificity.

The "angular" specificity is the most important increase in muscle strength. For example, following an isotonic training with maximum resistance, knee extensions register a more significant increase in force at an angle of 115°. In isometric training, strength development appears to be less specific. It is noted the existence of a certain specificity for one or two muscle groups trained at different angles.

Specificity of "work": In subjects trained with concentric isotonic contractions, the evolution of isometric force is not proportional to the isotonic force. The percentage increase in isotonic force exceeds the percentage increase of isometric values. It is concluded that an eccentric isotonic contraction implies a more spectacular evolution than the concentric isotonic contraction.

The assumptions of the research

In the course of the experiment, the established hypothesis was that the circuit method can make the physical training of athletes more efficient, especially the force in speed mode.

Theoretical data of the experiment

The design of the research

This research is quasi-experimental; the 40 subjects born in 2000 were selected based upon the observation method. In co-operation with the coach of A.C.S Sporting Cluj U18 team, Alin Bărăian, the selected subjects were considered to have perspective in the football performance but at this stage have some deficiencies in terms of force quality in speed.

Strength training sessions were flown three times a week in the morning at 6:45 am and lasted for 45 minutes.

Subjects

The subjects included in this study are members of the A.C.S. Sporting Cluj football team and they play at Junior A1 level. The anthropometric measurements were as follows: height 1.66 – 1.83 m; weight 60 – 72 kg.

Time and place of the research

The research was conducted at the Big Fitness Hall during the period 01.02.2017 - 31.07.2017.

The research period was divided into 3 stages as follows:

- 1st of February 2017 – Initial test,
- 2nd of February - 30th of July 2017 – experimental training period,
- 31th of July 2017 – Final test.

For the development of force, the 9-point circuit training method was used, each station having a different load depending on the body mass of the subject. Each training was structured in three to five parts:

- Preparing the body for effort and the selective influence of the locomotive apparatus (12 minutes)
- Circuit 1 (9 minutes)
- Rest (4 minutes)
- Circuit 2 (9 minutes)
- Rest and stretching (10 minutes).

Table 1. The circuit components

Exercise	Series	Dosage	Charge
Leg press	2	25-20, 20-15 rep.	100% From the body mass of the subject.
Machine bench press	2	25-20, 20-15 rep.	50% From the body mass of the subject.
Seated cable row or pulldown to front	2	25-20, 20-15 rep.	25% From the body mass of the subject.
Machine shoulder press	2	25-20, 20-15 rep.	20% From the body mass of the subject.
Calves extension	2	25-20, 20-15 rep.	25% From the body mass of the subject.
Leg flexures	2	25-20, 20-15 rep.	75% From the body mass of the subject.
Biceps flexures – machine	2	25-20, 20-15 rep.	25% From the body mass of the subject.
Triceps press – machine	2	25-20, 20-15 rep.	25% From the body mass of the subject.
Crunch - machine	2	25-20, 20-15 rep.	50% From the body mass of the subject.

At each station the actual working time was 40 seconds followed by a pause of 20 seconds, during which the subjects changed the workstation. The break between the two circuits was 4 minutes.

Results

Initial Test

Table 2. Initial test sample values

No.	Push-ups	Flat bench press / min	Chin – ups / min	Squats / min	High knee jumps / min
1	27	13	7	27	42
2	22	15	9	20	47
3	33	18	6	32	53
4	35	16	10	34	55
Average	29.25	15.5	8	28.25	49.25

Final test

Table 3. Final test sample values

No.	Push-ups	Flat bench press / min	Chin – ups / min	Squats / min	High knee jumps / min
1	39	27	15	42	68
2	33	20	13	36	59
3	35	25	12	39	65
4	37	23	14	40	55
Average:	36	23.75	13.5	39.25	61.75

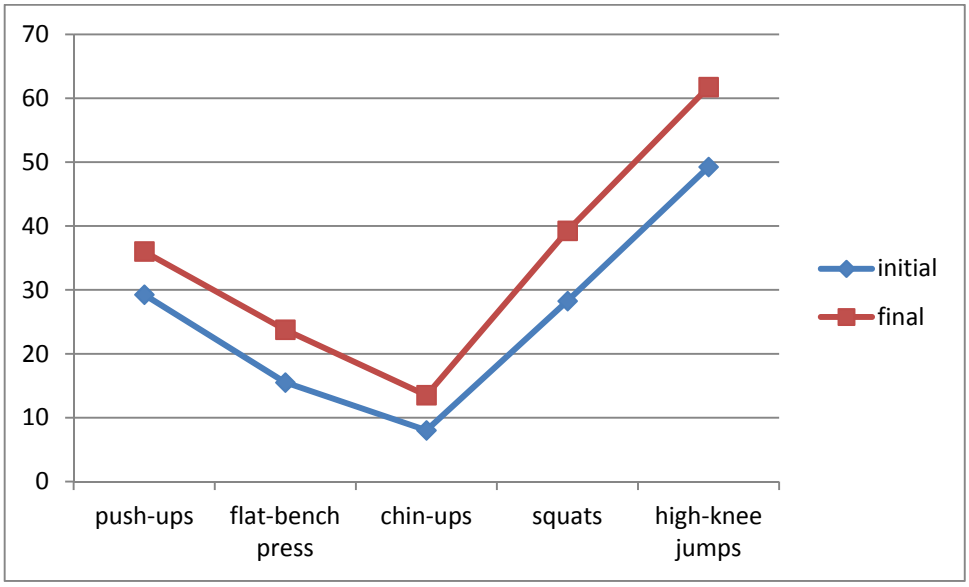

Figure 1. Evolution of average values from the initial to the final test

Comparing the obtained results with those of Saez de Villarreal et al. (2013) showed that advanced training associated with neural and morphological adaptations allow a better optimal power development and transfer to athletic activities.

When comparing them with those from the research of Wisloff et al (2004), the sole performance of one type of plyometric exercise, which has an apparent lower level of specificity, may explain, at least in part, the lack of transfer of training

adaptations to dynamic and complex activities, where the coordination and force production of different body muscles, as is the case of sprint performance, are essential.

Analyzing the results and comparing them with those of Balsalobre-Fernández et al, (2015) and Behm et al, (2017), it seems that strength/power training induces greater improvements in jump abilities than in running-based activities. Moreover, combining resistance- and speed-training or plyometric- and football-specific strength programs in the same session seems to be more effective than the resistance-training program alone

The multi-factorial constructs of football performance (technical, tactical, and physical performance) and their associated components bring a higher complexity to the designing of the training process, as was observed by Wahl et al, (2014). Moreover, professionals involved in the preparation of football teams have to reflect on some questions associated with the manipulation of the individual variables that affect each of these relevant constructs and how they can affect each other.

Conclusions

All research data has led to the confirmation of the hypothesis according to which the method of the circuit can physiologically improve the physical training of the athletes, especially the force in speed mode.

The means and methods used in the research found an improvement in the development of force.

The obtained results lead to the conclusion that force at this age can be influenced.

The development of force by our means does not harm the physical training as a whole, but on the contrary, these means form skills that can help in the future, acquiring more complex motor actions.

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RISK MANAGEMENT IN ROMANIAN AQUATIC FACILITIES

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ABSTRACT. An effective risk management strategy in aquatic facilities includes preventive measures that should be designed and implemented to improve safety and customer satisfaction. The objective of this study is to evaluate how Romanian aquatic and recreation facilities give importance to customer satisfaction and to risk management, establishing correlations between the existing study variables and identifying the way certain variables influence each other. We can assert that there are concerns about risk management within aquatic facilities and the number of safety measures is reduced in Romanian aquatic facilities, therefore we believe customer satisfaction could be improved primarily by the safety provided within the aquatic facilities.

Keywords: *sports and recreational aquatic facility, risk management, swimming pools, safety measures, customer satisfaction.*

REZUMAT. Managementul riscului în bazele acvatice sportive şi de recreere din România. O strategie eficientă de gestionare a riscurilor în bazele acvatice sportive şi de recreere, include măsuri preventive care ar trebui proiectate şi implementate pentru a îmbunătăţi siguranţa şi satisfacţia clienţilor. Obiectivul acestui studiu este de a evalua modul în care bazele acvatice sportive şi de recreere din România acordă importanţă satisfacţiei clienţilor şi managementului riscurilor, stabilirea corelaţiilor existente între variabilele studiului şi determinarea modului în care unele variabile le influenţează pe altele. Putem afirma că există îngrijorări cu privire la gestionarea riscurilor în cadrul bazelor acvatice studiate, iar numărul de măsuri de siguranţă este mult redus în cadrul acestora, de aceea considerăm că satisfacţia clienţilor ar putea fi îmbunătăţită în primul rând prin siguranţa oferită în cadrul bazelor acvatice sportive şi de recreere din România.

Cuvinte-cheie: *baze acvatice sportive şi de recreere. managemntul riscului, bazine de înot, măsuri de siguranţă, satisfacţia clienţilor.*

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Introduction

Sport facility managers must evaluate each event from its security risk point of view, taking into consideration not only the athlete's profile, but also the profile of the attending public and the anticipated media coverage. An important management strategy, in such situations, is represented by the elaboration and use of the crowd management plan. Such plan comprises the categorization of the type of event, knowing the surrounding structures and environment, the rivalries between different sports teams, the violence threats, the size of the crowd and the seating configuration; involving the security staff and the existence of an emergency plan (Sawyer, 2010).

Since, according to our knowledge in Romanian sports literature, there is no definition of sports and recreational aquatic facilities, we have proposed the following definition: sports and recreational aquatic facilities are those indoor and outdoor structures, that are including competitive swimming pools, public swimming pools, recreation and therapeutic swimming pools, as well as structures built on rivers, lakes, seas, oceans, where competitive, educational and leisure activities are taking place.

An effective risk management plan in aquatic facilities beside client's surveillance includes preventive measures that should be designed and implemented to improve safety and customer satisfaction.

Objectives

The objective of this study is to evaluate how Romanian aquatic and recreation facilities give importance to customer satisfaction and to risk management, establishing the existing correlations between the study variables and the way in which certain variables influence others, as well as establishing the relationships between them.

Materials and Methods

In this study the research was based on questionnaires addressed to 14 Aquatic Managers and 90 clients from the following surveyed aquatic facilities: Complex Natație Universitas and Complex Natație Politehnica from Cluj-Napoca, Bazinul Steaua and Bazinul Grinţescu (Floreasca) from Bucharest, Bazinul Ioan Alexandrescu and Bazinul Acoperit Crisul from Oradea, Csiki Csobbano from Miercurea Ciuc, Severus Pool from Zalau, Septimia Wellness&Spa from Odorheiu

Secuiesc, Bazinul Olimpic Delfinul from Arad, Complexul de agrement si sport Mureşul and Piscina Inginer Mircea Birau from Târgu Mureş, Paradisul Acvatic from Braşov and Piscina Select from Satu Mare.

We have introduced in the survey questions where those surveyed had to choose according to their preferences on a scale from one to five for patrons and yes or no to managers (Table 1. and Table 2.). One of the most frequently used scoring scale is the Likert scale, intended for evaluating the attitude of the subjects who express their agreement or disagreement degree regarding a certain topic. The scale has, usually, a set of equal steps for the agreement and the disagreement. The subjects are asked to choose one of the four or five answers, respectively (Norman, 2010).

Table 1. Questionnaire addressed to clients

How satisfied are you with the following?	Very satisfied	Mostly satisfied	Mostly unsatisfied	Very unsatisfied	I don't know
1. General opinion regarding the aquatic facility	1	2	3	4	5
2. Opening hours	1	2	3	4	5
3. Customer service	1	2	3	4	5
4. Cleanliness, hygiene	1	2	3	4	5
5. Quality of water in the pool	1	2	3	4	5
6. Quality of services	1	2	3	4	5
7. Safety	1	2	3	4	5
8. Employees' professionalism	1	2	3	4	5
9. Prices	1	2	3	4	5

Table 2. Questionnaire addressed to Aquatic Managers

Please indicate whether the following statements are true or not at your aquatic facility:	Yes	No
1. Our swimming pools are under constant surveillance by lifeguards	1	2
2. Our swimming pools are set with all the necessary equipment for rescue and first aid	1	2
3. Our aquatic facility is set with AED	1	2
4. The quality of equipment is checked daily for proper functioning	1	2
5. Our aquatic facility provides safe access and water entry equipment for people with disabilities	1	2

6. Our lifeguards are certified in Lifeguarding and CPR, and know the safety procedures in case of accidents	1	2
7. All of our employees know the safety procedures in case of emergency	1	2
8. All of our lifeguards and employees are familiar with safety procedures in case of lightning and other severe weather conditions (outdoor pools)	1	2
9. In our aquatic facility, chemicals and other materials for pool maintenance and hygiene are kept in a closed area and accessed only by authorized persons	1	2
10. Lifeguards/pool managers check and note (display to be visible for customers) the Ph and Cl chemical data of water every 2 hours.	1	2

Documentation is a key component of effective risk management. Unfortunately it is often a weak link in a facility's risk management system. Effective documentation can serve two main risk management objectives: injury prevention and legal defence in the event of an incident. Records provide valuable insights into the day to day operations of the facility. Analysis of these records reveals patterns from which preventive measures can be designed and implemented to improve safety. The records can also provide proof that reasonable efforts were made to identify and reduce or eliminate the risk (Life Saving Society Lifeguarding Experts, 2017).

We believe that it is also essential to establish a national commission for accreditation and safety supervision of aquatic facilities operation (Baloga, 2015).

Results

In order to find out if the risk management through the safety provided influences customer satisfaction, we have used the customer satisfaction index for each aquatic facility and the overall number of safety measures employed within those aquatic facilities. The average number of the safety measures in aquatic facilities in Romania is 5,6 on a significance of (p)= 0,000 (ANOVA analysis).

The correlation between the safety measures number and the customer satisfaction index, respectively the correlation between the number of safety measures and the customer satisfaction index regarding the safety provided leads us to the idea that there is an obvious concern regarding the risk management within the aquatic facilities that influences customer satisfaction (Table 3.).

