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CONTENTS

ORIGINAL RESEARCH PAPER

VIBROSTIMULATION IN BOBSLEIGH

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Abstract

Foreign literature contents studies about the general effects of vibrostimulation on the human work capacity, so we had an interest in local vibrostimulations application possibilities in the Olympic kind of sport - bobsleigh. Aim of study was to determine how local vibrostimulation can be used in bobsleigh and whether it is appropriate. As main methods we used method of test exercise, vibrostimulation, pedagogical experiment and method of questionnaire. Study took place in Ventspils Olympic Sports Center, Latvian bobsleigh team training camp during the sample period from 12th to 17th July. The study subjects was 26±2 years old, average weight 99±3kg, their experience aim a high performance sports training process an average of 6 years (including bobsleigh), n = 10. During all the camp the athletes took the test exercises - bobsleigh push from standing position and bobsleigh push from run. In addition we interviewed athletes' group, which took procedures of vibrostimulation to determine the muscle senses during and after vibration, as well as areas where the vibration should not be applied. Processing the experimental results we found that in bobsleigh push from standing position the mean results of experimental group remained worse. In bobsleigh push from run results of both groups deteriorated by 0.02sec ($p > 0.05$). Comparing the groups the difference was not reliable at the beginning of the experiment, at the end of the experiment ($t_t > t_e$). Processing results of questionnaire found that the athletes feel very unpleasant during and after vibrostimulation of calves muscle tendons (four respondents), quadriceps and calves muscle vibrostimulation (three respondents). Athletes mentioned the fact that just after vibrostimulation seen quite a feeling of lightness in leg musculature.

Key words: *Vibratory stimulation, muscle senses, training process in bobsleigh, testing.*

Introduction

Vibration is a method that has been known for a time, was also used in the Soviet space program, and with the Soviet Union collapsed, it became known in the world more widely. In Latvia studies of vibration in sport was engaged by Vladimir Nazarov (Назаров 1987), who called the vibration as biomechanical stimulation, and professor Viesturs Krauksts. There are widely distributed a variety of whole body vibration equipment which can be performed with a variety of exercises for various sports. Sports scientists have done research on the effects of vibration on the human work capacity changes, the study results showed a positive dynamics of human work capacity (Bosco, Cardinale and Tsarpela 1999), however, remains a problem - how to adapt vibrostimulation for individual sports, stick to a methodology? Furthermore, the whole body vibration has an important downside - it is not possible to separate vibration for the one muscle, muscle tendons, because, when the whole body or regional body part vibration initiates, oscillations partly are absorbed by articular cartilage, intervertebral discs and more. Equipment of whole body vibration is heavy, bulky, they are not very portable. We in Latvian Academy of Sport Education have equipment of local vibrostimulation, that is portable and can therefore be better included in the training process of various kinds of sports. Olympic sports coaching process is characterized to be carefully planned, they has testing and punctual athlete selection cycle, the major competitions - the Olympics, so it can be quite accurately mean to detect impact of vibrostimulation on sport-specific test results.

Materials and methods

The study was carried out in Ventspils Olympic Centre. In study participated ten athletes, in average of 26±2 years old, personal body weight was 99±3kg, athletic experience (including bobsleighs) in an average of 6 years. Athletes were divided into two groups, one of them was the experimental while the other control group. Test exercise was special training device pushing from standing position and run, this test exercise is common in bobsleigh training process of the preparation period characterizing athletes physical capacities.

Simulator has been pushed from standing position in 30 meter distance, push from run distance is about 1,5+20 m, 1.5m athlete used to be sped up before the start pushing simulator. After processing of the initial results of the groups we determined, that groups were homogeneous (coefficient of variation did not exceed 10% limit) and equivalent ($t_t > t_e$), therefore, suitable for the experiment. Experimental group parallel to the overall training process used local vibrostimulation, which was carried out on following muscle groups of the both lower extremities - the thigh quadriceps muscle, hamstrings, calves and Achilles tendon. Muscle groups were chosen because they are the most pressured in bobsleigh drills, so we were hoping to reach a higher vibration effects. Local vibration was carried out two times a day - in the morning and evening. In the morning, the vibration amplitude was 2mm and the vibration frequency reached 100Hz, but at the evening vibration amplitude was reduced to 1.5mm, the frequency remained 100Hz, but was increased vibration time. Some researchers recommend the vibration frequency, which is close to 100Hz (tab.1). Discussed in references (Roll, Weddell and Ribot 1989) there are indications that primary muscle spindle aferentus CNS stimulates at the frequency of 100Hz. It was assumed that if the frequency of primary afferents of the muscle spindles is synchronized with the frequency of mechanical vibration, it will be possible to achieve greater effect of vibrostimulation (Jackson, Turner 2003). With such a vibration methodology we hoped to achieve warm-up effect in morning and restorative effect at evening sessions. Planning of local vibration procedures can be seen in the table 1.

Table 1.

Local vibration plan for 6-day training period

	Duration in morning session, min	Duration in evening session, min
Day/Amplitude	*2mm*	*1.5mm*
1	0,3	1
2	1	1,30
3	1	2
4	1	2x1
5	1	2x1,30
6	1	2x1,30

Duration of evening vibration procedure was gradually increased, assuming that muscle adapts vibrostimulation load like any physical load, and during vibration muscle contracts unknowingly (Issurin 2005). Vibration procedures were carried out by local vibration equipment RE21 (Fig.1), that has vibration frequency range till 100Hz, and amplitude variations from 0 to 2mm. Vibration was applied to a whole muscle, sliding the vibrotode over the muscle in direction to the torso, pushing metabolism products via lyph vessels and venous blood vessels.

Figure 1. Local vibration equipment RE21

Athletes trained twice a day throughout the experiment. Training camp workout structure was as follows: before the first workout was performed aerobic load (jogging), stretching exercises followed. In the main part of workout athletes took various sprint drills and other exercises for leg muscle development using body weight. This was followed by various types of running on different surface. The second workout at the same workout day began with 30 minutes warm-up, which was followed by a some of sports game after coach's discretion, immediately after that a exercises of static strength development were carried out. The main part of the training has been organized to develop strength abilities by a set of exercises with free weights, loads are on average six rounds in six repetitions, load value was corresponded to 75% of 1RM (Repetition Maximum). In strength developing workout were used a combination of different methods - repetitions and series method, the maximum effort method and extensive interval circle drill method. Training plans were developed and the process led by head coach of Latvian Bobsleigh team Sandis Prūsis, he was assisted by the Jānis Ozols.

Athletes questionnaire was carried out as follows: during vibration the athletes were asked to express in written form their own muscle senses, total body senses, and the overall workout feelings for the period from the beginning of the experiment and since previous vibration. At the end of the experiment athletes were interviewed on the same issues, as well as the athletes' belief in connection with the use of vibrostimulation in future bobsleigh training process, answers and insights recorded in a free written form. Records were analyzed and searched for keywords of interest for future research to provide.

Experimental data were processed by mathematical statistical methods, which included the arithmetic mean, coefficient of variation, standard error, Student's criterion for independent and related groups.

Results

After the experiment we compared data of both groups in bobsleigh push from standing position. Average result of control group in bobsleigh push become worse by 0.07sec ($p<0.05$), but result of experimental group become worse by 0.04 ($p<0.05$). Difference between groups was not significant neither in the beginning, not at the end of experiment ($t_t>t_e$) (Fig.2).

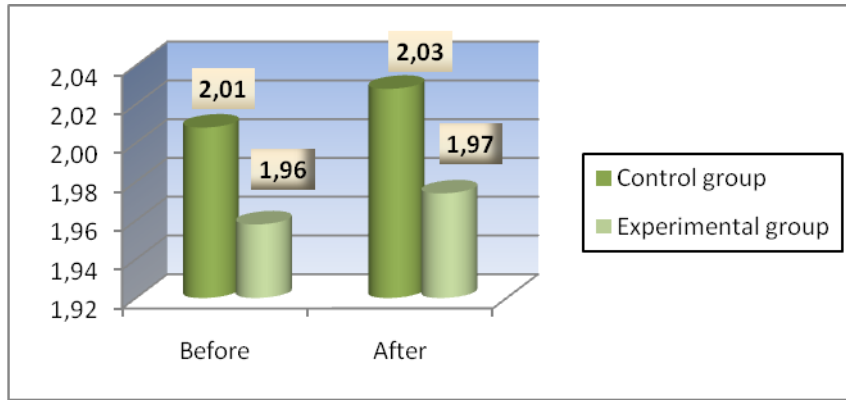

Figure 2. Bobsleigh simulator push from standing position, average results, n=10

Control group mean result in bobsleigh simulator push from run increased for 0.02sec ($p<0.05$), while the result increasement of experimental group remained just 0.01sec ($p<0.05$).

Comparing the group with each other, the difference was not reliable at the beginning of the experiment, and at the end of the experiment ($t_t > t_e$) (Fig.3).

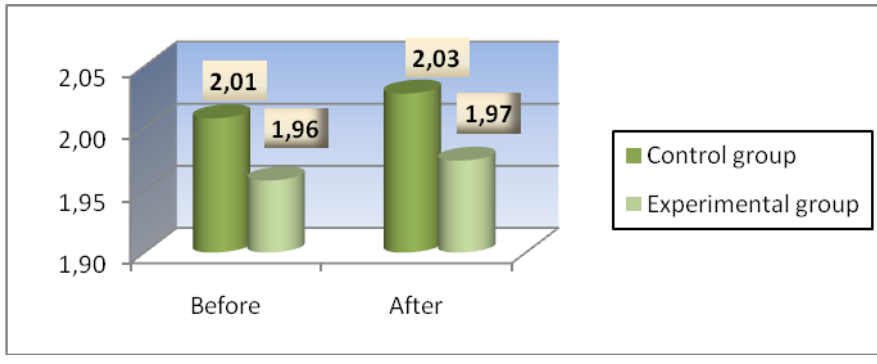

Figure 3. Bobsleigh simulator push from run, average results, n=10

In athletes questionnaire, collecting data in the graph, were three possible credits of athletes answer: "Yes", "No," and without a specific allegation (Fig.4).

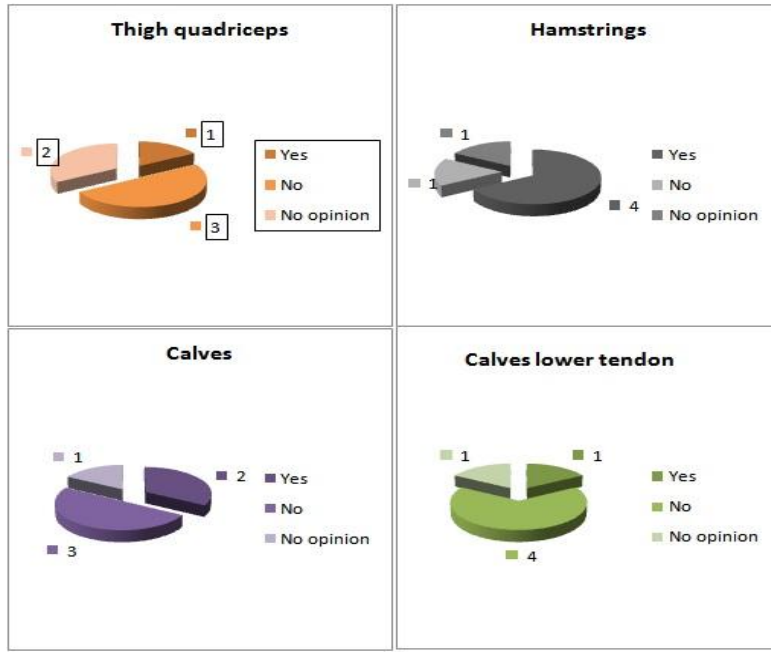

Figure 4. Results of athletes questionnaire about vibrostimulation of lower extremities, n=6

If the athlete specific detection of vibrostimulation caused the positive muscle feelings during or immediately after vibrostimulation throughout the period, the athlete's response was marked with a "Yes", and if the athletes muscle had opposite feelings, then "No", if the athlete did not have any specific muscular sensation, then his answer to a particular detection was not credited.

We can see that athletes are not very well refer to the vibrostimulation of quadriceps muscle, lower leg muscles and transition of lower leg muscles to tendon and Achilles tendon, except in certain cases, but there are four positive feedback on the hamstring vibrostimulation.

Most athletes (4 of 6) was observed in the positive sense of the Achilles tendon during vibrostimulation (Fig.5).

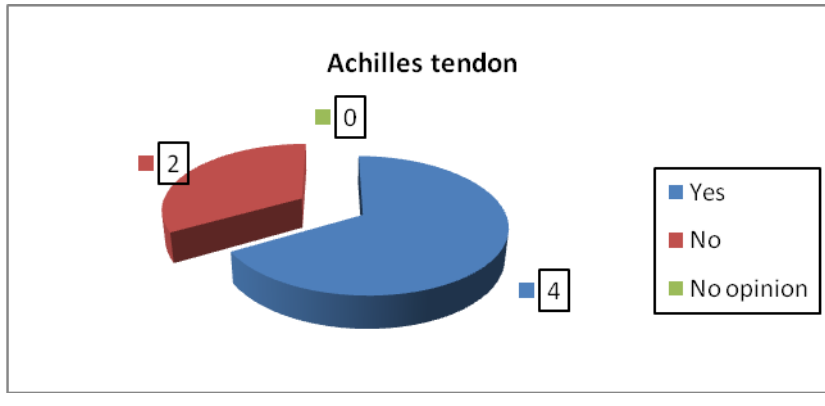

Figure 5. Results of athletes questionnaire about vibrostimulation of Achilles tendon, n=6

All athletes involved in the procedures felt a sense of ease immediately after the procedure, one athlete admitted muscle flexibility improved, and one athlete stated that vibrostimulation is too relaxing and reduces muscle tone.

Discussion and conclusions

Vibrostimulation in world of sport has been realized by the low frequency stationary vibroplates. We used high-frequency local vibrostimulation, which until now has been successfully used in clinic (Bishop 1974, Mattews 1966). Summarizing the study results, we can conclude that vibrostimulation has effect, the experimental group result in bobsleigh push from standing position increased by 0.04sec, while the control group by 0.07sec after applying local vibrostimulation.

It should be noted that during the training camp the test results mostly are getting worse (results are increasing), that is because the realization of a physical feature or a form of expression training requires more effort and athletes does not have time to recover, it is related to the cumulative fatigue, which increases during training camp, and load of high frequency vibrostimulation also summarizes to overall load (Bishop 1974, Mattews 1966). There are studies showing that procedures of vibrostimulation three times a week for five weeks did not give reliable improvement of results (Delecluse, Roelants, Diels, Koninckx, Verschueren, 2005). In bobsleigh simulator push from run result of experimental group increased by 0.01sec, but result of control group increased by 0.02sec, we can conclude, that chosen methodology of local vibrostimulation affects maximal strength (first two steps in simulator push) more than explosive strength expression (first two steps with body weight).

During questionnaire one of the athletes noted increased muscular flexibility (stretching exercises was performed more successfully), and the effect is confirmed by studies (Nazarov, Zilinsky 1984; Issurin, Liebermann, Tenenbaum 1994). We can say that vibrostimulation can be applied on Achilles tendon and hamstrings only, as the biomechanical analysis of bobsleigh simulator push say that hamstring muscle is most important in this movement (Клочков, 1992). We reached goal of our research - vibrostimulation can be an effective method for improving the performance of bobsleigh, even 0.07sec improvement is enough in Olympic kind of sport, where in one tenth of a second can finish up to the six crew.

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ORIGINAL RESEARCH PAPER

PECULIARITIES OF PSYCHOPHYSIOLOGICAL FUNCTIONS OF SPORTSMEN WITH DIFFERENT DOMINANCE OF BRAIN HEMISPHERES

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Abstract

Differences of behavior between left-handers and right-handers are determined by functional asymmetry of brain hemispheres. The character of left-handers usually is impetuous and very emotional. In some branches of sports left-handers reach high results. The aim of the investigation was to clear out psycho-physiological differences of young people sportsmen in connection with dominance of brain hemispheres. In the firs part of research psycho-physiological parameters as well as exactness of basketball throws in the basket were observed for 18 basketball players. In the second part of research 18 adult men with different brain hemisphere dominance were tested. Rate of information processing, productiveness of work and will properties of sportsmen were determined. In the third part of investigation stress reactivity of 32 young people with different brain hemisphere dominance who intensive go into sports was evaluated. Competition reaction in conflict situations is more expressed for basketball player's right-handers but cooperation reaction - for basketball player's left-handers. Exactness of basketball throws in the basket is higher for basketball player's left-handers in comparison with right-handers with the leading as well as with the "passive" hand.

The parameters of information processing and productiveness of work of left-handers are higher than the parameters of right-handers. Basketball player's left-handers have higher exactness of throws in the basket. Left-handers have higher self-control and endurance abilities in comparison with right-handers.

Key words: *functional asymmetry of brain hemispheres, left-handers, right-handers, basketball-players, psycho-physiological parameters.*

Introduction

Physiological processes in right and left human brain hemispheres realize in different ways. The left hemisphere ensures people's logical, rational and theoretical skills, while the right hemisphere is responsible for spatial orientation and also for creativity (Warner, 2000; Geake, 2011). Functions of right hemisphere is connected with language, mathematical formulas, words of songs, phonetic system of reading, consideration and analysis of experience and control of „biographic" time, while right hemisphere is connected with images and reproductions, forms and models, spatial manipulations, understanding of music, melodies of songs, responds for general feeling of space and time (Zigmont et al., 1999). There are differences of peculiarities of brain hemisphere asymmetry among men and women (Cahill, 2005). Damages of right and left hemisphere have different role in the development of psychic disorders (Smalley et al., 2005).

The asymmetry of brain hemispheres may be different for different persons (Krūmiņa, 1999; Pelša, 2004). The most explicit specialization of brain hemisphere functions has persons with right hand dominant (right-handers). Investigations have shown that asymmetry of brain hemispheres of left-handers have less explicit than right-handers. By increasing features of left-hander the asymmetry of brain hemisphere decreases. In general for left-handers more characteristic is dominance of right hemisphere.

The characteristic features of left-handers are following: left-handers are mobile and vigorous they use their energy economical and so sometimes seem tireless. The character of left-handers usually is impetuous and very emotional. Sharp changes of mood and unstable behavior are characteristic for left-handers. They are fanciful, creative with fertile imagination, visual memory usually is dominant, spatial vision is well developed. Left-handers prefer multiform work where great accuracy is necessary. Switch over of attention obtain difficulties for them (Pelša, 2004). A dichotic listening study revealed a strong association of better right hemisphere (left ear) localization ability and creativity (Weinstein, Graves, 2002).

Left-handers are irritable to drugs, alcohol, nicotine and other unhealthy substances. Sometimes they are apathetic (Pelša, 2004).

In some branches of sports (box, tennis, fencing) lefthanders have advantages in comparison with right-handers. The statistical data show that 30 – 40 % of cases boxer's lefthanders win in significant competitions (Brooks et al., 2004). The authors ascertained that boxers left-handers have some advantages in comparison with right-handers: attacks of lefthanders are faster than right-handers; lefthanders more often use quick unexpected movements; performing hits to head actions of lefthanders are more symmetric; boxers lefthanders have higher precision of hits especially using dominant hand. At the same time left-handers also have disadvantages in comparison with right-handers: boxers lefthanders has less speed of defense reactions with body. During motor and postural skill acquisitions (long-term judo training) lateral preferences are modified, probably due to neuroplasticity (Mikheev et al. 2002). In the study for determination the eye-dominant hand and the left eye-left hand visual reaction times, the left-handers had a superiority over the right-handers, but there was no difference between the right eye-right hand visual reaction times of the right-and left-handers (Dane, Erzurumluoglu, 2003)

The proficiency of basketball player depends of many factors: technical preparedness (precision of movements, rate of movements, ability to carry out precise movements in complex situations), endurance, strength, tactical understanding of basketball game and so on (Nevil, 2000). Significant role in technical and tactical preparedness of basketball player have psycho-physiological peculiarities which in a great extent depend from functional asymmetry of brain hemispheres.

The aim of the investigation was to clear out psycho-physiological differences of young people sportsmen in connection with dominance of brain hemispheres.

The tasks of investigations were: 1. Investigate the velocity of movement touches to surface, strength of nervous system and typical reactions in conflict situations of basketball players with different brain hemisphere dominance. 2. To clear up exactness of basketball throws in the basket of basket-ball players with "leading" hand and with "passive" hand. 3. To clarify rate of information processing, productiveness of work and will properties of sportsmen with different brain hemisphere dominance. 4. To clear up stress reactivity of young people with different brain hemisphere dominance who intensive go into sports.

Materials and methods

Research was carried out in three steps. In the first step investigation in order to carry out psycho-physiological peculiarities of basketball players – right-handers and left-handers was carried out. Two groups of 18-20 years old basketball players (men) were inspected: 1st group – basketball players with dominant right hand (right-handers), dominant left hemisphere; 2nd group basketball players with dominant left hand (left-handers), dominant right hemisphere. 18 basketball players were observed. Psycho-physiological parameters (velocity of movement, the level of nervous system strength and reactions in conflict situations) as well as exactness of basketball throws in the basket were observed for both group members. Tapping test was used in order to observe the strength of nervous processes – during 40 seconds. Every 5 seconds maximal touches to surface were observed for the right hand and for the left hand of testing person. Behaviour test K. Tomass, was used to determine typical reactions of basketball players in conflict situations: competition, cooperation, compromise, evasiveness and adaptation (Психологические тесты, 1999). The test envisages choosing one answer from two kinds in 30 various situations.

The exactness of basketball throws in the basket was checked up for every observed person throwing with the right hand and with the left hand in 3 series dynamics (10 throws in every of series). In order to determine the influence of load (5 minute load in order to pulse rate reaches 150 – 170 in a minute) on the exactness of throws – after the load 30 throws with right hand were made one after the other. The same was done by the left hand. In the second step of investigation young people with excellent physical condition (evaluated by Harvard step-test index) were divided into three groups taking into account brain hemisphere asymmetry: persons with right hand dominance (right-handers), persons with left hand dominance (left-handers) and persons with unvoiced hemisphere dominance (ambidexters). Brain hemisphere asymmetry was determined using table of 15 questions in which hand, eye, ear and leg priorities were taken into account. 18 adult (19 – 23 years old) men were tested. Rate of information processing, productiveness of work and will properties of all three sportsmen groups with different brain hemisphere dominance were determined (Психологические тесты, 1999). Rate of information processing and productiveness of work was determined by test in which during proofreading of text every participant, within a certain amount of time, has to look through large number of printed characters and cross out one particular of them. Information processing and productiveness of work

was calculated by formulas taking into number of checked printed characters, amount of mistakes and time of test. Test of determination of will properties consists of 5 subtests. Each subtest has 10 questions and it determines one will property: courage, purposefulness, insistence, initiative and independence, self-control and endurance.

In the third step of investigation stress reactivity of 32 young people (19 - 22 years old) with different brain hemisphere dominance who intensive go into sports using Vienna determination test (DT), was evaluated (Neuwirth, Benesch, 2003). All tested persons were divided into 5 groups taking into account brain hemisphere asymmetry: people with exact right hemisphere dominance, people with tendency to right hemisphere dominance, persons with unvoiced hemisphere dominance, and people with exact left hemisphere dominance and people with tendency to left hemisphere dominance. The DT is used to measure reactive stress tolerance and the associated ability to react. The test requires the respondent to use his cognitive skills to distinguish different colors and sounds, to memories the relevant characteristics of stimulus configurations, response buttons and assignment rules, and to select the relevant responses according to the assignment rules laid down in the instructions and learned in the course of the test. The difficulty of the DT arises from the need to sustain continuous, rapid and varying responses to rapidly changing stimuli. Number of right reactions, number of wrong reactions, number of omitted reactions and middle reaction time during test was determined.

