

General endurance of first-year university students in the context of Covid-19 pandemics

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Abstract

The Covid—19 pandemics caused significant damage to the system of physical education of students. The purpose of this research was to create a practical model of general physical endurance of first-year university male students in the context of the pandemic of the corona virus. The testing was carried out during physical education classes, which took place according to the first academic year curriculum. The time of overcoming the 2000 meters course on the stadium treadmill was measured in September and in March of the academic year 2019-2020. During the research stage, the indicator of general endurance of students of all the three universities statistically significantly deteriorated. According to the results of ANOVA the absence of a statistically significant difference in the value of the indicator of general endurance between students of three universities both at the beginning and at the end of the research stage was revealed.

Keywords: Covid—19; endurance; modeling; students; testing

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1. Introduction

Compliance with the rules aimed at limiting the spread of the disease caused by coronavirus leads to a decrease in physical activity, deterioration of the physical and mental state of people, in particular, to a decrease in the level of sports results. The problem of the research was to determine changes of the overall physical endurance of students during the academic year coincided with the first wave of the Covid-19 pandemics.

The Covid—19 pandemics caused significant damage to the system of physical education of students (Dushanin et al. 1985; Soysal et al., 2021; Yildirim et al., 2021). Due to quarantine, the emphasis on physical education classes was shifted from practical to theoretical, classes were held online. It is clear that in this situation, the indicators of the physical condition of students could decrease, and now it is time to conduct researches in order to obtain a quantitative assessment of these changes, in particular, the results of strength tests, the speed, flexibility, dexterity, and endurance (Dushanin et al., 1985; Faragas et al., 2015; Kharchenko et al., 2019; Zanevskyy et al., 2020a).

1.1. Purpose of the Study

The purpose of the research was to create a practical model of general physical endurance of first-year university students in the context of the pandemic of the corona virus. Research hypotheses were stated as follow: during the first academic year coincided with the corona virus pandemics the overall physical endurance significantly decreased; deterioration in overall physical endurance due to restrictions imposed during the coronavirus pandemics was approximately the same in students of the same specialty (for example “Tourism”) as an education in the economical and management sciences) in different types of high schools (for example sport, classic, and technical universities).

2. Method and Materials

Method of the research was constructed according the practical guidelines for valid and reliable youth fitness testing (Mahar and Rowe, 2008).

2.1. Participants

In total, 88 male students of the first year of the specialty “Tourism” at three Lviv leading universities took part in the study: sports – Lviv State University of Physical Culture named after Ivan Boberskyj (LSUPC), classic – Ivan Franko National University of Lviv (LNU) and technical – Lviv Polytechnic National University (LP). Commission reviewed and approved the planned studies. Studied subjects had body mass 67.4 ± 5.1 kg ($M \pm SD$) and body length 172.8 ± 4.6 cm. All the students declared their consent in writing form to participate in the testing, and the LSUPC Bioethics.

2.2. Data Collection Tools

The research used an experiment. The data was collected using observation. The time of running of the distance was measured using an electronic device with accuracy one second, and results were recalculated into minutes up to two places after a point, i.e. to one hundredth of minute.

The testing was carried out during physical education classes, which took place according to the curriculum of the first academic year. The time of overcoming the 2000 meters course on the stadium treadmill was measured in September and in March of the 2019-2020 academic year.

2.3. Data Analysis

The normality of the distribution of test results was checked by the methods of Shapiro – Wilk (n=20 and n=28) and Kolmogorov – Smirnov (n=40). The comparison of the results of students from different universities was carried out using one-way ANOVA, and the shift in the time of students' results of each university – using the paired t–Student. The calculation was carried out using Statistica computer package and functions as well, as the Analysis ToolPak of MS Excel.

3. Results

During the research stage, the indicator of general endurance (running time on 2000 meters) of students of all the three universities statistically significantly deteriorated (Table 1): in LSUPC – by 6.4%, LNU – by 4.6%, and LP – by 3.3% (p=0.001).

Table 1

Results of statistical processing of the indicator of overall endurance: M±SD (min.)*

University	September	March	Increment	t (p)	t(0.05, u)
LSUPC (n=20)	7.14 ± 0.84	7.59 ± 0.66	0.45 (6.4%)	4.86 (<0.001)	2.09
LNU (n=28)	7.47 ± 0.69	7.82 ± 0.54	0.35 (4.6%)	3.68 (0.001)	2.05
LP (n=40)	7.43 ± 0.73	7.68 ± 0.62	0.25 (3.3%)	3.69 (<0.001)	2.02

*Note: M is arithmetic mean, SD – standard deviation, t – Student statistics, p – significance, n – number.

According to the results of ANOVA (Table 2) the absence of a statistically significant difference in the value of the indicator of general endurance between students of three universities both at the beginning (p=0.253) and at the end of the research stage (p=0.433) was revealed.

Table 2: Results of ANOVA regarding the overall physical endurance indicator at the beginning (top) and at the ending (bottom) of the research stage

Source of Dispersion	SS*	df	MS	F	p	Q%
Between universities	1.54	2	0.770	1.398	0.253	3.2
	0.62		0.308	0.844	0.433	1.9
Within universities	46.83	85	0.551	–	–	96.8
	30.96		0.364	–	–	98.1

Total	48.37	87	0.556	-	-	100.0
	31.58		0.363			

*Note: SS is sum of squares, df – degree of freedom, MS – variance, F – Fisher – Snedecor statistics, p – significance, Q – quota of dispersion.