Table 3 a. Correlation between the safety measures number and the customer satisfaction index/ **b**. Correlation between the number of safety measures and the customer satisfaction index regarding the safety provided

a. Correlation between the safety measures number and the customer satisfaction index.	Pearson Correlation (r)	-0,042
	Sig. (2-tailed)	0,885
	N	14
b. Correlation between the number of safety measures and the customer satisfaction index regarding the safety provided.	Pearson Correlation (r)	-0,177
	Sig. (2-tailed)	0,546
	N	14

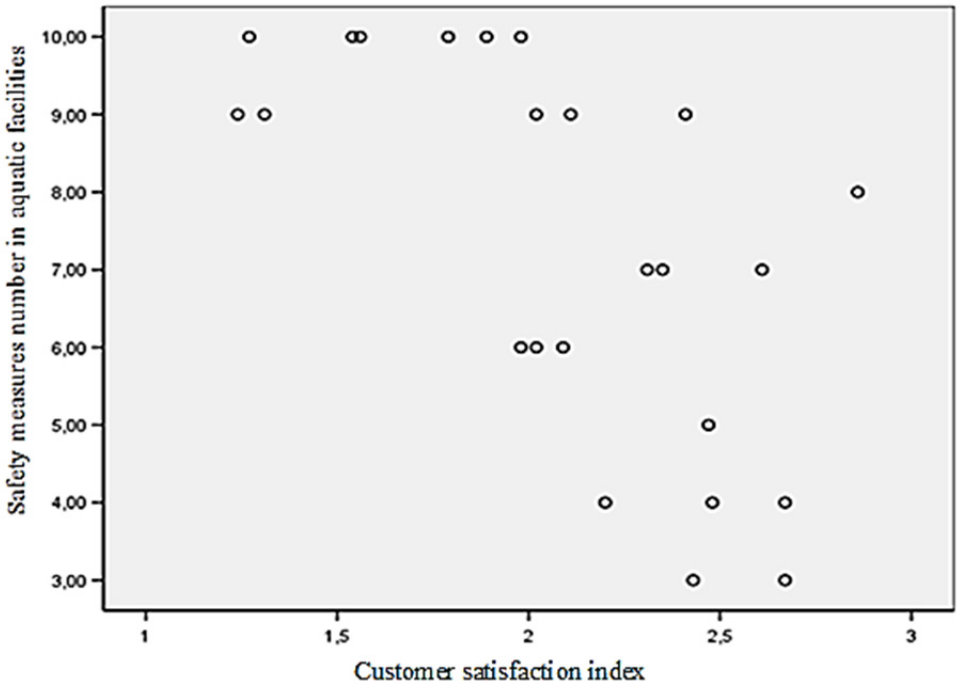

Figure 1. Chart of correlation between the safety measures number and the customer satisfaction index

Conclusions

In conclusion, we can assert that there are concerns about risk management within aquatic facilities that influence customer satisfaction and the number of safety measures is reduced in Romanian aquatic facilities.

Teachers, swim coaches, and aquatics personnel must plan for potential aquatics emergencies, the most serious of which include drowning, near drowning and spinal injuries; these incidents are a substantial source of liability exposure for aquatics organizations and can be very costly (Sawyer, 2010).

Customer satisfaction from the point of view of the safety provided within the aquatic facilities in Romania could be improved by: the acquisition of quality equipment that are suitable for prevention and rescue in case of injury; preparing the personnel by means of various qualification and first aid courses; effective documentation for injury prevention and legal defense in the event of an incident; the installation of aquatic facilities with devices allowing access to the water for people with disabilities; setting up a commission for countrywide aquatic facilities audit operations.

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THE IMPROVEMENT OF THE MOTOR QUALITY - SPEED WITH SPECIFIC MEANS FROM FOOTBALL IN THE PHYSICAL EDUCATION LESSON FOR STUDENTS OF SECONDARY SCHOOL

RAUL NEMEŞ[1], DAN MONEA[1*], RODICA PRODAN[1], VLAD GROSU[2], PETER SZABO[1], GHEORGHE MONEA[1]

ABSTRACT. The objectives of this study target ways to make the physical education lesson more efficient with a many-sided development, with a better environment, and, at the same time to reach the goals from the curriculum. For having true and relevant results there were used approved tests like 30 m sprint and 5x10 m shuttle. In order to have the best precision when measuring the results, it was used the Linggate Encoder (MicroGate). At the initial test it was determined that neither of the two groups of subjects is very different. The two groups have a good homogeneity. After the intervention on the two groups it was started to have real differences and modifications. The conclusions of the study shower us, one again that a many-sided training and the game type exercises grow the students' motivation, the efficiency of the lesson and helps getting new and better results.

Key words: *skills, methods, means, results, evaluation*

REZUMAT. Îmbunătățirea calității motrice - viteza prin mijloce specifice din fotbal în lecția de educație fizică pentru copii. Obiectivele acestui studiu vizează modalități de a face lecția de educație fizică mai eficientă, cu o dezvoltare multilaterală, cu un mediu mai bun și, în același timp, să atingă obiectivele din curriculum. Pentru a avea rezultate reale și relevante au fost utilizate teste aprobate cum ar fi 30 m alergare de viteză și naveta 5x10 m . Pentru a avea cea mai bună precizie la măsurarea rezultatelor, a fost utilizat Linggate Encoder (MicroGate). La testul inițial sa stabilit că nici unul dintre cele două grupuri de subiecți nu este foarte diferit. Cele două grupuri au o omogenitate bună. După intervenția asupra celor două grupuri a început să aibă diferențe și modificări reale. Concluziile studiului ne oferă din nou, că o formare

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multi-laterală şi exerciţiile de tip joc măresc motivaţia studenţilor, eficienţa lecţiei şi ajută la obţinerea unor rezultate noi şi mai bune.

Cuvinte cheie: abilităţi, metode, mijloace, rezultate, evaluare

Introduction

The changes that the Romanian education proposes are really important and one of the most important things that this kind of education is switching from the informative education to the formative education. In physical education and sport this applies as a reconstruction of the methods of teaching and the forms of the teaching process.

The motor quality – speed is conditioned by several factors, such as: physiological factors, biochemical factors, psychic factors but also morphological factors.

Physiological factor. Important in determining speed is the mobility of cortical nerve processes, and the quick alternation in the cortical center of the execution and inhibition. This mobility of the nerve processes is innate and hereditary and it can be perfected subsequently. The muscle excitability and responsiveness are also factors which condition the speed of moves.

Daneshjhoo et al. (2015) found greater knee adduction in non-dominant leg rather than dominant leg, which suggests the existence of bilateral different knee valgus joint angle. Usually, the non-dominant leg provides postural support while the dominant leg is used to kick the ball. In players with asymmetric kinetic patterns, more emphasis is given to one side of the legs which negatively influence muscle balance. Football players almost never use both legs with equal emphasis. Their preference to use one side more than the other is related to hemispheric dominance of the brain in the opposite side. This is the possible cause for this result in professional soccer players.

Marques et al. (2013) concluded in their study that a short 6-week period of combined sprint and plyometric training can significantly improve explosive strength in youth competitive soccer players, and, more importantly, that this improvement can be transferred to soccer kicking performance in terms of ball velocity.

In determining the speed, what's really important, is the transmission speed of the nerve impulse and this is conditioned by the time of transmission of the impulse by the central nervous system, the time of transmission of the impulse to the muscles, the time needed to make the organs move. The concentration capacity helps to keep a constant speed. (Demeter, A., 1982)

Hader et al. (2015) has shown that change of direction (COD)-sprints are largely less metabolically demanding than linear sprints. This may be related to the very low metabolic demand associated with the deceleration phase during COD-sprints that may not be compensated by the increased requirement of the reacceleration phase. These results also highlight the dissociation between metabolic and muscle activity demands during COD-sprints, which questions the use of metabolic power as a single measure of running load in football.

Loturco et al. (2016) in his study support adopting the jump squat exercise to the detriment of the Olympic push press in soccer players, due to its superior transference effects on sprinting over short (5 m) and long (30 m) distances. The use of jump squat could be a safe strategy for increasing speed ability in soccer players, without the inherent risks involved in maximal sprint training (e.g., hamstring injuries).

The morphological factor. Until recently, in the specialists' eyes, the best body type for fast movements was considered to be the body type with long legs. But in time, with all the research it was revealed that this factor has a small influence.

Usually the sprint contest is won by sportsmen who are really different in the means of morphological issues. Zibung et al. (2016) concluded that motor tests play a key role in talent selection in football and this is a viable means of forecasting performance in the age range of 12–15 years.

The psychic factor. A very important factor for sprinters is the capacity of their will. If they are really willing to win, they will do it. This aspect can be improved.

The biochemical factor. As we all know, the muscle has two types of fibers – red and whites. The white fibers are fast and the red ones are slower, but we have the mixt type too. For the speed we need more white fibers because they contain lots of myofibrils required for a contraction and because they are high in adenosine triphosphate phosphocreatine (ATP) and glycogen.

These substances, ATP and CP are considered macro-energetic, because when they decompose they eliminate energy.

Usually the sportsmen in this field have 80-90 % white fibers in their muscle. We are born with different muscle structure. Now, the question is, if the speed training helps to change the red fibers into white fibers? The results are partially positive, especially to those who train super maximal themselves for a long time. (Demeter, A., 1982)

For an efficient way of developing the speed, the velocity in all its sides, it is recommended to use the competition as a way of training and to enlarge the numbers of reps. You have to be attentive to having long enough rest time between reps. In these rest times, the body has to fully recover.

Haugen et al. (2015) proved that neither weekly sprint training at 90 or 100% velocity, nor supervised sprint training enhanced soccer-specific physical performance in junior soccer players.

In schools, in the last years, the motor qualities became really important. Almost each and every physical education and sports lesson has something to do with the speed.

The assumptions of the research

Starting with the premises shown already, the following assumption is considered: optimizing the lessons of physical education respecting the curriculum, in terms of the dynamics and complexity of the effort along a learning unit.

The research task was to set the tests and measurements, which give an overview on the students' level of athletic training, of learning the sprint running and of the somatic development.

There is the possibility of improving the speed in the physical education lessons, in specific conditions borrowed from football. By proper systematization of the main means that act on the development of speed, the possibilities of a good result are increasing.

Theoretical data of the experiment

After setting up the group of subjects, the ethical and research agreement within the education unit were received. The next step after the subjects' randomization was the initial testing for all subjects. Next, in order to develop the speed, the analytical means were used upon the control group and the football specific means were used upon the experimental group.

And so, the research ended up with the final testing where all the subjects had to repeat the tests used in the incipient phase of the research.

The tests are:

1. 30 m sprint

Objective: the evaluation of the travel speed.

Test description: When the teacher says, on your marks the students come near the white line of the field. After the whistle blows, they start running to the other white line, they have to take with them a piece of wood and bring it back to the start line, after they putted down the piece of wood they have to run again to take the second piece of wood too.

Materials: stopwatch, 2 cones, the wood pieces, and 2 lines on the field.

Application: The test runs on the synthetic ground, enough space to make the stop will be provided. The ground is straight and is marked with two white lines.

Indications: The stopwatch in on only when the student starts running and it stops when the chest of the subject crosses the finish line. For those who have a better time than the equivalent of 100 points it is added an extra 2 points for each tenth in minus.

2. 5x10 m shuttle

Objective: Investigation of speed-coordination quality.

Test description: 5x10 meters with full speed.

Materials: clean surface, stopwatch, chalk, cones.

Application: The subject is behind the white line, ready to go. When the teacher blows the whistle, he starts to run as fast as he can till the next line which is at 10 meters distance. The subjects have to cross the line with both feet. They have to repeat this road 5 times. Only one time is allowed this test, they cannot repeat it.

Indications:

- the two lines on the ground should be 1,20 m long,
- boarders should be marked with cones,
- at every tour the number of the tour will be said loud enough,
- the stopwatch is stopped when the subject, after the 5^{th} cycle crosses the line with foot.
- the recording of the time is made in tenth of seconds,
- example: A time of 21,6 seconds is 216 points.

The speed recording is made with a sort of a new technology. The technology has arrived to great standards and so, for recording times we have radio impulses. The possibility to loose data, to not being able to have exact results is buried away with these new types of technologies.

The LINKGATE ENCODER represents a new and innovating system for recording times. The tech evolution led us to advance from the old type of impulse to a new and modern type which gives us the maximum accuracy in transmitting large quantities of information.

The compact way and because it can be used with VHR and UHF radio transmitter makes LINKGATE ENCODER an ideal program for all kind of competitions.

Time and place of the research

This research was started in 14th of September 2016 and it ended in the 12th of October 2017. The author is a physical education teacher at the Elementary School of Chinteni, Cluj County.

The subjects are the students from the 8th grade at the Chinteni Elementary School.