Results

The velocity of movement touches to surface during 40 seconds for basketball players – right-handers with leading right hand (246,7 ± 18,9) is higher than for basketball players – lefthanders with leading left hand (Fig.1.).

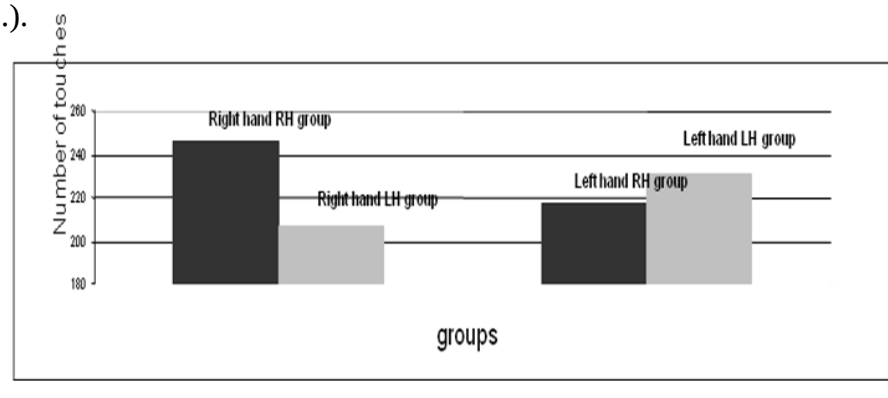

Figure 1. The comparison of hand movement velocity with right hand and left hand of basketball players: right-handers and lefthanders (by tapping test)

The difference is statistically significant ($p < 0,05$). The data difference between the other hand (right-handers left hand: 217,2 ± 20,6 and lefthanders right hand 206,7 ± 21,3) is not statistically significant.

The results of tapping test (test in which determinate velocity of movement touches to surface) showed that right-handers as well as lefthanders have middle nervous system strength (Fig. 2.). The number of touches to surface slowly decreased in time for all groups of tested persons.

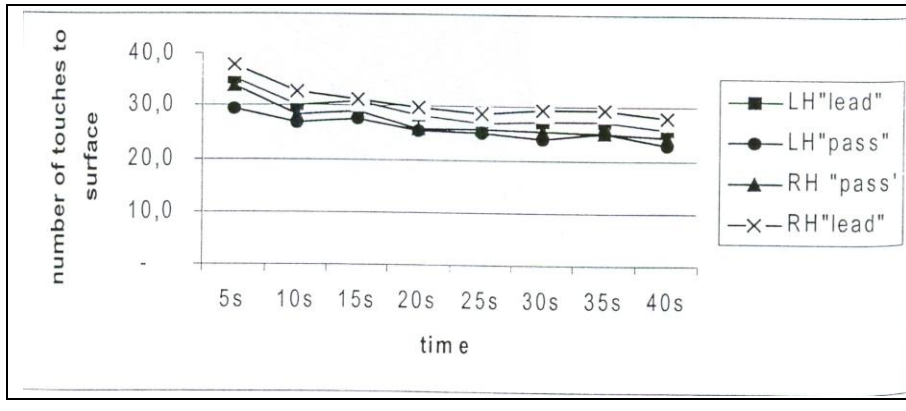

Figure 2. Level of nervous system strength for basketball players: right-handers (RH) and lefthanders (LH) (by tapping test). "Lead" – leading hand, "pass" – passive hand

Competition reaction for basketball players – right-handers is more typical in comparison with lefthanders. Difference is statistically significant: $p < 0,05$. Cooperation is a little more typical for lefthanders in comparison with right-handers. Difference is not statistically significant: $0,05 < p < 0,1$ (Fig. 3.).

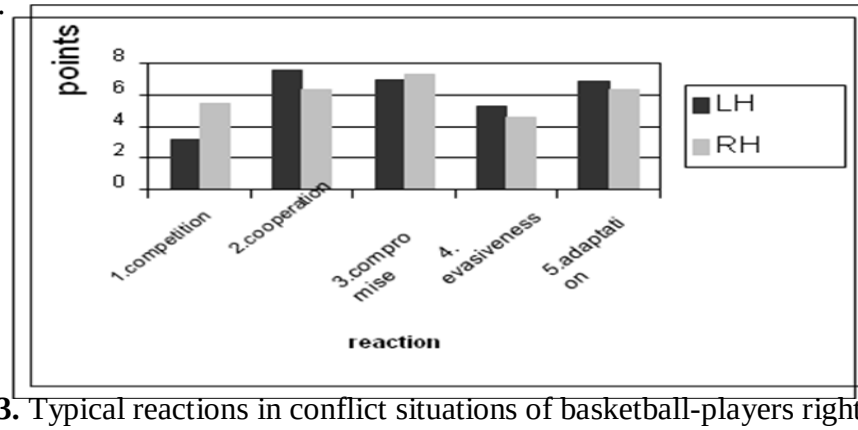

Figure 3. Typical reactions in conflict situations of basketball-players right-handers (RH) and left-handers (LH)

The exactness of basketball throws in the basket of left-handers with "leading" (left) hand was higher than right-handers with "leading" (right) hand in the second series of throws ($p < 0,05$). The exactness of basketball throws in the basket of left-handers with "passive" (right) hand was higher than right-handers with "passive" (left) hand before load in the series of 30 throws and after load in the series of 30 throws ($p < 0,05$) (Tab. 1).

Table 1.

The exactness of basketball throws in the basket with "leading" hand and with "passive" hand of basketball players – right-handers and lefthanders

Series of throws and conditions		Exact throws with the „leading" hand		Exact throws with the „passive" hand	
Series	Throws	Right-handers	Left-handers	Right-handers	Left-handers
1st series	10	3,91±2,33	3,89±2,18	1,77±1,09	1,87±1,26
2nd series	10	3,89±1,31*	4,78±1,48*	2,33±1,25	3,20±1,56
3rd series	30	4,22±1,40	4,67±1,58	2,33±1,25	2,89±1,66
Before load	30	12,02±4,26	13,34±4,56	6,32±3,07*	7,96±3,05*
After load	30	12,00±5,20	12,89±4,43	6,67±2,09*	7,82±2,15*

The results of rate of information processing and productiveness of work of sportsmen with different brain hemisphere dominance, (Tab. 2.) showed that the rate of information processing and productiveness of work of right-handers increase during work time.

Table 2.

Rate of information processing and productiveness of work of persons with different brain hemisphere dominance (bits/second)

Group	Rate of information processing (bits/s)			Productiveness of work (right signs / mistakes)		
	1st min	2nd min	3rd min	1st min	2nd min	3rd min
Right-handers	3,86	4,00	4,45	414,58	431,22	462,54
Left-handers	4,80	4,45	4,80	586,59	493,13	529,50
Ambidexters	4,49	4,41	4,42	482	479,87	508,13

For example, in the 1st minute of work information processing rate for right-handers is 3,86 bits/second but in the 3rd minute it is already 4,45 bits/second. These results give evidence of stabile information processing mechanisms for right-handers. The parameters of information processing and productiveness of work of persons with unvoiced hemisphere dominance (ambidexters) and especially of left-handers are higher than the parameters of right-handers.

During work the parameters of information processing and productiveness of work of persons with unvoiced hemisphere dominance changes little but for left-handers these parameters change wavy. It is an indicative of capacity of work but at the same time of imbalance and emotionality of left-handers.

The results of determination of will properties of sportsmen with different brain hemisphere dominance, (Tab. 3.) showed that left-handers have higher self-control and endurance abilities in comparison with right-handers ($p < 0,05$). The showings of initiative and independence for persons with unvoiced hemisphere dominance are lower than for persons with exact hemisphere dominance but difference is not statistically significant.

Table 3.

Will properties of sportsmen with different brain hemisphere dominance

Group	Courage	Purpose-fullness	Insistence	Initiative and independence	Self-control and endurance
Right-handers	30,17	34,50	32,34	33,67	32,34*
Left-handers	36,25	34,25	34,00	34,25	40,00*
Ambidexters	32,80	37,80	30,00	28,80	35,20

The results of Vienna determination test for persons with different brain hemisphere dominance are demonstrated in Fig.4. – Fig.7. No statistically significant differences of stress reactivity by DT test results between persons of different brain hemisphere dominance were observed.

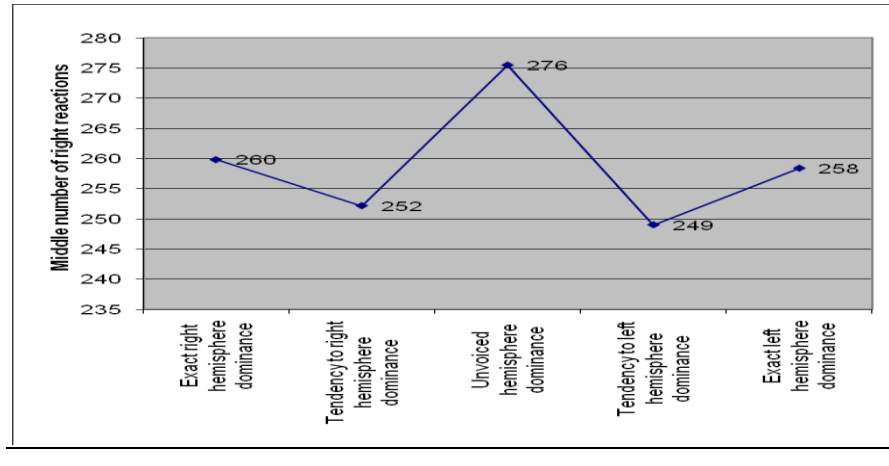

Figure 4. Middle number of right reactions during DT test for persons with different brain hemisphere dominance

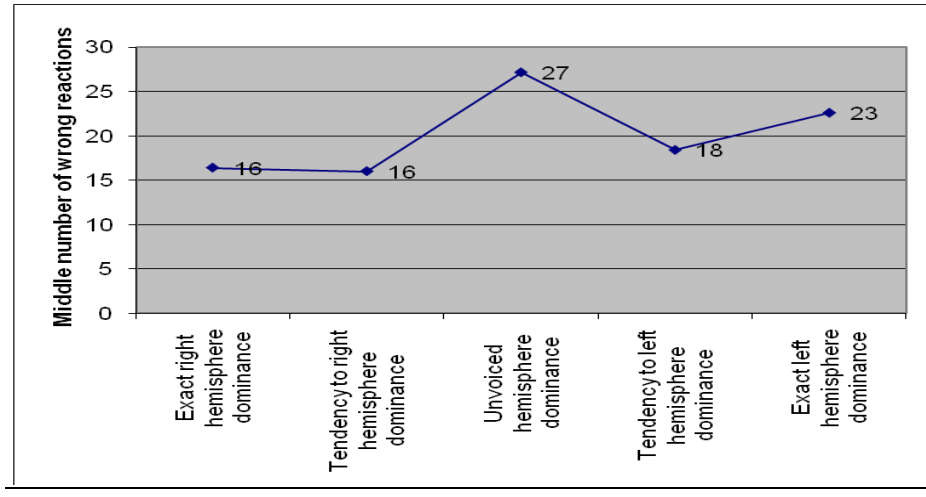

Figure 5. Middle number of wrong reactions during DT test for persons with different brain hemisphere dominance

Although the results of test demonstrated that persons with unvoiced hemisphere dominance in stress situations work faster (the reaction time is shorter) but they make more mistakes (the number of wrong reactions and the total number of reactions is higher) in comparison with persons with exact brain hemisphere dominance.

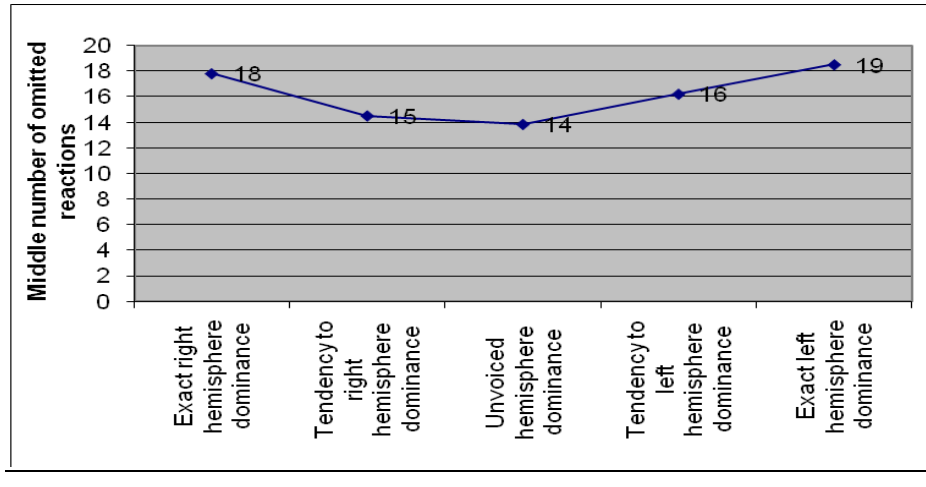

Figure 6. Middle number of omitted reactions during DT test for persons with different brain hemisphere dominance

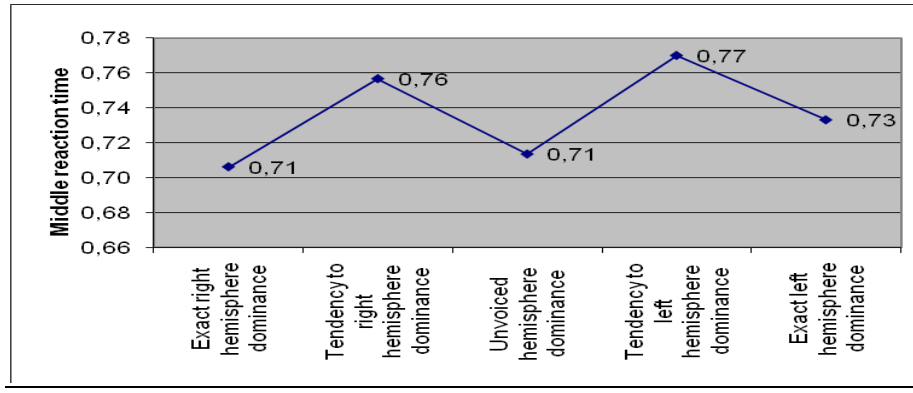

Figure 7. Middle reaction time during DT test for persons with different brain hemisphere dominance (seconds)

Discussion

It has been reported that there is a high proportion of left-handers among top athletes in different sports. The winning numbers and match degrees were higher in the left-handed wrestlers than in both right- and mixed-handed wrestlers among top international wrestlers (Zyagil et al., 2010). Investigations have shown that handedness is associated with hobby preference. Pure left-handedness is observed among those who preferred reading books, collecting, or going to the cinema/theater but pure right-handedness highly overrepresented among those who mainly preferred doing sports (Giotanos, 2004).

Investigation was carried out where right-handed and left-handed participants performed tasks on a well-established test of manual dexterity in addition to completing the Waterloo Handedness Questionnaire. Analysis of Variance revealed that left-handers performed significantly better on the Purdue pegboard test when the task relied on the co-ordination of both the left and right hands. Multiple regression analysis indicated that the Purdue pegboard assembly task is a predictor of self-reported hand preference and of handedness when classified by the Waterloo Handedness Questionnaire. Left-handers showed a smaller performance difference between hands, suggesting an advantage in using their non-preferred hand, although this did not lead to a better performance on a bimanual placement task (Judge, Stirling, 2003). These results suggest that left-handers perform more proficiently when hand actions have to be alternated in completing a task. The superior performance of the non-preferred hand in left-handers might be explored to develop future behavioral predictors of handedness.

Dane and Erzurumluoglu (2003) studied sex and handedness differences in eye-hand visual reaction times in handball players. They reported that of 326 young handball players, 82,82% were right-handed and 17,18% left-handed. But, it has been reported that of normal healthy students, 90.39% were right-handed and 9.61% left-handed in the earlier study. Sex and handedness differences in the eye-dominant hand, the right eye right hand and the left eye-left hand visual reaction times were studied in right-handed and left-handed young handball players. In the eye-dominant hand and the left eye left hand visual reaction times, the left-handers had superiority over the right hander. These results suggest that left-handed players have probably an intrinsic neurological advantage (Dane, Erzurumluoglu, 2003). Results of these experiments correlate with the results of our research which showed that basketball player's left-handers have higher exactness of throws in the basket. Probably, that possibility of basketball player's lefthanders to do more exact basketball throws in the basket is connected with domination of right hemisphere which has significant role in providing of spatial orientation. For lefthanders it is more accustom to act with right hand than for right-handers to act with left hand. It is connected with that fact that many of tools and instruments are adapted for the work with right hand. It is recommendable for basketball player's left-handers fully to put into use their advantages in the actions with "passive" hand. The capacity of work of left-handers is great but they are very emotional. It is very important to control their behavior during sport exercises.

Conclusions

1. The velocity of movement touches to surface during 40 seconds for basketball player's right-handers is higher than for basketball player's left-handers. Both group basketball players have middle strength nervous system activity. Competition reaction in conflict situations is more expressed for basketball player's right-handers but cooperation reaction - for basketball player's left-handers.

2. Exactness of basketball throws in the basket is higher for basketball player's left-handers in comparison with right-handers with the leading as well as with the "passive" hand. Especially great advantages basketball players left-handers have in throws with the "passive" hand.

3. The parameters of information processing and productiveness of work of left-handers are higher than the parameters of right-handers. The rate of information processing and productiveness of work of right-handers

increases during work time but for left-handers these parameters change wavy. It is an indicative of great capacity of work but imbalance and emotionality of left-handers. Left-handers have higher self-control and endurance abilities in comparison with right-handers.

4. Persons with unvoiced hemisphere dominance in stress situations work faster but they make more mistakes in comparison with persons with exact brain hemisphere dominance.

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ORIGINAL RESEARCH PAPER

THE CHILD AS FAMILY ANIMATOR OF PHYSICAL ACTIVITY

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Abstract

Physical activity in a family depends on numerous factors including attitudes of parents and teachers. It was assumed that recreational activities which children participate in constitute a good model to follow in order to change physical activity behaviors in a family. A model of recreational activities for children was elaborated, put into practice and then evaluated by parents. The model included physical activities as well as homework tasks for children. It was aimed at checking whether this offer is relevant and whether it meets the requirements of parents and children. The research included 45 families. The model met the requirements to inspire parents to undertake physical activity in a family.

Key words: *child, parents, physical activities, family.*

Introduction

Numerous authors highlight the leading role of a family in the process of promoting physical activity. Attention is directed to the meaning of parents' physical activity and its influence on children's physical activity. The more active the parents, the more active the children. Research in this field was conducted by Wolańska, Marczewska (1988) Brustand (1993), Dempsey, Kimiecik, Horn (1993), Bois, Sarrazin (2006), Bula-Biteniece (2011).The influence of parents' physical activity on children's physical activity is a dominating aspect in the current research in this field. Research analyzing this phenomenon from the point of view of a child, i.e. analyzing the way in which a child may encourage a parent to take up physical activity, are undertaken sporadically. Such an issue was analyzed in this research. In this work the following definition of recreation in a family was applied:"Physical recreation in a family is meant as sports or tourist activity

as well as other forms of physical activity undertaken by a family together in order to relax, gain pleasure and develop personality in
their free time; it might be the whole family or at least two members but the family must organize the recreation program themselves or may use the program prepared by an institution or organization especially for family groups" (Wolanska 1997).

Aim of the work and research questions. Physical activity in a family depends on numerous factors including attitudes of parents and teachers. It was assumed that recreational activities that children participate in may constitute a good model to follow in order to change recreational behaviors in a family. The elaborated model of recreational activities for children, which included homework to be done together with parents, was evaluated and verified by parents of children participating in the activities. It was aimed at checking whether this offer is well-aimed and whether it meets the requirements of parents and children. The aim of the research is to make an attempt at defining the place and role of sports and recreational activities in the promotion of physical activity in a family. Such an aim has inspired forming specific research questions.

1. Do recreational and sport activities influence the change in family behaviors?
2. Do children inform their parents about recreational activities which they participate in while they are in kindergarten?
3. Do parents perform homework tasks with their children?
4. Does children's participation in activities serve as an encouragement for purchasing sports and recreational equipment?
5. Do children talk to their parents about their experiences concerning sports and recreational activities in which they participate in kindergarten?

Methods, material and research organization

In order to answer the above-mentioned research questions and analyze the issue, the authors elaborated their own model of sports and recreational activities, and then it was implemented and evaluated. Observations included 6-year-old children attending a Council Kindergarten No 15 in Biala Podlaska who participated in sports and recreational activities together with their families.

Recreational and sport activities were aimed at increasing physical activity of children and their parents. Children were to serve as intermediaries in the physical education of families. They were delivering "homework tasks" given by a teacher. These tasks included various exercises

and plays. The leading research method was a diagnostic poll with the questionnaire for parents. The questionnaires were completed by at least one of two parents whose children participated in sport and recreational activities. The research included a total of 45 parents of children participating in the sports and recreational activities and performing homework tasks.

The model of sport and recreational activities for kindergarten children**.** Sport and recreational activities were conducted in the County Kindergarten No 15 in Biala Podlaska. They were held regularly once a week on Fridays for three months (October – December 2006 and March – May 2009). Both in 2006 and in 2009 the classes were conducted in three groups of pre-school children (10 children each) and lasted for 25-30 minutes. Homework tasks included sets of exercises for the whole family. The sets of exercises were prepared in such a way that it was possible for a child to perform them with at least one family member. They also enabled a child to perform an activity with both parents. The instructions for homework tasks suggested repeating the activities or plays at least three times per week.

Sports and recreational activities as a form of promoting physical activity in a family. Primarily it was decided that it would be checked whether a child mentioned the issue of sports and recreational activities at home. 95% of respondents claimed that they received such information, whereas 5% admitted that their child never mentioned such activities. The fact that a great majority of pre-school children shared the information concerning physical activities is a positive phenomenon. It may mean that these activities raised a sufficient number of emotions in children and they wanted to share their eagerness with their parents.

In order to learn what the examined children mentioned most frequently while talking about these activities after returning home, parents were asked what these impressions mainly concerned. The most frequent answers included: a variety of activities and plays (36.8%), information concerning homework tasks (26.3%), the demonstration of activities and plays learned during classes (15.8%), positive opinions about the teacher (10.5%) and descriptions of individual activities (10.5%). The children's impressions are presented in Fig. 1.

Children demonstrated exercises and games to their household members and siblings. This situation could have encouraged household members to play together.

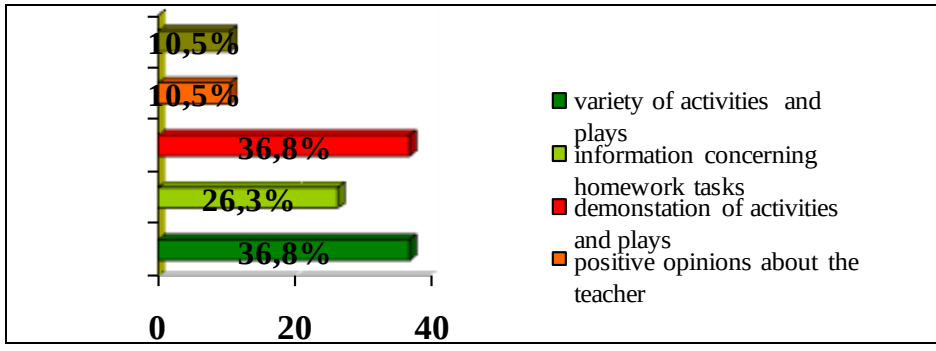

Figure 1. Children's impressions concerning recreational and physical activities which they shared with their parents after returning home (% for n=45)

All parents highlighted the fact that their children did not mention any bad impressions which would show their negative attitude to these classes. Plays and exercises which the examined children participated in varied considerably from plays with music to exercises with balls. Therefore, the examined parents were asked what elements of the classes were mentioned most frequently by their children. The biggest number of answers concerned common plays with the teacher (40.9%), recreational games and plays (36.3%) and exercises and plays with a ball (22.8%) Fig. 2.

