INDIVIDUALISATION AND PROPORTIONING OF PHYSICAL LOAD DURING SPORTS CLASSES

Summary

Introduction

Often sports teachers proportion the same amount of load to all students irrespective of their physical training, physical and functional development. Relation between regulated and proportioned physical loads and moments of rest become the structural and methodological basis of sports classes.

Aim of the Study

Development of proportioned exercises in sports classes according to the indicators of every student's physical training, physical and functional development.

Materials and Methods

Testing, anthropometry, pulsometrics, mathematical statistics.

Results

Exercises with individualised proportion of load were worked out for developing strength, coordination, stamina, flexibility, speed according to the indicators of functional and physical training in order to individualise the proportion of physical load. The assessment analysis of the efficiency of the set of exercises has been done.

Conclusions

Individualised and proportioned loads positively influence the indicators of the students' physical training and development of positive feelings.

Keywords: *physical load, sports trainings, sports class.*

Introduction

An appropriate portioning of physical load activates the physiological processes in students' organisms, stimulates adaptation skills and increases the functional reserves of the organism. Sedentary lifestyle or physical load that does not correspond to the student's physical abilities can lead to health problems and even negatively impact parameters of individual physical and functional development (Jansone, Krauksts, 2005).

Research shows that often sports teachers proportion the same amount of load to all students irrespective of their physical training, physical and functional development (Hardman, Marshall, 2000). If physical load and intensity during sports classes is the same for all students, there is a possibility to negatively impact the parameters of health of several individuals (Patte, Shepard, 1989). When the teacher chooses a load, it has to be proportioned differently for weaker and stronger students as an individualised approach will help to adapt to biological changes in the organism more successfully; it will also help to have fun from physical activities increasing their competitiveness in the conditions of the market economy (Malina, 1996).

Relation between regulated and proportioned physical loads and moments of rest become the structural and methodological basis of sports classes. Depending on the physical condition and training of every student, one and the same exercise to be done during a sports class will be perceived as a different physical load leading to various counter-actions in the students' organisms. Thus, the

load is not the content and volume of the exercise to be done but the results and consequences of it that depend on the psycho-physiological potential of the organism (Bouchard, Shepard, 1994). Load can be divided into two groups: external load characterised by volume and intensity and internal load influencing the physiological and psychological condition of the entire organism. If the load remains the same for a long period of time and the organism has got used to it, then during the recovery process after a load all functions of the organism return back to their starting condition. Through diversifying and proportioning as well as increasing the usual volume and intensity of exercises, the functional abilities of the organism together with the developmental level of the physical abilities increase during the recovery process (Jansone, Krauksts, 2005). The volume and intensity of the load creates a certain dualistic interconnection: when intensity increases, the volume of how much load can be taken decreases. Therefore when working with 16 years old students one have to assess the maximum load and optimal load individually. The maximum load is a load that a student can take without negatively impacting his or her organism. An optimal load results in super compensation. A total sum of load in sports classes should be understood as an impact of the sum of separate exercises on the students' organism. To regulate the load individually means to ensure that there is an optimal relation between individual volume and intensity of exercises where the optimisation of volume depends on the proportioning of physical exercises, the methods applied, organisational forms used as well as the emotional background. The objective parameters showing the impact of load are: blood pressure, body temperature, maximum consumption of oxygen, pulse frequency, etc. According to the conclusions of Canadian universities, the efficiency of cooperation between a teacher and a student during a sports class increases if an individualised approach is used (Hardman, Marshall, 2000).

One of the tasks in sports classes is to attain the development of physical qualities. The do not develop in isolation from one another – exactly the opposite: they develop in close interaction. When one physical quality is being developed, there is a considerable impact on the rest. Physical development and training is a topical problem in scientific research in modern sports pedagogy as it forms not only the physical but also mental health of the human being. Regular physical activities are of a great significance in keeping fit and strengthening health in a long run. The results of the research show that the functions of inner organs slowly and gradually adapt to systematic loads. That is why sports teachers have to ensure a gradual increase of overall physical conditions that is achieved by individualising and proportioning exercises according to the parameters of every student's physical development, training and functional abilities.

Aim of the Study

To develop a set of proportioned exercises for sports classes according to the indicators of physical training, physical and functional development of 16 years old students.

Materials and Methods

The following methods were applied in the research: testing to state the parameters of the student physical condition, anthropometry to state the parameters of physical development, pulsometrics to state the functional abilities. Mathematical statistics.