Table 1. Subjects – Control group

Subject No.	Gender	Height	Weight
1	F	164 CM	48 KG
2	F	160 CM	55 KG
3	M	159 CM	60 KG
4	M	158 CM	51 KG
5	M	155 CM	54 KG
6	M	160 CM	52 KG
7	M	158 CM	52 KG
8	M	163 CM	59 KG

Table 2. Subjects – Experimental group

Subject No.	Gender	Height	Weight
1	F	158 CM	42 KG
2	F	158 CM	50 KG
3	M	174 CM	69 KG
4	M	166 CM	60 KG
5	M	165 CM	57 KG
6	M	160 CM	55 KG
7	M	164 CM	58 KG
8	M	166 CM	57 KG

Results

Data presentation

Initial test – control group

Table 3. Initial test – control group

Subject No.	Gender	Speed 30 m / sec	Shuttle 10X5M/sec
1	F	5.3	24.4
2	F	5.4	22.5
3	M	4.9	21.8
4	M	5.0	24.2
5	M	5.1	23.4
6	M	4.9	23.4
7	M	5.2	21.9
8	M	4.6	22.3
	Mean value	5	22.9

Initial test - Experimental group

Tabel 4. Initial test - Experimental group

Subject No.	Gender	Speed 30 m / sec	Shuttle 10X5M/sec
1	F	5.0	23.7
2	F	5.3	23.8
3	M	5.1	20.8
4	M	4.9	24.6
5	M	4.5	20.9
6	M	5.1	23.2
7	M	5.0	23.5
8	M	4.9	24.0
	Mean value	4.9	23.06

Final test - Control group

Table 5. Final test – control group

Subject No.	Gender	Speed 30 m / sec	Shuttle 10X5M/sec
1	F	4.7	23.1
2	F	4.9	21.8
3	M	4.7	19.8
4	M	4.8	22.6
5	M	4.7	21.9
6	M	4.9	22.2
7	M	4.9	20.3
8	M	4.3	22.3
	Mean value	4.7	21.7

Final test - Experimental group

Table 6. Final test - Experimental group

No.	Gender	Speed 30 m / sec	Shuttle 10X5M/sec
1	F	4.1	21.1
2	F	4.6	20.8
3	M	4.7	19.8
4	M	4.4	20.6
5	M	3.9	18.9
6	M	4.5	21.2
7	M	4.6	21.3
8	M	3.9	20.3
	Mean value	4.3	20.5

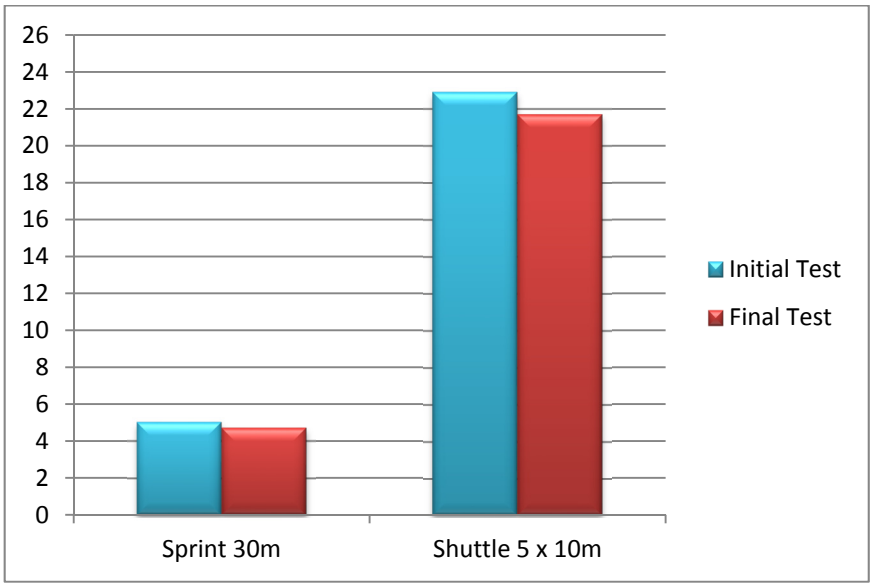

Figure 1. Comparison of the results – Control group

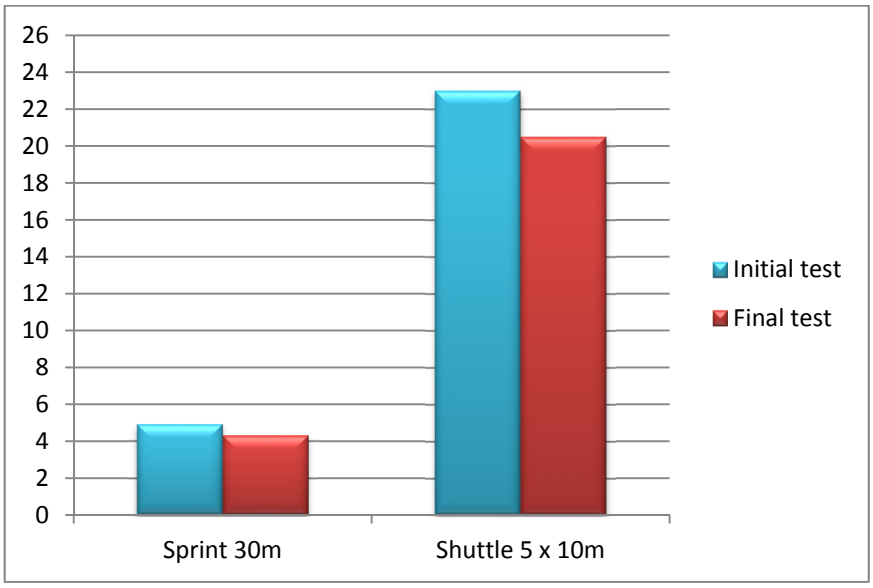

Figure 2. Comparison of the results – Experimental group

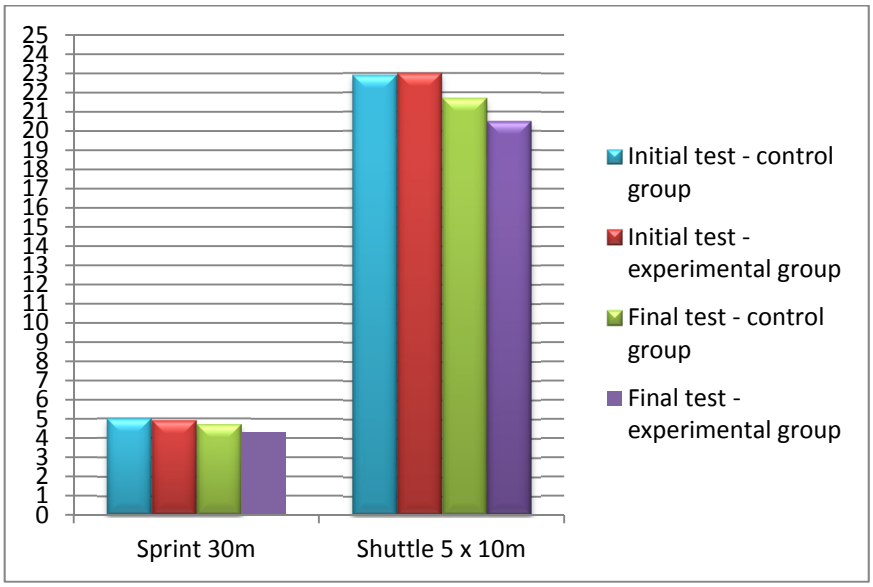

Figure 3. Comparison of the results for both groups – Initial and Final tests

Conclusion

The results give an answer to the questions from the begging of this paper. By using the specific means from football it was possible to see a good improvement in the development of the speed.

The results show that at this age velocity can be influenced.

The development of speed by new means doesn't harm in any way the physical training; by contrary this new means can be useful in the future, when the complexity of the movements grows. For the physical training in school it is very important to choose the right means and the right methods.

By using means as interesting as possible we can attract the students to come closer to our field, to physical education. If the students show a real interest in these kinds of activities, the training time interval or the complexity of the exercises can be increased in order to have a bigger progress.

The means have to be adapted to their possibilities, and teachers have to keep in mind the following aspects:

- the individual effort capacity,
- their age,
- their gender.

The best way to see each student during his activity is to use means which allow the teacher to see them individually. For this to happen, one can put them in smaller teams, or to make them work in pairs or individually. In all these cases to correct them is much easier.

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THE CONTROVERSIAL CONTRIBUTION OF STRETCHING AND THE DILEMMA OF PREPARATION FOR SPORTS REQUIRING MAXIMUM FORCE PRODUCTION AND LARGE RANGE OF MOTION

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ABSTRACT. The advantage of long static stretching is in the increasing of range of joint motion (ROM). However, the effect of static stretching on injury prevention has been found debatable while generally, most of the studies regarding this issue, claim for no effect. In addition, long static stretching has been found reducing maximum muscle voluntary contraction (MVC). The reasons for reduced MVC due to static stretching are both neural and mechanical: reduction of stretching effect, reduction in stretch shortening cycle (SSC) and reduction in musculotendinous stiffness. The contradictory effects of static stretching are creating a dilemma in sports that integrate MVC and large ROM. Therefore, the purpose of this article is to consolidate the information about the advantages and disadvantages of the stretching and to review the proposed solutions for this dilemma: Not to perform long static stretching immediately before the main activity, dynamic stretching are recommended instead; Intensive dynamic activity between the stretching and the main activity, may eliminates the impairing effect; Vibration or rolling a foam roller along the muscle may be a substitute for static stretching in term of increasing ROM without impairing MVC; And finally, it is best to perform static stretching as a separate training unit.

Keywords: *Static Stretching, Dynamic Stretching, Dynamic Warm-Up, Range of Motion, Maximum Voluntary Contraction*.

Introduction

Long static stretching of the muscles on the one hand are increasing range of joint motion (ROM), and on the other hand reduces force production and maximum muscle voluntary contraction (MVC) of the muscles in which

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stretching were performed. This creates a dilemma for athletes who engaged with sports that require a combination of large ROM and MVC (i.e. gymnastics, ballet, various fields in athletics, martial arts and more). The problem is how these athletes can increase ROM during warm-up process or at least not limiting muscle's force production by static stretching (Kinser et al., 2008)? Therefore, the purpose of this article is to consolidate the information about the advantages and disadvantages of stretching and to review the proposed solutions for the dilemma in which physical performances are integrating MVC and large ROM.

Muscle stretching has traditionally been part of the activity routine of many who engage in physical activity, either in physical activity for health purposes or in sports. Yet among many, stretching is part of the warm-up process before exercise, and for decades it has been considered as helping to improve performance (Behm & Chaouachi, 2011) and preventing injuries (Herbert & Gabriel, 2002). As part of the overall warm-up routine, the stretching usually takes place after a few minutes of light activity (usually jogging), followed by specific exercises that simulate the designated activity. Usually the warm-up aims are raising the body temperature, increasing the amount of synovial fluid in the joints, adjusting the neural system to the designated activity, injecting blood stream and oxygen into the muscles, increasing ROM and reducing the risk of injury (Young & Behm, 2002). However, it is unclear whether stretching contribute to the warm-up process.

The literature distinguishes between three types of stretching: **long static stretching**, which is performed by stretching the muscle to discomfort or pain zone, and staying there for 30 seconds or more - without movement or with light movement. These stretches are the only ones that improve range of movement in the joints (Behm & Chaouachi, 2011; Young & Behm, 2002); **Dynamic stretching**, which are carried out in the same way as static stretching, but last only a few seconds while performing several repetitions in slow movement (Fletcher & Jones, 2004); **Ballistic stretching**, which are carried out by a quick stretching that activates a reflex of defensive mechanism - which in turn contracting the muscle (Eldred, 1953).

The benefits of long static stretching

The benefit of long static stretching, lasting longer than 30 seconds per set, is the chronic increase in ROM. Static stretching has an important health value and a primary value in sports where the ROM is an achievement component (Behm & Chaouachi,. 2011). The static stretching technique that is considered most effective is the Proprioceptive Neuromuscular Facilitation (PNF)

(Sharman et al., 2006; Marek et al., 2005; Bradley et al., 2007; Church et al., 2001). This technique is also considered the best for increasing ROM in a short period of time. There are two ways to accomplish this technique. One is stretching the muscle to the area of discomfort, In this area, a contraction of about three seconds should be performed with a force of about 20% of the maximum strength of the stretched muscle and then continue stretching the muscle further. The second, which is even considered to have better results, does not contract the stretched muscle but the antagonist muscle or the antagonistic muscle group. In order to achieve an effect over time, this protocol should be performed twice a week (Hindle et al., 2012).

Stretching and injury prevention

Traditionally muscle stretching has been considered to prevent injuries. Despite this belief, studies have found that there is no direct link between stretching and preventing injuries (Rubini et al., 2007; Black et al., 2002; Herbert & Gabriel, 2002; Thacker et al., 2004; Pereles et al., 2012). Pope et al (2000), examined whether there is an effect of static stretching for legs muscles, as part of the warm-up of 1538 young recruits for the Australian army, on the prevention or reduction of legs injuries. The study argues for no impact on the reduction of injuries.

In contrast, Hartig & Henderson (1999) found that during 13-week infantry basic training course, troops that added three hamstring stretching sessions to their already scheduled fitness program, increased significantly hamstring flexibility and decreased significantly number of injuries resulting from an overuse and stiffness of lower limbs extremity. In addition, Amako et al (2003), found no significant difference in overall injuries among army recruits who performed static stretching by comparison to those who did not performed. However, among the recruits who did performed stretching, there were significantly less muscle/tendon injuries and low back pain. Stone et al (2006) summarize that acute stretching seems to have little effect on injury and chronic flexibility may have some injury reduction potential. Although most of the literature claims for no relation between stretching and injury prevention, further research is needed.

The disadvantages of the static stretching

For many years, many athletes from various sports and physical activities have been using long static stretching as part of the preparation and warm up process for physical activities that require power. It turns out that this

habit reduces MVC of the stretched muscle (Behm & Chaouachi, 2011). In measuring force production of the quadriceps, using interpolated twitch technique (Shield & Zhou, 2004) and surface integrated EMG, found 12% and 20% respectively, a reduction in MVC, after 20 minutes of static stretching to quadriceps muscle, versos quadriceps force production when no stretching performed before measurement (Behm et al., 2001). Fowles et al (2000), found that a bout of more than 30 minutes long static stretching, are impairment MVC immediately after long static stretching (28% reduction comparing to pre-force production test), after 5 minutes (21%), after 15 minutes (13%), after 30 minutes (12%), after 45 minutes (10%) and even after 1 hour (9% reduction) after the stretching.

In many of the field tests that examine leg's MVC, we measure and compare vertical jumps performed after different types of stretching. This is a simple and effective way, in addition to the fact that the vertical jump characterizes many sports. In many of the studies dealing with leg's MVC and those described below, it is customary to examine three types of high jumps from standing position: Squat-Jump (SJ), usually performed from a knee bending angle of °90, without the eccentric phase of the jump; Counter movement (CMJ), regular standing vertical jump, usually performed with arm kept on the waist; Drop jump (DJ), like CMJ but while jumping downward from height of 40cm usually. The CMJ and DJ jumps testing in addition to muscle's MVC, also the effect of stretching reflex that is affected by the muscles and tendon censors: Muscle spindles and Golgi tendon organs.