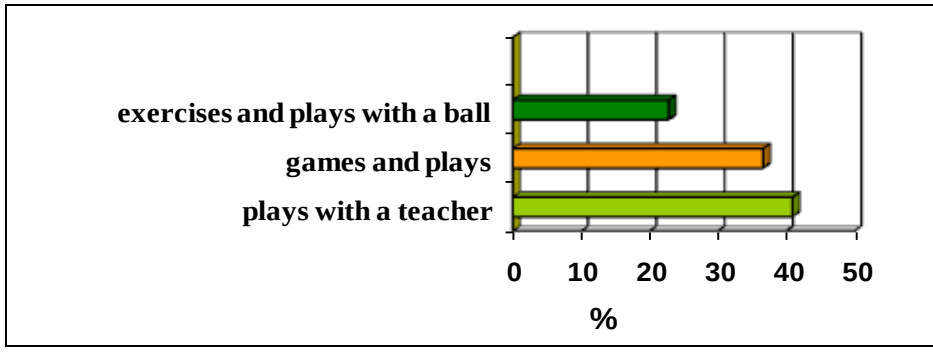

Figure 2. Elements of classes which were most frequently mentioned by the children (%, n=45)

One of the most significant pieces of information which the authors wanted to receive from parents was whether the children informed their parents about homework tasks given by the teacher.

Almost all respondents (90.5%) claimed that children informed them about homework tasks. It is a very significant element of the whole process which is connected with raising the level of physical activity of the whole family through the introduction of homework tasks.

At this moment there occurs the most significant question: Did the examined parents perform these homework tasks with their children? The biggest group included parents who admitted that they exercised with their children (71.4%).

The teacher did not have direct contact with parents and thus was not able to influence the realization of these tasks. The only intermediary between the teacher and the examined parents was a child. The person who most frequently fulfilled the given tasks was a mother (47.8%). Siblings were the second group most frequently mentioned by the respondents (21.7%), then grandparents (17.4%) and next fathers (13.1%). (Fig. 3.)

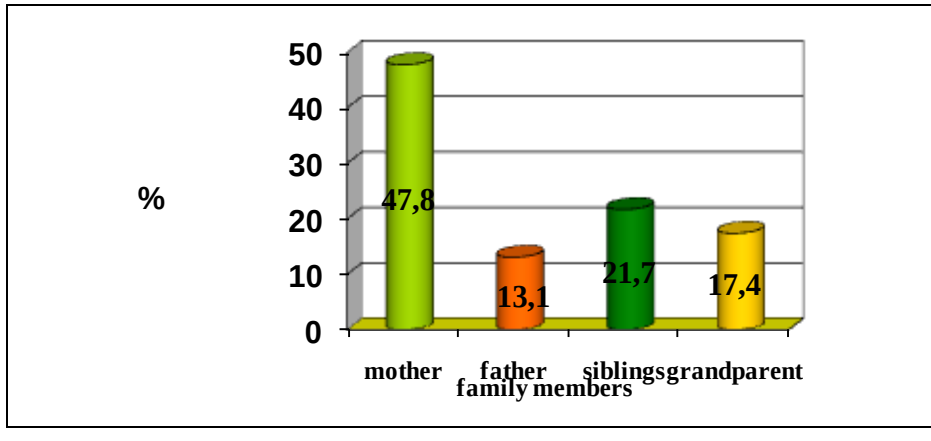

Figure 3. Members of the examined families who fulfilled homework tasks with the children most frequently (% for n = 45)

The most common reasons for not realizing the tasks which were mentioned by the respondents included the lack of time (19%) and tiredness (14.3%). Moreover, the question was asked whether a common participation in the suggested form of spending free time serves as a reason for gaining additional impressions and experiences. Having participated actively in the performance of homework tasks, parents claimed that it builds family bonds (54.5%), improves the child's engagement in proper fulfillment of tasks as well as a parent (9.1%), brings joy and pleasure (18.2%) and enables a parent to get to know a child better (18.2%) (Fig.4).

Figure 4. Impressions and experiences of parents resulting from performing homework tasks together in a family (% for n=45)

The respondents were asked whether the participation of children in sports and recreational activities brought about the increase in physical activity in a family. The majority of responses were positive. 73.7% of respondents admitted that these activities influenced positively the increase in the recreational activity in their families. It is illustrated in Fig. 5.

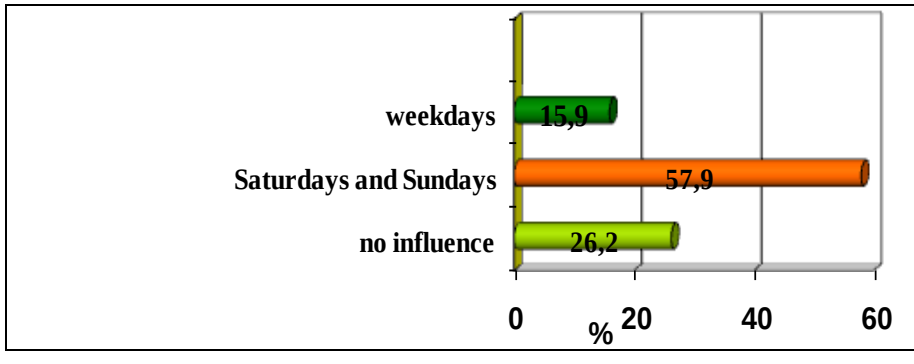

Figure 5. The influence of recreational and physical activities on the increase in the physical activity of the examined families (% for n 45)

Unfortunately, there were also such families that admitted that these activities did not exert any influence (26.2%). Family activity was most frequently increased on free Saturdays and Sundays (57.9%) while on weekdays it occurred in a lower number of the examined families (15.9%). Additionally, the aspect of purchasing sports equipment for a family must be pointed out. No significant data which would allow claiming that the activities exerted significant influence on the increase in such purchases were obtained. Such data were collected in the previous research (Piech 2004).

Conclusions

The research by various authors (Wolańska, 1977; Piech, 2004 et al.) has confirmed the thesis that a child can be a successful animator of physical activity in a family. This fact is also confirmed by the research carried out for this work. The majority of children included in the research were successful in encouraging their parents to take up various exercises and plays suggested by the teacher.

Parents participating in the realization of homework tasks together with their children point to the fact that they brought about positive reactions in them. Parents' opinion concerning positive emotions and experiences brought about by these activities included building family bonds, joy and pleasure of participation and getting to know the child better. However, mothers and siblings were those household members who played with the children while doing homework tasks more often than fathers or grandparents.

The respondents' answers also revealed that the participation of children in sports and recreational activities did not influence the purchase of additional sports equipment significantly.

We are aware of the fact that the number of people examined was not very high. However, it is worth conducting such research in a bigger group of respondents for a longer time so that the habits could be more consolidated. In order to achieve a higher reliability of research, a pedagogical experiment might be applied.

While discussing the research, certain research questions were answered. Taking into account the whole material collected in the research, the following conclusions might be presented:

1. While promoting physical activity, it is worth paying more attention to the institution of kindergarten. Pre-school age is a period of a significant bond between a parent and a child and of a willingness to fulfil a child's interests. This fact might be used by implementing activities directed at physical education of families into the didactic and educational curriculum of kindergartens.
2. Recreational and sport activities promote the participation of families in recreation and constitute a significant element in the process of educating children to participate in the future. It is shown in a considerable engagement of parents in performing homework tasks given by the teacher.
3. Parents who declared that in the nearest future they would purchase sport and recreational equipment claimed that they had been encouraged to do this by performing homework exercises with their children.

4. Parents who declared that in the nearest future they would purchase sport and recreational equipment claimed that they had been encouraged to do this by performing homework exercises with their children. Thisequipment will be selected to meet the child's needs, which proves the fact that parents realize the need for a child's physical education.
5. Pre-school children may be successful animators of physical activity in a family. The major proof confirming this statement might be the fact that they shared information concerning homework tasks with their parents and they successfully encouraged them to perform these tasks.
6. The participation of children in recreational and sport activities contributed to the increase in physical activity of the families, in particular on free Saturdays and Sundays. A bigger tendency for spending free time together on weekdays is also observed.

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ORIGINAL RESEARCH PAPER

EFFECTIVENESS OF LOCAL VIBRATION TRAINING IN INCREASING THE KNEE JOINT EXTENSION STRENGTH IN ISOKINETIC REGIMEN

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Abstract

Coaches, athletes and sport researchers all over the world search for new training methods, training means, new techniques and the newest technologies of other sciences to increase various strength expressions in all kinds of sport. In sport science more or less effective training methods to increase various strength expressions have worked out almost in all sports. Coaches recommend their athletes different training methods to be applied in their trainings. In our investigation we offered a new method to increase strength – the method of local vibration with the help of which, not realizing traditional strength trainings, it is possible to increase the expressions of maximal strength and muscle endurance. Moreover, the new method influences effectively also those muscles which are not trained by the vibration training method, considerable transfer of training effect to the control muscles is observed. By the experiment the influence of local vibration on torque, maximal and average power dynamics were tested. In all cases the dynamics was positive, the increase significant. The greatest torque dynamics was at 350deg/s, where the increase was 51Nm for the experimental group, the increase of power and mean power for the experimental group was correspondingly 166W and 70W. It was concluded that vibrostimulation has positive influence on different muscle physiological systems, and it can be applied before or after the training, as well as in some part of the training.

Keywords: *strength expressions, vibration training, isokinetic work regime*

Introduction

Vibration can be divided into the whole body vibration or separate body part vibration (local vibration).

Vibrostimulation is also called biomechanical stimulation (Nazarov, 1987). For the whole body vibration special platforms are used where separate exercises are performed. An athlete usually stands sits or lies on these vibration platforms. So far negative expressions on an athlete body have not been observed. The greatest positive effect is obtained only when vibration works in the longitudinal direction of the muscle fibres. Vibration frequency plays an essential role. In the end of the 70-s and in the beginning of the 80-s of the last century the researchers of the Research Institute of USSR Naval Forces A. Nemcheno and V.Krauksts stated for the first time that every individual has his own optimal frequency that gives the greatest training and therapeutic effect (the Patent 12937B and Patent LV 12714B). In 1999 a group of the Italian researchers under the guidance of Dr Bosko approved it in their research on athletes (Bosco, 1999). They found out that every individual has his own optimal muscle vibration frequency that gives the greatest training effect.

One of the leading conceptions in increasing athlete physical condition is the increase of athlete strength expressions. Strength expressions have essential role in practically every kind of sport. Therefore it is necessary to look for new methods and means whose effectiveness is bigger than the one of the traditional strength development methods.

More and more new possibilities to increase strength expressions are being looked for. There is a large amount of literature about the positive influence of total vibration in this field (Bosco et.al, 1999, Issurin, Tenenbaum 1999). All publications contain indications that the result of mechanical stimulation is accelerated strength influence on the body. Vibration forces cause muscle to stretch and shorten, as a result the length of every muscle fibre changes, stretching impulses are sent from each muscle fibre to the central nervous system (CNS), considerably greater number of muscle fibres takes part in the muscle fibre contractions than usually during physical loads (Issurin, Tenenbaum 1999), and electromiographical activities express more effectively (Bosco et.al., 1999; Delecluse et.al., 2003). As a result of vibration loads a greater number of muscle fibres (motor units) than in the usual muscle loading variant activates and the muscle is loaded more effectively (Cormie et.al., 2006; Bosco et.al., 1999; 2000; Rittweger 2001, 2004; Amonette et.al., 2005). Muscle is loaded considerably faster and more effectively, and the muscle can produce greater strength. Sure, this effectiveness will not be effective enough if the stimulus caused by vibration is too strong and too long, as then fatigue can be caused and work capacity can be decreased. After the vibration load the intensity of blood circulation increases.

Fast contraction and relaxation of the muscle (20-50 times per second) mostly act as a pump of the blood-vessels and lymphatic vessels, as a result the speed of the blood flow increases, as well as the oxygen transport, provision of energetic substances and the elimination of the end products of the metabolic processes from the loaded muscles (Kerschan-Schindl et.al., 2001). Individuals usually feel as if the temperature increases in the vibrated parts of the body, other authors also point out that the blood-vessels widen (vasodilatation) (Oliveri et.al. 1989, Stewart et.al., 2004).

The effect of continuous vibration loads has positive influence on the body system tiredness or various light stresses.

When the body is regularly and periodically loaded or overloaded the effect of super-compensation is observed. As a result the body adaptation to the vibration loads is observed. In other words, the athlete's physical work capacity increases as the vibration loads have a training effect. This effect is found out in multiple repeated researches with young and also older individuals (Roelants et.al, 2004; Delecluse et.al, 2005; Verschueren et.al, 2004).

In the research, where the structural effect of the vibration trainings is stated, it is also found out that strength expression increase as a result of the vibration trainings can be compared to other methods of strength development. However, the best results applying vibration training methods are achieved in the field of explosive power (Delecluse et.al, 2003), where vibration trainings have considerably greater effectiveness than generally accepted trainings.

Another important difference being observed between standard training methods and the vibration training method is that the vibration training method gives identical result increase with minimal loads both speaking about the intensity and amount. So, load does not have negative influence on the bones, tendons and joints. As a result the vibration training method is very effective with elderly athletes, women, children, teenagers, as well as in cases of injury, different diseases and health damages. The method is very effective with well-trained athletes (professionals), who try to maintain and even increase muscle strength expressions not loading joints and simultaneously relaxing physical systems (Cochrane et.al., 2005; Mahieu et.al., 2006).

Taking the above mentioned as the basis the following hypothesis was put forward for the research – local vibration trainings can effectively influence athletes' torque and power expressions, spending considerably smaller time for it. The main aim of our research is to test effectiveness of

explosive strength at different angular speed in the knee joint. To solve the forwarded aim and prove the hypothesis several tasks were stated: to do the local vibration training process only on the quadriceps muscle (m. quadriceps femoris) of the right leg and in the end of the research to state the effectiveness of the local vibration training method determining the dynamics (increase) of maximal strength and muscle endurance expressions. The research object is to state experimentally the dynamics of torque and power expressions applying the local vibration method. The research subjects are 20 athletes, 24±3years old males having strength training experience, but who have not trained in the field of increasing strength for at least 3 years.

Materials and methods

The experiment was organized at the Biomotor ability diagnosing laboratory of the Latvian Academy of Sport Education, using technical local vibration equipment, muscle functional diagnostics was done using the isokinetic dynamometer REV9000 (Technogym). The following parameters were stated by the isokinetic dynamometer REV9000: torque (Nm), power (W), mean power of five repetitions (W) (Fig.1.).

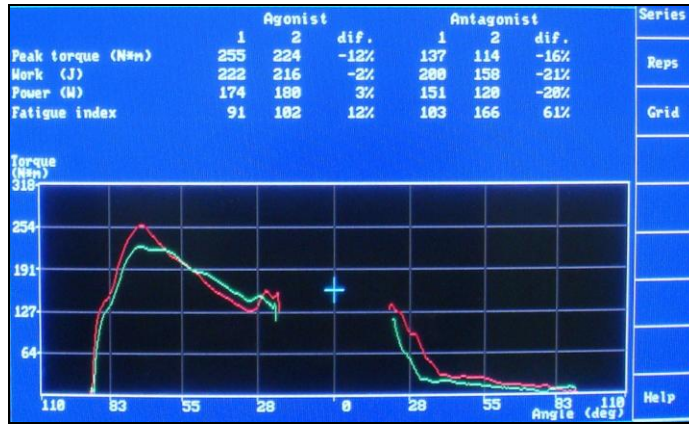

Figure 1. Stating of muscle functional diagnostics parameters by isokinetic dynamometer REV9000

A movement that knee joint flexion and extension from 18 up to 85 degrees - was chosen for the test, as this test is described in the research literature as being valid. The movement was executed in a dynamic regimen, the measurements were made in concentric muscle contraction regimen, the extremity was returned into the starting position passively.

Following other researchers' experience, three basic angular speeds in the knee joint were chosen: 350deg/s, 250 and 150deg/s, and the subject executed five repetitions at every angular speed. The knee joint was fixed passively with constant speed 100deg/s. The testing protocol included 5 minutes stretching of the thigh front and back muscles, as well as the lower leg muscles; it was followed by eight minute warm up using free movements and three minute warm up on the isokinetic device. In the beginning the test was done at speed 350deg/s, then at other angular speeds. There was five minute relaxation break between the tests at different angular speeds.

Practically healthy 20 subjects with age 24±5 years and weight 83±11kg were selected for the experiment. The subjects were divided into two groups 10 people each, one group was called the experimental group, who used only local vibrostimulation in their training process, another group was called the control group, and they did not use vibrostimulation.

The subjects had previous experience in some of heavy athletics kinds of sport, as well as the necessary technical abilities to do the exercises. The experiment participants had not practically done strength trainings for at least three years.

The experimental group applied the local vibration training method to increase strength expressions influencing the quadriceps muscle (m. quadriceps femoris). The subjects were in a sitting position, the knee joint at right angle, thus the thigh muscles were a little stretched. Vibration was linear from the muscle's distal to proximal part, with "stroking" and pulsing movements along the whole surface of the quadriceps muscle of the thigh, including also the transition of the muscle belly into tendons. Vibration was applied according to the following methodology (Tab.1.):

Week 1 – linear influence on the quadriceps muscle – 2 min, 1 set;
Week 2 – linear influence on the quadriceps muscle – 2 min, 2 sets with 2 min pause (passive rest);
Week 3 – linear influence on the quadriceps muscle – 2 min, 3 sets with 2 min pause (passive rest);
Week 4 – linear influence on the quadriceps muscle – 2 min, 3 sets with 2 min pause (passive rest);
Week 5 – linear influence on the quadriceps muscle – 2 min, 3 sets with 2 min pause (passive rest) between the first and second set, and 1 min pause between the second and third set. In the second and third set the linear influence was substituted by the pulsing vibration methodology;
Week 6 – linear influence on the quadriceps muscle – 2 min, 3 sets with 2 min pause (passive rest) between the first and second set, and 1 min pause

between the second and third set. In the second and third set the linear influence was substituted by the pulsing vibration methodology;
Week 7 – linear influence on the quadriceps muscle – 2 min, 3 sets with 1 min pause (passive rest) between all three sets. In the second and third set the linear influence was substituted by the pulsing vibration methodology. The total time of vibrostimulation was 36 minutes.

Table 1.

Methodology of vibrostimulation application during the experiment
(L – linear vibration, P – pulsing vibration)

	Sets with a rest pause, min		
Week	1	2	3
1	L		
2	L, 2	L	
3	L, 2	L, 2	L
4	L, 2	L, 1	L
5	L, 2	P, 1	P
6	L, 2	P, 1	P
7	L, 1	P, 1	P

During local vibration 120-200Hz frequency with amplitude 2-6 mm was used. Every time such amplitude was chosen for each individual, which caused the best feeling. The acceleration of the vibration movement was from 1 to 200g.

The experiment lasted for seven weeks. After the experiment both the experimental and control groups were repeatedly tested by the isokinetic dynamometer REV9000 in the same way as in the beginning of the experiment. The results obtained during the experiment were processed using the methods of mathematical statistics.

The experiment and the research itself were concerted with LASE Ethics Commission.

Results

By solving the tasks forwarded for the research the following results of muscle functional diagnostics in both groups were obtained. Stating of torque before and after the experiment showed that the results of the experimental group are better than the ones of the control group, the difference is significant, and the increase of the results of the experimental group is also significant (Fig.2.). At 150deg/s the result of the experimental group has increased on average per 19Nm and reaches 283±2Nm, while the

result of the control group has increased on average per 4Nm and reaches 265±3Nm after the experiment. At the angular speed 250deg/s the result of the experimental group has increased on average per 30Nm and reaches 243±2Nm, while mean result of the control group has increased per 3Nm and after the experiment maximal torque is 224±1Nm. At the angular speed 350deg/s the result of the experimental group has increased per 51Nm and makes 213±2Nm, while the increase of the result by the control group is 13Nm, making on average 176±3Nm.

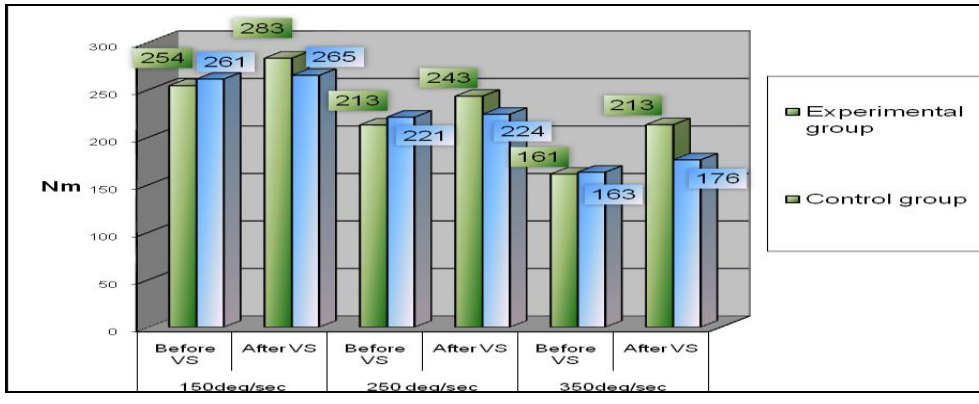

Figure 2. Changes of torque at different angular speeds.
VS - vibrostimulation

Stating power before and after the experiment at different angular speeds we found out that the increase of the test results of the experimental group is significant, as well as there is significant difference between the indices of the experimental and control groups (Fig.3.).

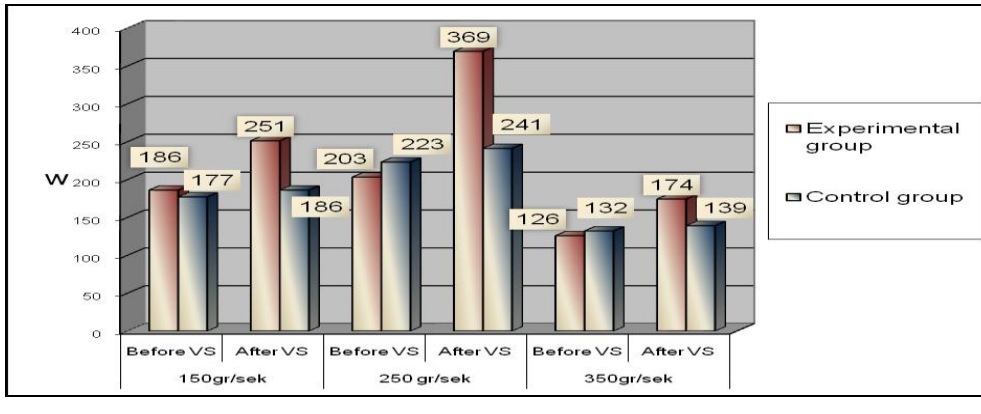

Figure 3. Changes of power at different angular speeds. VS - vibrostimulation

At 150deg/s the mean maximal power of the experimental group has increased per 65W and makes 251±13W, while the mean maximal power of the control group has increased per 9W and makes 186±4W. At the angular speed 250deg/s the mean maximal power of the experimental group increased per 166W and made 369±2W, but the increase of the control group was 18W and made 241±3W. At 350deg/s the mean maximal power of the experimental group in five repetitions increased per 48W and made 174±2W, but the power showed by the control group increased per 7W and made 139±4W.