- ♦ To assess the parameters of students' physical condition, it was set: push-ups 33 ± 13 , hanging in bent arms 32.9 ± 13.1 s, sit-ups 27 ± 3 times, jumping from the place taking off with both feet (8 jumps) 17.43 ± 2.40 m, jumping from the place 212 ± 24 cm, shuttle run 3 x 10 m 7.66 ± 0.69 s, stamina run 1600 m 5.58 ± 2.35 min, 30 m run 4.52 ± 1.05 , jumping with the skipping rope with both feet 72 ± 25 times.

Having analyzed the obtained results it can be concluded that the 16 years old students have a very different physical condition.

- ◆ While evaluating the parameters of the physical development, the following average results have been obtained: age 16 years, height 174 ± 7 cm, weight 62.4 ± 13.5 kg, waist circumference 79 ± 9 cm, wrist 17 ± 1 cm, right hand strength 33 ± 9 kg, left hand strength 31 ± 8 kg, arm length 77 ± 3 cm, leg length 105 ± 5 cm.

Having evaluated the parameters of the physical development it can be concluded that they are irregular, and that can be explained by the peculiarities characteristic to the age.

- ◆ The parameters of the functional condition were evaluated by stating: heart frequency from the lying position 81 ± 8 beats/min, heart frequency from the sitting position 85 ± 9 beats/min, heart frequency from the standing position 87 ± 13 beats/min, heart frequency after the load 95 ± 13 beats/min P3, heart frequency after the load 141 ± 18 beats/min P1, after the load 114 ± 16 beats/min P2, the systolic blood pressure 114 ± 16 mm/Hg, diastolic blood pressure 71 ± 9 mm/Hg, breath holding at inhalation 0.35 ± 0.09 s, breath holding at exhalation 0.16 ± 0.06 s.

There are differences in practically all functional condition parameters. Especially vivid they are during the recovering process after the load. Two student groups had been formed after obtaining of the background data.

- ◆ Exercises with individualised proportion of load were worked out during the research for developing strength, coordination, stamina, flexibility and speed qualities. The exercises were applied according to the worked-out physical quality expressions form development plan with an individualized dosage for the students having different parameters of physical condition, physical and functional development (Table 1).

Table 1. Individualised plan for developing the expression of physical qualities for 16 years old students (an cut version).

Month, week	The developmental tasks of the form of expression of physical qualities	Content, volume, proportion of exercises
January Week 1	1. To develop overall strength for arm muscles 2. To develop overall strength for back muscles	1. Bent arms, straightening push-ups a) 2x20r; b) 2x15r 2. Bending, lifting of arms and legs a) 3x16r; b) 3x10r
Week 2	1. To develop strength stamina 2. To develop speed stamina	1. To move in deep squatting, squats a) 3x20m; b) 3x15m a) 3x20r; b) 3x15r 2. Run a) 3x 200m; b) 2x200m
March Week 8	1. To develop overall stamina 2. To develop speed stamina	1. Run a) 1x2000m; b) 1x1500m 2. Carrying of a sand ball a) 5x25m; b) 4x25m
Week 10	1. To develop reaction to motion speed 2. To develop strength stamina	1. To start a run from various initial positions (from laying on the stomach; from laying on the back; after turning a somersault). a) 3x3r; b) 3x2r 2. To move in squats holding onto the ankles, transferring body weight from one leg to the other a) 3x20m; b) 3x15m
April Week 13	1. To develop coordination 2. To develop overall stamina	1. A ball is rolling on the floor, the student must catch up and jump over it a) 4r; b) 3r 2. Slow run for 6 min
Week 14	1. To develop speed stamina 2. To develop strength stamina	1. Speed increase a) 5r; b) 3r 2. Squats, jumps with a skipping-rope a) 3x20r; b) 3x15r a) 3x1min; b) 2x1min

Results and Discussion

To assess the set of exercise and the efficiency of the impact a particular portion on the parameters of physical condition of a 16 years old student, the parameters in following disciplines were compared in December and May: stamina run 1600 m; 30 m run; push-ups from laying on the back on the ground; throwing of a ball with a running start; jumping from the place.

Having evaluated the influence of the physical exercise routine on the student physical condition while individualising and setting a definite proportion of load, we obtained the following results:

- ♦ In the stamina run 1600 m (s) the results have not improved. In May the results in this exercise increased for 5 students from the 1st group and for 3 students from the 2nd group. Decreased for 4 students from 1st group and 6 from 2nd group. The result has not changed for 1 student from the 2nd group. The average increase is 10.89 s, but it is not statistically significant. The average parameter in December was 403.89 s, but in May – 414.78 s. The standard deviation has increased from ± 38.56 s up to ± 59.50 s. The variation coefficient in the beginning was 9.5, but in May – 14.