The stretching reflex occurs in muscles and tendons that are involved in jumping and at the end of the eccentric phase. The reflex is the beginning of the stretch shortening cycle (SSC). This effect also enables increased recruitment of the strong and fast muscle fibers of (FTb) and also the use of elastic energy, which is found in the elastic components that are part of muscles and tendons structure. These elastic components create a "spring" effect that contributes to the jump height. In contrast, SJ neutralizes SSC and isolate force production only, to determine height jump (Bosco et al.,1982; Bosco et al., 1986).

Young & Behm (2003), found decline in SJ and DJ immediately after a bout of long static stretching for the leg muscles involved in vertical jump. On the other hand, they found incline of SJ and DJ after running only and after long static stretching when between the stretching and the jumps, an explosive dynamic activity was performed. The researchers conclude that the explosive dynamic activity had a stimulating effect after the negative effect of the static stretching. Robbins & Scheuermann (2008), tested whether short static stretching, 15 seconds per set, will not impair SJ height. They found that two sets of short static stretching did not have any effect on SJ height but the more

the stretching sets were multiplied, jumping capacity has decreased. The researchers conclude that if still a static stretching before a force-like activity such as vertical jump is desired, they should be carried out in one or two times only, for a short period of time for each set. This implies that even if the stretching is short and does not adversely affect the force production in the legs, it still does not have a positive effect on muscle force production.

Sim et al (2009), examined combinations of dynamic activity and static stretching before a repeat sprint test (20m X 6 times). The results of the slowest sprints were found when stretches were performed before and close to the sprints and the fastest sprints tests were achieved, whether before the sprints a dynamic activity only was performed or whether before the dynamic activity a bout of static stretches were performed. The researchers point out, therefore, that long static stretches may not impair the speed of a repeated sprint test if dynamic, extended, structured, and gradual activity was performed between them. This indicates that the weakening effect of static stretching is not chronic.

Wilson et al (2010), examined the effect of static stretching on distance runners. In a 30-minute run on a treadmill, the runners could follow the running time, increase or decrease the speed but not knowing the speed and the distance they have already run. In a different day, the same runners performed the same 30-minute run, under the same limitations but before the run they performed 16-minute static stretching. The running distance after the stretching was shorter. Cramer et al (2007), add that the static stretching performed before physical activity, weaken the muscle's MVC among all types of athletes, both those that are required for MVC and those are required for aerobic capacity.

In contrast to the findings that strongly suggest a decrease in muscle's MVC after long static stretching, a decline in balance functions after long static stretching is not unequivocal, although balance does not improve after these stretches. Behm et al, (2004), found a light decrease (9.2%) in balance test of standing on one leg, between pretest and posttest performed after static stretching of 45 seconds for major leg muscles. On the other hand, there was an increase of 17.3% in the balance test when between the two tests there was no-work interval. Costa et al (2009), also examined the effect of static stretching on balance functions, but compared the balance after sets of 45-seconds static stretching to the major leg muscles and the balance after sets of 15 seconds only. In contrast to the previous study, no balance effect was found after 45-second stretching test, however, short 15-second stretching sets resulted in an 18% improvement in balance test, a similar improvement to stretching after no-work interval in the study of Behm et al (2004).

Long static stretching in PNF technique is not different in their effect on muscle's MVC than all the long static stretching. They were also followed by a decrease in MVC (Marek et al., 2005; Sharman et al., 2006; Church et al., 2001; Bradley et al., 2007). Young & Behm (2003) recommend not to perform static stretching before an activity that requires MVC, such as jumping. They argue that one of the reasons for static stretching is reducing risk of injury, however, they say, a more significant factor in reducing the risk of injury during warm-up is raising muscle temperature, therefore, apart from increasing range of motion, the additional contribution of the stretching is questionable. Simic et al (2013), summarize dozens of studies of the immediate impact of static stretching on force production, noting the negative impact of these stretching. However, the effect of static stretching lasting less than 30 seconds should also be examined. The authors assume that the lengthening time in a state of muscle-stretching position of discomfort is a significant factor in the reduction of MVC.

The reasons for reducing muscular force production as a result of prolonged static stretching

The reasons for stretching induces muscle's force production impairment, can be divided into the mechanics of muscle activation and neuronal activation. Several researchers explain the mechanical reasons for reducing the ability: Kokkonen et al (1998), found that MVC of knee flexion and extension is decreased immediately after long static stretching quadriceps and hamstrings. These researchers find similarity between the results of their study and the findings of Wilson et al (1994), that indicate that the stiffer the musculo tendinous, the greater the ability to produce force.

Wilson et al (1994) and Fletcher & Bethan (2004), hypothesize that stretching exercises stimulate the elasticity of the elastic components in musculotendinous, resulting in increased compliance of these tissues, thereby moderating muscle force. This is similar to two identical engines that lift the same load in a very short time, but one connects directly to the load and the other connects to a spring that connects to the load. The first motor will probably lift the load faster. Herda et al (2008), hypothesize that reducing MVC due to static stretching is caused by an increase in muscle length beyond the optimal level of rest before the contraction of the sarcomeres, which prevents them from effectively extracting the force of contraction.

The neural factors for stretching induces muscle's force production impairment, associate with the mechanical factors: Fletcher & Bethan (2004); Behm et al (2001); Cramer et al (2007) and Herda et al (2008), note that increased compliance in muscle and tendons also impairs neural conduction to

muscle cells and for this reason, reduces MVC. Evetovich et al (2003), measured MVC output in the biceps brachii in an action preceded by static stretching versus an action that did not precede stretching. The results of the Mechanomeography (MMG) showed insignificant differences between a biceps brachii MVC pretest and MVC posttest, when long static stretching performed between them. A significant increase in MVC was observed when between the pretest and the posttest there was a resting time instead of stretching. In this study, the researchers concluded that stretching reduces the recruitment of motor units (neural effect). Rosenbaum & Hennig (1995), found that static stretching slows down the stretching reflex, which stimulates the muscle spindles that under normal condition increases MVC in gastrocnemius, which actives in many physical activities including running and jumping. Moor (1984), also notes that stretching also inhibits the neuronal response of the Golgi system in the Achilles tendon, which has a similar role to the muscle spindles but in tendons.

The dilemma of stretching in sports requiring large ranges of motion and maximum force production

Because of the accumulated information about the acute impairing effect of long static stretching on MVC and force production, and because long static stretching are the only ones among other types of stretching that positively affect the increasing of ROM, the following dilemma arises: How long does this impairing effect continue? Are there any interventions (activities), placed between the long static stretching to the designated activity, which have the potential to eliminate the static stretching impairing effect? Is there a way to warm-up and yet to increase ROM without impairing MVC (Stone et al., 2006)? The continuation of the review will be focused on the dilemma and the solution suggested in sports that integrating ROM and MVC.

By comparison to no-stretching warm-up, McNeal & Sands (2001), found reduction of 8.2% in DJ height in female gymnasts, immediately after long static stretching for the extensor legs muscles. Costa et al (2010), found reduction of 8.75% in force production among jiu-jitsu athletes in 1 RM horizontal bench press, immediately after total 180s of stretching for the main muscle groups involved in the bench press. The authors indicate that static stretching is beneficial and important for gymnasts, jiu-jitsu and other martial arts athletes' flexibility. However, stretch training should not be placed before performance that integrates flexibility and force-like activity, which characterizes these sports.

Donti et al (2014), found that among artistic and rhythmic gymnasts, performing long static stretching for the legs, does not impair MVC performance, if after the stretching there is a potentiating activity like a series of tuck jumps. Moreover, after three sets of five tuck jumps, elite gymnasts can improve their ROM and CMJ average height. These finding corresponding the findings of Young & Behm (2003) which claim that in order to eliminate the weakening effect of the long static stretching, it is vital to perform between stretching and the next force-like activity, a series of dynamic and potentiating exercises.

By comparison to a concentrated rhythmic gymnastics warm-up exercises (i.e. 4-minute jogging warm-up period; 4minutes of plyometric training and hopping; 10 minutes of ballistic stretching for leg and back flexibility; 2 minutes of abdominal and dorsal muscle strength training). Di Cagno et al (2010), found a reduction in flight time (7.2%) among rhythmic gymnasts, immediately after a warm-up that consisted of multiple sets of long static stretching only. Because of the flight time reduction, judges graded lower a technical leap, which is also a combination of vertical jump and high-level flexibility.

These authors suggest that a warm-up before explosive gymnastic movements combined with high ROM level, should not be performed immediately prior to the gymnastics exercise. To maintain the high level of the gymnasts' flexibility during rhythmic gymnastics training session, ballistic stretching could be more appropriated (Di Cagno et al., 2010). Usually a warm-up for rhythmic gymnastics competition starts 30-60 before competition, by 15 seconds long static stretching. In the middle until the end of the warm-up, in addition to specific exercises, static stretching is alternated with dynamic stretching (Guidetti et al., 2009). The use of dynamic stretching will be detailed below.

One of the solutions for the decrease of muscle's MVC as a result of long static vibration, may be exposure the muscle to vibration. Rohmert et al (1989), found that the arm and shoulder muscles, respond to vibration by increasing MVC. RøNNESTAD (2004) found also that performing 1RM in squat on a vibration platform, followed by maximum CMJ, resulted by higher CMJ then performing CMJ after no-vibration with the same 1RM squat. Cochrane & Stannard (2005), found increase in ROM and vertical jump in female field hockey players, after a bout of vibration by standing on a vibration platform. A combination of vibration and long static stretching helps to increase ROM in highly trained male gymnasts (Sands et al., 2006). With the aim to find a method for integrating long static stretching in warm-up for gymnastics routines without impairing MVC, Kinser et al (2008) found that a combination of vibration and long static stretching helps to increase acute ROM in forward split position and not impairing vertical jump. SJ and CMJ, that performed immediately after bout of long static stretching with vibration, achieved similar jump height results as achieved in pretest.

Another alternative method for long static stretching in an aim to improve acute ROM without impairing maximum force activity, is rolling a foam roller in high-pressure along the muscle, instead of stretching it. MacDonald et al (2013), found that foam rolling for only 2 minutes enhances quadriceps muscle ROM to a similar degree as previously reported in other static stretching studies, and more importantly, the authors claim, it had no significant impact on quadriceps muscle force. Sullivan et al (2013) also found an increase in ROM and increase in MVC in hamstrings, immediately after rolling the foam roller along the hamstring muscle.

Dynamic stretching as a substitute for static stretching

In contrast to the ballistic stretching that stretches the muscle in a quick movement and activates the muscle spindles, which in a reflex arch, as a defense mechanism, creates fast contraction of the stretched muscle (Eldred, 1953), The dynamic stretching is performed as very short static stretching lasting about a second or two, then a slight relaxation, and so forth. Dynamic stretching takes about 12-15 repetitions per stretching set. The dynamic stretching leads to short stays in the muscle discomfort / pain situation, as opposed to the long and continuous stretch of the static stretching (Fletcher & Bethan (2004). Numerous studies have examined the effect of dynamic stretching in comparison to static stretching. In contrast to the unequivocal findings regarding the reduction in MVC after long static stretching, the findings of the effect of dynamic stretching are not unequivocal.

With regard to MVC, some of the researches claim for no change after performing dynamic stretching (Fletcher & Bethan, 2004; Herda et al, 2008) and more researches claim for MVC enhancement after dynamic stretching (Needham et al, 2009; Yamaguchi & Ishii 2005; Yamaguchi et al., 2007; Behm & Chaouachi, 2011; Hough et al, 2009; Cornwell et al., 2001; Kokkonen et al., 1998; Wallmann, et al., 2005). However, Pearce et al (2009); Fletcher & Bethan (2004) and Siatras et al (2003), claim for better improvement in MVC after dynamic activity and dynamic activity with large ROM respectively.

In an attempt to find a solution to increase ROM without impairing force production, Harper (2011), found that dynamic stretching can be beneficial before a performance of split jump, which is a combination of high vertical jump and large ROM. However, Behm & Chaouachi (2011), indicating that the purpose of dynamic stretching is increasing force production, while the increasing of ROM, as a result of dynamic stretching, is negligible. Artistic Gymnastics considered one of the important ROM and force-like sports. Siatras et al (2003), tested three different warm-ups before a handspring vault:

1) integrated long static legs stretching; 2) integrated dynamic stretching; 3) only dynamic warm-up. Among the three they found the slowest run speed before jump, measured after static stretching and the fastest run speed achieved after no stretching and dynamic warm-up.

Discussion

Stretching muscles as part of the preparation for physical activity where maximum and sub-maximum force production are required is controversial. On the one hand, long static stretching, lasting more than 30 seconds per set, including PNF, significantly increases ROM (Sharman et al., 2006; Marek et al., 2005; Bradley et al., 2007; Church et al., 2001). This is important in terms of long-term health and because of the importance of large ROM that characterize sports and physical activities such as branches of gymnastics, ballet, various fields in athletics, martial arts and more (Behm & Chaouachi, 2011).

On the other hand, when static stretching is lengthening, or more sets of stretching are performed in close proximity to the main activity, then the more reduces the ability to produce maximum force in the stretched muscle. This is particularly significant in activities characterized by MVC and explosive force (i.e. jumping and sprinting) and even when generating sub-maximum force production, such as long-distance run (Behm et al., 2001; Young and Behm, 2003; Cramer et al., 2007; Sim et al., 2009; Kokkonen et al., 1998; Bradley et al., 2007; Wilson et al., 2010).

Most of the sports that engage with the combination of ROM and MVC are engage also with balance. It turns out that the static stretching, when carried out before and close to balance performance, have no beneficial effect. Although long sets of static stretching lasting more than 30 seconds did not significantly impair these functions but they also did not improve them. However, when static stretching of only 15 seconds per set was performed prior to balance exercise, balance enhancement was achieved, but similarly to enhancement achieved after no-stretching preparation (Behm et al., 2004; Costa et al., 2009). These findings raise the question of the necessity of static stretching in close proximity to activity requiring balance and proprioceptive functions (Evangelos et al., 2012), which are essential in the branches of gymnastics and other large ROM and MVC sports.