Stating power before and after the experiment at different angular speeds we found out that the increase of the test results of the experimental group is significant, as well as there is significant difference between the indices of the experimental and control groups (Fig.4.).

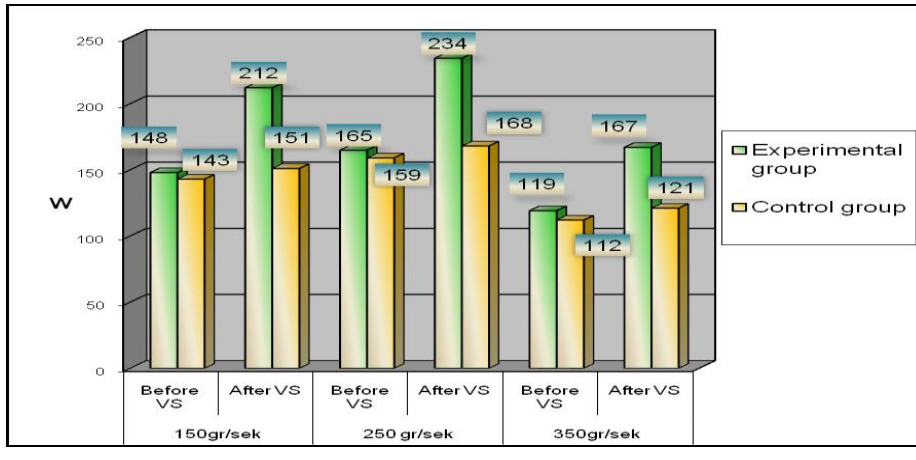

Figure 4. Changes of average power in five repetitions at different angular speeds. VS - vibrostimulation

At the angular speed 150deg/s the mean power in five repetitions of the experimental group has increased per 64W, making 212±3W and the control group had 8W increase, making 151±4W. Executing the movement at the angular speed 250deg/s the increase of the experimental group was 70W, making 234±2W, but the increase of the control group was 9W, making 168±5W. (Fig.5)

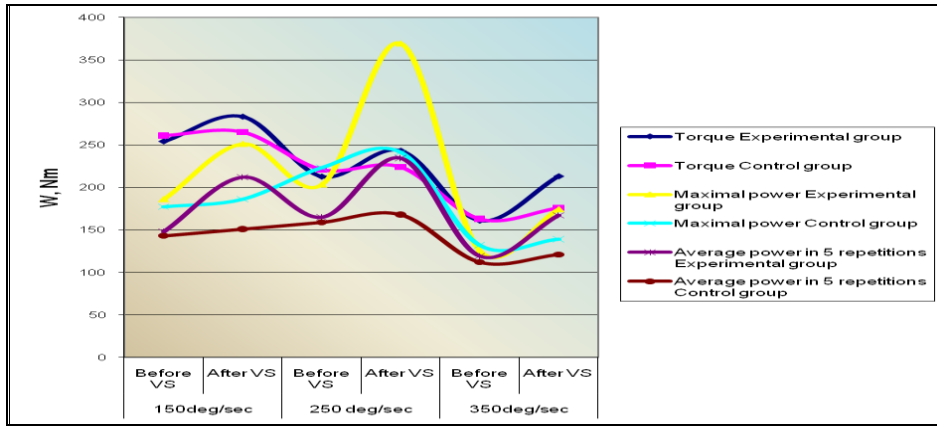

Figure 5. Dynamics of torque, maximal power, and mean power in five repetitions. VS – vibrostimulation

At the angular speed 350deg/s the results were as follows – the result of the experimental group increased per 48W, making 167±2W, but the increase of the control group was 9 W and made 121±2W after the experiment.

The significance of the increase was tested using the methods of mathematical statistics, definitely, the Student t-test for equal variances. The increase was significant, as the empirical value of the Student criterion was greater than the theoretical value; group difference was tested using the Student criterion for independent samples, also here the empirical value was greater than the theoretical value, and it showed the group difference at definite angular speed. The Student criterion was used as the obtained data correspond to normal distribution, what stated by descriptive statistics.

Discussion and conclusions

During vibrostimulation the subjects were in a sitting position, as it is a well-known fact that stretched muscles are more sensitive to vibrostimulation, what is important in our experiment, and muscle contraction is stronger **(**Eklund, Hagbarth, 1966, Rohmert et.al, 1989).

Taking a look at the changes of torque at different angular speeds, we see that the more is angular speed, the less is torque. The greatest changes of the torque in the experimental group was at the angular speed 350deg/s (51 Nm), what proves the essential influence of vibrostimulation on the central nervous system (CNS), what obviously causes faster muscle fibre recruiting in shorter time and involvement of greater movement unit number in movement execution.

Vibrostimulation activates the CNS which is responsible for movement neural regulation.

We have concluded that vibrostimulation can be used as additional means of rehabilitation in the kinds of sport where rapid force or explosive strength is very important. The essential influence of vibrostimulation on the muscle innervations is confirmed by the fact that, while doing vibrostimulation, unconstrained independent flexion of the subjects' knee joint of the stimulated extremity was observed. There are also references in the literature that vibration, applied to a muscle and muscle tendons, lead to an independent muscle shortening, known as tonic vibration reflex (Eklund, Hagbarth, 1966). We also concluded that local vibration tones muscles and it can be used the case, when due to some reason (disease, injury and immobilization) an individual is unable do a movement independently.

Taking a look at power, which is the component of both the applied strength and speed, we see that maximal power in the experimental group has increased at the angular speed 250deg/s, but the result of the control group is not significant. Both the beginning and end results in both groups at this angular speed are greater than at other speeds. We conclude that vibrostimulation has positive influence on the mean angular speeds what is connected with the composed power component. Comparing to torque, where greater speed dominated, we can say that it also influences the power indices; the increase of the movement speed component is bigger than the strength component. The information confirming this fact can be found in literature that, thanks to local vibration, muscles are partially activated, but their mobilization in the beginning of effort will be faster (Issurin et.al, 1994). There is information about strength expression increase in the muscles, which have renewed by the application of short time vibrostimulation. The increase of a muscle receptor sensitivity against irritation lies on the basis of this effect, wherewith the receptor sensitivity increases also against active irritation, provided by the individual himself.

In the experiment we also analyzed the mean maximal power in five repetitions what gives us objective information about the subject's ability to realize the given maximal load in several repetitions and to a greater extent excludes different coincidences possible when stating maximal power in the best repetition. We see that the greatest power expression is observed at the angular speed 250deg/s, and the experimental group has also the greatest increase of the results at this angular speed. There is information that exactly at the angular speed 250deg/s the greatest power expressions are observed, and that can be explained that movement quality expresses the best at this speed.

Obviously, the expressions of the explosive strength of the definite experimental group individuals express the best at the knee joint extending angular speeds about 250deg/s. Vibrostimulation of muscle tendons causes irritability of the muscle sensory organ (Brown, 1967). It explains the fact that the subject muscle feelings after the third vibration set were not so explicit than before vibration.

The increase of the muscle temperature caused by vibrostimulated tissue friction (Oliveri, 1989) and the increase of blood circulation caused by vibration (Wakim, 1985) can cause post-vibration effect, so vibration can be used in the training process for both to warm up the target muscle groups and to provide against the decrease of the muscle work capacity during long relaxation pauses between the sets, required by training process and methodology of some kinds of sports, as well as in competitions during long pauses between the sets.

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ORIGINAL RESEARCH PAPER

DYNAMICS OF REACTION CHANGE OF THE ORGANISM OF HANDBALL PLAYERS ON LOADINGS OF VARIOUS VOLUME AND INTENSITY

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Abstract

The purpose of our experiment was to state dynamics of change of indicators of the physical condition at athletes of handball players. For definition of dynamics of the sports form of athletes we used the program of complex computer research of a physical condition of sportsmen a hardware-software complex "Omega-C" which is intended for control of indicators of a physical condition of athletes. 11 athletes took part in our pilot experiment. Athletes before training passed inspection on the program "Omega-C". The program read out 300 blows of heart and defined level about its functional condition at present. After athletes trained under the program set by the trainer, and exercises were fixed (registered) in the registration form for the subsequent data processing for loading definition on training. After training each athlete stated to itself a mark on the spent training, marking results in the registration table. Athletes estimated themselves on 10 ball system. Proceeding from the data following conclusions are drawn: The program "Omega-C" ascertained: level of adaptation to physical activities, indicator of training degree an organism – improvement of indicators has occurred at 6 athletes, level of power maintenance – improvement of indicators at 9 athletes, a psycho emotional condition and an integrated indicator of "the sports form» – improvement of indicators at 7 athletes. Only at 5 athletes all indicators simultaneously have improved. On comparison of a self-estimation of the athlete to a mark of the trainer following tendencies are visible.

Key words: *handball players, self-estimation, "Omega-C" program*

Introduction

The complex “OMEGA- C” allows carrying out diagnostic procedures on a basis neirodynamical analysis of variability of a warm rhythm of a human body. It is established that all processes proceeding in a human body, find the reflection in changes of a rhythm of its heart. Thus on the basis of studying of dynamics of rhythms of human heart, probably to carry out the impartial assessment of a condition of an organism. Prominent feature of the given method is its high sensitivity to the diversified internal and to external influences that allows to evaluate result of system reaction of mechanisms of multiplanimetric and multilevel regulation of the processes occurring in an organism of the athlete.

The new information technology of the analysis is put in a basis of work of a complex "OMEGA-C" cardiorhythmologyc processes proceeding in an organism. The given technology is approved by Ministry of Health of the Russian Federation, allowed to application in the medical purposes, and protected by patents and copyright certificates of the Russian Federation [2].

Application of the given equipment allows receiving the impartial assessment of a physical condition of the surveyed athlete during the minimum time. So, at use of a multichannel variant of system "OMEGA-C" time of inspection of one athlete does not exceed one minute.

The condition of an organism of the athlete varies daily. It is connected with a training cycle, with day of week, with personal privacy events etc. These changes are noticed often by athletes and trainers when find out that loads which, for example, were easily transferred yesterday, became today heavy. Thus such indicators as pulse, arterial pressure, etc., can there is nothing not to speak. During too time, dosing out load disregarding an organism condition, it is possible to cause over fatigue and stress easily. Knowing about it, athletes and trainers try to select load proceeding from the sensations and experience. Often such approach does not give desirable result.

System "OMEGA- C" allows evaluating objectively the general condition of an organism of the athlete and is the useful instrument at selection of loads. Applying diagnostics of a condition of an organism, we can predict influence of physical activities and warn exhaustion and stress.

For correct planning of loads it is important to trace an organism condition in dynamics, daily evaluating its changes. Therefore **the purpose** of our experiment was: to state dynamics of change of indicators of the physical condition at athletes of handball players.

Method of research: Pilot experiment. Variants of subjective value judgment of training loading in handball.

A method of mathematical statistics. Following problems of experiment have been put: to define dynamics of the sports form of the athlete with the help of the "Omega-C" program. To compare a self-estimation of handball players at the age of 23 years on loading with opinion of the trainer.

For the decision of tasks in view adjusting experiment has been made from 1st March till 1th May, 2010. 11 athletes have participated in experiment, representatives of the handball which middle age has constituted 22,7. Experiment was conducted on the basis of the Latvian Academy of Sports Education and athletes of a youthful national team on handball participated in it.

To solve the first problem we used the operational program "Omega-C".Process of removal of indications by means of the program "Omega-C" passed as follows. Before training all athletes passed inspection on the program of Omega. In a quiet condition on a wrist of patient 2 electrodes which read out pulse at the athlete were imposed. Imposing of electrodes is made on hands of the patient in the field of wrists, a contact platform from the inside. In a place of contacts it is recommended to moisten a skin with a physical solution or water plentifully. The patient should is at rest, in position "sitting" or "lying". Polarity observance at imposing of electrodes is not required. Hands of the patient should be motionless and weakened. In position "sitting" hands of the patient are in a lap, In radius of 1.5-2 meters from the patient extraneous people should not move. (Fig.1.).

Figure 1. The express- control table [4]

In the course of registration the patient should be in as much as possible comfortable and weakened condition. It is not recommended to distract the patient conversations and to show it the screen of the computer from a registered electrocardiogram

Having removed indicators after 300 blows of heart the program gave the account on each athlete in particular about its functional condition at present. Visually displaying an *electrocardiogram window* - on an axis of abscises time in minutes and seconds from the record beginning, on an axis of ordinates – amplitude of an electrocardiogram is postponed. Vertical lines mark allocated R – teeth. By default the electrocardiogram is displayed to scale 25 mm/seconds the *Window rythmogram* – shows dependence of duration RR – an interval from number of a cycle of measurement. *The window «PQRST»* – displays cardio complex, corresponding to the RR – interval chosen on ritmo–gramme. Dark blue labels are indicated by position P, Q, R, S and T – teeth. A *window "Histogram"* – the histogram represents the diagram of a parity of quantity of RR-intervals in various intervals of their duration. A *window of "Skatterogramma"* – skaterogram RR – intervals – two – dimensional display of a rhythm of the heart, allowing receiving characteristic "mnemopictures", infringements of a warm rhythm peculiar to the basic variants. A *window "Diagram PC"* – on the diagramme are displayed normal significances of indicators of a physical condition.

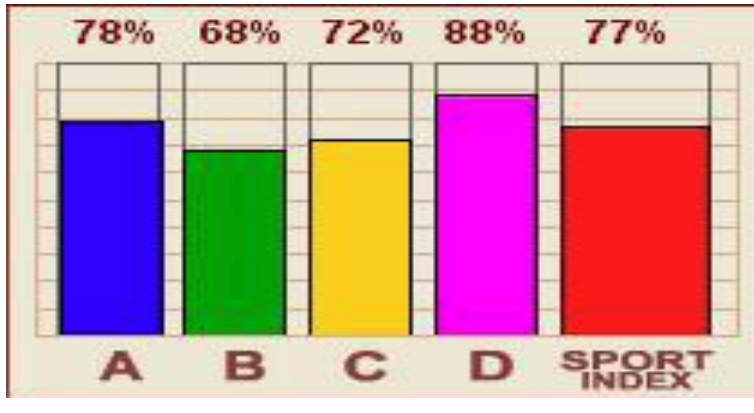

Figure 2. "Traffic light" window [5]

A – level of adaptation to physical activities; B – indicator of training degree an organism; C – level of power maintenance; D – a psycho emotional condition. Health – an integrated indicator of "the sports form». A *window*

"Traffic light" – the combination of colors of "traffic light" corresponds to various levels of a physical condition from 1 to 5 points [3].

The general data on athletes are resulted more low in the Table 1.

Table 1.

Complex estimation of a physical condition

initials	age	date	FWR	A	B	C	D	H
B.K.	21.3							
		15.04.2010	55	100	100	100	99	99
		04.03.2010	70	94	99	91	90	93
E.A.	20.1							
		29.04.2010	68	96	98	75	81	88
		04.03.2010	68	79	89	63	61	73
K.E.	21.0							
		04.03.2010	62	85	94	86	71	84
		15.04.2010	64	100	100	100	100	100
K.A.	23.1							
		29.04.2010	62	94	100	94	85	93
		15.04.2010	62	73	75	67	65	70
L.G.	29.1							
		15.04.2010	56	57	90	51	51	62
		04.03.2010	66	77	87	61	61	72
L.I.	29.3							
		15.04.2010	57	94	100	84	88	91
		04.03.2010	60	92	98	72	70	83
L.K.	23.6							
		15.04.2010	59	81	96	91	93	90
		04.03.2010	61	77	97	77	89	85
P.E.	20.3							
		29.04.2010	60	83	98	74	71	82
		04.03.2010	59	86	95	62	63	76
R.E.	19.3							
		29.04.2010	76	70	70	71	66	69
		04.03.2010	60	80	96	68	71	79
V.V	21.4							
		29.04.2010	81	63	61	63	69	64
		15.04.2010	76	79	86	72	75	78
P.R.	22.1							
		15.04.2010	66	61	70	71	65	67
		04.03.2010	57	62	89	67	69	72

From the above said table follows:

• level of adaptation to physical activities - improvement of indicators has occurred at 6 athletes.

• indicator of training degree an organism - improvement of indicators is visible at 6 athletes.

• level of power maintenance - improvement of indicators at 9 athletes.

• a psycho emotional condition - improvement of indicators at 7 athletes.

• an integrated indicator of "the sports form» - improvement of indicators at 7 athletes.

Only at 5 athletes all indicators simultaneously have improved. At 2 athletes decrease in results on all indicators was observed. At one of athletes at the general growth of all indicators except for one – the indicator of training degree an organism has decreased result on 1 point. At one athlete as against the general improvement of all results 1 of indicators – level of adaptation of an organism to physical activities, has decreased on 3 points and pulse has increased by 1 point. At 2 athletes at the general decrease in indicators improvement is visible only on 1 indicator - level power maintenance.

Athletes trained during all experiment under the program set by the trainer, we did not interfere with training process. Trainings passed 4 times a week, lasting 2,5 hours. Tasks and exercises were fixed in the registration journal, for the control of load and definition of an orientation of training. The variant of the registration table is lower resulted (Tab. 2).

Table 2.

The used variant of the account of training load in handball

Initials		P.E.	R.E.	L.I.	
Runing ≈20-30min		+	+		
Exercise room (Circular training on all primary groups of muscles)				+	
Power exercises (a raising on a ladder 3 flour. ≈ 5-7time)				+	
Transfers of 6-8 times.	Max. 30sec.		+	+	
	Middle. 1 min				
Accelerations 30м. 6-8 times.		+	+		
Working off of combinations of 6-8 times		+	+	+	
Working off of throws on collars		+	+	+	
Working off of feints, barriers		+	+	+	
Coordination exercises		+	+	+	
Competition					
The theory, lecture, discussions					
Quantity of points					

For the decision of 2nd problem - estimations of load of the athlete on training we have developed registration sheet for a self-estimation of the athlete where each participant of experiment stated to itself an estimation on the conducted training.

In lower presented table (Tab.3.) has showed 10 point scale of an estimation of load.

Table 3.

The form of a self-estimation of the athlete

Points	The description of possible loadings on training the athlete the trainer	athletes	couch
10	At me remarkable mood, I am overflowed with energy. On training worked in full, with the specified intensity and with full self-return, following all instructions of the trainer. I have completely given all the best on all of 100 %		
9	At me good mood, I am full of strength, on training worked well, tried to carry out in full, but did not maintain rate to the full, following instructions of the trainer. Work has carried out on 90 %		
8	I in quite good mood am ready to training. I trained today on 80 % from possible potential		
7	I know that I should keep forces since at me ahead responsible competitions, I cannot give all the best on full power. I worked on 60-70 %		
	On what or other reason I worked not with full return of percent on 60-70		
6	I not in the best condition, but have managed to be adjusted on training and worked on 50-60 %		
	The theory (20-30 %) + practice (70-80 %) where practical elements were fulfilled		
5	Today theoretical employment on preparation for forthcoming competitions, we discussed tactics, the theory with the trainer and have practically fulfilled elements, the theory has occupied 50 % of training		
4	Intensity in work Is felt. (At me a problem (on work in a family, personal character, etc.)) Thoughts in other direction, me it is difficult to concentrate on training and tasks in view, with a great effort force itself to work.		
3	It is felt, has not slept, working capacity what, I cannot be adjusted on training (a body is ill after loading, before a disease state, etc.)		
2	At me a feeling sick, but I was present on training, but did not take part in it.		
1	I feeling sick, I on good reasons was not on training		

The trainer as evaluated each athlete personally putting down the mark to the athlete for the conducted training. Later results were compared.

From comparison of a self-estimation and an estimation of the trainer it is possible to draw following conclusions:

As a whole the self-estimation is given problems adequately delivered on training and practically coincides with opinion of the trainer. Under questionnaires of athletes it is not visible that they overestimated the possibilities and fairly enough realized about the conducted training. It can be judged to that their opinion in many respects coincided with opinion of the trainer. Estimations varied within 1st point. Except for one moment when in the scheduled day of testing took place competitions on handball. Where a self-estimation of the trainer did not coincide at all with a self-estimation of the athlete. There the difference to 3 points was observed. Some results of registration-comparative record of results are resulted more low.

Table 4.

Registration-comparative record of a self-estimation of the athlete with opinion of the trainer on the conducted trainings

Nr.	Date / Initials	04.03.2010		18.03.201 (The theory + practice)		15.04.20.10		29.04.2010 (competition)	
1	B.K.	8	8	7	7	7	8	9	9
2	E.A.	8	8	7	7	7	7	7	8
3	K.E.	6	6	7	6	7	7	7	7
4	K.A.	7	8	8	7	8	9	9	9
5	L.G.	7	7	6	6	6	7	6	6
6	L.I.	8	8	8	7	7	8	7	8
7	L.K.	7	8	9	7	9	8	9	8
8	P.E.	8	7	6	7	8	7	8	7
9	R.E	8	8	7	6	8	8	8	7
10	V.V.	6	7	5	6	5	7	5	6
11	P.R.	7	7	6	7	6	7	6	6

Discussion

Three basic approaches to selection of loadings are most widely used. The first way, hygienic, is based on use of certain average levels of loading for groups of the people differing on a sex, age, etc.

However similar specifications do not consider specific features of the person and of some other factors, for example, a food and other. Such norms can be used only as a reference point.

The second way, improving, is directed on achievement of the maximum improving effect. But the same as also the majority of definitions of the term "health", this way is not concrete also it is of little use for application.

The greatest application was received by the approach based on concrete physiological reference points, such as pulse, arterial pressure, blood structure etc. Is supposed that achievement in these parameters of certain values during time or after training and is an indicator of an optimality of loading. The problem consists that it is very difficult to define, how much chosen reference points meet requirements and organism possibilities. At use of this method we again face the insufficient account of individuality of the person.

The account of specific features of an organism and achievement of the best improving effect are possible at planning of loadings by means of a complex "OMEGA-C". The analysis of a condition of an organism allows selecting loadings taking into account deterioration or improvement of possibilities of an organism. It is the fastest way to a way to improvement of health and formation of psycho emotional comfort.

Conclusion

It is possible to tell:

1. "Omega-C" allows defining in an express control mode: level of adaptation of the athlete to physical activities; training degree of the athlete; level of power maintenance of physical activities; a current psycho emotional condition of the athlete; an integrated indicator of "the sports form»."Omega-C" helps the trainer and the sports doctor to supervise indicators of a physical and functional condition of athletes, and to predict achievement and maintenance of the high sports form by them throughout all training period.

2. In view of absence of the objective monitoring system and self-checking in handball we have accepted attempt activating the operative control on subjective indicators of the trainer and the athlete

The control of training loads and their effect on an organism, under our assumptions, has allowed approaching objectively to managerial process by training loads in handball.