Between universities, variation accumulates only 3.2% (autumn) and 1.9% (spring) that shows approximately no difference between students of the sport, classic, and technical universities (Figure 1).

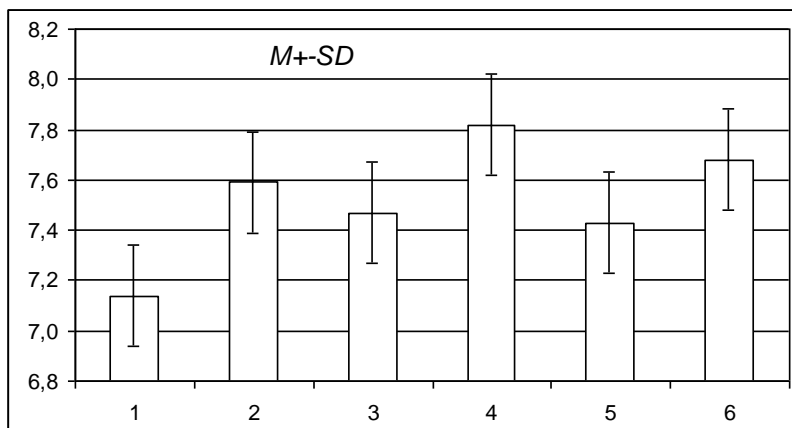


Figure 1. Running time on 2000 meters (min.): 1 – LSUPC (September), 2 – LSUPC (March), 3 – LNU (September), 4 – LNU (March), 5 – LP (September), 6 – LP (March).

4. Discussion

According to the purpose of this research, a practical model of general physical endurance of first-year university students in the context of the pandemic of the corona virus was presented. The research hypotheses regarding changing of the overall physical endurance during the first academic year coincided with the corona virus pandemics was accepted with high significance ($p < 0.001$). The overall physical endurance was significantly decreased due to restrictions imposed during the coronavirus pandemics (3.34–6.4%).

Contrary to the results of the 2019–2020 academic year (coincided with the corona virus pandemics), during previous academic years, the results regarding the overall physical endurance did not show significant differences between the beginning and ending of the year. Thus, during the 2015 – 2016 academic year, the time of running of the 2000 meters distance changed a little better (0.84 min., $p = 0.317$). Again, no significant differences were noticed between the universities (Zanevskyy and Labartkava, 2020^b).

During the last several decades physical inactivity became to the global problem of the modern society (World Health Organization, 2018^a). Pandemic crisis appeared as a challenge for the higher education system (Education during a pandemic crisis: problems and prospects, 2020). Higher school was not ready to meet a deep changing of the educational paradigm under the influence of the crisis. Because Covid–19 situation, conceptual principles for promoting the health of youth are partly destroyed (World Health Organization, 2018^b). For example, the conceptual principle declares physical activity for health as more active people for a healthier world (The Draft global action plan on physical

activity 2018–2030, 2018) does not work as it has been planned. Covid–19 quarantine restrictions take place especially among university students. The impact of isolation measures due to Covid–19 on energy intake and physical activity levels in Australian university students (Gallo et al. 2020; Galle et al., 2020). About 90% of studies included in the systematic review conducted by Lopez-Valenciano et al., (2021) showed significant decreases in physical activity levels during lockdown, both in questionnaires as accelerometers.

Overall physical endurance is one of the main sides of the physical fitness. Kaur et al. (2020) tried to determine the unique experiences of fitness exercises during the period of lockdown due to Covid–19. The paper also intended to explore the ways in which alternate exercises and fitness activities at home helped them deal with psychological issues and physical health consequences. Leisure sports and sport healthy tourism participants have adopted many health prevention behaviors during the COVID–19 pandemic, but this had led to some interpersonal constraints. These results indicate that, in the case of future pandemics, personal and institutional efforts will need to be made to promote participation in leisure sports and prevent excessive social isolation (Burnstein et al., 2011; Kim et al., 2020; Zanevskyy and Zanevska, 2017).

An overall endurance is the ability to perform aerobic muscular work for a long time with the participation of many muscular groups. In group form classes, the level of development of overall endurance is estimated by the time of running 2000 m for men and 1700 m for women (Liposek et al., 2019). High level of validity and reliability of this test data results have been determined by Cosgrove et al. (2019) and approved by Zanevskyy et al. (2020^b). The mathematical model of the overall endurance of first–year students presented in this report can be applied to all three studied universities, since the corresponding average values of the endurance indicator were statistically the same both at the beginning ($p=0.253$) and at the end of the research stage ($p=0.433$).

5. Conclusion

This research was dedicated to the problem of changes of the general endurance of first-year university students in the context of Covid-19 pandemic. The results of 2000 meters running time in September and in March convincingly showed significant deterioration of the general physical endurance during 2019-2020 academic year coincided with the first wave of Covid-19 pandemic.

A statistically significant increase in the time of overcoming the distance indicates a significant deterioration in overall physical performance due to restrictions imposed during the coronavirus pandemic ($p=0.001$). The proposed model is informative for determining the overall physical performance of freshmen of the specialty “Tourism” of sports, classical and technical universities. Because the model is presented in the graphical and table forms, it could be recommended for practical uses by teachers and students which are not familiar with mathematical modeling.

This research was conducted between male students. In future, it should be useful to conduct corresponding research between females’ students. There are some reasons to wait from females similar results comparing males’ students. The general endurance of fresh student woman could be determined using running time of the distance of 1700 meters that was proved by.

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