Unlike the traditional approach of stretching before exercise reduces risk of muscle or tendon injury, there is no unanimity regarding to injury prevention. Many researchers claim that the risk of muscle injury is the same whether or not stretching has been integrated in warm-up (Pope et al., 2000; Thacker et al., 2004; Pereles et al., 2012) and even under certain conditions, a

risk of injury may be increased as a result of routine performance of static stretching before activity that requiring MVC (Gabbe et al., 2006). In contrast, some researchers claim for positive effect of stretching on injury prevention (Hartig & Henderson, 1999; Amako et al., 2003). The contrast of the findings implies that further research, regarding to the issue of stretching and injury prevention, is needed. This is because muscle or joint injury has variety of reasons. It is suggested that performing long static stretching as a training unit that is not integrated in warm-up for activity (Stone et al., 2006), possibly reduce the likelihood of certain injuries in certain sports (McHugh et al., 2010).

The dilemma, how athletes can prepare themselves for optimal performance in optimal ROM and optimal MVC?

- If long static stretching, including PNF, are necessary as part of preparation, it is recommended to perform it about an hour before the designated activity. In order to maintain flexibility during the rest warm-up time, it is recommended to perform ether ballistic or more important, dynamic stretching (McNeal & Sands, 2001; Costa et al., 2010; Guidetti et al., 2009; Di Cagno et al., 2010).
- Performing a bout of explosive force activities to the stretched muscles, for five/ten minutes between long static stretching and the designated activity, may eliminate the impairing effect of the static stretching (Donti et al., 2014; Young & Behm, 2003). However, it is not known whether carrying out the explosive activity reduces ROM in an acute manner.
- A combination of long static stretching with vibration or even vibration only, in preparation for designated performance may enhance ROM without impairing or even increasing MVC (Rohmert et al., 1989; RøNNESTAD, 2004; Sands et al., 2006; Kinser et al.,2008) and even reinforcing it (Cochrane & Stannard, 2005).
- Rolling a foam roller in high-pressure along the muscle is an effective substitute for stretching in relation to ROM as part of warm-up and preparation for designated activity, without impairing MVC (MacDonald et al., 2013), and even reinforcing it (Sullivan et al., 2013).
- Dynamic stretching is not increasing ROM but performing dynamic stretching as part of the preparation for designated performance may maintain ROM which achieved in different training unit or approximately an hour before the designated performance (Guidetti et al., 2009; Sands et al., 2006; Siatras et al., 2003).

- Dynamic stretching may also increase MVC (Needham et al, 2009; Yamaguchi & Ishii 2005; Yamaguchi et al., 2007; Behm & Chaouachi, 2011; Hough et al, 2009; Cornwell et al., 2001; Kokkonen et al., 1998; Wallmann, et al., 2005). However, dynamic activity and dynamic activity with large ROM may increase MVC to the same extant or even more (Pearce et al., 2009; Fletcher & Bethan, 2004; Siatras et al., 2003).

For summary, this data revealed that in order to achieve the benefits of the long static stretching, with regard to flexibility, it is best to perform it as a separate training unit and this is true for all sports and physical activity. With regard to the dilemma of sports and physical activity that integrate large ROM with maximum force production, although several solutions are proposed, little research has dealt with this dilemma and further research is needed.

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EXTENSIONS OF PHYSICAL EDUCATION AND SPORT INTO THE PERFORMING ARTS

LUMINIȚA MILEA[1]

ABSTRACT. ***Extensions of Physical Education and Sport into the Performing Arts.*** For the acting student, physical education and sport have formative valences, developing influence relationships into the study of stage movement and body expressiveness. The actor's physical training or the creative art behind a successful role engage all the components of the human being, combining the body's physical education with mental education, in complete harmony. For obtaining the acting performance, the established methods and techniques of the major theater schools of the 20th century that underlie the actor's professional training are enriched with new formulas and currents specific to the actor's art, physical education and sport. With an interdisciplinary approach, physical education and sport, through specific means, naturally intersect with the other formative components focused on the actor, on his physical form, on the ability to understand and artistic expression. By influencing each other, these methods hone the actor's path to professional fulfillment and assume his living presence in a scenic space at a given time. In the equation of the actor's training, based on their professional experience and knowledge, all trainers will be involved alongside, instituting methods of progressive training appropriate to contemporary times.

Key-words: *physical, formative training, stage movement, body expressiveness, body, voice*.

REZUMAT. ***Extensii ale educației fizice și sportului în artele spectacolului.*** Pentru studentul la actorie, educația fizică și sportul au valențe formative, dezvoltând relații de influență în studiul mișcării scenice și a expresivității corporale. Antrenamentul fizic al actorului sau munca de creație cu succes a unui rol angrenează toate componentele ființei umane, combinând educația fizică a corpului cu educația psihică, într-o deplină armonie. Pentru obținerea performanței actoricești, metodele și tehnicile consacrate ale marilor școli de teatru de secol XX ce stau la baza formării profesionale a actorului, sunt

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îmbogățite cu formule și curente noi specifice artei actorului, educației fizice și sportului. Printr-o abordare interdisciplinară, educația fizică și sportul, prin mijloacele specifice se intersectează în mod firesc cu celelalte componente formative focusate pe actor, pe forma sa fizică, pe capacitatea de înțelegere și exprimare artistică. Influențându-se reciproc, aceste metode jalonează calea actorului spre desavârșirea profesională și asumarea prezenței sale vii într-un spațiu scenic și un moment dat. În ecuația formării actorului, bazându-se pe experiența și cunoștințele profesionale, se vor implica cot la cot toți formatorii, instituind metode de antrenare în progres, adecvate contemporaneității.

Cuvinte cheie: *antrenament fizic, formativ, mișcare scenică, expresivitate corporală, corp, voce*

Introduction

The indisputable values of physical education and sport have allowed these activities to enter the higher education system, regardless of the field and specialization. For the acting student, these components of physical culture with an instructive-educational role for the body, mind and psyche are materialized in a stimulus which enters naturally and organically his day-to-day life, becoming his partner throughout his entire career. The integration of physical education and sport into the formative path of the future actor involves analysis, knowledge and understanding of the functions, principles, activities and relationships that it generates.

1. Physical Education and Sport Landmarks in Higher Education

Components of the higher education system, regardless of the field and specialty, physical education and sport in academia are a natural continuation of the educational act which shapes personality. According to the axis of continuity, the first year student is at the end of a formative cycle and at the beginning of a new one. It is a new educational pathway which provides a framework favorable for physical education and sport to leave its mark on shaping the student's correct body development, in developing and perfecting his motor skills. As a leisure activity or as an instructive-educational process, physical education and sport equally manifest their role in improving the quality of life, physical and mental health and preparing students for their later life and professional activity.

During the first academic year, at least from a theoretical point of view, we come into contact with the student who is at a level of his personality in agreement with the forms of expression, aware of the benefits of physical education and sport programs, with basic motor skills, as well as good physical shape. During this stage of development, the student most often is eager to move and has sufficient knowledge of anatomy and physiology. Thus are created the premises for continuous training and education through physical exercise, as a means for consolidation and perfection of the processes started in the early part of his adolescence.

Practicing physical exercise isn't resumed solely to physical effort and physical development. It involves mechanisms for the personality development, for training and developing attention, logical thinking, memory, perseverance and will. Practice has proven that by designing an attractive and efficient training system, adapted to the present social requirements and trends, while also taking into account the direct beneficiary of the training-educational process, namely the student in our case, positive results are obtained, both physically and psychologically. According to a basic principle of training through physical education and sport, more precisely the *principle of connecting training with the requirements of practical activity*, also known in specialized theory as *principle of shaping*, physical exercise must have a practical value, and the acquired motor skills and performances must be transferable into professional and leisure activities (Cârstea, 2000). The veracity of this principle is also confirmed in the higher education environment. The instructive-educational programs, through the specific means of physical education and sport, are designed according to particularities related to the future profession of students.

An example of this is the higher education into the arts. The objectives and requirements derived from the program for the education and training of future actors, lyrical artists or dancers require a scientific approach based on two communication coordinates: the verbal coordinate, namely speaking and singing and the physical or non-verbal coordinate, defined by corporality. In universities with artistic vocational profile, the physical coordinate involves the study of stage movement and body expressiveness, while the theory and practice gives the students the opportunity to experience various physical activities, applying specific techniques and methods.

2. The show's existence based on the actor's work

Remaining in the field of artistic academia, namely in training the future actor, we must remember that the study of movement and body expressiveness seeks to develop the body's natural assets and understanding the mechanisms

underlying movement. Physical education and sport have a well-established place into this process, being rightfully considered a part of the artist in training's day-to-day life. Gymnastics, fencing, dancing, acrobatics, dynamic games, wrestling and martial arts are just a few activities that significantly affect the process of training and shaping the future actor and that is why they are found in his educational program. Just like professional athletes, the training period for the future profession involves continuous training throughout their entire careers.

"The acting profession is the only one where the artist is his own instrument. It's better to play a Stradivarius and not a decrepit violin. A healthy mind in a healthy body is the actor's first condition, as he resembles a professional athlete, because he always has to be in excellent physical shape. If he's not «in shape», he cannot perform on stage, under excellence conditions, a script lasting one or two hours and which challenge his both mentally and physically to the same extent." This is what the great Radu Beligan believed about the place of sports into his artistic career, in one of the few interviews he gave to the press. It's a confirmation of the symbiotic existence of sports and the performing arts and an acknowledgement, if it was still needed, of the fact that in the *actor's work* there are no boundaries between art and sport.

Although they resort to different means of expression, theater, ballet, lyrical theater, operetta and musical use both the human body in movement and the spoken or sung word. In their professional education and training, the actor, the lyrical artist or the dancer go through an ample process of physical, mental and emotional harmonization. The future lyrical artist perfects his vocal technique with correct breathing, the result of the exercises which are part of his daily training, and for correct posture, he performs exercises in physicality and body expression. During his training and subsequently in his profession, the actor in training participates in trainings with specific physical exercises for body expressiveness, for the development of motor skills, of the strength of his body energy, plasticity and mobility. In the art of dance, an art of movement, the spoken word is replaced by the gesture, acrobatics and body expressiveness. Moreover, in the contemporary show, defined by grandeur, nonconformist and the reunion of the arts, the actor has to resort to means of expression from various artistic genres. He has to be the *total actor,* who knows how to emphasize the spoken word, voice, expressiveness and body mobility. It is, therefore, a clear proof that the existence of the show is based on the actor's work.

A careful look into the contemporary theater phenomenon emphasizes the fact that the theatrical show has shifted its center of gravity from the dramatic text to the theatrical language. The actor thus becomes the main

instrument in the theatrical creation. The affirmation of stage movement, of body and voice expressiveness requires an approach to the performing arts which dictates a work for the "decryption of the meanings in the dramatic text and their insertion into the body and voice actions; […] the discovery and assumption of body language, the functional unit between body and voice" (Cozma, 2016, p. 55).

In the process of training an actor or in the process of creating a role, it is a well-known fact that the actor experiments with means of different theatrical methods and techniques, through exercises, analysis, observation, research, assumption and rendering, the actor combines the education of the body with the education of the personality, perfecting that physical, mental and emotional harmonization. The actor has to be able to control and manage, at the same time, the manner in which he communicates on the stage through movement, speech or singing, in such manner as to transform verbal communication on a continuation of the body's movement. To achieve this goal, the actor undergoes a lengthy process of knowledge, documentation and training. This double-role formative process, namely exploring and developing, represents precisely the actor's training or that which we call *the actor's work with himself.* For the future actor, reaching a certain level of creating freedom is a primordial goal, for which "the recovery of innocence and construction of experience are called in to structure his entire formative path" (Odangiu, 2013, p. 15).

From the perspective of communication, directing our attention to the relationship between the actor and his body, in the process of training the future actor, the knowledge of his own body as physical, mental and emotional presence becomes essential. This is the first step he takes in becoming a *total actor*. He must know himself, be actively aware of the bodily mechanisms from an anatomical, biomechanical, physiological and psychological point of view in order to develop and progress. Discovering, knowing limits, assuming and updating his potential from the body language's point of view is a process which takes place over time. In "The Transient Dance of the Actor's Actions" the author, give particular attributes to the actor's body, which becomes "musical or instrumental", and "needs to be tuned in order to perform flawlessly" (Cozma, 2016.p.57).

Movement, relaxation, physical exercises imply an activity involving the spine, legs and finally the arms. Performed with active consciousness, this activity materializes in a *process of learning the geography of the body* (Oida and Marshall, 2009*,* p. *35).* In this sense, an interesting aspect is the work on segments, part of any artist's technique. For example, for the future actor, preparing for the role of a mime requires complex biomechanical work. He works on segments, oscillating between the fixed parts and moving parts of the

body. The mime's joints serve as hinges between a moving part of the body, moving in relation to the other fixed part of the body. We could have the following examples of pairs: hand -finger; head – neck; neck – chest; chest – waist; waist – pelvis; pelvis – legs. The specific training for the mime begin with light movements and continue with ample movements, going in both directions through all segments, exercising them both as fixed and as mobile parts.

Another step in the actor's work is the release of emotions. It is an act resulting from the action of the psyche, which involves dedication and concentration. Given the fact that the mind, body, and emotions are closely intertwined, the way in which this connection is made is responsible for natural interpretation. The position of the body, the thoughts and the emotions always change together, and the human body, "bearer of signs and emotions, is a perfect dramaturgic instrument" (Cozma, 2016, p.57). As the actor needs to be natural, *a living being,* to live everything through his own body, it requires involvement, "methods that will produce a *human*, truthful interpretation in each show, regardless of the actual feelings of the actor at that time" (Oida and Marshall, 2009, p.78).