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ORIGINAL RESEARCH PAPER

SWIMMING EXERCISES FOR STIMULATING ARM PULL SUPPORT REACTION

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Abstract

Body balance is one of the key aspects of fast and efficient swimming. To learn how to swim it is necessary to develop arm pull reaction in water. Since water is liquid not hard support, you have to learn how to pull your arm in a way that feels more resistance; The path of most resistance results in an effective arm pull. Swimming gives weak support reaction. Usually arm pulls are made "vainly", which requires many inefficient pulls to swim certain distances leading to increased swimmer fatigue. Support reaction stimulation is combined with "water feeling". The better a swimmer feels the water and that path of most resistance during an arm pull, the more efficient his pull will be. You can train "Water feeling" – how the swimmer should make better support, how to affect the strength of the pressure around palm and hand, make comparisons and act according to your senses. Using support reaction exercises, gives big progress to the arm pull efficiency, and later helps to learn swimming styles. Hand support reaction during arm pull starts from hands entering the water and continues until hands leave the water.

Key words – *body balance, "water feeling", arm pull reaction, traction strength, water, resistance, swimming.*

Introduction

The basic principle of swimming is buoyancy. The human body has a high water content and its density is close to the density of water. Due to its cavities (most prominently the lungs), the average density of the human body is lower than that of water, so it naturally floats. Terry Laughlin has summarized the relevant physical principles for effective and efficient swimming in his book "Total Immersion" in 1996 [2]. Using several

researcher ideas (R.Gusman, 2007, C.M.Colwin, 2002, A.I.Pogrebnoy and E.G.Maryanichev, 2007), the support developing exercises set for swimming was worked out. This exercise develops support reaction in any part of the arm pull, and improves swimming efficiency. Importance is placed on the swimmers senses and deliberation of feedback during swimming [5]. Therefore exercises are carried out individually and slowly, by comparing one to another. Quite often balance is rarely touched upon while teaching swimming but if more time is spent developing balance and "water feeling" a more efficient stroke will develop.

The aim of the study was to develop exercise sets for swimming, which develops buoyancy and support reaction in any part of the pull, thereby improving swimming efficiency.

Using the untraditional arm pull reaction exercises during swimming lessons, helps the swimmer to learn how to make bigger support (more resistance) in one arm pull, to feel traction strength during arm pull; increases movement efficiency and as a result swimming techniques are learned more effectively. Using of effective exercises for swimming teaching helps to increase swimming skills and efficiency.

Materials and Methods

All swimmers received the same first 4 lessons on water adjustment, water entry and exit, locomotion, personal safety and buoyancy with support. Swimmers were then divided into two groups of 14 students aged 6 to 7 years old (height 129 +- 6cm and weight 26 +- 4kg).

The control group learned freestyle and backstroke over 12 lessons in the traditional style while the experimental group learned freestyle and backstroke in 2 stages concluding with two lessons on freestyle and backstroke arm movement.

Stage 1: 5 lessons – precursory support reaction exercises in water immovably; maintaining body balance in the water in different body positions using body weight and water resistance.

Stage 2: 5 lessons – moving of the body and making support reaction using body, legs and arms. 2 lessons – arm movement for free style and backstroke. Exercises were performed for approximately 60% of the lesson.

We used 6 drill blocks: balance stationary floating and swimming in horizontal body position, using head and back muscles; balance stationary floating and swimming in sitting body position on the roll; balance stationary floating and swimming, using support reaction with hands; body moving in sitting position, using arm and legs forward and backward; body moving in laying position, in any direction; develop efficiency of arm pull

according to the palms, hands position; swimming movements.

Both stages (stationary floating and swimming) may be used together, depending on swimming skill level. All swimmers completed 36 exercises repeated 4 – 6 times or 2 -3 laps, depending on exercise nature.

In the first stage there are precursory exercises in the water to make support reaction in hands. In the beginning, it is advisable to explain, that arm pulls efficiency increases or decreases according to the palms position. Exercise "Handful of water" helps to feel it better. Palms position – fingers together, make shallow handful and move water to the right and to the left in the palm.

At the beginning of the class, during warming up it is recommended to allow swimmers run and jump into shallow and deep water, so that they could feel water resistance and that it is easier or more difficult to move depending on the water depth. Different kinds of water jogging: sideward, demi plie, "learning" with hands on water. Mouth breathing-in above water, slow breathing-out below water. Also exercises on finding support with hands in water are included at this stage. Sitting or standing in water, "making waves" with hand movements under water: with both hands – to the right, to the left; outward, inward; unbending hands – with palm upper part hand movement outward, back with palm inside part). Preparatory exercises help swimmers understand water physical qualities and to sense water resistance. Preparatory exercises also help build support with hands in the water, and build understanding of feeling the difference, in which palm position the swimmer feels the largest water resistance. The next exercise "Maintaining balance" could be done as a frolic (Fig.1).

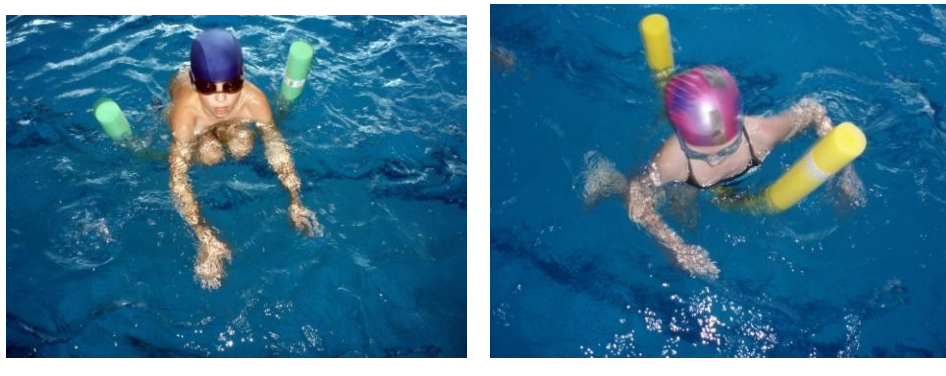

Figure 1. "Maintaining balance" in water

The task is to catch in the circle, straddling on the rod or to maintain balance squatting on the rod with underwater hand work help.

In the first stage attention is paid to the execution of exercises for body floating up and slipping – "Asterisk" and "Slipping".

The exercise "Asterisk" on the breast and on the back (Fig.2.) could be done several times during the class. Before doing that exercise on the breast – breath in; in water – breath-out with "bubbles" and as soon as shortness of breath arises, lift up head and breath – in.

Figure 2. "Asterisk" and "Moving asterisk"

Streamlining on the breast or on the back (Fig.3.) could be done also following competition method. Breath-in, push off from the floor or wall, in slipping – hands are put out from the head, bend at maximum and make longer distance! The streamlining could be done, tightening and relaxing body, as well as making one arm pull with hands in the streamline on the breast.

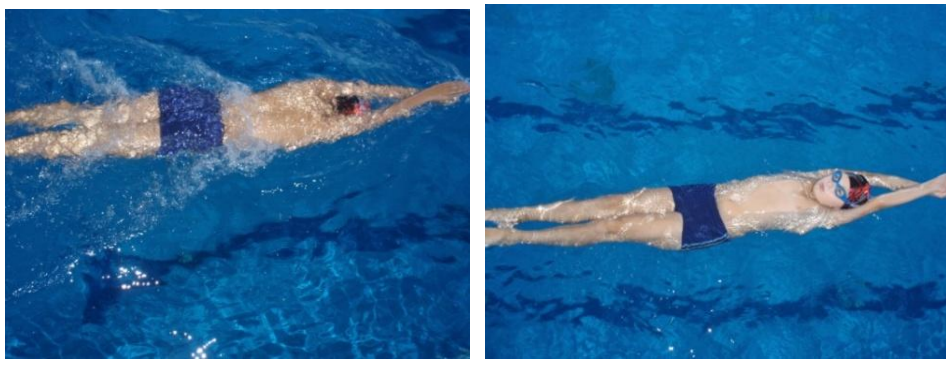

Figure 3. Streamlining on the breast or on the back

The exercises of the first stage are provided to help the swimmer not only to glide and to feel for the sensation of the body and water peculiarities, but also to be able to control them. For example, if the swimmer's legs go down, it should be clarified that, changing position of hands or head, this process could become slower, or toughening or relaxing muscles, the sensation and body position changes as well. After execution of the exercise it is necessary to speak about new feelings, which arisen during exercises.

In the second stage let's turn to the moving of the body and stimulating support reaction of the hands to the different directions. It will develop efficiency of one arm pull according to the palms, hands position; improves hands "water feeling", increases palms support in the water, in the result swimmer will feel and will be able to affect water resistance; to move the hands and forearms in different ways in the water; to feel and to improve hydrodynamic strength influence, and to strengthen palms. In the second stage the swimmer improves the feeling of balance and abilities to use hydrodynamic strengths.

Before participating in these exercises, the swimmer has to know how to lie above the water, for example "a star". It is not allowed to put yourself in tension, the breath has to be usual, rhythmic. To complete the exercises "with legs forward" easier, use small pull buoys between your legs in the sitting position, make round movements outward, back, forward with your palms (Fig.4.).

Figure 4. Swimming "sitting with your legs forward"

The same could be done in the position lying on the back; hands – over the head, by the turns or at the same time bend forearms. "Push" the water back with palms, swimming with legs forward (Fig.5.).

Figure 5. Swimming "lying on the back with legs forward"

One more relevant exercise: lying on the breast, hands – forward, by the turns or at the same time bend forearms over the head. "Push" the water back with palms, swimming rewards (Fig.6.).

Figure 6. Swimming rewards, lying abdominally

Results

After 12 lessons each group succumbed to 3 control exercises:

1. Gliding with the straight arms after pushing from the pools floor, (m)

2. Gliding with the straight arms after pushing from the pools floor and one long stroke with both hands (m);

3. 5 strokes with both hands on back with the pull buoy between legs (m) (Tab.1.)

Table 1.

Control exercise results after 12 lessons (m)

	Control (n=14)	Experimental (n=14)	
Gliding with straight arms after pushing from the pool floor, (m)	3,6±0,46	4,3±0,33	($\alpha < 0,05$)
Gliding with straight arms after pushing from the pool floor and one long stroke with both hands (m);	5,2±0,33	6,6±0,36	($\alpha < 0,05$)
5 strokes with both hands on back with the pool boy between legs (m)	10,01±0,39	12,83±0,42	($\alpha < 0,05$)

Discussion

Results indicate that when developing stroke efficiency it is better to spend time teaching "water feeling" and balance than just teaching the stroke.

Control exercises where employed for their increasing ability to incorporate balance and "water feeling." Control exercise one is balance only. Control exercise two adds a small component of "water feeling." Control Exercise three add a much larger component of "water feeling" and core balance as swimmers are not allowed to use their legs to balance their body.

Results show that after the first control exercise there is not a large difference between the control and the experimental group. However as you move through the control exercises the results become more prominent. The largest difference between the groups occurs in the third control exercise with over a 2 meter difference between the groups. This difference indicates that taking the time to learn balance and "water feeling" will develop more support throughout a swimmers pull leading to increase efficiency and less swimmer fatigue.

Recommendation

Regardless of swimming skills, water safety should be always in mind! The exercises are being done not only in the shallow swimming pool, but in the deep swimming pool as well, using supporting inventory, if necessary (floats, pull buoys, over sleeves).

Conclusions

Overall swimmer – beginner will learn how to understand unusual senses, and how to transfer your body in different directions. This is not traditional, but swimming lessons become more interesting. Exercises should be done step by step, although it is possible to change the exercise sequence, according to the swimmers individuality, qualification and situation. Using of the swimming exercises, will improve "water feeling" and feeling of the traction strength, and in the result support reaction during arm pull will be more efficient and therewith will increase movement efficiency and the speed of body movement.

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REVIEW PAPER

BUSINESS IN THE FITNESS FIELD

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Abstract

Business of any management decision cannot disregard the market trends and customer behavior in respect to the goods. Without that business aims are impossible to reach. It is therefore important to be informed about statistical parameters for a given area. Aim: to identify factors that contributes to the fitness areas of rapid development of Latvia. Subject: fitness club establishment and operation. Methods: a legal framework study, survey. Results: business in the field of fitness services has tendency to grow, but its growth is relatively small; fitness clubs are mainly established in Riga; there is a tendency in Latvia to increase the number of fitness clubs that are oriented to a particular contingent, such as women. Conclusions: to promote fitness club establishing outside of Riga - the largest cities of Latvia and county centers; to restore national statistical report on sports and should include data on the commerce in the fitness field; necessary to establish criteria for assessing the fitness club, introducing the star ranking; establishing new fitness clubs focused on medium-sized clubs without great luxury services, as well as use the chain of clubs, franchise club benefits; regular assessment of the demand and to offer only the most popular type of services, as well as trying to introduce new ones.

Keywords: *business, fitness, fitness club, marketing*.

Introduction

Twenty years have passed since the restored independency of the Republic of Latvia. During this time there have been very big changes in the economy of Republic. The privatization process is practically done; number of small and medium-sized enterprises in the state has grown. However, there is no shortage of negative moments. In 2008 the country was reflected in the economic crisis, which business is still trying to overcome - including the fitness area. Business, associated with fitness services tend to evolve all over the world. In Latvia fitness area is still weak, and its development pace is rather slow.

Material and methods

Statistics on business in the field of business clubs was summarized during the period from year 2006 – 2009. The analyzed indicators are quantity, income and services in Latvia. The main sources are *The International Health, Racquet & Sportsclub Association* (IHRSA) and *The Latvian Fitness and Health Promotion Association* (LFHPA). Business of any management decision cannot disregard the market trends and customer behavior in respect to the goods. Without that business aims are impossible to reach. It is therefore important to be informed about statistical parameters for a given area.

In order to set up and to manage companies that provide services in the field of sports, including fitness, knowledge about law, rules of Cabinet of Ministers that regulate business field and field of sports is essential. The key legal acts that fitness clubs should keep to, regulate following fields – creation and operation of business, payment of taxes and charges, the organization of accounting, submitting of annual reports, legal labor relations, labor protection, social security payment performance, organization of sports activities, certification of sports professionals etc. [2]. As leading can be marked out the *Law of Commerce* and *Law of Sports* [3, 4].

The fitness club - the company that offers services, enabling individuals to engage in various physical activities, and often provide additional services. Fitness clubs, by their legal status are individual merchants or limited liability companies or stock corporations [3].

According to *The International Health, Racquet & Sports club Association* (IHRSA) data, the number of Latvian fitness clubs tend to increase. (Fig. 1.) [5].

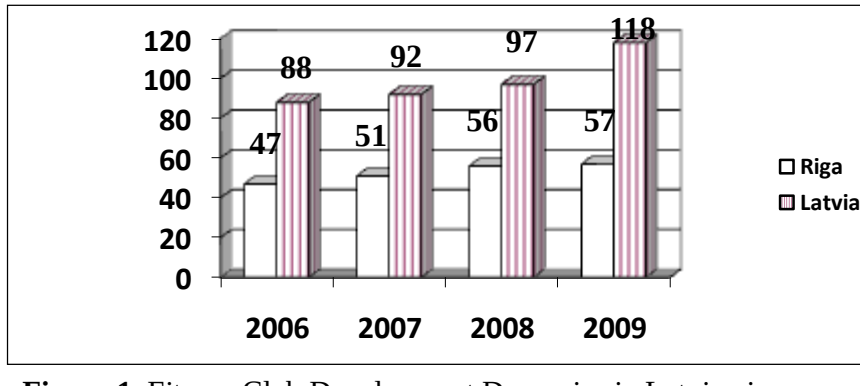

Figure 1. Fitness Club Development Dynamics in Latvian in years 2006 –2009

As shown in fig.1, the period from year 2006 – 2009 the number of fitness clubs in the capital city Riga and in general in Latvia has a tendency to increase.

Besides fitness services, the basic services, fitness clubs may also offer the following goods and services:

- recovery services - sauna, sports massage;
- intellectual goods - advice, information, methodology;
- socially everyday goods - sports equipment for sale, rent;
- tenancy - the gym, court, pool rows;
- goods for sports plays - sports competitions, sports shows;
- to ensure the safety of sports activities - presence of the on-duty instructor, lifeguard presence, insurance of sports goods etc. [1].

Fitness clubs can be classified according to indicators such as market segment, size, and range of services. Latvian Fitness and Health Promotion's Association (LFHPA) divides fitness clubs in Latvia as follows:

- chain - two or more branches.
- large - area ranging from 1200m^2;
- averages - area 500 m^2 to 1000m^2;
- small - area 400m^2 to 500m^2;
- luxury - especially high-service and service quality, additional services;
- basement fitness clubs - small size, limited range of services;
- women - services to women-only audience.

Precise fitness club breakdown trends can be found in Table 1.

Table 1.

Fitness club growth over the years according to the breakdown

	2006.	2007.	2008.	2009.
Chain clubs	1	-	1	-
Large clubs	-	-	-	-
Average clubs	1	2	-	-
Small clubs	-	-	1	1
Luxury clubs	1	1	1	1
Basement clubs	-	-	-	-
Women's clubs	-	1	2	2

As shown in table 1, luxury clubs were established continuously during the period in question. The largest number of clubs introduced were women's clubs.

An important indicator of the fitness industry development is income.

Fig. 2 shows the fitness club income year 2007 – 2009 [5].

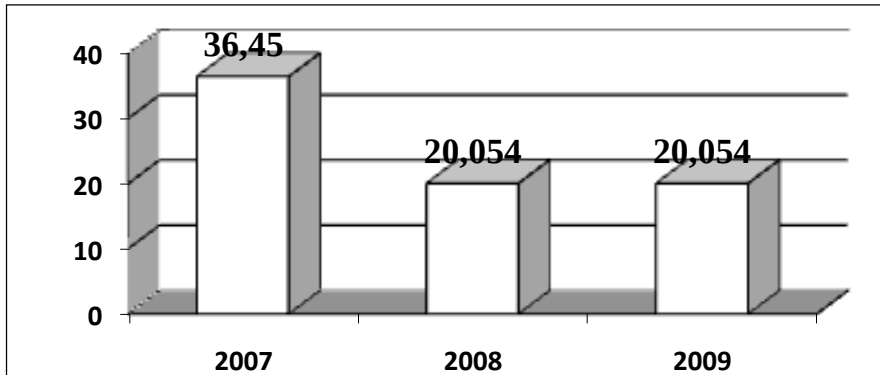

Figure 2. Fitness Club Income (US dollars)

According to the data of IHRSA for the period from 2007 - 2009, this industry revenue peak in Latvia - 36.45 million USA dollar reached in year 2007, while the 2008 and in 2009, despite the relatively large increase in the number of fitness clubs, revenue was without changes - 20.054 million. Such statistics could have several explanations: growth of number of sports clubs, decreased price of services, inaccurate records or false information provided.

Results

1. Business in the field of fitness services has a tendency to grow, but its growth is relatively small.
2. Fitness clubs are mainly established in Riga.
3. There is a tendency in Latvia to increase the number of fitness clubs that are oriented to a particular contingent, such as women.

Conclusion

1. To promote fitness club establishing outside of Riga - the largest cities of Latvia and county centers.
2. To a restore national statistical report on sports and should include data on the commerce in the fitness field.
3. Establish criteria for the assessment of fitness club, introducing the star ranking.
4. Establishing new fitness clubs focus on medium-sized clubs without great luxury services, as well as chain of clubs and franchise club benefits.

5. Regular assessment of the demands and to offer only the most popular type of services, as well as trying to introduce new ones.

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REVIEW PAPER

THE INVESTIGATION OF FACTORS, DETERMINING COACH FURTHER EDUCATION IN THE CONTEXT OF LIFE-LONG EDUCATION

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Abstract

Nowadays, the meaning of further education constantly widens, thus children should incessantly master new technologies, as well as adjust to changing job market. At present it is not possible to keep competitiveness, if knowledge base is not updated; therefore the popularity of gaining further education is growing up. Also sport specialists conclude that further education opens possibility to improve life and work quality. Continuous knowledge increase becomes an industry, encouraging people to learn more and more. Different independent learning programs, internet resources, materials of manuals and self-education courses provide an opportunity to improve the qualification in correspondence to the demands of labor market.

The main aim of our research was to find out factors which determine coach further education in the sphere of life-long education. For this purpose, we have created and distributed questionnaires for determining and evaluating such factors, and then we have analyzed the surveys. After summarizing the results, we concluded that for coaches in the sphere of life-long education it is necessary to improve professional knowledge, emphasizing latest innovations in sport science. During evaluation of factors that determine coach further education, we concluded that 55% of respondents (participants of the Project) pointed out self-motivation as the main factor for education, 58% of respondents (students of further education program) indicated Certification, which includes testing of sport specialist theoretical knowledge and professional acquirements and recognition of professional qualification of specialist in definite sport for the period of five years, 38% of respondents (students of Level 1 higher professional education program) indicated competitiveness in labor market, but 30% of

respondents (both the participants of the Project and students of Level 1 higher professional education program) asserted that determining factor for further education are the demands of the employer.

Keywords: *life-long education, further education, sports specialist*

Introduction

Life-long education is education process, taking place throughout the whole length of human life, in which everyone can obtain knowledge, skills and experience, raising or changing qualification, accordingly with the demands of labor market, interests or needs [7]. Life-long education or learning in the duration of the whole life has become the main instrument in increasing human competitiveness, the cause of which is extraordinary rapid emerging and dissemination of new knowledge.

We agree with pedagogue D.Lieģeniece, who points out that in these concepts can be observed several common elements: 1) strict confidence in internal value of education and learning in opposition to instrumental or usefulness value; 2) people have common wish to use their learning possibilities, notwithstanding age, gender or employability status; 3) is considered the importance of informal learning in different environments: in lecture halls, in informal activity, as well as in any other form of human activity [6].

The concept of "further education", in its turn, is the continuation of previously obtained education and the improvement of professional mastery in accordance with the demands of definite profession.

Implementing the model of Latvian growth and development, in the centre of education development politics is human being, who is able to obtain education in the length of the whole life.

In the context of life-long education are set forth several aims, which are topical to all inhabitants, depending on their age, living area, social belonging, as well as are adequate to interests and abilities of individuals and the needs of the development of national economy [2,7].

The investigations of the definitions, concerning life-long education and given by several authors, have been found the following common traits:

- the idea of life-long education influences secondary and higher education;
- it has widened the limits of formal education and takes place in groups, individually, or in agencies, through different kinds of learning activities (formal, non-formal, informal, adult education);

- it is based on the belief that individuals should be able to understand the value of life-long education in their life;
- life-long education promotes social equality;
- life-long education helps integration in labor market and life, performing different social roles [1,3,4,5,6].

Taking into account the mentioned insights, in the center of the research is investigation of coach further education in the context of life-long education.

The main aim of our research is to find out factors which determine coach further education in the sphere of life-long education. For this purpose we proceed with following tasks:

1. Find out coach opinion about the necessity of further education in the sphere of sport.
2. Analyze factors, promoting further education in the context of coach life-long education.

Materials and methods

The research was carried out in Latvian Academy of Sport Education during 2009/2010 academic year.

In the investigation participated 31 Level 1 higher professional education program students, 30 students of professional improvement education programs in the qualification of coach in a kind of sport, as well as in the course of the investigation were surveyed 36 participants of the seminar, conducted in the framework of professional improvement program "The improvement of the competence of pedagogues, involved in professional education" of ESF project "Competent sport pedagogue**.**

In our research we use following investigation methods: survey with the help of questionnaires and mathematical statistics.

Results and discussion

The studies of scientific literature reveal that several authors, who investigate adult education, as most valuable consider human resources (in the aspect of "person, who learns") [6], attaching great importance to different kinds of learning activities (formal, non-formal, informal, adult education) [3,4,6,8,9].