Table 2. Results of stamina run for 16 years old students. (s)

Stamina run 1600 m	Group 1	Group 2
Average	403,89	414,78
Standard deviation	38,56	59,50
Variation coefficient	9,5%	14,3%
Average increase		10,89
Empirical value of the Student's criterion		1,31
Theoretical value of the Student's criterion		2,11
Increase is not likely.		

- ♦ In 30 m run (s) the results have improved. Comparing the results in December and May, in May higher results were shown by the 7 students from the 1st group and 9 students from the 2nd group. Lower results were shown by 2 students from the 1st group and 1 student from the 2nd group. The average increase is 0.23 s, it is statistically significant. The average parameter in December was 4.72 s, but in May it improved and was 4.49 s. The standard deviation was ± 0.30 s in December, but in May ± 0.19 s showing less dispersion of the results. The variation coefficient has changed from 6.3 , up to 4.2.

Table 3. Results of 30 m run for 16 years old students. (s)

30 m run	Group 1	Group 2
Average	4,72	4,49
Standard deviation	0,30	0,19
Variation coefficient	6,3%	4,2%
Average increase		-0,23
Empirical value of the Wilcoxon's criterion		7,0
Theoretical value of the Wilcoxon's criterion		40,0
Increase is likely.		

- ◆ In sit-ups (times) comparing the results in December and May it is seen that the results have significantly improved in both groups. The average increase is 36 times. It is statistically significant as the probability of a mistake is < 0.05 . In December the average result in the class was 27.1 time, but in May it reached 63.3 times. The standard deviation in December was ± 3 , but in May ± 5 . The variation coefficient in December was 9.6, but in May – 7.7.

Table 4. Results of sit-ups for 16 years old students (times).

Sit-ups	Group 1	Group 2
Average	27,1	63,3
Standard deviation	3	5
Variation coefficient	9,6%	7,7%
Average increase		36
Empirical value of the Wilcoxon's criterion		0,0
Theoretical value of the Wilcoxon's criterion		40,5
Increase is likely. Probability of a mistake < 0.05		

- ◆ Ball throwing with the approach (m). This event was done only in May, therefore we cannot compare it (Figure 1). The highest result in the class was 60 m, the lowest – 25 m. 5 students were free from the execution of this event. The average result is 49 m. The dispersion around the average result is big, as the standard deviation is ± 10 m. The results are not homogeneous, that we can see from the highest and lowest result, as well as the variation coefficient which is 21.01 ($S\% > 10$).

Figure 1. Results of ball throwing with the approach.

- ◆ In jumping from the place (cm) the results have improved. Higher results were shown by 5 students from the 1st group and 6 students from the 2nd group when the results in December and May were compared. The results have no changed for 2 students from the 1st group. Lower results were shown by 2 students from the 1st group than they had been in December. Lower results were shown by 3 students from the 2nd group in May. The average increase is 5 cm. It is statistically significant as the probability of a mistake is < 0.05 . In December the average result was 217 cm, but in May - 221 cm. The standard deviation in December was ± 21 cm, but in May – ± 17 cm. The variation coefficient in December was 9.5, but in May – 7.8 (Table 5).

Table 5. Results in jumping from the place (cm).

Jumping from the place	Group 1	Group 2
Average	217	221
Standard deviation	21	17
Variation coefficient	9,5%	7,8%
Average increase		5
Empirical value of the Wilcoxon's criterion		5,5
Theoretical value of the Wilcoxon's criterion		6,0
Increase is likely. Probability of a mistake <0.05		

Conclusions

- ♦ Having analyzed the obtained results it can be concluded that the 16 years old students have a very different physical condition. Having evaluated the parameters of the physical development it can be concluded that they are irregular, and that can be explained by the peculiarities characteristic to the age. There are differences in practically all functional condition parameters. Especially vivid they are during the recovering process after the load. Two student groups had been formed after obtaining of the background data.
- ♦ As a result of the research, five sets of exercises were worked for developing strength, coordination, stamina, flexibility and speed qualities. The exercises were applied according to the worked-out physical quality expressions form development plan with an individualized dosage for the students having different parameters of physical condition, physical and functional development.
- ♦ Thus it can be concluded that an individualized load dosage influenced positively the college student parameters of physical condition, it facilitated the improvement in health and development of a positive well-being.
- ♦ Physical development and training is a topical problem in scientific research in modern sports pedagogy as it forms not only the physical but also mental health of the human being.

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