Developing actor's energy is another requirement in his education and training. The actor's energy influences the show's energy. The actor has to be unique; he has to have personality and individuality, to maintain a plentiful stage presence. "The source of the actor's specific corporeality is energy and vertical alignment. Only after studying and training these two basic elements can we speak of a development of expressivity" (Bács, 2012, p.24). "To study the actor's energy means to explore the principles on which the actor can model or shape his own muscular and nervous force through means which are not specific to everyday life" (ibidem, p.23). Physical and emotional alignment attracts energy. In performing the physical exercises that help to develop energy, it is important to understand, to gradually sense the origin of energy, and then to unite our own selves with that energy.

If up to now we have only referred to the body-actor relationship, it is still important to continue by noting that in this chain of physical and vocal actions in the actor's training, an important role lies in the exploration and development of the communication skills from the perspective of the actor-spectator and actor- stage partner relationships. Here I would like to highlight the role of Commedia dell'Arte in training students, as a curriculum for the second year. Considered to be a reference in terms of complexity, this show requires the best of an actor for certain roles, both vocally and in terms of stage movement, most of the times overcoming their limits. Being an improvisation show, it requires perfect coordination, reaction speed, promptitude of movement and a number of motor skills and plasticity, in perfect coordination with student stage partners.

In the actor's daily training, the balance between inner movement and outer activity is essential. Quality performance requires technical craftsmanship, freedom of movement and free thinking. Following this training path, physical training becomes the support for shaping the mind.

In searching for the path to acting performance, the great theatrical researchers of the 20th and 21st century have developed theatrical methods and practices focused in the actor, on the actor's physical training. Stage theorists and practitioners, regardless of their philosophical thinking, have focused on the actor's work with other actors, researching and developing techniques for training the actor. The common denominator in their research is the actor as the essence of the show, exploring his vocal, bodily and mental potential, creating harmony between his mind and his body. K.S. Stanislavski and his disciples, Vsevolod Meyerhold and Michael Chekhov, Antonin Artaud, Jacques Lecoq; Jerzi Grotowski, Peter Brook, Eugenio Barba and Andrei Şerban distinguished themselves through the methods for the actor's physical training and the creation techniques they assumed and promoted.

The "*system*" created by famous director and pedagogue K.S.Stanislavski (1863-1938) is being developed in Russia. *The actor's work with himself* requires for the actor's training techniques and methods based on his own experience. In his view "the artist's voice and body need to be educated starting from nature itself" (Stanislavski, 2014, p.11) otherwise "the bodily apparatus used for embodiment will be too crude for the delicate work destined for it" (ibidem, p.12). The indicated gymnastics follows the sculptural requirements of the body and the acrobatics programs have the role of developing firmness, ability and mobility. Dance is the one that corrects the position of the hands, legs, or spine, but the hours spent dancing in the director's view also serve as support for more complex exercises. For the expressiveness and plasticity of the body, his method promotes dance and ballet exercises on the extremities of the legs, arms, hands and fingers. By exercising walking during the exercises, he seeks the continuity of the horizontal line of movement and reaching the floating sensation. Awareness and sensation of all these activities are fundamental to external expression. The Russian pedagogue pays particular attention to voice and speech. Voice impersonation work involves the development of correct breathing and sound, which implies exercise, awareness, assumption and understanding. These are only a few relevant aspects of the famous "Stanislavski system", which is focused on the actor's training and included in his book, "An Actor's Work".

A disciple of Stanislavski, but detached from the psychological side of the theater, Vsevolod Meyerhold (1874-1940), the creator of the *virtuous actor,* produces a radical change in the actor's training. In Meyerhold's theatrical

thinking, movement, as an expression controllable by measure and rhythm, is essential in the theatrical expression. Applying the principles of mechanics and anatomy, he proposes a training system with a focus on gesture, drawing attention to the concept of biomechanics, as an art of decomposing and recomposing, of reinvention and shaping corporeality. Michael Chekhov (1891-1955), another one of Stanislavski's disciples, in "The Actor's Body and Psychology" identifies three basic requirements of the actor's training: the sensitivity of body to the psychological creative impulses, the richness of the psychology itself and complete obedience of both body and psychology to the actor (Chekhov, 2017).

Antonin Artaud (1896 – 1948), French playwright and theorist, advocates in the practices and methods he developed for the release of the subconscious and the appreciation of the sensory forces of body and gesture.

Practicing athletics, swimming and gymnastics in his youth, Jacques Lecoq (1921 – 1999) develops a system of theatric pedagogy focused on movement, the starting point of his pedagogical system being precisely his sporting experience. His early connections with the sport world have helped him better understand the mechanisms of movement and its effects from a mental and emotional point of view. Considered to be a pedagogical concept with deep communicative meanings, the system proposed by J. Lecoq respects the physical limits, the freedom of expression, the flexibility and the naturalness of the movement (Lecoq, 2009).

Jerzi Grotowski (1933-1999) brings great changes in dramaturgy. A director and theater theorist, he is considered to be the exponent of theater reformation in the 20th century, focusing his research on the actor's work. Focusing his research on the *actor - living presence*, he brings to the fore *via negativa* in his *laboratory theater.* The method based on physicality in stage creation and in the actor training is the path to the *total actor,* by eliminating mental blockages, physical reminiscences and negative energy. Grotowski is also the artisan of a *poor theater*, in which the actor can shine without many decors, lights and other effects, only through the actor-spectator functional relationship (Grotowski, 2014).

The special interest given to physical training is also evident for the 21st century theorists and practitioners. In his plea for *an empty space*, Peter Brook draws attention to the liberation from the lifeless theater and the orientation towards the *immediate theater*, towards honest play and the living presence of the actor. Peter Brook's pedagogy, oriented towards life and vitality, puts in the forefront the body and the actor's ability to "live everything through his own body" (Brook, 2014, p. 175). For Eugenio Barba, the actor's body has to say more than the word, the pre-expressive actor technique used Odin Teatret

focusing on the *decided body,* available for creation and generating emotions. Permanently searching for perfection in theatrical art, in his theatrical creation workshops Andrei Şerban devotes the moments in the early hours of the morning, in the midst of nature to physical exercise. In: „Cartea Atelierelor" the author noted: "To pass through fire and water you need a certain force, another unknown energy. For this, the whole body needs to mobilize." (Şerban, 2013, p. 17)

We can observe that in all these models, methods and techniques, physical education is responsible for creating and maintaining the bond between the mental act and the physical exercise. This bond is a primordial condition for the intelligent construction of a scene and its successful artistic completion.

3. Forms of sport and physical education in the performing arts

In light of the above, we can therefore deduce that physical education and sport, as a complementary subject with a formative function in the training of stage movement and means of expression, acts in two directions.

One pursues as a priority the achievement of the basic objectives of physical education and sport as an instructive-educational process, acting for: harmonious and correct physical development; developing basic motor skills; acquiring and perfecting motor skills; cultivating the customary practice of physical exercise. At the same time, it is hoped that these activities will become an option for a healthy and balanced life. From this perspective, the role of the sports teacher is paramount, as he is the one who sets the appropriate objectives, techniques and methods, as well as putting them into practice.

The other direction based on the influence relations sport - actor's art, requires collaboration between the trainers on physical education and sport, acting and vocal coaching. Since the acting teacher leads the actor's training, he has the task of setting the performance and competence objectives in accordance with the specific circumstances deriving from the work schedule of the acting class or the artistic productions and performances to be staged. In this complex process of training the future actor, through his status and role, the sports teacher has the task of making the best decisions so that the general and specific objectives can be reached. Based on his professional experience and knowledge, he will look for ways and means to optimize the movement potential of the future actor, acting as efficiently as possible, establishing the training strategy with the appropriate methods and techniques, the correct duration and frequency, and the optimal training parameters. The sports teacher must be a *pillar* in the actor's training process. Some of the objectives are:

- identifying and determining the physiological limits for the training process by assessing the biological, mental and motor state of the future actor;
- harmonious and correct physical development, following morphological and functional indicators;
- developing and perfecting basic motor skills, namely speed, strength, endurance and deftness;
- developing and educating specific motor skills (physical mobility, speed of reaction, precision and promptness in the execution of movements, the appropriation of a correct posture, a correct body attitude in harmony with correct breathing, as fundamental elements of the form) ;
- developing and educating sensory skills (sense of rhythm, rapidity of perceptions, speed of response to stimuli);
- development of motor skills specific to joints (elasticity, plasticity and expressiveness in motion);
- developing and educating coordination and balance;
- knowledge, self-knowledge from an anatomic, biomechanical, physiological and psychological point of view;
- training and correcting basic driving motor such as walking, running, jumping, throwing, catching, climbing, escalating and more in as many variations as possible;
- forming and developing basic attitudes and values such as discipline, self improvement, awareness of the concept of training - long-distance marathon.

The palette of instructive-educational means through sport and physical education is a generous one. The discipline has challenging means and methods specific to the European school, specializing in body education, in physicality, as well as oriental methods that engage all the components of the human being, combining the education of the body with the education of the mind and soul. Thus, through physical exercises, the body of the future actor transforms, acquiring new motor skills, physical condition, plasticity and mobility. By resorting to oriental methods, the training program aims at physical, mental and emotional harmonization. “The purpose of all these exercises should be to encourage the freedom of the body and the mind” (Oida and Marshall, 2009, p. 65).

For optimizing performances, the training methods and techniques are based on the established models of the great theatrical art schools, constantly enriched with new formulas and trends. Practice has shown that gymnastics, dynamic games, fencing, martial arts, fitness, dancing and acrobatics are responsible for the actor's physical shape and body expression.

Dynamic games, through their multiple forms, combine motor and mental benefits, contributing to the increase of distributed attention and focus, to educating self-reliance and the development of responsibility. As a form of dialogue between man and the unforeseen, games develop observation, orientation, auditory acuity and team spirit. Through its universal and permanent character, dynamic play is a generator of good mood, imagination and creativity (Chiriţă, 1983).

Fencing, a sport of elegance, uses corporeality to the utmost potential. The objectives of training through fencing programs seek, on the one hand, to acquire the skills specific to scene battles in order to deal with the theatrical roles involving the art of battle, and on the other hand, they fall into the sphere of corporeality and artistic expressiveness (Habala, 2007).

Gymnastics, fitness and aerobics improve coordination and balance skills, tone the muscles, strengthen the bone system and have beneficial effects on the cardiovascular system.

Another beneficial sport for actors and singers is Pilates. It combines breath control with motion control at a precise pace and the permanent control of the mind over the body. The conscious execution of each element induces harmony and a gradual increase in concentration power, effects which the actor needs so much (Ganciu, 2012)

Practicing martial arts produces physical, mental and attitude changes. By combining knowledge of Oriental philosophy, medicine, psychology and material science, he also develops a higher consciousness, a capacity for knowledge and understanding of various mechanisms specific to the body and the mind. Physical and mental exercises develop the capacity for self-control and for overcoming one's own limits. Judo, as a situation sport, is based on the unpredictability of the situation and involves a variety of procedures and techniques. The alert pace of the attack, defense and counter-attack phases demands precision and a high response speed (Burlacu and Focşeneanu, 2007).

Conclusions

Achieving a high level of creative freedom can only take place by perfecting physical, mental and emotional harmony. Physical education and sport through specific means fit perfectly into the category of educational sciences responsible for raising the level of performance and improving the control mechanisms of the future actor. Moreover, the rigor, discipline and consistency of the trainings practiced by professional athletes are fully applicable to the actor throughout his entire artistic career. This is the reason why the techniques and trainings practiced by athletes will always provide effective solutions to the actor's training.

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VERTICAL JUMP ENHANCEMENT WITH RESPECT TO VOLLEYBALL VERTICAL JUMP

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ABSTRACT. The purpose of next review is to present the knowledge gained about the mechanical and physiological aspects that responsible for vertical jump (VJ) height, as well as the general training methods for VJ enhancement, with specific reference to volleyball players. Several intertwined aspects determine VJ capacity: muscle power, neural properties and elastic properties of muscles and tendons. Three major methods for enhance VJ are discussed in this review: Plyometric training (PT), which involve jumping, hopping, and skipping and reinforces muscle's neural activity and the ability to restore elastic-energy; Electromyostimulation (EMS), which increases the ability to recruit muscles' motor units; And resistance training (RT), which is usually performed using weights and increases muscles' power generation. These methods complement one another and therefore present the best results when integrated. In addition, part of the reviewed studies claims for even better VJ enhancement when RT are performed in the VJ pattern. Therefore, ballistic RT and Olympic weight-lifting (snatch, clean and jerk) in relatively low resistance (30-50% of IRM) at high velocity are preferable as RT for VJ enhancement. The effect of PT and RT, when integrated into specific volleyball training, even increases VJ because this specific leg power training can be transferred more efficiently into a volleyball specific VJ.

Keywords: *Vertical Jump, Plyometric Training, Stretch-Shortening Cycle Electromyostimulation, Resistance Training, Ballistic Resistance Training.*

Introduction

Volleyball is considered one of the most explosive and fast-paced sports (Stanganelli et al., 2008). For example, according to data examined among elite male players, they have performed between 250 to 300 actions requiring

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explosive force production during a five-game match. The vertical jump (VJ) constitutes most of these actions (Hasegawa et al., 2002). Of these activities, the attack and block situations represent 45% of the total actions of the game and are also responsible for 80% of the points obtained within international matches (Voigt & Vetter, 2003). Setting for spike in high level volleyball, is also performed by VJ to shorten the flight time of the ball in the transition from passing to attack or from defense to offence (Borràs et al., 2011).

The range of VJ is wide and ranges from 65 to 136 average VJ per five-game match, according to the following roles: the setter jumps the highest number of jumps: 136 VJ, but the jumps for setting are not performed with maximum force. The centers (middle blockers) perform 97 VJ, the opposite perform 88 VJ and the left side hitters 65 VJ. A major part of the VJ of all players are block jumps (Fontani et al., 2000; Borràs et al., 2011). The performance of volleyball VJ skills, attack and block, as well as jump service, depends on the height at which these motor actions occur in relation to the height of the net and is determined by the capacity of the athlete to raise vertically his center of gravity. Thus, when planning volleyball training practices, one of the main objectives is the development of the VJ capacity (Stanganelli et al., 2008).