To evaluate coach opinion about the necessity of further education in the sphere of sport, with the help of the questionnaire were determined main factors in coach further education in the context of life-long education. Questionnaire consisted of 15 questions, which were divided into 3 blocks: the questions in Block 1 are connected with coach education in the context

of life-long education, in which in comparative aspect was evaluated the following information: respondent gender, mean age, previously obtained education, as well as the length of service in the sphere of sport; the questions in Block 2 are connected with the evaluation of the necessity of the improvement of professional competence; the questions in Block 3 are connected with main factors, determining further education and its positive and negative aspects. For the sake of comparison in Table 1 is reflected the information, provided by three groups of respondents, involved in the investigation, in which can be traced their diversity in mean age, which in the sphere of life-long education unambiguously can be evaluated positively (Tab.1).

Table 1.

Mean age of respondents and their gender

	The participants of the project	*Students of further education program*	*Students of Level 1 higher professional education program*
Mean age (years)	44.5	28	32
Gender	Female: 24, male: 12	Female: 11, male: 20	Female: 7, male: 23

Evaluating information about respondent previous education in the sphere of sport, we conclude that 97% participants of the ESF project have higher education, and the majority of them have obtained it in Latvian Academy of Sport Education, 45% of students of further education program, in their turn, have obtained higher education in other Latvian higher education institutions, and 23% of the students of Level 1 higher professional education program previously obtained higher education is not connected with the sphere of sport.

Analyzing respondent length of service in the sphere of sport can be observed significant differences in the duration of it. For 45% of participants of the project the length of service in the sphere of sport exceeded 21 year, in their turn, for 27% participants of the project it exceeded the limits of 11 – 20 years.

On the other hand, 77% of respondents (students of further education program) un 23% of respondents (students of Level 1 higher professional education program), the length of service in the sphere of sport is comparatively small (from 0 to 5 years) (Tab.2).

Table 2.

Previously obtained higher education and the years of service in the sphere of sports

	The participants of the project *36*	*Students of further education program 31*	*Students of Level 1 higher professional education program 30*
Higher education	97%	45%	23%
Years of service in the sphere of sports	From 11 to 20years (27%) More than 21 (45%)	From 0 to 5 years (77%)	From 0 to 5 years (83%)

In the analysis of Block 2 of the questionnaire, directly connected with the improvement of Professional competence in the process of further education, our main interest was about the opinions of respondents and their self-evaluation, concerning the necessity to improve their professional competence.

Answers, given to the question – How do you evaluate your theoretical professional knowledge? - show that 80% of respondents (participants of the project), 76% of respondents (students of further education program) and 54% of respondents (students of Level 1 higher professional education program) their theoretical knowledge consider as sufficient, but would better improve it (Fig.1.).

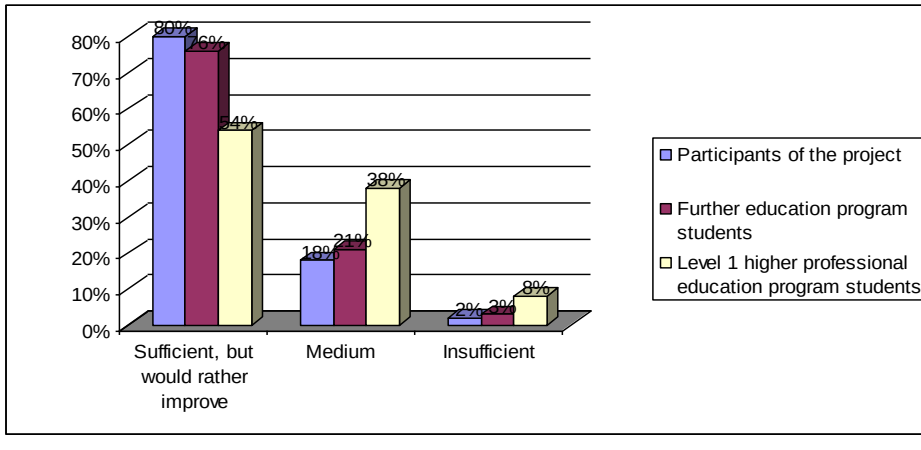

Figure 1. Professional knowledge in the sphere of sport

According to the results of self-assessment we conclude that the coaches in study process in the sphere of life-long education need to improve their professional knowledge, especially paying attention to the latest innovations in the sphere of Sport science. The coaches expressed varied opinion about the possibilities and pre-requisites of provided further education, they, for example, emphasized that it is important to obtain knowledge, which raises the self-esteem and amplifies entrepreneurship; improve professional competence, physical and mental health, develop and put in order the system of values, as well as increase the understanding and promote personal attitude to the events, happening in the society.

To the question of the questionnaire „How do you evaluate your professional skills?" (Fig.2.).

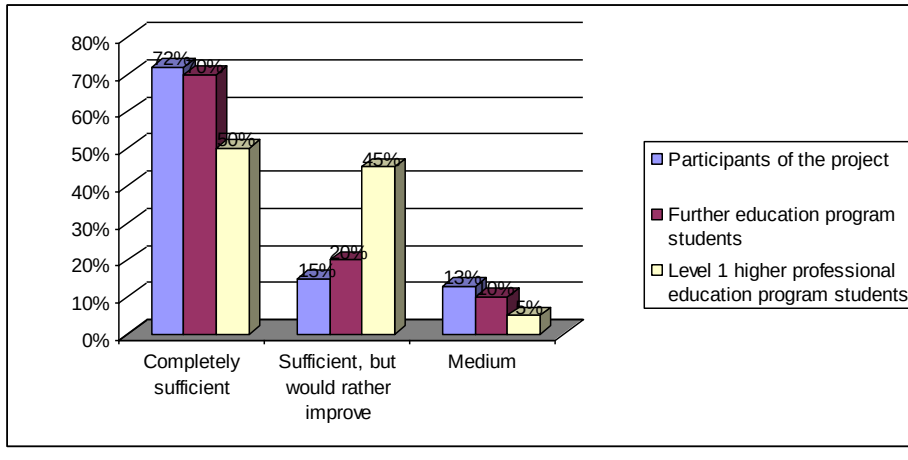

Figure 2. Professional skills in the sphere of sports

72% of respondents (the participants of the project), 70% of respondents (students of further education program) and 50% of respondents (students of Level 1 higher professional education program) their professional skills consider as sufficient, in their turn only 15% (the participants of the project), 20% (students of further education program) and 45% (students of Level 1 higher professional education program) are willing to improve their professional skills, what obviously proves coach high self-evaluation, concerning the necessity of further education. During the process of our research we also evaluated respondent opinion about everyday learning activities, which is scientific literature is defined as meaningful experience enriching process in any life situation (family life, free time and everyday working life) [2].

Answers, given to the question – Do you engage in physical activities and everyday learning activities? (indicating „Yes" or „No") in all three in the investigation involved groups of respondents were affirmative (Fig. 3. 4.);

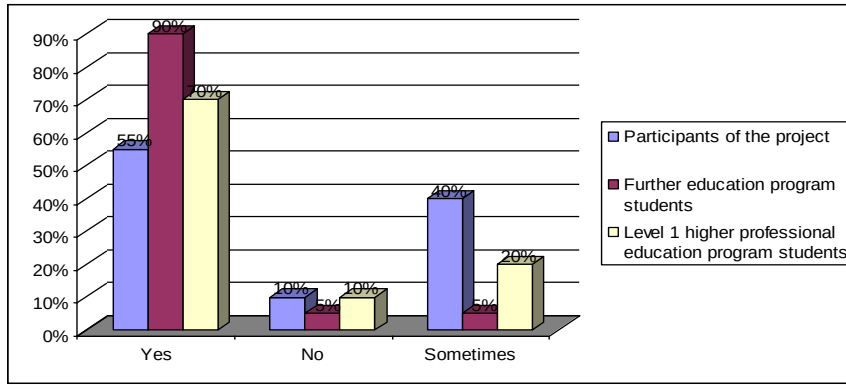

Figure 3. Regular pursuing of physical activities

Above figures reveal the following facts:

- 55% of project participants pursue physical activities and 60% participate in everyday learning activities;
- 90% of further education program students pursue physical activities, what can be explained, taking into account average age of respondents, if compared to other groups, and 70% participate in everyday learning activities;

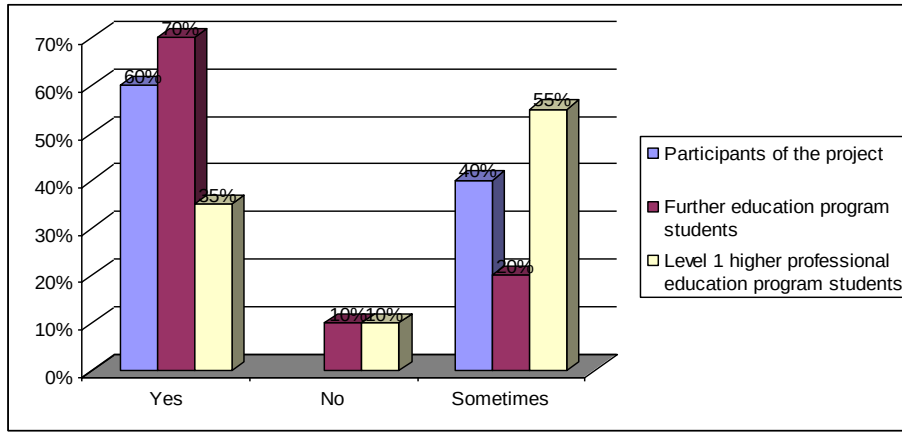

Figure 4. Participation in everyday learning activities

- 70% of Level 1 higher professional education program students pursue physical activities, and only 35% everyday learning activities.

The analysis of Block 3 of the questionnaire allowed determining factors in coach further education in the sphere of sport (Figure 5).

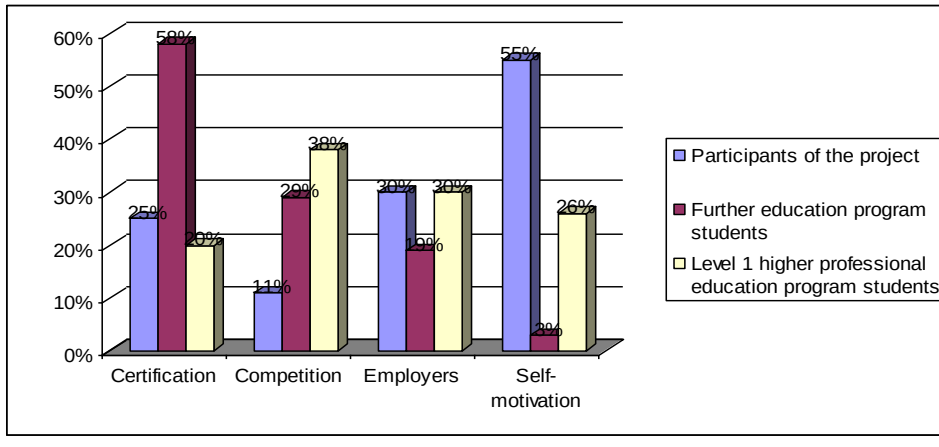

Figure 5. Factors, motivating further education in the sphere of sport

The analysis of factors, motivating further education, revealed that 55% participants of the project as determining factor for education indicate self-motivation, as well as the possibility improve their professional competence, indicating the possibility to educate themselves without paying tuition fee, because the project is financed from European foundation. 58% of the students of Further education program as the determining factor for education acknowledge Certification, which, according to the Regulations of the Cabinet of Ministers No. 77 „Regulations about the order of Certification of sport specialists and requirements for sport specialists" **[**6] should be met to work in the sphere of sport; in their turn, 38% of respondents (students of Level 1 higher professional education program) as important factor consider competition in labor market, and 30% of respondents (both the participants of the project and students of Level 1 higher professional education program) indicate that determining factor for education were the requirements of the employer.

Conclusions

- First, as a positive factor in the process of further education coaches consider to evaluate:

- knowledge obtained about innovations in sport education, raising their self-confidence and promotes self-motivation for further professional activity;
- possibilities for experience exchange in discussions with coaches of different sports.

Coaches also point out that in the process of further education it is necessary to:

- improve professional competence, and civic responsibility (knowledge and skills in particular sport);
- develop and put in order the system of values, which could help in further professional activity.

Most of the coaches assert that the importance of further education is connected with the role of professional activity as value or place in their lives, as well as with the factors, determining the importance of professional work: needs, which can be satisfied in work, and which act as the motivators for further education.

Second, evaluating factors which promote coach further education in the context of life-long education, is found that 58 % of respondents as the most important factor for further education point out Certification, which includes testing sport specialist theoretical knowledge and professional acquirements, and the issuing of professional qualification Certificate in particular kind of sport for the period of five years, ensuring the possibility to work in the sphere of sport, but 55% of respondents, in their turn, as the most important factor for further education consider self-motivation, as well as possibility to enhance one's professional competence.

Generally, sport specialist further education in the context of life-long learning is mainly connected with the perspectives of the employability, as well as with the possibilities of self-realization and self-actualization, because in the process of life-long education is enhanced knowledge about innovations in the sphere of sport, improved professional competence and civic responsibility.

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REVIEW PAPER

SEDENTARY LIVING AND THE LEVEL OF PHYSICAL ACTIVITY IN LATVIA: ANALYSIS AND PROBLEM

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Abstract

The case for exercise and physical health is now widely accepted by medical authorities across the world. On the one hand a product of modern life is increased living standards and improved quality of life. On the other hand, such modern developments as industrialization and computerization have resulted in reduced physical exertion, which has an adverse effect upon people's health. The case for exercise and health has primarily been made on its impact on diseases such coronary heart disease, obesity and diabetes. More than a half of all deaths in Latvia have been caused by cardio-vascular diseases (CVDs). The data are alarming because sedentary living is widespread and it increases rapidly. Most of the population of Latvia engage in physical activities in amounts that are less than sufficient. Physical activity is an essential health affecting factor at any age – it is one of the most effective ways to prevent high level of death from CVDs.

The aim of the study was to explore physical activity level in different ages in Latvia and its effect on the main cause of death – cardio-vascular diseases. To achieve the target we analyzed and investigated more than eleven English and Latvian literature sources.

Keywords: *sedentary living, cardio-vascular diseases, mortality, Latvia, Europe, age, sex.*

Introduction

Higher living standards and improved quality of life resulting from the rapid integration of the achievements of science and technology into the life of modern man have affected man's life style in different ways. Unfortunately, not all of these effects benefit the human body and health. Life has become physically less demanding. With less effort and less

physical activity needed our modern life tends to facilitate immobility among general population [9]. Quality of life, physical activity and health are interrelated aspects. It has been proved that immobility facilitates the development of a number of chronic diseases, including cardio-vascular diseases, which are the principal cause of death in Latvia and other European countries [4,9].

Materials and methods

During our investigation we analyzed data from associated literature. We analyzed data from Euro barometer (2010), data from World Health Organization Web site, literature sources about European Cardiovascular Disease Statistics, data and statistics from Latvian Public Health Agency and Latvian Health and Economic Center. Totally, we investigated and analyzed more than 11 literature sources.

Results

The most common causes of ill health, disability and mortality in Latvia are non-communicable diseases (Fig.1) [5]. More than a half of all deaths in Latvia have been caused by cardio-vascular diseases.

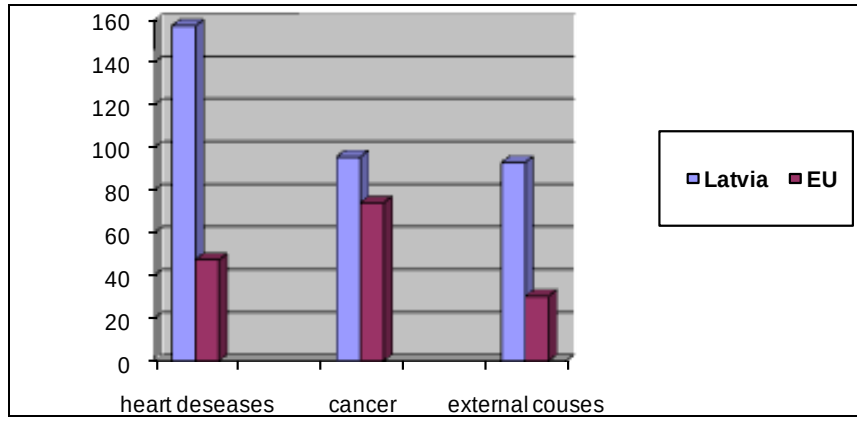

Figure 1. Death causes in Latvia and EU per 100 000 persons [1]

In Figure 2 we showed that the death rates resulting from cardio-vascular diseases in population up to the age of 45 to 74 are higher than the corresponding average rates in the European Union. To approximate the average CVD-caused death rates in the European Union Latvia must diminish its CVD-caused mortality rate at least by 50% [6,8].

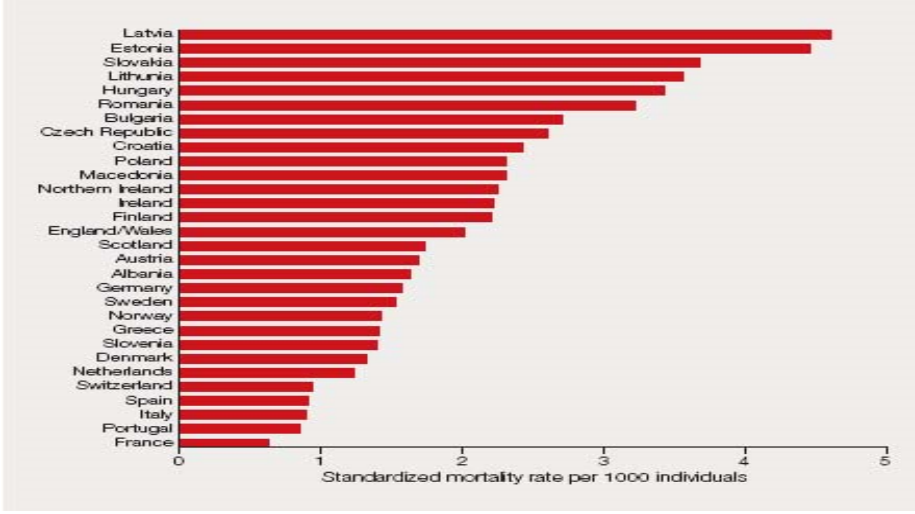

Figure 2. The age-standardized mortality rates for CVD in 2000 for population aged 45 to 74 years in different European countries [4]

Latvian life expectancy is among the lowest in the European Union - 68.1 years for men and 78 years for women. Latvian, 48% men and 28% of women die within the age of 65 years. In 2010 in Latvia 30,046 people died (about 118 death more than in 2009), but 19 000 were born [10]. In Figure Nr.3 we can see causes of death in the European Union in males and females under the age of 75 years. CVDs is still in high level in the European Union, but not as high as in Latvia.

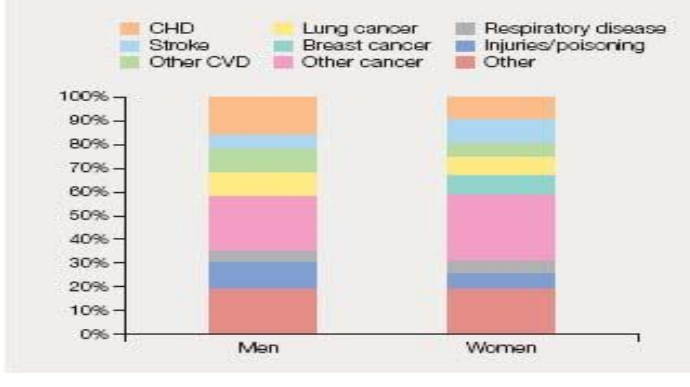

Figure 3. Causes of death in the European Union in males and females under the age of 75 years [4]

The statistics showed that in Latvia the mortality rates for CVDs are slightly decreasing, but it is still in alarming level (Figure 4). In 1990 it is 58.1 % of all deaths are caused by CVDs; 56.2 % in 1995; and 55.9 % in 2004 [3]**.**

The data for 2006 reported around 65,000 newly- registered cases and the total number of cases under observation 375,000 in 2006. In 2009 the mortality rates for CVD were 16,077 and in 2010 – 16 278 people (7249 men and 9209 women). However, more than 9000 of those would not have happened had there been no risk factors involved [5]. CVD deaths tend to increase starting from the age of 35 (especially among men); the tendency of growing mortality rates becomes more pronounced with age.

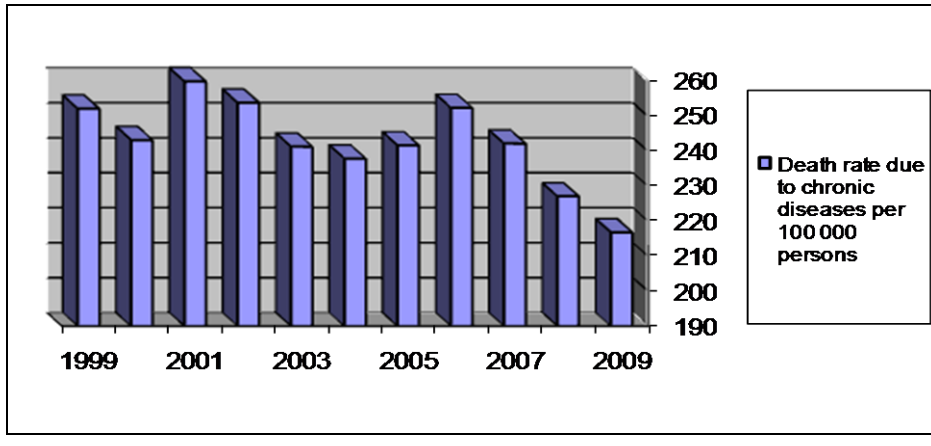

Figure 4. Death rate due to chronic diseases in Latvia per 100 000 persons [6]

The most effective prevention of CVDs is engaging in regular physical activity, giving up the habit of smoking, consumption of healthy food and weight control [4,9].

Most of the population of Latvia engage in physical activities in amounts that are less than sufficient [1].

When considering peoples' models of spending free time a tendency towards immobility can be observed. In Figure 5 we can see that at leisure people typically tend sedentary - during the interview 52% of the men and 50% of the women admitted their preference for reading and watching television [5].

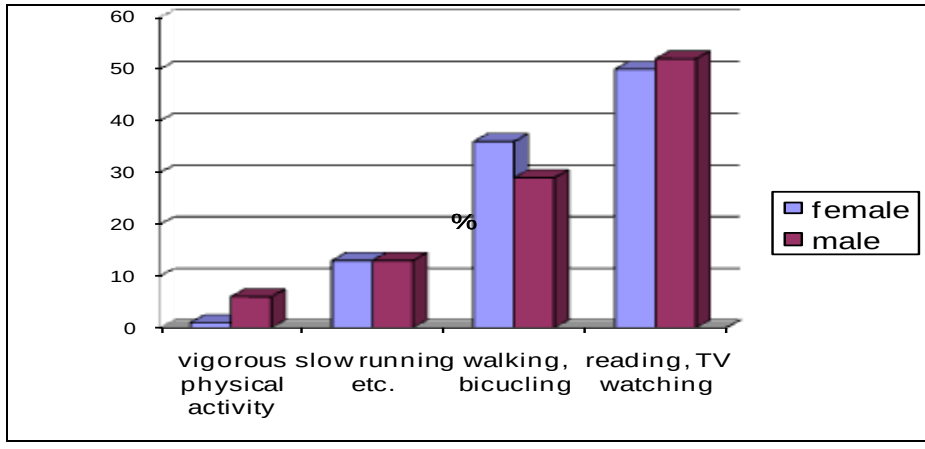

Figure 5. Leisure activities in Latvia in 2006 *(FINBALT survey)*

The health of the community is determined by the lifestyle of an individual. One of the decisive factors is the amount of physical activity the person engages in on daily bases. Physical activity is an essential health affecting factor at any age. According to the data available 40–60% of the EU population are immobile. Growing numbers of data emphasize the significance of physical activities for the elderly. Though it can be argued that in old age people actually enjoy the consequences of the lifestyle they adhered to while middle aged or possibly even earlier in their youth. The amount of physical activities that the elderly engage in is essential for their physical health and their ability to manage their own life [10].

According to the research of the health affecting habits of the population of Latvia carried out in 2006 on average every third person (constituting 38% of men and 30% of women), exercised for at least 30 minutes a day 2-3 times a week or more frequently.

In 2008 35.2 % of the population engaged in physical activities for at least half an hour a day at 2-3 or more times a week, the amounts being considerably smaller among women (30.4%) than men (41.6%) [8].

Euro barometer [2] statistics shows that Latvia is one of the European countries where 44% of people are active 'regularly'.

The amounts of physical activity that men and women generally engage in are very similar. Men are slightly more active than women. 63% of men exercise at least once a week compared with 54% of female respondents. Men are also more active than women in the 70+ age group: 31% of men in this group exercise regularly, as opposed to 24% of women.

But the trend is reversed in the 40-54 age bracket, in which only 24% of men exercise regularly compared with 28% of women, and 62% of men exercise at least once a week ('regularly' or 'with some regularity'), as opposed to 68% of women.

Typically physical activity decreases with age, but not among those who exercise regularly. Although regular exercise decreases after the 15-24 age groups (32%), it then stabilizes at 26-27% for all other age categories. This clearly shows that the majority of those who form a regular exercise pattern early on carry it on throughout their lives. The data suggests the importance of setting a pattern of exercising early on in life, as the majority of people then appear to continue exercising well into their retirement. Only 7% of 15-24 year-olds never exercise at all, as opposed to 27% of respondents in the 70+ group [2].

The positive aspects of maintaining physical activity bring psychological (life satisfaction) and physical, as well as physiological and social benefits (World Health Organization). Strong evidence demonstrates that regular physical activity is an effective means for diminishing and eliminating a number of functional disorders related to the process of aging. As stated in Global Recommendations on Physical Activity for Health adopted by the WHO in 2002, healthy adults should engage in at least 30 minutes of moderate-intensity aerobic physical activity per day throughout the week or at least in 20 minutes of vigorous-intensity aerobic physical activity 3 days per week. The aerobic activity may be performed in bouts of at least 10 minutes duration; likewise the necessary duration of physical activity may be achieved by moderate-intensity aerobic physical activity and vigorous-intensity aerobic physical activity following each other in regular pattern. Besides, on 2 -3 days a week time should be devoted to muscle-strengthening and stamina-improving activities [1].

Discussion

The most common causes of ill health, disability and mortality in Latvia are non-communicable diseases. One of the most effective prevention of CVDs is engaging in regular physical activity. To explore data of physical activity level in Latvia we came to a conclusion that most of the population of Latvia engage in physical activities in amounts that are less than sufficient. The amount of physical activity level decreases with the age and men and women in Latvia generally engage similar level of physical activity.

Conclusions

We have made following conclusions of our investigation:

1. The most common causes of ill health, disability and mortality in Latvia are non-communicable diseases.
2. More than a half of all deaths in Latvia have been caused by cardio-vascular diseases and up to the 64 years of age death by CVDs are 3 times higher than the corresponding average rates in the European Union.
3. Latvian life expectancy is among the lowest in the European Union - 68.1 years for men and 78 years for women.
4. Physical activity is an essential health affecting factor at any age – it is one of the most effective ways to prevent high level of death from CVDs.
5. Latvia is one of the European countries where 44% of people are active 'regularly' – they exercises at least 5 times a week.
6. Typically physical activity decreases with age and in Latvia men and women generally engage in similar level of physical activity.

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REVIEW PAPER

DISABLED CHILDREN IN GENERAL EDUCATION SCHOOL

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Abstract

Teachers of Latvia are facing the fact that many children in their classes require special attention. Factors that potentially could limit the integration process of disabled children into school environment should be carefully analyzed. Definitely, one of these factors is a teacher. The main aim of our research was to find out teachers' opinion about the integration of disabled children in general education school. For this purpose we have analyzed available sources in the literature. Finally, we have visualized results with the help of mathematical statistics. Results showed that 62% of respondents have positive view of disabled children integration in today's society in Latvia. Majority of respondents defined disabled children as individuals who are having different health disorders, with deviations from health norms, and some of them are not able to learn in a general education school. Only 28% of the respondents think that their school is ready to accept disabled children, and 75% of them think that boarding schools are necessary. In conclusion, our investigation to show that respondents assert that the integration process in Latvia is very slow and not enough discussed, therefore people should be informed accordingly about this problem. The respondents also stated that disabled children have their physical and psychological peculiarities, and therefore they need a special education and study system, as well as adjusted program corresponding to their abilities. Special attention should be aimed to the care and development of special approach in the study process.

Keywords: *study process, disabled children, children with language disorders, integration, inclusive education*

Introduction

According to speech specialist experience there are quite many children having different speech disturbances in general education institutions, and the number is increasing (Tūbele, 2002). For disabled

children to integrate in the environment of general education school we should be certain that nobody will be a loser, also the talented children. Every child should have the necessary optimal learning and educative conditions.

Everyone in any country has the rights to get wholesome education. Nowadays the attitude towards education has changed, it allows us be aware of the value of education what in broader meaning is education for everybody. As we know, the provision of special education needs in inclusive environment in Latvia is one of the priority directions of education policy, it is included in the document *Education Development Basic Directions 2007 – 2013.* Every member of society should acquire inclusive thinking what, firstly, means overcoming of difficulties and acceptance of differences (physical, mental and social) in people **(**Koķe, 2009)**.**

The main aim of our research is to find out teachers' opinion about the integration of disabled children in general education school.

Materials and methods

Our investigation consisted of three main sessions:

1. Analysis of the literary sources;
2. Questionnaire and the processing of the obtained data;
3. Method of mathematical statistics.

Inclusive education is conceptually completely new approach. In the process of integration some disabled children are included into general education school system where both school and inclusive society almost do not change. But the inclusive education is the process where both school and society are changing. Every child gets high assessment, ignoring the seriousness of his/her problem. The problems are considered and they are worked on. Every child has rights to belong to the same society as all others. It could be considered as the school of new thinking, able to accept such children and where there are teachers who could work with them individually. It means to realize the ideals about society for everybody practically.

Research shows that a disabled child develops more successfully in general education school if his/her needs are satisfied and the necessary support is given (Nīmante, 2008).

Schools are developing various support systems. Every school develops its own support system that suits this school the best. These systems can be also called as support models.

The inclusive possibilities for disabled children in general education

schools in Latvia are carried out if a school provides availability, accepting all children, if a school changes, changing its work organization and study process, offering wide range of program (special, for minorities, correction), if they provide all-inclusive support for all children in the study process, developing various support systems – models at school, cooperate with parents, provide children possibilities of out-of-class activities and in the process of a school development broaden the opportunities for including every child in the school (Nīmante, 2008, May).

Integration is the process where disabled children are included in the environment of normally developed children, involving them in the classrooms together with other children, satisfying their special needs. This process includes environmental, social and functional integration. The term disabled children appeared when these children were started to integrate in general education schools. Today teachers have stated that there are many such children who need special attention in their classes. However, Sarmite Tūbele (2002), Dita Nīmante (2008) noted that the children having normal intellect and normal health, but having behavioral problems and therefore they disturb work in the class may also have special needs (Pedagoģijas terminu skaidrojošā vārdnīca, 2000).

There always are the children who integrate easily and the children who feel better in a special school, as well as there are the children for whom it is necessary to learn at home or in an institution of special medical treatment. Society itself is not ready to integrate unhealthy children, especially if we speak about medium serious and very serious mental disability. People cannot overcome themselves. A child gets accustomed to the surrounding world, but people do not get accustomed to him/her (Tihomirova, 2008).

The world-known expert on inclusive education and the Professor of Cambridge University Lani Floriani thinks that inclusion, simply saying, is a possibility to participate in education process, education program and school life.

Inclusive education is an ideal to strive for, a process which is infinite. Inclusive education is opposite to isolation – at school, in a class and in a lesson. Inclusive education creates a possibility to learn and participate in the studies and out-of-class life for all children (Nīmante, 2007/2008).

Attention should be paid to the factors which could limit the process of integration, and one of the factors is a teacher. Therefore once more the teacher training process should be emphasized, as all future teachers should

be given a possibility to obtain knowledge in special pedagogy, psychology, medicine and social pedagogy (Tihomirova, 2008). The survey was conducted to analyze the situation in Latvian schools for types: children with special needs, children with language disorders. The survey was carried out in five Latvian regions: Kurzeme, Zemgale, Riga, Vidzeme and Latgale from August 2007 to October 2008. The survey involved teachers from 26 areas. Totally 560 people from 290 Latvian schools were interviewed. They participated in various professions: sports specialists - 320 people, other 140 - Latvian, English, the Russian language, Visual Art, Music, Math, Social Science, Cultural History, Informatics, Physics, Chemistry, Science, Crafts, Dance, school, extended day teachers and social educators, nurses, School Director, Extracurricular Work Vice Principal, speech therapist.

The questionnaires were used in two ways: working groups, the researcher's presence and without. They included various types of questions (after the issue of classification Dobreņkovas 1972).

Results

According to the ninth question "What do you mean by the expression „a child of special needs" respondents expressed their opinions that it is a child with a variety of health problems. He is special because it could be due to various illnesses and a child's development is a sizable deviation from the health standards.

The respondents considered it is important to understand the child's problem and help him with adapting. Some of those kids can`t learn in a usual class, they have a sense of failure, difficulties in communication, which makes it difficult to keep daily duties.

The respondents found out that children with special needs have their own physical and psychological characteristics, and, therefore they need special education and teaching system, individual program according to their abilities. (Fig.1).

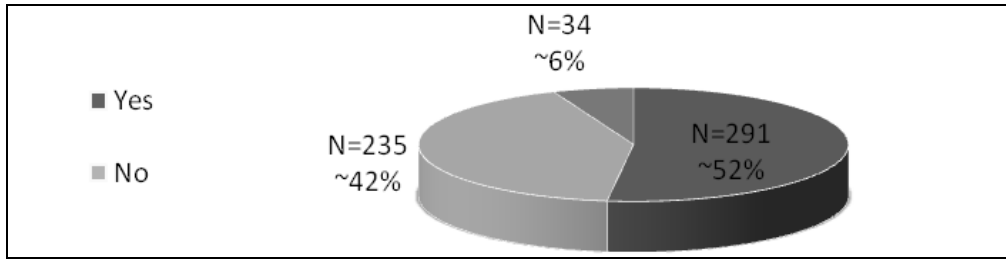

Figure 1. Answers to question „Can you help disable students in a special way?" n=560

52% of respondents believe that they are able to provide special assistance for these children, while 42% find that they can`t because of a lack of knowledge, special training and other causes. 6% could not give their comments

Also 34% say that this matter is not highlighted enough in literature, 32% do not know or do not pay attention to them because such children are not engaged.

51% (19% +37%) of respondents are ready to share 5 min for the child's special needs. 23% - 10 minutes, only 5% - more time, and 14% did not know what to say (Fig.2).

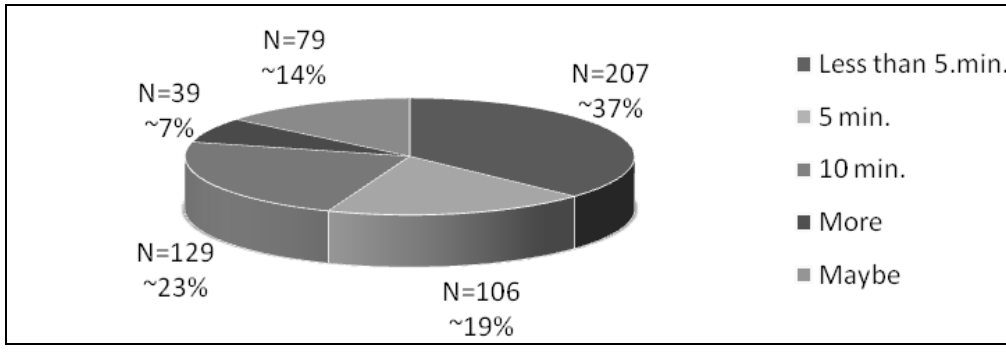

Figure 2. Answers to question „How much time can you spend for such a help?" n=560

Approximately 52% of respondents would like to work in the same room with another teacher, while 43% believe that it would impede the learning process because it disturbs other students' attention. 5% do not think about it because the answer was – „I do not know" (Fig.3).

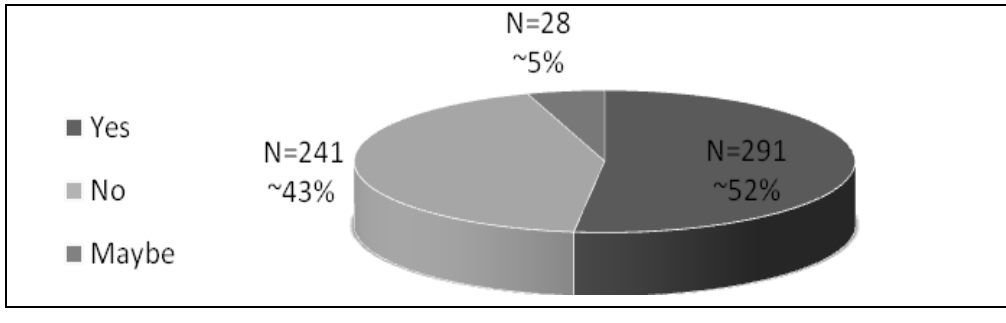

Figure 3. Answers to question „Would you like to share a classroom with another teacher?" n=560

The respondents believe that their child with special needs have to learn in a special boarding school (39%), in a special class of a secondary school (45%), and ordinary classes (16%) (Fig.4).

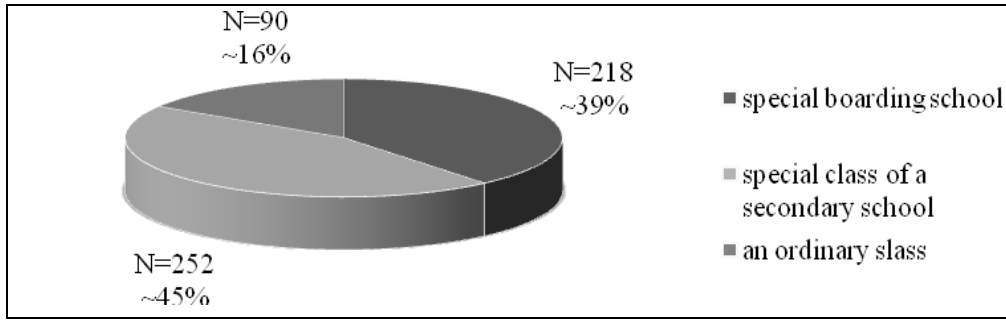

Figure 4. Answers to question „What is your opinion about the best place for disable students studying?" n=560

59% of respondents positively evaluated the idea of opening special classes in mainstream schools, 35% had negative opinion about this idea and 6% did not express their views (Fig.5).

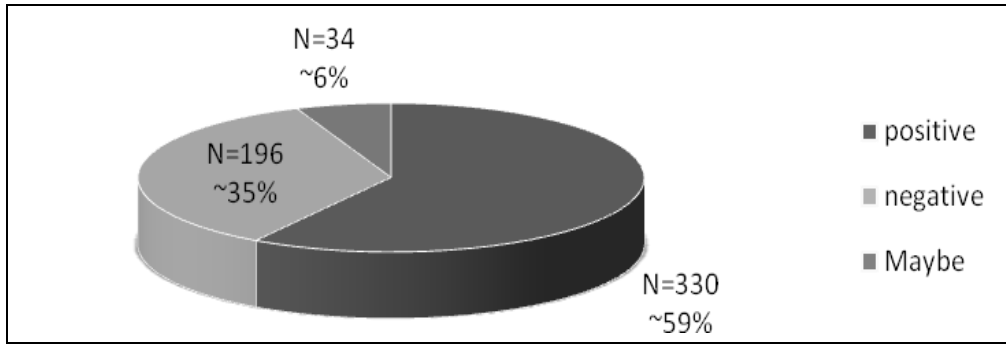

Figure 5. Answers to question „What is your opinion about establishing special classes in a secondary school?" n=560

51% respondents consider that not all children with disabilities are guaranteed equal opportunity to acquire basic education, and 7% could not accurately speak on the subject.

As for question № 15 „What do you mean by the expression „the child with language impairment", respondents answered that they mean a child with language development disorders. Such children have problem of stuttering, and they could have physical problems with articulation and

hearing disorders. The most common problems we meet are concentration and psychological disorders. There are language problems, perceptual disorders, distorted sound, pronunciation, and literacy. These children hear one thing, pronounced another one, write in a different way. They do not know how to express their thoughts for different reasons. They find difficult to communicate with others. These children often use gestures and pantomime.

According to question № 17 on „In your opinion, what are the features of a child with language impairment?" respondents answered that such children may have a phobia of speech, different types of fear, feeling, rhythm and sense of self-esteem problems. They are more introverts, and think differently moving. Moreover, they think and move in another way demonstrating weak concentration, orientation in time and space.

They suffer with inadequate development of small motor skills, and often incorrect breathing. They have learning difficulties because they can not adequately meet the teacher's tasks, without extra explanation, slowly learning the subject matter, often not perceiving a given material; with difficulty they receive information and prepare for the answer for a long time. They are "bad" language speakers unable to construct a sentence, written with mistakes, reading slowly, ending with the pronounced clearly without it such students. Need more time for various skill-building.

62% of respondents believe that these children's integration in today's changing society is welcome, 18%of respondents' opinions are negative, but 20% did not respond at all. Perhaps, many of them didn't express views on this matter because the integration process is not highlighted enough. Some respondents have never thought of it.

The thoughts are bilateral. On the one hand, integration is needed, on the other hand, it is very difficult to realize. Integration is difficult because of the need for more government aid and public interest. Respondents considered that these children are "almost like everyone else" being a part of our society. Every child has the right to live a normal, fruitful life, to be a vital part of community. Integration is beneficial as the child's development it would be a huge benefit. It will help the children develop both physically and mentally. Children should be integrated at an early age, helping them to become members.

Integration becomes more advanced. But the process is slow. The public should know that there are some people who learn to understand and help them. Of course, there are many specialists who help the children's integration. But most of people are not ready to accept the children and they don't consider such children's useful members of our society. Today this

process is slowing and because of teenagers' cruelty, teenage relationship it is almost impossible.

Schoolmasters and classmates often treat them inadequately. There is much spoken about it, but our country is not ready to accept children with special needs. The issues slowing down the process are such as money matters, teachers with special education and special programs, appropriate conditions, special assistance, less pupils in the classroom. It is necessary to create circumstances for such children to participate in society's fruitful life.

28% of respondents believe that their school is ready to accept children with special needs, while 40% find that it cannot because of a lack of finance, specialized training and other causes. 32% could not give any comments.

Results

We have obtained following facts from the results of our investigation:

- 62% of respondents have positive view of disabled children integration in today's society in Latvia.
- Majority of respondents defined disabled children as individuals who are having different health disorders, with deviations from health norms, and some of them are not able to learn in a general education school.
- The respondents understand the expression „a child having language disorders", that such child has language development disorders. Such children have difficulties to communicate with other people around. They often use gestures and facial expressions. They need a speech therapist's help and special attention.
- The respondents could give special help to these children (51%), could devote 5 min. and less time during a lesson to it (51%) or 10 min. (23%), and could work in one room together with an assistant teacher.
- Only 28% of the respondents think that their school is ready to accept disabled children, and, of course, 75% of them think that boarding schools are necessary.

Conclusions

Our investigation defined following facts:

- Majority of respondents assert that the integration process in Latvia is very slow and not enough discussed, and that society is not interested in this problem, therefore people should be informed accordingly. A healthy attitude towards each other should be developed.
- Society should be informed by organizing events together.

- The respondents state that a disabled child has his/her physical and psychological peculiarities, and therefore they need a special education and study system, separate program corresponding to his/her abilities. A special attention should be paid to care and special approach in the study process. The respondents emphasize that additional teachers are needed, as well as special equipment and adapted environment.
- There is a lack of qualified teachers able to work with disabled children.
- New effective further education program for new teachers should be developed.
- These program should be included in the higher education curriculum for new specialists.

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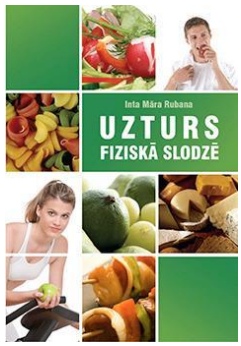
SHORT COMMUNICATION



REVIEW OF INTA MĀRA RUBANA BOOK "NUTRITION IN PHYSICAL LOAD"

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Abstract

A book by Inta Māra Rubana "Nutrition in physical load" ("Raka", Riga, 2010, p. 200, ISBN 978-9984-46-095-6) deals with dietetics in sport. It is addressed to sports professionals, athletes and all physically active persons. In the book are explained basic concepts of biochemistry: carbohydrates, fats, proteins, vitamins, ATP and its resynthesis, principles of muscle work, etc. Such dietetics basic principles as types of body composition, calculation of BMI, daily energy consumption are described. In the monograph are discussed a wide variety of challenging topics, such as vegetarian diet, functional food for athletes, alcohol and sports relationships, ergogenic substances (carnitine, creatine, caffeine, antioxidants, etc.). The book presents a detailed analysis of nutrition during the competition period, and young athlete nutrition analysis; moreover, it introduces a lot of detailed specific menus. The monograph reveals characteristic features of diets designed for women – athletes and presents problems requiring special attention. In the book is discussed immunity stimulation by diet, diet influence on concentration ability and mood, as well as food consumption disorders – anorexia and bulimia. Practical recommendations and examples of drawing up menus are extremely valuable. Having read the book, the reader broadens horizons about processes happening in muscles during exercise and the ways of energy production, gains insights in sport dietetics, strengthens knowledge base about healthy food intake, and develops practical skills of properly drawing up menus.

Key words: dietetics, nutrition, athlete's nutrition.

A new book "Nutriment in physical loads" has been issued. Author of this book is Doctor of Biology Inta Māra Rubana, professor in LASE. Book

deals with dietetics in sport and is addressed to sports professionals, athletes and all physically active persons.

Saying "You are what you eat" is known since antiquity. Nutrition is a fundamental condition for the athlete to achieve high results. Often inadequate or unbalanced nutrition becomes an obstacle to reach the expected results or leads to serious health disorders. Therefore, athletes should pay great attention to diets. There is a whole branch of science – sports dietetics, the study of athletes' diets. This publication aims to help sports professionals, athletes and anyone physically active to understand process of the transfer of substances and energy during exercise, investigate the athlete's nutritional needs during different types of loads and select the appropriate nutrition without risk to health.

At the beginning of the book the metabolism and energy exchange, both known to be closely related, are described in simple words. Metabolism consists of two opposite parts: anabolism (synthesis reactions) and catabolism (degradation – hydrolysis and oxidation reactions). Anabolic reactions occur during recovery time and require energy, but catabolic: occur during exercise and release energy from chemical bonds of the substances. Chemical energy is used during muscle work, during which it is converted into mechanical energy. To obtain raw material for recovery processes, we intake food that splits in the following components in the digestive tract: polysaccharides (starch) form simple sugars (glucose), proteins: amino acids and such fats as glycerol and fatty acids.