In aim to develop effective training programs to enhance jump capacity of adult volleyball players, volleyball coaches, strength and conditioning coaches, athletic trainers, and physiotherapists, who work regularly with the players throughout the training program, should obtain relevant information on physical and physiological aspects of VJ in volleyball (Ziv & Lidor, 2010). Therefore, the purpose of the next review is to present the knowledge gained about the mechanical and physiological aspects that responsible for VJ height and what are the general training techniques for high VJ development, with specific reference to volleyball players. The review will also address the methods of measuring VJ in general and specifically for volleyball players.

Factors affecting VJ performance

VJ performance is determined by a complex interaction among several factors including maximal force capacity, rate of force development and the mechanism of stretch-shortening cycle (SSC) (Baker, 1996). VJ performance is affected by both muscular and neural aspects. In order to jump higher, the greatest vertical acceleration should be achieved before leaving the ground. This acceleration will create the greatest initial vertical velocity. The greater this velocity is, the higher the center of mass that will be reached. In aim to achieve the greatest vertical acceleration, the player needs to create as much force as possible over the shortest period of time. By increasing muscle

strength on one hand and by training neural mechanisms (e.g., muscle spindle and stretch reflex) on the other hand, the player can enhance her or his VJ (Ziv & Lidor, 2010).

Some of the physiological aspects, affecting VJ height, can be studied from the effect of Post-activation Potentiation (PAP) which, under certain conditions, affect immediately and positively VJ height. PAP refers to the acute enhancement of muscular function as a direct result of its contractile short history (couple of minutes prior to an explosive movement) (Dello Iacono et al., 2015). It is also defined as an increase in muscle performance after a conditioning contraction. The conditioning contraction could be a maximal voluntary contraction, (Hamada et al., 2000), or a series of evoked twitches (Sale, 2002). It has been shown consistently that such conditioning stimuli can increase twitch contractions, rate of force development and explosive movements. With relation to VJ an example of PAP is an acute enhancement in the VJ height, occurs immediately (2-5 minutes) after high load resistance action, which is usually carried out using weights (3RM) (Xenofondos et al., 2010; Robbins, 2005; de Villarreal, 2007; Güllich & Schmidtbleicher, 1996).

The VJ factors that are enhanced under the effect of PAP, are teaching about the characteristics that generate higher VJ capacity (1) People with leg muscles of higher percentage in type II motor units (fast twitch muscle fibers), exhibit greater PAP (Hamada et al., 2000) and therefore, higher VJ (Xenofondos et al, 2010). This is because type II motor units undergo greater phosphorylation of myosin regulatory light chains then slow twitch muscle fibers and as a result, develop greater force production per single fiber (Moore and Stull, 1984; Sweeney, 1993; Zhi et al., 2005). In addition (2) the neural effect: PAP increases the recruitment of higher percentage of fast twitch muscle fibers. Athletes with higher recruitment capacity of type II motor units exhibit faster explosive movement, greater potentiation and therefore higher VJ, this is due to greater twitch force and H-reflex (Hodgson et al, 2005). H-reflex is analogous to the stretch-reflex which stimulates muscle-spindles as a respond for muscle fibers stretching throughout the eccentric phase of VJ (Ziv & Lidor, 2010). From the above, it implies that chronic enhancement in both muscle fiber's force production and increasing in type II (especially type IIb) motor units' recruitment, have major role in generating higher VJ.

Third important contribution for VJ height is the SSC mechanism which describes an eccentric phase or stretch followed by an isometric transitional period (amortization phase), leading into an explosive concentric action. The SSC explains why VJ that preceded by a countermovement or a pre-stretch, increases vertical displacement above a squat jump (one with no pre-stretch). During hopping, jumping, and running. In this manner, for example, our legs

exhibit similar characteristics to a spring, whereby the leg spring compresses on ground contact and stores energy, before rebounding at push-off and releasing energy. It is currently recognized that the tendon is the primary site for the storage of elastic energy (Turner & Jeffreys, 2010). These authors indicate that there is connection between the stretch reflex (muscle spindles), neural property, and SSC in the eccentric phase. However, in an untrained athlete, the stretch reflex is in fact acting but as a counter-reaction and as a defense mechanism, in which Golgi tendon organs moderate the stretching reflex. Gradual plyometric training, which will discuss later, moderates this Golgi tendon organs reaction and enables stretch reflex to be significant in creating a higher VJ.

To conclude, three physiological and mechanical aspects should be taken into consideration when physiological manipulation is required to enhance VJ capacity: Muscle power, neural properties and elastic properties of muscles and tendons. These characteristics work together in every VJ, in every sport that VJ are part of it.

Vertical jump tests

Many tests that measure leg force production use VJ as a manifestation of this capacity, because of the simplicity of its performance. At most of the studies, three types of VJ are examined: Squat Jump (SJ), carried out without any pre-movement, from approximately °90 in the knee angle, neutralizes the eccentric contraction phase in the leg's extensor muscles; Counter-Movement Jump (CMJ), carried out as a regular standing VJ, with or mostly without the swing of the hands (hands kept on waist), with the pre-eccentric contraction phase in the leg's extensor muscles; Drop Jump (DJ), mostly carried out while dropping from 40cm height, with or mostly without the swing of the hands. This VJ is carried out while overcoming the braking force with the immediate transition to jump. CMJ integrates, in addition to muscle force production, the stretching reflex and SSC as mentioned before and DJ is an extension of the CMJ which is reflected in plyometrics and in the use of muscles and tendons stored elastic energy. Plyometrics will discuss later as an important training technique for VJ enhancement. On the other hand, SJ neutralizes stretching reflex and SSC and enables to measure only the leg extensors power (Komi & Bosco, 1978; Bosco et al. 1982, 1986; Baker 1996).

However, in researches that conducted on volleyball players, the specific volleyball VJ volleyball attack jump (VAJ) and volleyball block jump (VBJ), were tested in addition or separately from the traditional VJ tests (Newton et al., 1999; Newton et al., 2006; Ziv & Lidor, 2010). Stanganelli et al (2008) took it

even farther and suggested that using VAJ and VBJ tests seem to be more sensitive to the training-induced adaptations and better reflect the specificity of volleyball game then the traditional VJ tests. In fact, VBJ is performed similarly to CMJ without arm swing and VAJ is a combination of DJ and CMJ. These VJ can be a valid measurement instrument, instead of the traditional VJ among volleyball players (Sattler et al., 2012).

Methods for the improvement of VJ

Various training methods have been applied to enhance VJ. The methods that will be reviewed relate to plyometric training (PT), electromyostimulation (EMS) and resistance training (RT), which is usually performed using weights.

Plyometric training

Since the improvement of the elastic properties of the tendon-muscle has an important role in the whole enhancement of VJ capacity, PT tends to be the most influential factor in enhancing the VJ height. PT constitute a natural part of most sport movements because they involve jumping, hopping, and skipping (i.e., such as high jumping, throwing, or kicking) (Bauer et al, 1990).

PT come in various forms depending on the purposes of a training program. Typical plyometric exercises include the CMJ, the drop jump (DJ). These exercises can be either combined within a training program or can be applied independently. Furthermore, plyometrics can be performed at various intensity levels, ranging from low-intensity double-leg hops to high unilateral-intensity drills. As far as the lower body is concerned, plyometrics includes the performance of various types of body-weight jumping exercises, such as DJ, CMJ, alternate-leg bounding, hopping, and other SSC jumping exercises. These exercises are characterized by SSC actions; that is, they start with a rapid stretch of a muscle (eccentric phase) and are followed by a rapid shortening of the same muscle (concentric phase) and ends by maximal force at the detachment of the ground (de Villarreal et al, 2009; Bobbert, 1990; Markovic, 2007).

More about the effect of PT we can learn from the meta-analytical review by Markovic (2007) of total 26 studies, yielding 13 data points for SJ, 19 data points for CMJ, 14 data points for CMJ with arm swing and 7 data points for DJ. The analysis of the gathered data demonstrates that PT provides both statistically and practically, relevant significant enhancement in VJ height with the mean effect ranging from 4.7% for SJ and DJ, over 7.5% for CMJ with the arm swing and 8.7% for CMJ hands kept on waist. The author suggests that the effects of PT are likely to be higher in slow SSC vertical jumps like CMJ and CMJ with the arm swing, rather than in either concentric jump only like SJ, or fast SSC jump like DJ.

De Villarreal et al (2009) concluding that athletes with more experience in a specific sport, are better responding to combinations forms of PT and obtained greater enhancements in VJ height. This does not mean that subjects in both good or bad physical condition cannot benefit also from PT. These authors add that men obtain better power results than women using PT. In addition, they indicate that the training volume of more than 10 weeks (with more than 20 sessions), using high intensities (with more than 50 jumps per session), is the optimal strategy that maximize one's probability of obtaining significant VJ enhancement.

Electromyostimulation training

Short term of neuromuscular electrical stimulation (EMS) protocols, known as electromyostimulation, such as those commonly used in rehabilitation medicine, can increase strength in healthy muscles. Although the magnitude of the increase is no greater than the enhancement that can be achieved with voluntary training, the increases can be achieved in considerably less time (Enoka, 1988). In the recent years, it has also been used by athletes in the context of training programs to develop strength and physical performance (Malatesta et al., 2003).

EMS training, is an involuntary resistance training, that induce both neural and muscular adaptations in healthy humans (Gondin et al., 2005). EMS, is generally delivered to the muscle in static conditions (without functional movement occurring) and at sufficiently high current intensities to evoke visible muscle contractions (beyond motor threshold). EMS is an effective strength training tool for healthy subjects and athletes, since its chronic use may induce neuromuscular adaptations similar and complementary to voluntary strength training (Maffiuletti et al., 2011). EMS found as an effective training in sports where high VJ is important in the general functioning of the athletes (Malatesta et al., 2003; Babault et al., 2007; Maffiuletti et al., 2000).

Maffiuletti et al (2000) found in basketball players 14% increase in SJ after four weeks and 12 EMS trainings and 17% enhancement in CMJ after four more weeks of regular trainings, by comparison to baseline. Malatesta et al. (2003) found in volleyball players that ten days after the end of 4-weeks EMS training program, the jumping height significantly increased compared to baseline: SJ 6.5% and CMJ 5.4%. The authors claim that sport-specific workouts following EMS would enable the central nervous system to optimize the control to neuromuscular properties. It implies that EMS training has a long-term effect on VJ enhancement.

Resistance training

In aim to maximize athletic explosive performance like VJ, athletes should increase strength in the hip, knee, and ankle joints and improve the rate of force development training with relatively low resistance (30-50% of IRM) at high velocity. This effect the increase in the rate of force development and the gains in strength, in specific sports (Newton et al., 1999; Thompson et al., 2007). Although traditional RT has been shown to improve VJ performance as much as 2-8 cm or 5-15%, it seems that lighter and more explosive lifts, may be more effective than heavier lifts that are performed at lower velocities (Fatouros et al., 2000).

Channell and Barfield (2008), have compared between the contribution of the olympic weight-lifting (snatch, clean and jerk) (OL) and the traditional RT to VJ enhancement. They concluded that traditional exercises, such as squats and squat variants, have been determined to be excellent exercises for improving lower-body strength. However, they have a low correlation to VJ performance. In addition to other several studies (Garhammer & Gregor; 1992, Garhammer; 1993, Kraemer & Newton. 1994) they indicate that the pattern of OL movements is similar to the pattern of VJ. This explain why weight-lifters have been shown to have a higher VJ and power output compared to other athletes (Kraemer & Newton. 1994). Therefore, OL movements have been considered as more specific to VJ than the traditional RT and more effective for improving VJ capacity (Garhammer & Gregor. 1992, Garhammer. 1993). Coaches of OL are in general agreement that the most rational technique for executing competitive lifts, is including phases that can be characterized as jumping vertically but with a barbell (Garhammer and Gregor, 1992).

The specificity of training model suggests that RT exercises to enhance VJ, should be performed by similar movement patterns and joint angels as the VJ. This will elicit the greatest improvement in VJ performance (Baker. 1996; Semenick & Adams. 1987). In contrast to traditional low speed power lifts, ballistic resistance exercises like OL, moving with lower resistance at higher velocities and results in acceleration through the entire movement. This may launch an object or the body, fast into free space (Newton and Kraemer. 1994). Ballistic resistance training is the dynamic weight training, performed at the load that maximizes mechanical power output. This training strategy involves lifting relatively light loads (approximately 30% of maximum) at high speed (Wilson et al., 1993). Low-resistance ballistic exercises may produce smaller gains in strength, compared with heavy resistance training, but they also may produce significantly higher gains in speed strength or power as measured by the force-time curve (Young, 1993).

Strength and force production in sport are influenced by a range of neuromuscular factors. It means that muscle performance is determined by a combination of muscle cross-sectional area and the extent to which the muscle mass is activated, that is the neural factors. General strength training might be beneficial for athletes because of the potential to enhance force-generating capability of the muscle, which leads to increasing in muscle's mass, which reduces the risk of sports injuries and enhance core stability. However, direct conversion to enhance specific sport performance might be limited by such training in experienced athletes. Although nonspecific resistance training can induce neural adaptations and increase the force production of individual muscles, it appears that in aim to maximize transfer to specific sports skills, training should be as specific as possible, especially regarding to movement pattern and contraction velocity. The specific training may enhance intermuscular coordination and may ensure that muscles are “tuned” to any newly acquired force-generating capacity (Young 2006).

Whilst the role of special strength training is often seen to be that of "converting" strength into power, the role of specific strength exercises is thought to be to further convert power into the actual specific jumping requirements of the sport. For example, an increase in maximal squat jumping power will transfer only slightly across a sport specific VJ. However, when it integrated with some specific jump training, the increase in jumping power may transfer across to a sport specific VJ by as much as 78% (Baker, 1996).