Further in the text are described athlete nutrition basic principles: diversity, balance and moderation. The principle of diversity means that nutrition must provide proteins, fats, carbohydrates, including essential amino acids and fatty acids, as well as vitamins and trace elements. Balance means that proteins provide 15%, fat: 30%, and carbohydrates: 55% of total energy. This ratio can be modified depending on the load character: percentage of carbohydrates slightly increases in strength loads, but the amount of proteins: in power loads. The principle of moderation means balance between energy intake and consumption.

Hereinafter are given characteristics of the nutrients by using food pyramid. First level of the pyramid form cereal products (flour, bread, buckwheat, rice, pasta, potatoes, porridge and breakfast cereals), which are main sources of energy, and supply us not only with carbohydrates and fibers, but also with B vitamins and minerals: potassium, phosphorus, etc. The second level consists of vegetables, fruits and berries. Its energy value is small, but it is the major source of vitamins and minerals. Colored vegetables contain also bioactive substances - antioxidants, blue and violet

fruit and vegetables (beets, blackberries and blueberries), for example, contain anthocyanins, red ones (tomatoes): lycopene, orange ones (carrots, pumpkin, sea buckthorn): alpha and beta carotene (precursor for vitamin A in the body and antioxidant). Third level of the pyramid consists of protein sources (milk, meat, fish, eggs, legumes, nuts and mushrooms). These products provide not only protein but also fat, cholesterol, they are high in vitamins and minerals.

The following section covers the energy supply within muscles during exercise. The energy measure is calorie (cal) or joule (J). The only energy source that can be used in muscle contractions is adenosine triphosphate (ATP), it is called a universal energy source or "molecular unit of currency". Macroergic bond breaks in ATP molecule during exercise, phosphoric acid releases and energy is used to carry out the muscle work. ATP reserve in the cell is small; it provides half a second long work. Therefore continuous muscular work is achieved by continuous producing (resynthesis) of ATP in different pathways depending on the load intensity.

All the fuels - carbohydrates, fats and proteins – are used for the formation of ATP in the body. Carbohydrates are the main source of energy, but their reserve in the body is very limited. They are in liver and muscles in the form of glycogen. Glycogen is located in the cell cytoplasm in the form of small grains. During exercise glycogen splits into glucose. Carbohydrates serve as energy sources mostly at the beginning of exercise, or during the exertion of high intensity (over 80% of O_2 max consumption). Carbohydrates are advantageous source of power, as these can be oxidized both in anaerobic and aerobic conditions. Oxidation of 1 g of glucose produces 4 kcal or 17 kJ.

Fat is almost an inexhaustible source of energy, body contains on average 10 - 15% (men) or 15 – 20% (women) of fat. By degradation of 1 gram of fat 9 kcal or 34 kJ of energy are released. Fat provides energy during sustained load with a moderate intensity. Increased fat utilization occurs in sustained load, under stress and in cold weather. When you need energy, fat tissue triglycerides split and are released fatty acids; they reach the muscles via blood in complex with albumin. There they are oxidized to carbon dioxide and water by engaging beta-oxidation and Krebs cycle reactions.

Proteins do not serve as an important source of energy, but they are used for energy only in endurance or heavy power loads as well as in hunger condition. Proteins are converted to amino acids for production of energy. For energy production are mostly used branched-chain amino acids: leucine, isoleucine, valine. Before amino acid is used for generation of energy, it undergoes amino group cleavage, in which it is liberated as ammonia, then

converted to urea and excreted via the urine. Part of amino acids is converted to glucose in the liver.

There are three systems that produce energy to resynthesise ATP. First is ATP-PC system (phosphogen system, PC – phosphocreatine or creatine phosphate), which is used only for very short loads of up to 10 seconds. It works by breaking down a creatine phosphate and then by forming ATP. If oxygen is unavailable, the ATP-PC system neither uses oxygen, nor produces lactic acid, and therefore it is said to be alactic anaerobic. This is the primary system behind very short, powerful movements like a golf swing, a 100 m sprint, or power lifting. Anaerobic system (lactic acid system), also known as the glycolytic system, predominates in supplying energy for exercises lasting less than 3 minutes. A 400 m sprint or activities of similar intensity and duration are supplied by energy from this system. The third is aerobic system, which is long duration energy supply system. After 5 minutes of exercise the O_2 system clearly is the predominant system for energy supply.

The anaerobic threshold is a term used for the characterization of human aerobic capacity. Energy production of muscle during low intensity work is exclusively aerobical. Aerobic threshold is the point at which aerobic energy production ends and begins a mixed area, in which the ATP production occurs both in aerobic and in anaerobic glycolysis processes. This is indicated by an increase in blood lactate, which reaches a concentration of 2 mmol/l (at rest it is around 1mmol/l). Anaerobic threshold is the point, when mixed mode of energy production ends and completely anaerobic energy production occurs. Since this moment, the blood lactate concentration increases rapidly (4 mmol /l). The increase in lactic acid concentration causes fatigue in the athlete; it makes impossible long-lasting work. Anaerobic threshold correlates with about 50 - 65% of the maximal oxygen consumption for untrained people and with 80 – 90% for endurance sports athletes. Endurance training with intensity close to anaerobic threshold can raise this threshold.

Oxygen demand is a term that is closely related to the oxygen consumption of an organ. Although the two terms are often used interchangeably, they are not equivalent. Demand is related to need, whereas consumption is the actual amount of oxygen consumed per minute. Under some conditions, demand may exceed consumption because the latter may be limited by the delivery of oxygen to the myocardium. Oxygen debt is the amount of extra oxygen required by muscle tissues after vigorous exercise to oxidize lactic acid and replenish depleted ATP and creatine phosphate. Oxygen debt is compensated after load by increased breathing.

To know how much the energy is needed we must know the energy consumption per day. Basal metabolic rate is the amount of daily energy expended by organism at rest. Rest is defined as existing in normal temperature environment in post-absorptive state. Daily energy consumption can be calculated, adding energy consumed by physical and mental work, dietary intake, digestion and absorption to basal energy. In the book are characterized a lot of direct and indirect calorimetry methods. One of indirect calorimetry methods measures the heat produced by a human, from which is calculated the amount of energy required for it. There are also indirect methods like respiratory method, in which oxygen used for an activity is measured in exhaled air. In the book are provided practical examples for the calculation of daily energy consumption and basal metabolic rate.

The following chapter describes the body composition types: ectomorph, mesomorph and endomorph. Typical traits of an ectomorph body composition type are: small "delicate" frame and bone structure, flat chest, small shoulders, thin, lean muscle mass, body finds it hard to gain weight, it has fast metabolism. Mesomorph body composition type has athletic, hard body with well defined muscles, body is rectangular shaped, body is strong, it gains muscle easily, and it gains fat more easily than ectomorphs. But an endomorph body is soft and round, it gains muscle and fat very easily, it is generally short and "stocky", it exhibits round physique, it finds it hard to lose fat, it has slow metabolism. "Pure" body composition types are rare, usually are observed mixed types. Gymnasts usually have ectomorph body composition with some mesomorph body composition features. But sumo wrestlers have endomorph body composition with the features of mesomorph body composition.

Body mass index (BMI) (weight, kg/height, m2) most commonly is used to assess body mass. BMI of normal body weight is between 18.5 and 25 kg/m2, BMI of overweight body is to 30 kg/m2, BMI of obese body is over 30 kg/m2.

The next chapter describes in detail the nutrients in athlete's diet: carbohydrates, fats, proteins, vitamins and vitamin related products, minerals and water.

Notwithstanding fat reserves in the body, carbohydrates always are the limiting factor of energy supply. Carbohydrate reserves are quite limited: there are about 70 g (0-135g) in the liver, and 450 g (300 – 900g) in muscles. Athlete must take a large amount of carbohydrates to permanently restore carbohydrate reserves and ensure reserve during exercise. Carbohydrates are mainly taken in the form of starch, only about 15% of them are taken in by various sugars - glucose, sucrose, etc. A daily workout

carbohydrate dose for cyclic sports athletes is 60 - 65% of energy consumption. Glycogen loading is required a week before the competition for endurance sports (long distance running, cross-country skiing, biathlon, cycling, swimming). To maximize glycogen accumulation five days before the race the athlete increases carbohydrate dose to 70 - 75% of energy consumption, simultaneously reducing training time to 20 min. On the day before the race he rests to protect the stored glycogen reserves. The last meal with carbohydrate intake of 4.5 g/kg of weight is taken 2.5 to 3.5 hours before the start. It is also believed that an hour before the start athlete can supplement the carbohydrate reserves by receiving products with low glycemic index. Food and drink with high glycemic index (candies, sweet drink) rapidly increase blood sugar and cause insulin release. At the start of load insulin remains high, but the glucose levels is substantially lowered. High insulin level also hinders the use of fatty acids and can lead to energy shortages. If the time of load exceeds 1 hour, endurance sport athletes need to take in carbohydrates in the form of glucose and maltodextrin-based drinks in the amount from 0.5 to 1g/kg of body weight per hour. Consumed carbohydrates recover after the load when glycogen is synthesized. This process is the fastest in 2 hours after the load and it is called the "carbohydrate window". Then dietary carbohydrates are used most effectively. Sportsman should intake products with high glycemic index from 0.75 to 1.6 g/kg every hour for the first 2 or better 4 hours after the load. A lot of interesting facts are revealed when reading about proteins, fatty acids and other dietary components.

Diet affects also acid-base balance of the body. Blood pH norm is from 7.35 to 7.45, i.e., weakly alkaline. Sulfur, chlorine, bromine, phosphorus (that forms ions: SO_4^{2-}, NO_3^-, Cl^-) shift pH to the acidic side (cause acidity). Alkaline environment results from calcium, magnesium, potassium, sodium, iron, etc. ions. Meat products, fish, eggs, pastries and fat cheeses lead to the formation of acids in the body. But nearly all fresh vegetables, fruits and berries, jacket potatoes, oatmeal and milk promote formation of alkali. Athletes are often trying to eat protein-rich foods; that produces the acidity in the body. The body then has to work more in order to neutralize and remove acids from the body. The body's mineral reserves: calcium, magnesium, potassium, sodium, etc. are depleted for neutralizing the acid. If they are in insufficient amount in the food, they are taken from the bones, teeth, blood vessel walls, etc, resulting in mineral deficiency of the body. Acidosis has serious consequences: immune weakness, acne, fungal, oxidative stress, osteoporosis, vasoconstriction, oxygen supply problems, lack of energy, and even premature aging. Acidosis decreases

athlete's aerobic working capacity. Therefore Caucasians, who consume a lot of meat (shashlik - Turk type of kebab) eat it with a lot of greenery.

Many more interesting topics are discussed: vegetarian diet, functional foods for athletes, alcohol and sports relationships, ergogenic substances (carnitine, creatine, caffeine, antioxidants, etc.). Detailed analysis of nutrition during the competition period, young athlete's nutrition, examples of their specific menus are provided. Characteristic features of diets designed for women – athletes and problems requiring special attention are also explained.

Ways how diet can stimulate immunity, diet influence on concentration ability and mood, as well as food consumption disorders - anorexia and bulimia – are explained.

Finally some popular myths and facts about athlete's nutrition are discussed. An example of such a myth: to increase muscle mass, one should eat 400g of meat or protein dietary supplements. In fact, the athlete's body can limit the amount of protein. Strength sports athlete's daily dose of proteins is from 1.6 to 2 g. Excess proteins pollute the body with protein catabolic end-products and raise the risk to develop the excess weight.

The book is interesting, valuable and informative. The basics of biochemistry are provided in a concentrated form. Different concepts are explained, at the end of the book is provided a short glossary. Extremely valuable appear to be practical recommendations and examples of drawing up menus. Having read the book, the reader broadens horizons about processes happening in muscles during exercise and the ways of energy production, gains insights in sport dietetics, strengthens knowledge base about healthy food intake, and develops practical skills of properly drawing up menus.

Book is addressed to coaches, sports professionals, athletes and anyone who is physically active.

GUIDELINES FOR CONTRIBUTORS

Instruction to Authors

The **LASE Journal of Sport Science** is a journal of published manuscripts in English from various fields of sport science. It covers the following types of papers:

- ✓ *original research papers* (maximum 12 standard pages of typescript, including tables, figures, references and abstract),
- ✓ *review papers* commissioned by the Editor (maximum 20 standard pages of typescript, including documentation),
- ✓ *short communications* (maximum 3 standard pages of typescript plus two table or figure and up to 5 references),
- ✓ *letters to the Editor* delivering an opinion or a comment to published manuscripts (maximum 2 standard pages of typescripts),
- ✓ *current news* (information on conference, abstracts of PhD. theses and Post-Doc. theses, book reviews, biographical notes),
- ✓ *advertisements* that may be covered on separate pages of the journal (prices are subjects to individual negotiations).

Papers must be accompanied by the following submission letter (form available at journal's website), signed by all Authors: "The undersigned Authors transfer the ownership of copyright to the **LASE Journal of sport science** should their work be published in this journal. Authors state that the article is original, has not been submitted for publication in other journals and has not already been published except in abstract form, preliminary report or thesis. Authors state that they are responsible for the research that they have carried out and designed; that they have participated in drafting and revising the manuscript submitted, which they approve in its contents. Authors also state that the reported article (if it involves human experiments) has been approved by the appropriate ethical committee and was undertaken in compliance with The Helsinki Declaration."

Research papers and short communications will be sent anonymously to two reviewers. Depending on the reviewers' opinion, the Editors will make a decision on their acceptance or rejection. The Editors' decision is ultimate.

Manuscript specification

Articles must be submitted in English and only to the **LASE Journal of Sport Science.**

Authors should observe the ethics of manuscript preparation (avoiding duplicate publication, inaccuracy of citations, fraudulent publication, plagiarism and self-plagiarism).

Copyright will be owned by the publisher: **LASE Journal of Sport Science**. A properly completed Transfer of Copyright Agreement must be provided for each submitted manuscript. A form is available at journal website.

Authors are responsible for the factual accuracy of their papers, for obtaining permission to reproduce text or illustrations from other publications and for an ethical attitude regarding the persons mentioned in the manuscript.

Format

Document format – Microsoft Word 97-2003 or 2007.

Page format – 210x297 mm (A4).Text – single column (font Times New Roman, letter size 12 pt), line spacing – Single, paragraph alignment – Justified, left margin – 20mm, right margin – 20mm, bottom margin – 25mm.

Style

Papers must be written in a clear, concise style appropriate to an international readership. Familiar technical terms may be used without explanation. Acronyms and abbreviations are likely to need full presentation at least once.

Content

Research or project reports, case studies of practice, action research reports, and reports on teaching practice or techniques will be accepted.

Research reports should include a description of the practical application(s) of the ideas tested, while reports of teaching practice or techniques should contain an explanation of the theoretical foundation underlying the practice or technique in question.

Material in the form of illustrations or photos is welcomed. This material should be accompanied by text clearly setting out its philosophical or practical origins or implications. All material should be clearly referenced to its sources.

The manuscripts should be arranged as follows: title page, abstract and body text

Title page should contain: title of the paper, first and last names of authors with affiliation, first and last name of corresponding authors with postal address, telephone, fax and e-mail.

Abstract (up to 250 words) consisting of the following sections: justification and aim of the study, material and methods, results, conclusions, as well as 3-6 key words, should be provided before the body text.

Body text should be sectioned into: Introduction, Material and Methods, Results, Discussion, Conclusions, Acknowledgements (If necessary) and References. In articles of others types, the text should follow in a logical sequence and headings of its particular sections should reflect issues discussed therein.

Introduction – should be short and concise; it should introduce readers into research problems addressed in the study as well justify undertaking the research and specify its aim.

Material and methods – should describe the subject of the study (in the case of human subjects data should include their number, age, sex and any other typical characteristics) and methods applied in a sufficiently exhaustive way to enable readers to repeat the experiments or observations. For generally known methods only references should be given, whereas detailed descriptions are to be provided for new or substantially modified methods.

Results – should be presented in a logical sequence in the text, tables and figures. Data collated in table and figures should not be repeated in the text which should summarize the most important observations.

Discussion – should emphasize new or important aspects of experimental results and discuss their implications. Results of own studies are to be compared with findings described in the respective domestic and international references used by the Authors.

Conclusions – should be started in points or descriptively and should be logically connected with objectives stated in the *Introduction*. Statements and conclusions not derived from own observations should be avoided.

References – following instructions for Authors on References (APA style).

Citing in-text

Following artificial text shows different types of in-text citation:

Claessens (2010) found evidence that attention will be given to multi-compartment models, such as the 3-water, 3-mineral and 4-compartment models, to assess percentage of body fat. However, Raslanas, Petkus and Griškonis (2010) noted that Aerobic physical load of low intensity got 35.1 % of total trainings time. Research on physical loading also focused on identifying the basis of many years' research of physical activity (Bytniewski et al. 2010). According to Ezerskis (2010), "… heavy physical loads had the undulating character

depending on the dynamics of workloads…" (p. 71) yet girls are more ascertained that the Track & Field training helps to develop courage.

Instructions for Authors on References (APA style)

This document describes standards for preparing the references in the APA style. The following sections give detailed instructions on citing books, journal articles, newspaper articles, conference papers, theses, web pages and others.

Please provide all the required elements in the references to your paper. Please pay particular attention to spelling, capitalization and punctuation. Accuracy and completeness of references are the responsibilities of the author. Before submitting your article, please ensure you have checked your paper for any relevant references you may have missed.

A complete reference should give the reader enough information to find the relevant article. If the article/book has DOI number, the author should include it in the references. And most importantly, complete and correct references may allow automatic creation of active links by the MetaPress technology that we use for making the electronic version of our journal. Active reference linking is regarded as the greatest benefit of electronic publishing and it adds a lot of value to your publication.

Additional information about APA style writing is found on LASE web page: http://www.lspa.lv/ .

Tables – should be prepared on separate pages (saved in separate files) and numbered using subsequent Arabic letters. They should be provided with titles (above). Every column in a table should have a brief heading and more extensive explanation should be given under the table, e.g. statistical measures of variability.

Figures – should be prepared in an electronic form and saved in separate files. A separate page should be provided with legends to figures, authors' names, manuscript's title, and consecutive number of figure with "*bottom*" or "*top*" identification. Photographs or other illustrative materials may be submitted in an electronic form (*.tif, *.jpg, image resolution: 300 or 600 dpi) or any other form suitable for final technical typesetting by the Editorial Office. In the appropriate places in the text consecutive numbers of tables or figures should be provided in parentheses, e.g. (Tab. 1) or (Fig. 1). Places of insertion of the illustrative material should be marked with pencil on the margin of the typescript.

General principles – the Editorial Office reserves for itself the right to correct stylistic errors and to make necessary changes (abridgements) in the text without Author's knowledge. Articles not accepted for publication are not returned. Manuscripts not prepared following *Instruction to Authors* will be sent back to Authors for revision. Galley proofs of manuscripts will be sent to Authors for proofreading. It is the Author's responsibility to return the proof within one week. Each Author will receive free-of-charge one copy of the issue in which their work appears.

Submission of manuscripts

The articles should be sent to:

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CURRENT NEWS

Latvian Academy of Sport Education
90th anniversary
International Scientific Conference in Sport Science
5 September, 2011 Riga, Latvia

Presentations are invited on the broad theme of the significance and meaning of sport science and physical education: 1. Sport and Education; 2. Sport Science and Performance; 3. Physical Activity and Health.
The official languages of the Conference are Latvian and English for oral and poster presentations. Deadline for the submission of the registration form and abstract is July 1, 2011. Submission of articles. The valuable articles (in English) 12 pages prepared according to the requirements will be published in the LASE Scientific Journal of Sport Science 2011. The information for the authors is placed on the website: www.lspa.lv
Deadline for the submission of the articles in English in the LASE Scientific Journal of Sport Science 2011 is September 5, 2011.

PLZK APVIENOTAIS PASAULES LATVIEŠU ZINĀTNIEKU 3. KONGRESS LETONIKA UN LETONIKAS 4. KONGRESS

Latvian Academy of Sciences, University of Latvia, Riga Technical University and Riga Latvian Society invites all scientists and people, interested in science, to participate in the **United World Latvian scientists and IV Letonika congress.** The goal of the congress is to summarize achievements in science during recent years, foster cooperation with scientists, working abroad, and strengthen links with politicians and society, informing them about achievements and challenges in science. And not less important - the organizers hope that congress will become a scientists festivity, which are so rare in our everyday life. We invite all researchers with a PhD degree to present their research on innovation in sports science. Congress will be held in Riga, from 24 – 27.10.2011 and in the framework of it will be held several plenary sessions, as well as concurrent sessions in 45 different fields of science, including sports science. Session in sports science *"Innovation in sports science"* will take place on **25.10.2011** in Latvian Academy of Sport Education, Brivibas street 333, Riga.

OSRESS 2011

Outdoor Sports and Recreation Education Summer School 2011
Outdoor Games from the Historical Perspective in Latvia
August 21-26, 2011 Madona, Latvia

Organizers: Latvian Academy of Sport Education and Latvian Association of Outdoor Education and Recreation **in collaboration with** Jozef Pilsudski University of Physical Education in Warsaw, Faculty of PE in Biala Podlaska, Poland, State College of Computer Science and Business Administration in Lomza, Poland, Swedish School of Sport and Health Science, Sweden and University of Malaga, Spain.

CONGRATULATION

Strong support for LASE has been provided by professors from Sweden and Poland, who have received LASE honorary Doctor title, hereby appreciating foreign colleagues' contribution to the development of LASE.

The cooperation with Professor Rolf Carlson from the Swedish School of Sport and Health Science in Stockholm has lasted for fifteen years. Cooperation began in 1995 with the project "Latvia-Sweden in Sport"; when Professor R.Carlson gave lectures in sports sociology for LASE lecturers and other Latvian sport professionals. Professor R. Carlson for several years has been educating LASE doctoral students in the field of qualitative research in sports, with teaching staff from LASE works in different sports research projects. Professor R.Carlson has managed number of LASE students coach practice, organized cooperation with Swedish sports clubs to ensure LASE students practice.

Professor Johnny Nilsson is a scientist in the field of sport physiology and biomechanics from Swedish School of Sport and Health Science in Stockholm. On several occasions has advised our experts on scientific research both in skier and orienteer functional preparedness. During LASE student practice in Stockholm has ran sports medicine and testing methodology course for LASE students.

Together with associated professor Krzysztof Piech, representing Warsaw Josef Pilsudski University of Physical Education in Biala Podlaska, Poland, has organized the International Summer School for doctoral and master students. Professor K.Piech was a curator of Latvian students in Poland. For six consecutive years professor K. Piech has educated LASE students both conducting practical classes in "Nordic walking" study course, and reading lectures about tendencies of the development of family sport in the world.

Figure. 1 LASE Honorary Doctors at 3rd Baltic Sports Science Conference (From the right: LASE rector professor Jānis Žīdens, associated professor Krzysztof Piech**,** professor Rolf Carlson, professor Johnny Nilsson, LASE Vice-Rector professor Juris Grants)

CONGRATULATION

We congratulate **Inta Bula-Biteniece,** the student of doctoral studies at the Latvian Academy of Sport Education, to have defended her thesis "Holistic Approach in Family Sport in Pre-school Education" (Sport Science) at the Latvian Academy of Sport Education on May 12, 2011. Supervisors prof. J. Grants and prof. R. Jansone.

PhD Inta Bula-Biteniece lecturer of the Department of Sports Theory in Latvian Academy of Sport Education. Executive director of Latvian branch of Baltic Sport Science Association, Leisure time education expert, Children and Youth Sport Center „Laimīte".