Integrated methods to enhance VJ

Although each one of the three methods for VJ enhancement has validated to enhance VJ without integrating another method, combination of methods creates even higher enhancement. Adams et al (1992) compared the effectiveness of three training programs: squat (RT), PT and squat plus PT, in increasing hip and thigh force production as measured by VJ. After 14 trainings, the mean results showed: Squat group increased VJ in 3.30 centimeters, PT group increased VJ in 3.81 centimeters and the squat and PT group increased in 10.67 centimeters. The authors indicate that both squat and PT training are necessary for improving hip and thigh force production as measured by VJ ability.

Toumi et al. (2004a,b) suggest that a change in maximal strength and/or explosive strength training does not necessarily creates changes in combined movement such as the SSC, which is an important factor in CMJ or any jump that involves eccentric phase, transition isometric phase and concentric phase. Thus, among the variety of the RT methods, specificity of

training is considered as an important criterion to determine optimal training strategies for the enhancement of VJ. The authors suggest that the combination of resistance training and VJ training will provide a significant improvement in VJ height, which has a combination of SSC mechanism. This mechanism is involved in all jump styles in all ball games.

Wilson et al. (1996) found that Plyometric training enhance the rate of eccentric lower body force production, while weight-training primarily enhance concentric function. De Villarreal et al (2009) add that PT significantly improves VJ height when it integrates several forms of plyometrics and the most beneficial PT should also integrate versions of SJ, CMJ and DJ. An original way to overload leg muscles and integrate it into VJ training is to practice on sand. Mirzaei et al (2014) found that performing DJ, as manifestation of PT, with CMJ training on sand, two days a week for six weeks improved significantly DJ and CMJ, 16.2% and 13.5% respectively.

Arabatzi et al (2010) studied the combination of RT and PT regarding to the periods of the whole season. They suggest that PT, OL and a combination of PT and OL are affecting positively VJ enhancement. They claim that OL exercises are more appropriate in pre-competition period, PT are more appropriate in the competitive period and the combination of OL and PT are practically useful to allow an easy transition from OL to the sport-specific exercises at the transition from preparatory period to competitive period.

Integrated methods to enhance VJ in volleyball players

Because volleyball is a game of jumping in its nature, each one or combination of the three methods (PT, EMS and RT) for VJ enhancement are in fact, integrated into jumping exercises that are part of the volleyball trainings and the nature of the game. Borràs et al. (2011) conducted a longitudinal descriptive study in a purpose to assess the physical state of male volleyball players. They compared their VJ heights along three consecutive seasons. The results of the study showed an increasing through the years for the two volleyball jumps, VAJ and VBJ.

The results found a progress in explosive strength, elastic-explosive strength, reflex-elastic-explosive strength, and arm use. This knowledge supports the fact that volleyball players should train all these properties that affect VJ height. This knowledge is also reinforcing the approach of integrating the methods for VJ enhancement. Stanganelli et al. (2008) indicate the necessity of PT in most of the integrated methods. They support the contention that the elastic properties of the muscle, which are trained mostly by PT, are important factors to enhance VJ height for volleyball players. Thus, training these properties should receive top training priority among volleyball players.

Marques et al (2008) tested a 12-week RT program for elite female volleyball players. Over 12-week in-season, the athletes performed 3–4 sets of 3–8 repetitions of ballistic type RT exercises and PT exercises during each training session. By the end of the period the researchers found an improvement of 3.8% in CMJ. Nonetheless, they suggest that caution is warranted even with elite players, to avoid overtraining, especially during the in-season. Moderate-intensity RT in combination with low-volume power drills maybe useful methods for enhancing VJ.

Several studies were dealing with the integration of EMS with PT. SSC, which is an important mechanism in the PT activity and the ability to tolerate high stretch loads, as in the DJ, is critical for VJ associated with volleyball performance (Sheppard et al., 2008) EMS training combined with PT training, found very efficient in VJ enhancement among volleyball players (de Villarreal et al., 2009; Maffiuletti et al., 2002). Maffiuletti et al (2002) studied the effect of the combination of EMS of the knee extensor muscles (48 contractions), EMS of the plantar flexor muscles (30 contractions), and 50 PT jumps in volleyball players, three times per week. At the end of the four weeks training program, VJ was increased in 8.3% for the CMJ with arm swing and in 21.4% for the SJ, with respect to baseline. These results were maintained with even a little insignificant improvement, within the next two weeks of volleyball training.

Similar conclusions obtained by Herrero et al (2006). They compared the effects of four-week training periods of EMS only, PT training only, or combination of EMS and PT. In each week, there were 2 days of EMS training and 2 days of PT training, with one rest day in between. Significant increase in combined EMS and PT was observed in SJ (7.5%) and CMJ (7.3%) after four weeks training. However, no significant VJ enhancement was observed in EMS training only.

Newton (1999), compared treatment and control groups of both elite volleyball players, for eight weeks of preseason volleyball training. The control group completed three sets each of squat and leg press exercises using load of 6RM while the treatment group completed ballistic resistance training consisting of six sets of jump squats with a counter movement. The treatment group produced a significant increase in VJ over the control group. One of the key questions about enhancing VJ for volleyball players is whether it is possible to maintain or even enhance VJ even during game season? Newton et al (2006) found that comparing to traditional leg resistance training, ballistic resistance training can better maintain VJ height during and until the end of volleyball game season.

Sheppard et al (2011), turned the conventional approach of weight loading in aim to chronically enhance VJ in volleyball players. Instead, they reduced body weight while exercising. The reduction in approximately 10 kg of body weight was executed by a bungee strip. They hypothesized that this VJ assistantship may encourage the leg extensor musculature to undergo a more rapid rate of shortening, while chronic exposure to this accelerated rate of shortening may promote an enhancement in VJ ability. Five weeks intervention plan, twice a week, had led to enhancement of 2.7 cm in CMJ and 4.6 cm in Volleyball Attack Jump (VAJ).

Discussion

Despite the contribution of the three methods to enhance VJ capacity: PT, EMS and RT, EMS is less useful to most of the volleyball teams and players, because of low availability and high cost. This leaves the methods of RT and PT that are simple to perform in different variations and are simple to adjust into volleyball training and site.

Some of the studies on the contribution of RT to the VJ enhancement, support that these methods should be carried out in an explosive movement, that is similar to VJ, with relatively low resistance (30-50% of IRM) at high velocity (Newton et al 1999; Thompson et al. 2007). This training approach has led to prevalent use of OL training as a ballistic RT which is similar and specific to the VJ pattern (Channell and Barfield, 2008; Garhammer & Gregor; 1992, Garhammer; 1993, Kraemer & Newton. 1994;) On the other hand, other studies support the performance of PT to enhance VJ capacity, because of their reinforcing effect on SSC and because PT constitute a natural part of most sport movements like volleyball (Bauer et al, 1990; de Villarreal et al, 2009; Bobbert, 1990; Markovic, 2007).

In aim to enhance VJ, volleyball players need to enhance explosive strength, elastic-explosive strength (SSC), reflex-elastic-explosive strength, and arm use. All these properties are synchronized into the VJ action (Borràs et al., 2011). It implies that great attention should be given for planning VJ integrated trainings, which strengthening at one practice unite muscle power, neural properties and elastic properties of muscles and tendons. Integrating PT and ballistic RT in one training unit, leads to an enhancement in VJ, which is more significant than the separate execution of each method (Adams et al., 1992; Toumi et al., 2004a,b; Wilson et al., 1996; De Villarreal et al., 2009; Marques et al., 2008). Another factor that supports the integration of these methods inside a specific volleyball training, is of the better conditions for immediate conversion of muscle's power into the actual specific jumping requirements of volleyball (Baker, 1996).

An important issue is regarding to the combinations of the methods to enhance VJ according to the annual periods of the activity. According to Arabatzi et al (2010), during the preparation period it is recommended to perform ballistic RT to increase power and during the competition period it is recommended to perform PT to increase neural functions and SSC. However, this review supports the importance of performing PT along all annual periods as well as ballistic RT. Therefore, it implies that the best is integrating low intensity PT with high intensity RT and ballistic RT during preparation period, and integrating low intensity ballistic RT with higher intensity PT during competition period.

In conclusion, many studies stress the importance of integrated training of PT, RT and EMS, to enhance volleyball VJ capacity. However, to the best of our knowledge, no studies have been found to determine the effect of volleyball VJ (VAJ and VBJ) to the maximum height a volleyball player can perform, as a method of enhancing VJ. Not as an independent training unit, not as a training unit that integrated with the other methods and not as a training that integrated into a specific volleyball training. Therefore, it is recommended to investigate the effect of performing maximal volleyball jumps (VAJ and VBJ) as another method to enhance VJ capacity among volleyball players.

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TRENDS REGARDING THE ROLE OF THE SETTER IN VOLLEYBALL

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ABSTRACT. During time, it has been found that the setter plays an important role in the team game. In what concerns the volleyball, the setter holds the most important position in the team, being the most valuable player, his/her opinions being highly respected by the teammates. Nowadays, the volleyball has significantly evolved by fast and unpredictable offenses, strong defensive, forceful serves with the highest speeds. The setter is also called as the team coordinator. Beside the remarkable physical qualities the setter has, he/she is a kind of team psychologist, notices the teammates reactions in difficult and crucial moments, anticipates some affective states in certain phases of the game, and therefore together with the trainer, the setter is able to manage the situation as best possible.

Key words: *volleyball, setter, coordinator*

REZUMAT. ***Tendinţe ale rolului ridicătorului în jocul de volei***. Pe parcursul anilor s-a demonstrat că în jocurile de echipă un rol important îl joacă ridicătorul acesteia. În jocul de volei acesta este cel mai important pion din teren al echipei, fiind cel mai bun şi respectat de ceilalţi coechipieri. Jocul de volei de astăzi a progresat foarte mult, prin atacuri rapid, neaşteptate, apărare fermă, servicii în forţă şi cu viteză foarte mare. Ridicătorul, în jocul de volei a mai fost numit şi coordonatorul echipei. Acesta pe lângă calităţile fizice deosebite pe care le are, el este şi un fel de psiholog al echipei, observând reacţiile acesteia în unele momente dificile, de cumpănă, a coechipierilor, anticipează unele stări afective in anumite faze ale meciului, astfel putând împreună cu antrenorul să gestioneze cât mai bine situaţia.

Cuvinte cheie: *volei, calităţi, ridicător, coordonator*

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During the life of a sport team, both in training and in competition, it was found that the Setter plays an extremely important role. The setter is the team member who has a series of valuable qualities and has the most authority in the team.

Nowadays, the volleyball is distinguished by a various range of technical and tactical procedures, a modern game, based on a fast and unpredictable offence and a strong defensive. This fast and varied style of play requires coordinators – setters, who masters not only the techniques of passes but are also able to tactically use these passes during the game.

One player becomes a team setter-coordinator, due to the fact that he/she has a mixed of qualities and because the pattern of his/her personal qualities are easily adapted to the requirements of the team activities and objectives.

The factors associated to the setter-lifter position are as follows:

- Motor abilities
- Fluency of speak
- Intelligence
- Independence
- Agility
- Perseverance
- Originality
- Aggressiveness
- Fast thinking
- Self-confidence
- Speciality knowledge
- Desire to be special
- Initiative
- Popularity (Bengeanu, Rusu, Braicu, 1999).

Based on certain experience and possessing special qualities that help the team, the play coordinator is the one who notices the critical moments of the team, solves the issue of "psychical breakdowns" by measures taken on own responsibility, encouragement or other types of contributions.

The trainer must know how to use the activity and experience of the play coordinator, in order to exert by means of the play coordinator a greater influence on the team.

Furthermore, the coordinator is the one who sees the team and the team mates actions, anticipates certain emotional states, and sometimes eliminates the feeling of abandonment and anxiety caused by failures. Each

team member wishes to be considered as a different individual with strong personality. The athlete is characterized by a well-defined dynamism, given by the desire to mean something for the others. The athlete wants that his/her thoughts and interests to be taken into consideration.

Sometimes the sport team represents a mean to gratify this dynamism.

This is the task of the setter – play coordinator who should pay attention to fully accomplish this task.

The specific characteristics of a setter – coordinator are as follows:

- Self-confidence – usually the play coordinators have a degree of self-confidence above the other members of the team. This self-confidence is based on the one hand on the player value and on the other hand on the experience earned and a good knowing of the teammates, which confers to the coordinator the ability to anticipate their reactions.
- Fast decision taking – the setter-play coordinator, based on the experience and own qualities takes original decisions or chooses from the similar situations known, the ones that are most suitable for a given situation.
- The social intelligence – this ability allows the coordinator to properly asses situations, to know better his/her teammates and to explain certain social relationships.
- Cooperation – has two aspects: first, the play coordinator, more than any other member, works for the team assuming a sort of general responsibility and second, the coordinator encourages cooperation between the other team members.
- Sociability – this characteristic in addition to others skills, leads to establishing positive relations between the team members.
- Popularity and prestige - confer confidence to the teammates and convince them about the correctness of the solutions found by the coordinator, the teammates having a complete faith in the coordinator's abilities.
- Authority – is acquired as a result of repeated manifestations of certain positive answers given in a decision system. The coordinator's value and some of his/her personality traits stand upon the basis of this authority. Each team member has a certain degree of authority, however that of the setter – play coordinator overcomes in force and thoroughness the authority of other teammates (Muresan, 2005).

The play coordinator has a superior ability to observe the general opinion of the team in case of particular issues (i.e. reaction toward the opponent or partner).

If the play coordinator is the one who has the greatest influence upon the team, we can say that the play coordinator is influenced in return by the teammates, adjusting his/her behaviour and work style depending on the teammates.

Conclusions

A volleyball team acts like a self-regulating system, the play coordinator and the team members have a mutual influence on each other's.

As an overall view, the play coordinator is that team member who has a functional superiority which makes him/her capable to assume a certain role of setter – play coordinator in difficult moments. Therefore, training of a setter – play coordinator takes considerably long time.

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